WHAT COULD THE **FUTURE** HOLD FOR YOU?

DO THE 4 QUESTION QUIZ AND FIND OUT!

1

Would you like to do something new in your free time ?

YES

You are obviously energetic, interesting and dynamic. Congratulations - that makes you a special kind of person !

NO

NOT ? HOW BORING...

You are missing out BIG time!

2

Would you like to discover the wonders of the world around you ?

YES

NO

You are a creative problem solver and would probably like to spend some of your free time doing all kinds of fun activities dealing with science, design and management.

3

Will you be in Grade 10 (Standard 8) in 1999 and taking mathematics and science ?

YES

YOU WON'T? WHAT A PITY...

NO

You have three years left to do all kinds of science-related fun things in your free time. You are also on the right track for a career in the wide and varied field of science, technology, design and management.

4

WOULD YOU LIKE TO GO TO UNIVERSITY AND GET YOUR TUITION FREE ?

YES

NO

You don't? Get real!

If you answered yes to all of the four questions, then you should most definitely get more information from your teacher, because you are an ideal candidate for the University of Pretoria's exciting UP with Science enrichment programme !

UP WITH SCIENCE

Ask your science teacher or school principal NOW for a brochure and application form for the 1999 UP with SCIENCE programme

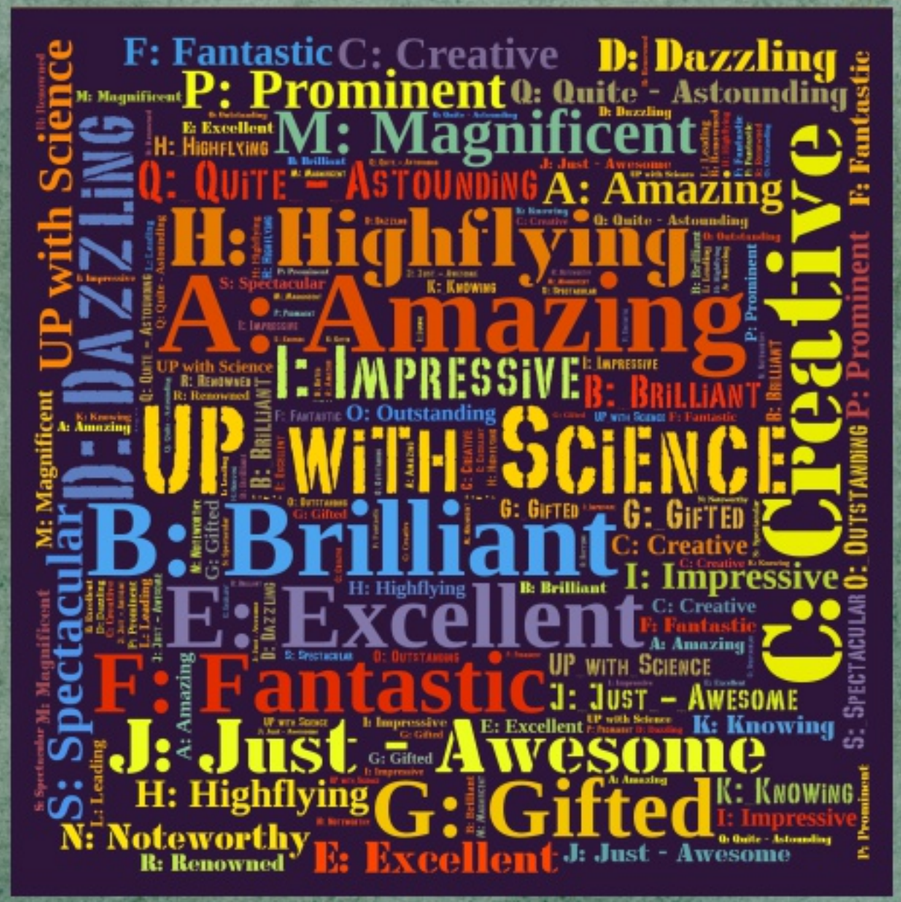
For more information phone (012) 420-2644 or visit the Faculty of Science's web site at http://www.up.ac.za/science/welcome.html

University of Pretoria

UP with Science 1998 - 2016 Group A to Group S

UP with SCIENCE

The Programme, the Posters, the People with Passion & the Projects



The 'UP' in UP with Science is a wordplay on the abbreviation of the University of Pretoria (UP) and the word 'up' meaning 'upward' or 'forward'.

How it started

Recollections from Prof John Rogan

Not long after I arrived at UP in 1997 I was taken by Max to meet the head of the Physics Department, Prof Friedland. He asked if I had any ideas on how to attract more students to his department. That might have started the wheels turning. Also I seem to remember that Prof Erasmus was keen for UP to make some kind of contribution to the Year of Science.

I then began to draw on my experiences in the USA. Many universities there, including some in Montana, run summer camps for high school students with the aim of getting them excited and interested in science. Summer is not a good time to run such a programme in South Africa, but Saturdays seemed to be a viable option. It is also not unusual for US universities to offer tuition scholarships to high performing high school students.

Based on these challenges and experiences, Max and I sat down and wrote a proposal for the UP with Science programme, and submitted it to Prof. Erasmus. When it was approved, all that was left was to get the show on the road. We submitted the idea to each department in the two science faculties, and invited them to send a delegate to an exploratory meeting. It was here that the content and structure of the programme was hammered out.

We then circulated information and application forms to all schools in the Pretoria area, selected candidates, and got the show on the road. 2016

UP with Science

Science Enrichment Programme for a group of Grade 10-12 learners

Purpose of the project

South Africa is faced with a severe shortage of students from disadvantaged backgrounds studying science, and an even greater shortage of qualified science teachers, regardless of background. Many students from disadvantaged backgrounds have no scientists as role models. By-and-large the only professional role models visible are lawyers, doctors and teachers. Hence induction into this culture is a vital prerequisite to the selection of a scientific career.

The goal of this long term intervention "UP with Science" is to contribute to the solution of these two shortfalls, as well as to foster a more inquiry-based approach to the learning and teaching of science.

UP with Science is an intensive three-year enrichment programme beginning with pupils selected in their Grade 10 year. The project presents a Saturday school and winter week where pupils spend time with university staff. While in the programme they:

- are exposed to an inquiry-based approach to science, science researchers and careers;
- carry this vision of science into other classrooms during their second year, thereby experiencing first hand the joy and satisfaction of teaching; and
- are assigned to a mentor, a researcher at the University of Pretoria, to assist with real science while being inducted into the culture of science in their school-leaving year.

Pupils who stay with the programme and gain admission to courses in the Faculty of Science or Biological and Agricultural Sciences are granted tuition scholarships by the University for the period of their first (bachelor) degree.

Prof Max Braun, 1999

Photo: UP Archive

"I support the UP with Science programme - It's what we must do. Only a few of South Africa's universities can make a difference to South Africa - and UP is one of them. We will make the difference - only by training gifted scientists from all population groups."

Prof van Zyl, Rector of the University of Pretoria during an interview on 15 May 1998.

UP with Science

Structure of the programme

Group A

Grade 10: Visits to departments: broad exposure to different science fields
Grade 11: Computer literacy and ThinkQuest
Grade 12: Research project ('real science') and Expo participation

It was found that the matric learners are under considerable pressure from their school work and can't spend enough time on their research projects. Therefore it was decided to move the research projects in small groups to the second (grade 11) year and the "ThinkQuest" in the final (matric) year.

Group B & C

Grade 10: Visits to departments: broad exposure to different science fields
Grade 11: Research project ('real science') and Expo participation
Grade 12: Computer literacy and ThinkQuest

From 2003 the Grade 12 learners did short science projects instead of participating in the ThinkQuest competition to move the emphasis from computer studies back to science.

Groups D to I

Grade 10: Visits to departments: broad exposure to different science fields
Grade 11: Research project ('real science') and Expo participation
Grade 12: Computer & Internet literacy and a short science related projects

Groups J to S

Grade 10: Visits to departments: broad exposure to different science fields
Grade 11: Research project ('real science') and Expo participation
Grade 12: Computer & Internet literacy, Science Communication and a 'student skills' development

UP with Science

Aim of the programme

The programme plans to ensure that talented pupils from primarily disadvantaged regions within 80 km of the University of Pretoria, but racially, gender and economically balanced:

- use computer technology and the Internet productively,
- create and contribute to the development of Internet resources for introductory mathematics, science and technology,
- have an interest in scientific fields or science teaching as a career strongly stimulated,
- have a real opportunity to enter tertiary studies by committing the University to providing tuition scholarships for participants.

1999

The UP with Science programme was started in 1998 in the Centre for Science Education under the guidance of Prof John Rogan and Prof Max Braun. In 2000 Helga Nordhoff joined the team and when the Centre for Science Education was restructured in 2003 the UP with Science programme and Helga were transferred to the Discovery Centre @ TUKS, now Sci-Enza. From 2003 until her retirement at the end of 2016, Helga Nordhoff was the UP with Science programme manager.

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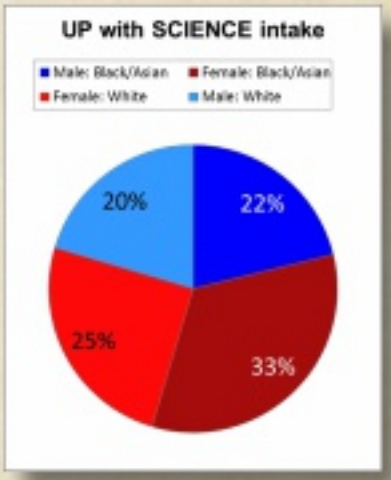
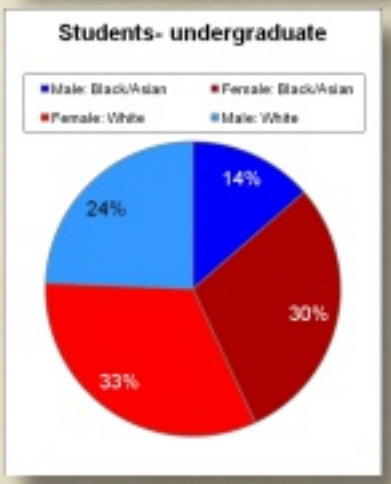
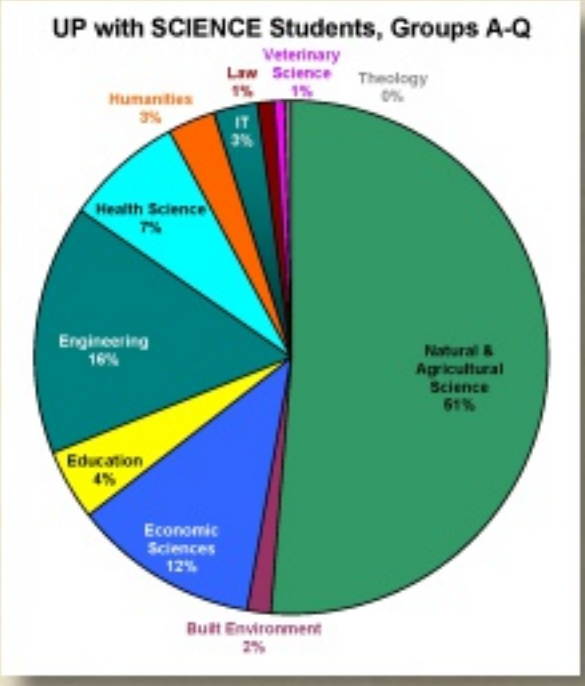
UP with Science Statistics





From 1998 to 2016, 673 learners from Groups A to Q successfully completed the UP with Science programme; 470 of these learners enrolled at the University of Pretoria, 265 in the Faculty of Natural and Agricultural Science. As can be seen from the graph below, most other courses are science related.

Few UP with Science students drop out and 111 students from the fist 13 UP with Science groups continued with a post graduate course after completing their first degree.



"The experiments we conducted made me feel like a real scientist, but most importantly it made me realise that am alive with possibilities to become a real scientist and made me spread the love of science at my community. The programme was not all work and no play. I made real friends who are involved in the program. It was my first time ever being in a multiracial environment, and I made strong connections. Every month that I got to come here, I was excited because I got to go to town once in a while, and at the university you feel how wonderful varsity life is, but most importantly I was looking forward to the fun activities of the day and meeting my friends.

In conclusion I would like to say that, as small as we are, we are worth to be spent on. For some this programme does not only benefit an individual by their communities at large."

Obakeng

The following pages aim to show the diversity of the UP with Science programme; the recruitment posters, departments visited, science related activities, excursions, challenges, talks and workshops. The photos show activites that were unique for each group in an effort to cover most of the topics the learners were exposed to.

Book compiled by Helga Nordhoff.

In the Lab

Visit to Sterkfontein

At FABI

Pretoria News, 1998

Budding scientists Bea Erasmus and Molemo Mosupyae put their new-found scientific knowledge to the test at the University of Pretoria over the weekend. PICTURE: NICOLENE CLOETE

New programme for budding scientists

This weekend saw Tuks launch a new science-enrichment programme for high school pupils – the first of its kind in South Africa.

The programme, called UP with Science, is aimed at expanding pupil's interest in knowledge and skills in science, and includes Saturday classes and a winter camp.

Nearly 50 grade 10 pupils were selected for the course.

After completing the programme successfully, candidates who wish to study science courses at the University of Pretoria will get free tuition if they are accepted into one of the study programmes offered by participating departments of the faculties of science, biology or agriculture.

"Apart from submitting academic records and a letter of recommendation from their science teacher, applicants also had to write an essay stating why they wished to take part in UP with Science," said Professor Max Braun, director of the Centre for Science Education.

"Participants were chosen in such a way that the group reflects the racial and gender diversity of the South African population."

Activities over the next three years will include hands-on laboratory work, presentations by practising scientists, working with problem-solving science and maths software, becoming familiar with the Internet and participating in ongoing research. – Staff Reporter

In the Lab

Visit to the
Electron microscope

"In the 3 years I learnt the most from the Thinkquest challenge; the study of a specific subject matter and the web site design experience."

Namosha

Group A (1998 intake)

Maseeha Ansermeah
Haseel Bhima
Robert André Brink
John Chuchu
Hendrik Coetsee
Didi Coetzee
Jaco De Witt
Karen Dieterich
Michael Ellis
Beulah Erasmus
Petrus Ferreira
Faaiza Haffejee
Geraldine Hattingh
Gasenna Kungwane
Schalk le Roux
Johanna Letwaba

Donald Sibusiso Mabuza
Innocentia Maduma
Carmen Magardie
Ntebaleng Makgalemele
Canon Mametse
Junior Maswanganye
Malcolm McLean
Karen Milford
Molemo Mosupyoe
George Moyo
Sarafina Mpapele
Regina Mtshweni
Lucky Nemakwarani
Dikgang Ngcobo
Sindiswa Nkabinde
Theo Thulani Phantshwa
Jeffrey Pitsi

Ziyaad Shaboddin
Johannes Shihlane
John Shirindi
Shabana Shivani
Thulane Sikhakhane
Lawrence Skhosana
Nontlantla Skosana
Riaan Smit
Edward Stroebel
Lizette van der Merwe
Fransie van der Merwe
Catharina van Harmelen
Namosha Veerasamy
Elizabeth Venter
Susan Bonisile Vilakazi
Ilse Viljoen







Research project presentations






Group A Research Projects

Biochemistry:	TB or not to be ... Who needs AIDS?
Earth Science:	Rocks: where they come from and what they consist of.
Food Science:	Utilisation and preservation of traditional African foods.
Genetics:	White grubs expose and their ... genes.
Physics:	Investigation of mechanical properties of polycrystalline copper.
Plant Pathology:	Preserving fruits with natural products.
Plant Production & Soil Science:	Biological methods of decreasing fruit rot.
Zoology:	The Highveld mole rat – a nutritional study.

Research project presentations

UP alumnus receives prestigious medal in Science

By Marita Maree

Posted on 25 October 2010

Michael Ellis

An alumnus of the University's Faculty of Natural and Agricultural Sciences, Michael Ellis was recently awarded the Junior Captain Scott Memorial Medal in Zoological Sciences.

The Suid-Afrikaanse Akademie vir Wetenskap en Kuns (South African Academy for Science and Art) awards this medal annually for the best MSc dissertation submitted at a South African university in either the Zoological or Botanical Sciences. The title of his dissertation is Honeycolonists: Humidity and water relations in honeybee colonies (Apis mellifera). His supervisors were Dr Vincent Dietemann, Prof Sue Nicolson and Prof Robin Crewe.

His dissertation showed that honeybee colonies are able to regulate humidity in the hives. In essence acting like the humidifiers that we use in our homes and workplaces. Although, rather than struggling with too low humidity as we often do in our homes, honeybee colonies struggle with excessively high humidity. In the process of making honey, bees evaporate an incredible amount of water from the gathered nectar. Michael showed that worker bees expel this humid air from the hive by using their wings for fanning the air much like an air-conditioning system in a building.

Meet the new lead science communicator at SAASTA, Michael Ellis

By Staff Writer, SAASTA

Establishing dialogue between science and society is one thing that Michael Ellis, the new Science Communication Manager at the South African Agency for Science and Technology Advancement (SAASTA), is passionate about. It was, therefore, a no-brainer that he would embrace an opportunity to join SAASTA, which is at the forefront of the country's national science engagement efforts. He believes that industry involvement and multi-stakeholder partnerships will be crucial in strengthening the national science engagement initiatives. When not consumed by his day, this married father of two finds enjoyment and purpose in his faith, family and freedom, he says.





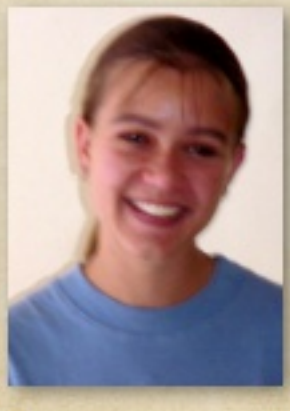




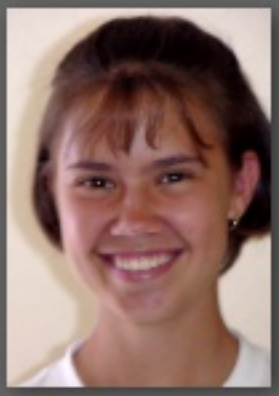












"Although I am not specifically interested in Astro science, I found the trip (to HartRAO) really interesting. It was also fun to hang out a bit more with the other kids."

Marja

Group B Research Projects

Earth Science:	Geology and climate
Genetics:	DNA fungi
Physics:	Study of materials with scanning, transmission electron microscopes, Auger and Raman spectroscopy
Plant Pathology:	Food safety
Plant Production & Soil Science:	Use of tissue culture to grow a food crop
Zoology:	Metabolic rate in a small mammal

Group B (1999 intake)

Brenda Behle
Jasper Buys
Theuns Cloete
Carlo Combrinck
Thea de Villiers
Gerald Delebo
Tanya Groenewald
Lilla Haynes
Bianca Hinze
Renee Hlozek
Zakiya Ismail
Zaheer Ismail
Zack Jansen van Rensburg
Rencia Joubert
Yolande Khutlisi

Tsholofelo Kibido
Rudi Kraft
Robert Langa
Ling-Ling Lee
Edmund Magalanyane
Haseena Mahomed
Elrike Malan
Lesego Mamabolo
Patrick Manganyi
Susann Marais
Ruth Mathale
Lucratia Mathe
Christopher Medlin
Jacob Modiba
Hazel Mogadi

Phenyo Molefe
Fatima Moosa
Thomas Mthombeni
Lawrence Ngalela
Marja O'Neill
Wessel Oosthuizen
Nadarajan Padayachy
Wilma Prinsloo
Cindy Schoeman
Goitseone Sere
Marlize van der Berg
Cornelius Viljoen
Nesime Vural
Madelaine Weideman
Gloria Zwane

Students

Passionate to make Science accessible for all

Fascinated by the burning questions about the universe – its origin, fate and evolution – Renée Hlozek gravitated towards Science at school, in the hope of one day being able to answer them. It seemed destined because, through various programmes, scholarships and natural aptitude, the universe literally opened up to her.

In 2012 she was selected as one of the Mail & Guardian's 200 Young South Africans under the age of 35, who are doing extraordinary things. She is seen as a future leader. Renée is currently conducting postdoctoral research in cosmology at Princeton University as a Lyman Spitzer Jr. Postdoctoral Fellow in Theoretical Astrophysics, analysing light originating just 380 000 years after the Big Bang. She is also the Spitzer-Cotsen Fellow in the Princeton Society of Fellows in the Humanities. She was recently named a TED Fellow for 2013, a fellowship which focuses on both her Science and the communication of Science to the public.

Renée kicked off her illustrious career in Science through the "UP" with Science Programme whereafter she completed a BSc degree in Mathematics in 2005 in the Faculty of Natural and Agricultural Sciences at the University of Pretoria (UP). She completed her honours in Applied Mathematics in 2006 at the University of Cape Town, as part of the National Astrophysics and Space Science Programme (NASSP). A master's degree followed suit and her studies were funded by the SKA Human Capital Development Programme. Between 2008 and 2011, as a Rhodes scholar, Renée read for her DPhil in Astrophysics at Oxford University.

Renée recently visited the "UP with Science programme, which is still flourishing after almost 15 years. She was delighted to meet the current students and gave them a talk about her research. She is also going to work with them in an upcoming science-outreach initiative, where learners use video technology to communicate science ideas and questions.

Just as passionate as she is about making Science accessible, so passionate she is about giving back. Therefore she is involved in several outreach programmes, including teaching Mathematics in prisons and Astronomy at schools. "I am passionate about science communication – allowing Science to open the minds of young people. I believe in the power of Science to enthral as well as to educate. I'm passionate about Africa."

Renée emphasised how fascinated she is by our universe – "how it started, how it evolves with time and how it will end".

*The UP with Science Programme is a science enrichment programme for senior secondary school pupils, presented by the University of Pretoria. Approximately 50 grade 10 school learners who have a high potential and a keen interest in Science are annually selected to participate in the science enrichment programme. While in the Programme, they are exposed to an enquiry-based approach to Science. It runs over three years, and thereafter the learners may qualify for a full tuition scholarship, valid for most of the study programmes that are offered in the Faculty of Natural and Agricultural Sciences, provided that they meet the normal admission requirements. This Programme includes Saturday meetings once a month and a project week during the holidays, once per year. The Programme is aimed at increasing young people's interest in, knowledge of, and skills in Science.

Visit http://www.upwithscience.up.ac.za/ for more information on the UP with Science programme.

Credit: Mail and Guardian, and Renée Hlozek

UNIVERSITY OF TORONTO | DUNLAP INSTITUTE for ASTRONOMY

Site Navigation

PROF. RENÉE HLOŽEK

Hložek studies a variety of problems in theoretical and observational cosmology through observations of the Cosmic Microwave Background, Type Ia supernovae and Baryon Acoustic Oscillations.

Using data from the Atacama Cosmology Telescope, her research focuses on constraining cosmological models, as well as determining the structure and amount of dark energy in the Universe.

She uses Baryon Acoustic Oscillations to constrain and test models of the Universe, and is interested in methods of extracting the signal from both spectroscopic and photometric galaxy surveys.

She also developed BCards, Bayesian Estimation Applied to Multiple Species, a statistical method for performing parameter estimation in the presence of contaminated cosmological data, which she applies to datasets such as the SDSS-II SN survey.

Hložek studied at the University of Pretoria and the University of Cape Town. She received her DPhil from the University of Oxford in 2011, where she was a Rhodes Scholar. Before coming to the Dunlap, she was a Lyman Spitzer Jr. Postdoctoral Research Fellow in the Department of Astrophysics at Princeton University and the Spitzer-Cotsen Fellow in the Princeton Society of Fellows. She is also a Senior TED Fellow.

During her visit to South Africa in April 2013, Renée Hlozek presented an Astronomy Workshop to the Grade 12 UP with Science learners of Group N.







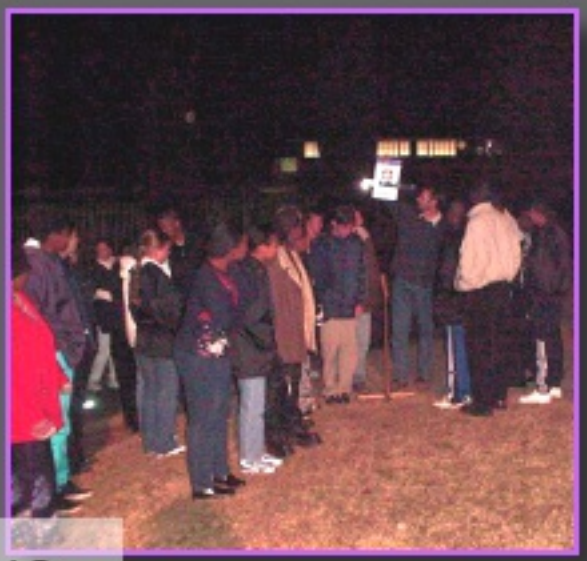




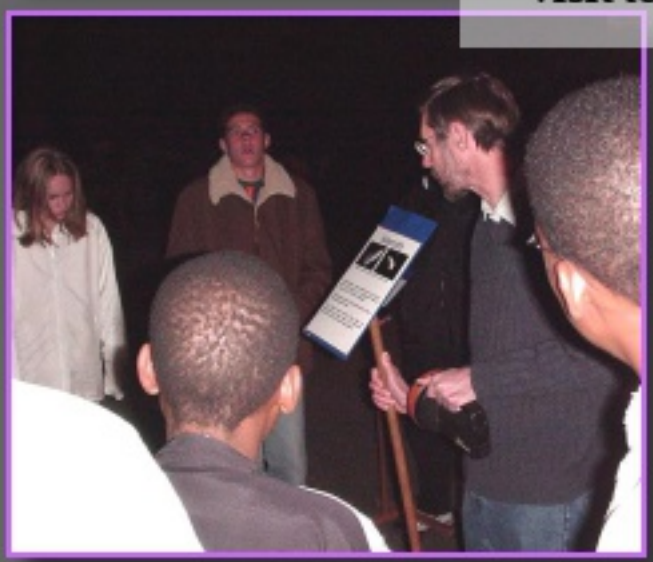






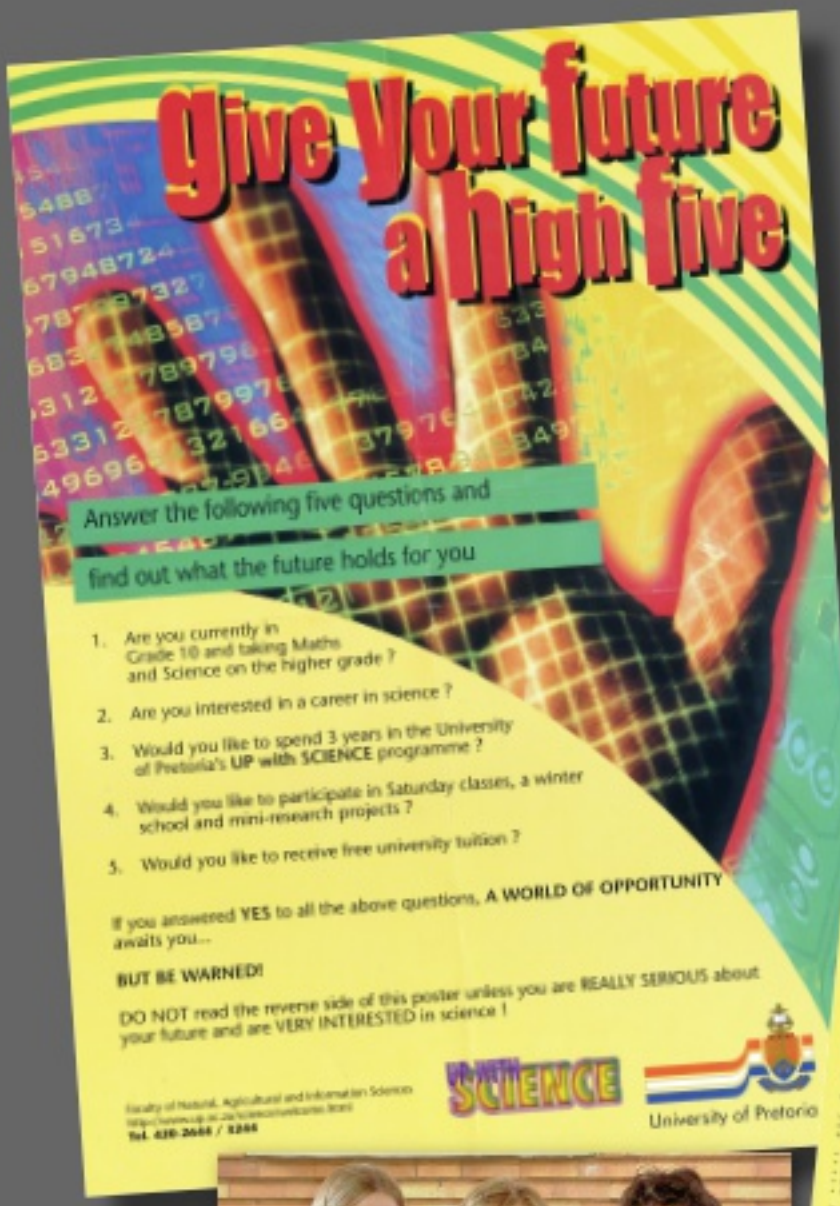
Visit to HartRAO



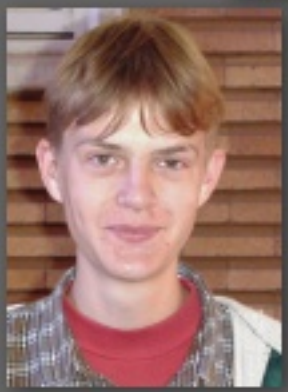
Jacob Modiba and **Edmund Magalanyane:** winners of the special award for the best ThinkQuest web site of a Telkom 1000 school.

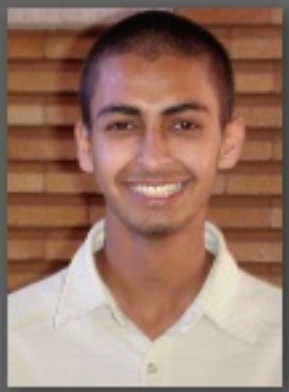
In the Lab

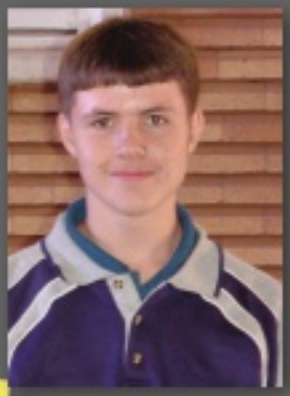
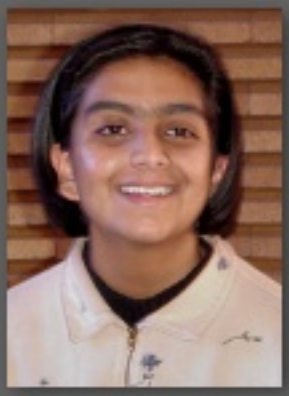
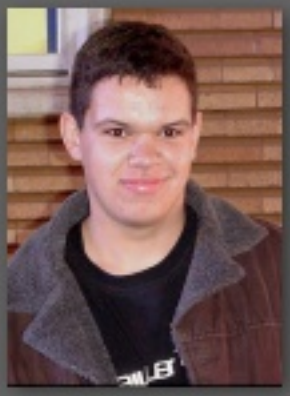
2000

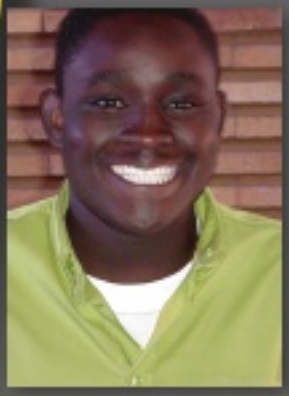

Give Your future a High five
Answer the following five questions and
find out what the future holds for you
1. Are you currently in Grade 10 and taking Maths and Science on the higher grade ?
2. Are you interested in a career in science ?
3. Would you like to spend 3 years in the University of Pretoria's UP with SCIENCE programme ?
4. Would you like to participate in Saturday classes, a winter school and mini-research projects ?
5. Would you like to receive free university tuition ?
If you answered YES to all the above questions, A WORLD OF OPPORTUNITY awaits you...
BUT BE WARNED!
DO NOT read the reverse side of this poster unless you are REALLY SERIOUS about your future and are VERY INTERESTED in science !
SCIENCE
University of Pretoria


Up With Science
A Science Enrichment Programme for
High School learners presented by
the Centre for Science Education
University of Pretoria





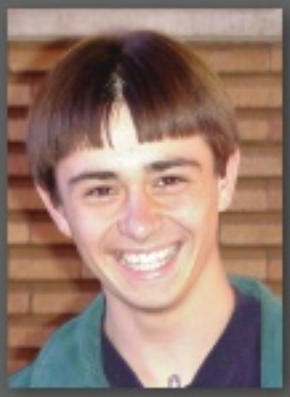








Departments visited

Botany
Chemistry
Earth Sciences
Electron Microscopy
Food Science
Genetics
Physics
Plant Production
Soil Science
Tswaing Crater
(Geology & Botany)
UP Farm
Zoology




"I learned the most from the activity of building the AM radio; I had some knowledge of electronics prior to the activity but it was more interesting to learn from a practical experience."
Waheed





Group C (2000 intake)



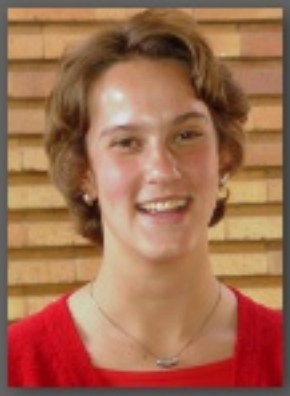


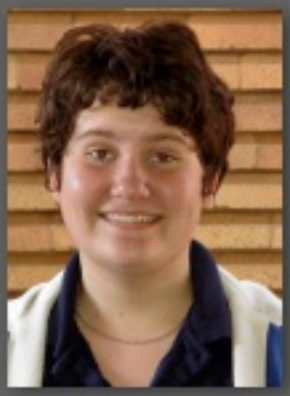











Group C
Research Projects

Biochemistry: Science of vaccination

Chemistry: Crystal growth on rough surfaces.

Earth Science: Soils: Where do they come from, what do they consist of and how do they affect plant life.

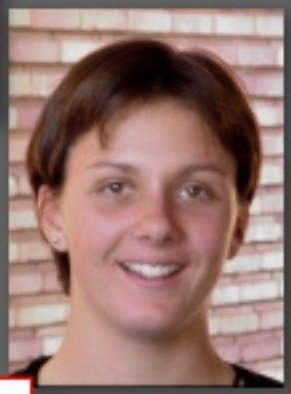
Food - & Consumer Science:
1. What I eat.
2. Food security in urban and peri-urban areas in Gauteng

Physics: Getting to know semi-conductors.

Plant Production & Soil Science: Use of tissue culture to grow an ornamental plant.

Zoology & Entomology: Evaluating the taxonomy of two medically and agriculturally important species of mice.






Martin Ackermann
Rubina Adam
Nadine Chambers
Susan Didiza
Kabelo Ditshego
Aboobaker Gani
Joao Goncalves
Izanda Grobler
Jason Hübner
Anjli Kala
Modiba Khomotso
Karien Labuschagne
Marius Lategan

Patrick LeBepe
Lerato Mabena
Waheed Mahomed
Matlhodi Makena
Jane Makgoba
Jacqueline Meyer
Mfundo Mlambo
MMakoma Charlotte Mlangeni
Rethabile Selekani Mohapi
Baleseng Mokone
Moses Mokwena
Jafta Mthimunye
Zika Myeni
Letta Kuki Ndala
Bongile Nethanonda
Priscilla Ngomane
Bobby Ramagwede
Kenosi Rapoo
Suné Rossouw
Tshegofatso Sebapu
Macdonald Selahle

Marius Snyman
Ruan Snyman
Carmen So
Amitha Thomas
Cynthia Ned Tjatji
Carel van Dam
Neline van der Merwe
Morné van der Waltsleben
Elana van der Wath
Sonica van der Westhuizen
Louise van Niekerk
Jacques van Wyk
Kamantha Veerasamy
Vittorio Vorster
Adell Vorster
Elizabeth Maria Walters
Maryke Wolmarans

Group C at the Tswaing Crater

team

SUNENERGY
CONVERSIONS
FACTS
INTERACTION
HOME

The creators of this site are Louise van Niekerk and Adell Venter.

We are two enthusiastic teenagers, believing that science will pave the roads for generations to come. Having spent our lives in sunny South Africa thus far, we saw know that energy sources and fuel substances are limited. Then . . .

HOW 'BOUT USING SUNLIGHT FOR ENERGY ?

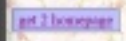
After realising it had already been done, we thought we'd give people the opportunity to gather information on solar energy and its conversion on our fantastic website, which we dedicate to God's diverse gift to mankind.

ACKNOWLEDGEMENTS:

Thanks to the following people
Prof. J . Roger
Helga Nordhoff
Malcolm McLean
Michael Beard

did you know?

- Kalahari is the second biggest African desert
- It takes up one thirds of the Botswana country
- Kalahari is flat, covered with thorn trees and long grass
- Kalahari desert is located in Botswana, it is a very beautiful and dry desert
- Botswana is Southern Africa's largest and authentic wilderness, and it is a land of great contrast
- During summer it is hot to very hot with temperature sometimes exceeding 38 degree Celsius
- Winter daytimes temperatures are normally warm, the rainy days are often extended from November to April
- Even the San people can be found in Botswana
- Accessories and clothes are essential to accommodate the weather
- Before visiting the Kalahari desert you have to consult your doctor for more precautions for the deseaze of Malaria, there has been an increase on the incidence of this deseaze amongst the visitors and residents.



Beat This

CLICK ON THE PICTURE TO ENTER OUR SITE

Images scanned from the covers of Christopher's Handbook (see Bibliography)

INTRODUCTION

A tribe is a group of people living in a particular place. In South Africa we have various tribes.
These tribes differ according to their names, the way they live(lifestyle), their customs, the foods which they eat, the way they dress and their traditions.

VARIOUS TRIBES


BATSONGA TRIBE


XHOSA TRIBE


BATSWANA TRIBE

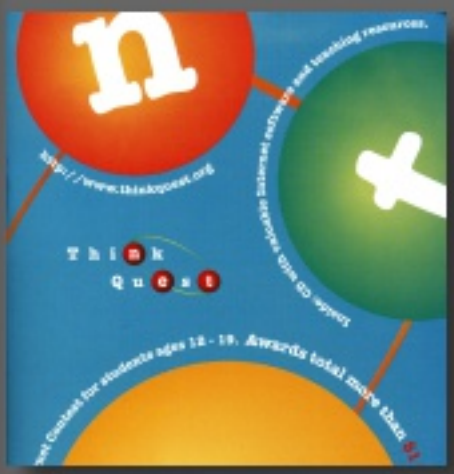

ZULU TRIBE


BAPEDI TRIBE


NDEBELE TRIBE


VENDA TRIBE

ThinkQuest
Grade 12 Project



EDIBLE WORM

Warming My Way Into Your Mouth!

Choose the worm that matches the description.

DESCRIPTION

This worm is called Gonimbrasia belina. The body of the worm is segmented and hairy. It grows around to 10cm in length. Its native name, given by those who eat it is a Mopani Worm. It is found on Mopani trees (Colophospermum). In South africa it is found mostly in Venda which is in the Limpopo Province and in Mpumalanga.

Answer:
Well done if you got that right ,if you got it wrong don't worry you can have a shot at the next quiz.

MaRiUs'S HoMePaGe

This Is Me!


I am 16 years old and in GR 11


My subjects are : Afr , Eng , Maths , Science , Electronics and Computer Science.


I live in Pretoria and missed my 4Xtying here !

Take five !

A Journey into the lives of south africa's big five...

REFLEXOLOGY

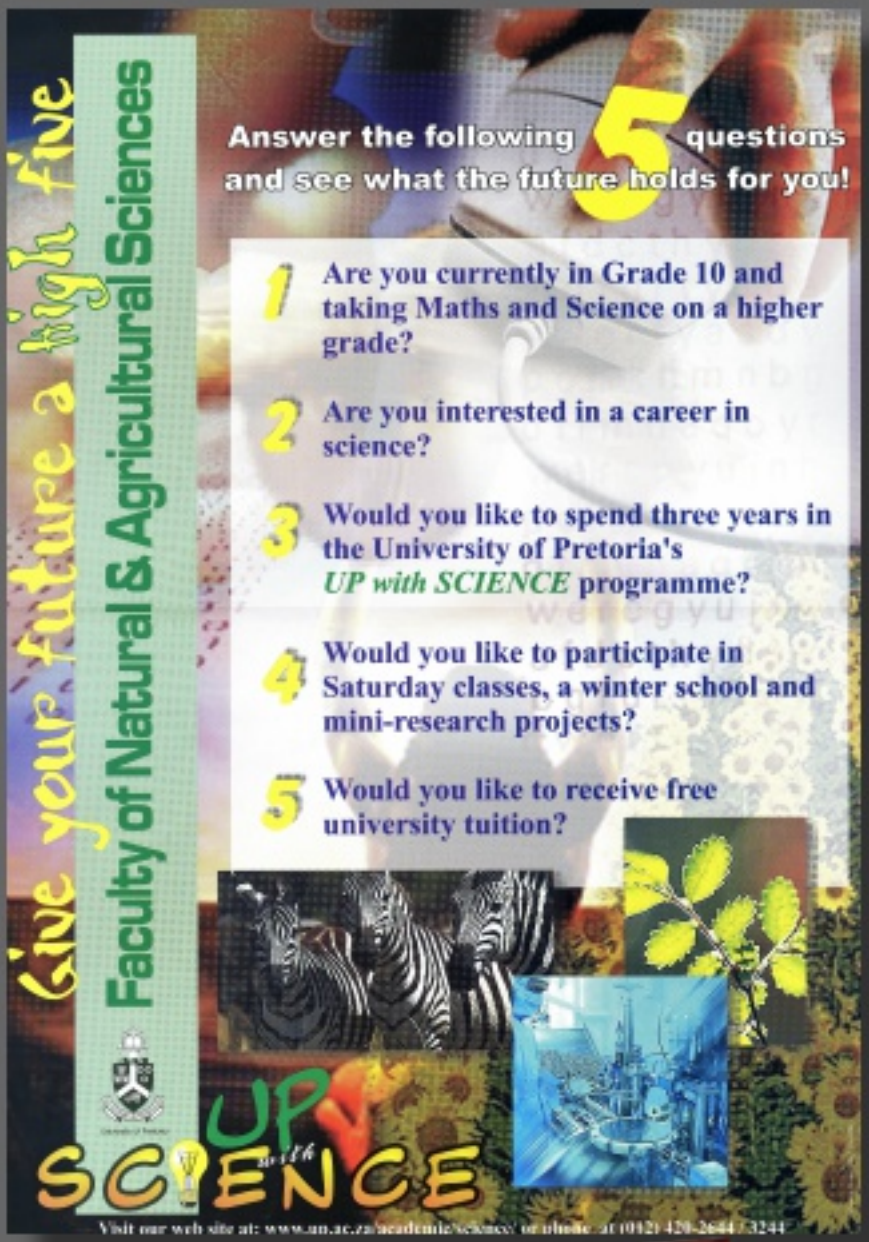
AROMATHERAPY

TREATMENT
THERAPY
ACCOMPLISHMENTS
SIDE-EFFECTS
SEE A DOCTOR IF...
ABBUCUS
REFERENCES

ALTERNATIVE MEDICINE

AYURVEDA

MEDITATION



2001

Departments visited

Biochemistry
Botany
Chemistry
Consumer Sciences
Genetics
Hydrotech
Lab for Microscopy
Mathematics
Physics
UP Farm (Plant Production)
Sterkfontein Caves
Tswaing Crater
(Geology & Botany)
Town & Regional Planning
Zoology

"This year was fun, exiting, eventful & educational. I enjoyed myself, the food was excellent and I made new friends."
Sadiyah

Group D
Research Projects

Biochemistry & Microbiology:
The science of antibiotic drugs.

Botany: A Biological Inventory of two *Hypoxis* species in the Rietvlei Nature Reserve.

Chemistry: Fire in Africa.

Earth Science, Plant Production & Soil Science:
Soils: Where they come from, what they consist of and how they affect plant live.

Genetics: Can DNA be used to detect differences in Clivia?

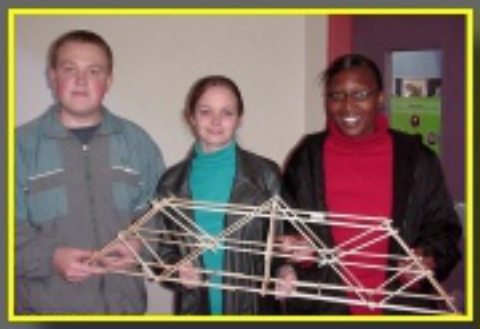
Meteorology & Mathematics:
Meteorology, Mathematics and Marion Island.

Physics 1: Radiation Physics.

Physics 2: Study of materials.

Plant Pathology: The use of indigenous plant extracts to control bacterial and plant pathogens.

Research project presentations



Grade 12 Projects
Bridge building
Kite designing
Sundial
Science Shop

Group D (2001 intake)

Izak Bisschoff
Magda Booyens
Piet Bopape
Simphiwe Chabalala
Khanyisa Chauke
Gareth Chilton
Mark Coote
Jennilee Damons
Naomi de Beer
Marcia Dlamini
Shanie Emslie
Thasnie Govender
Wilma Janse van Rensburg
Kenalemang Kgarume
Amelia Kruger
David Laolang

Thato Letlape
Leon Lombard
Blantina Matheka
Yoliswa Matu
Edwin Mhlongo
Charity Mngube
Victoria Moleya
Vivian Möller
Kgaogelo Moloko
Georgina Motha
Makatu Murulana
Nomxolisi Ngubane
Leana Opperman
Sadiyah Patel
Nikolaas Pienaar
Lüka Potgieter

Adinda Preller
Liezl Prinsloo
Tsheko Ramantshane
Bronwyn Retief
Jean Saayman
Tidimalo Seboane
René Sissing
Thipe Solomon
Robert Steen
Raeesa Suliman
Tsholo Talane
Khutso Tlaka
Leonardo Tommassini
Maryke van Vuuren
Isabel Venter
Barbara Vilakazi

2002

Departments visited

Biochemistry
Chemistry
Consumer Science
Food Science
Genetics
Geography
Lab for Microscopy
Mathematics
Plant Pathology
Physics
Plant Production & Soil Science
Tswaing Crater (Geology & Botany)
Town & Regional Planning
UP Farm
Zoology

"I enjoyed my Grade 11 project on Meteorology. It was great fun putting the project together and I enjoyed our trip to the SA Weather Service. I learnt a lot!"

Albert

Pupils conducting a science experiment in the school's science lab.

Experiencing the wonders of science

This year for the fifth consecutive year, the Centre for Science, Mathematics and Technology Education and the schools of the University of Pretoria's Faculty of Natural and Agricultural Sciences are once again presenting their science enrichment programme for high school learners, UP with Science.

Approximately 30 grade 10 learners from high schools in and around the greater Pretoria area are selected annually to participate in the three-year programme which includes monthly Saturday classes and an annual winter school.

There is tough competition for the 30 available places.

A school may recommend a maximum of only two learners and only in exceptional cases will more than one learner from any one school be selected.

This year Lyndon Maser High School took the chance and nominated two of its learners to represent the school. This resulted in a delightful outcome. I was overjoyed.

This year, we are taking part in all sorts of weird and wonderful science enrichment activities and experiments that the University of Pretoria's Centre for Science, Mathematics and Technology Education arranges.

These activities include hands-on laboratory work, being part of an audience for presentations by prominent scientists from various departments in the Faculty of Natural and Agricultural Sciences, working with problem-solving science and maths software, and exploring the world wide web and using electronic mail.

It gives me great pleasure to represent Manor High on UP in Science.

I'd like to encourage all those learners [illegible] currently in grade 10 to seriously consider taking up the opportunity when it comes again next year, to be a part of UP with Science and join in the fun.

Desiree Steyaert, grade 10

Group E Research Projects

Biochemistry:	Biosensors - Biosense or Baie Nonsens?
Chemistry:	Colours, Pigments and Dies
Genetics:	Tea-extracts used to control pathogenic fungi
Meteorology & Mathematics:	Mathematical modelling in Finance and Meteorology
Physics:	1. Radiation Physics 2. Study of materials 3. Efficiencies of rechargeable batteries
Plant Pathology:	Antimicrobial activity of tea (*Camellia sinensis*) extracts against plant pathogenic fungi on vegetable crops

Pretoria News, September 2002

Grade 12 Project

"Touch Me!"
Drawers for
Sci-Enza

"Creating the boxes was really awesome!"
Sherwin

Group E (2002 intake)

Etienne Ackermann
Imke Birkenstock
Charisse Buchanan
Brūmilda Cloete
Francois Conradie
Robyn de Jager
Bernard Erasmus
Fiona Ferris
Sherwin Gabriel
Neo Gomba
Trevor Hansen
Sadika Ismail
Jaco Jansen van Rensburg
Haseena Khan

Rose Khoza
Burr Knott
Leigh-Anne Koekemoer
Jaco Kok
Christoffel Kriel
Esther Lietsiso
Obakeng Maema
Calvin Maleka
Marcia Maluleke
Busisiwe Masuku
Agrinatte Mbatha
Schalk Meintjes
Jan Nagel
Kutlo Ndabambi
Fezeka Ndhlovu

Jaco Nieuwenhuiys
Tryphina Nyalungu
Jané Peens
Letlhogonolo Pitse
Dalene Prinsloo
Cynthia Seemane
Mohamed-Naeem Shaboddin
Denise Snyman
Louisa Steenkamp
Zuleikha Suliman
Ben Tjibe
Albert van Heerden
Liesl van Rooyen
Evett Vorster

2003

Departments visited

Biochemistry
Chemistry
Genetics
Geography (Meteorology)
Lab for Microscopy
Mathematics
Physics
Plant Pathology
Sterkfontein Caves
Tswaing Crater
(Geology & Plant Science)
Veterinary Science
Zoology

"From my point of view, I think the UP with Science project is really helping us to become better heroes for the future and also to make our country a better place for everyone."

Pretty

Genetics

At the Tswaing Crater

Biokinetics

Building a radio

Chemistry: Tie dying

At Onderstepoort

Group F
Research Projects

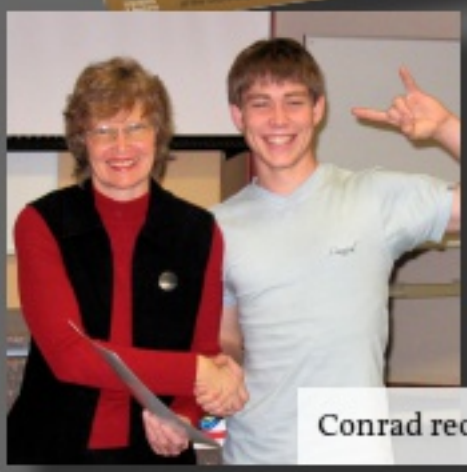
Biochemistry:	Science against crime.
Chemistry:	Environmental Chemistry.
Genetics:	Mushrooms - Food or Hallucinogen?
Mathematics:	Is the fourth dimension really time?
Meteorology:	Predicting the weather with a mathematical algorithm.
Physics:	Evaluation of solar energy devices for use in rural South Africa
Plant Pathology:	Aflatoxin in Peanuts and Peanut Butter.
Plant Production and Soil Science:	Response of lettuce transplants to nitrogen nutrition in a floatation production system.
Town & Regional Planning:	A settlement analysis of Hatfield.

Town & Regional Planning project

Plant Production group

From Newton to Einstein

A card game - Grade 12 Project



Conrad receiving his certificate of participation

Group F - Russells (2003 intake)

Karmi Barnard
Petro Bester
Danica Botha
Darrel Chilton
John de Jager
Susan du Raan
Chanél Fourie
Juan Gijzelaar
Conrad Gohl
Thiloshni Govinder
Helinka Hager
Christy Holloway
Naeema Ismail
Thobile Jiyana
Abinaar Khunou
Anina Kleynhans

Alinke Labuschagne
Pretty Langa
Michael Louw
Phethang Mabeba
Malesotse Makgalemele
Relebogile Malele
Robert Mangwane
Lesego Marumo
Ntombifuthi Masango
Thapelo Mokau
Oleboge Mokoka
Refiloe Morailane
Koketso Ndukula
Gabangaye Ndwandwe
Riaan Nel
Romeo Nkwane

Thabang Noge
Ian Pelser
Petria Rademeyer
Precious Ramushu
Kabelo Raphotle
Francois Saayman
Kyla Steenveld
Ntsako Valoyi
Christene van Niekerk
Martin van Niekerk
Rushka Venter
Wilandi Visser
Arifa Vorajee
Chantelle Vorster
David Weatherhead
Wolfgang Wehrmeyer

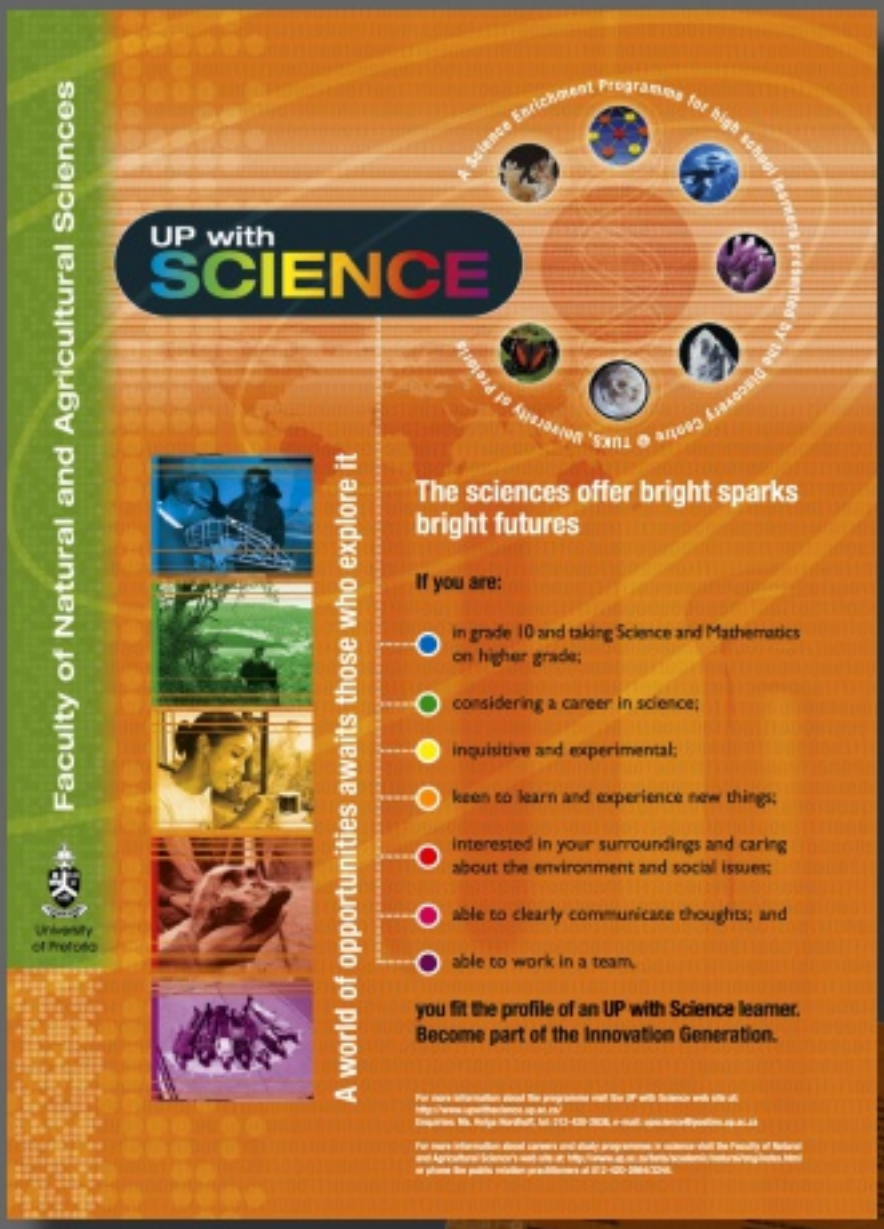
2004

Departments visited

Biochemistry
Chemistry
Food Science
Genetics
Geography (Meteorology)
Mathematics
Microbiology
Physics
Tswaing Crater
(Geology & Plant Science)
Veterinary Science
Zoology

"With all these really clever people around me, I'm inspired to work harder to equal them.".

Anonymous



At the Expo 2005

Department of Geography, Geoinformatics & Meteorology

UNIVERSITY OF PRETORIA

Lunch!

Food Science

Genetics

Group G
Research Projects

Biochemistry:	White Ant-i-freeze: Survival of the fattest.
Botany:	An Eco-Physiological Investigation of Black Wattle (*Acacia mearnsii*) in the Rietvlei Nature Reserve
Chemistry:	Synthesis of Aspirin.
Genetics:	Fungal genetics.
Mathematics:	Is the stock market a casino?
Physics:	Forensic investigation of car headlight filaments involved in accidents.
Plant Pathology:	Fungi, bacteria, yeasts and viruses
Plant Production and Soil Science:	Tissue culture of banana plants.
Zoology:	Reconstruction of an African mammal.

Zoology - reconstruction of an Aardvark skeleton

Group G (2004 intake)

Jonathan Alston
André Bekker
Nelda Breedt
Tshegofatso Chauke
Thobile Chemese
Reinardt Cromhout
Jacqueline du Toit
Pieter du Toit
Barend Engelbrecht
Toni Fernandes
Mohammed Gani
Nastasha Glenewinkel
Nicolle Gomba
Tinyiko Gumede
Shelagh Hartley
Nabila Ismail

Sumaya Kassim
Tshegofatso Kekana
Lehlohonolo Lehasa
Muzi Madaure
MacDonald Mampuru
Reneilwe Mathebula
Vusi Mathebula
Sinah Matshego
Mpumelelo Mdlalose
Rearabilwe Mogashoa
Keikweditse Mogoba
Raeesah Moosa
Kaneez Moosa
Kelebogile Mophatlane
Neo Mosupi
Tumelo Motaung
Busisiwe Mtsweni

Lloyd Naidoo
Debby Nixon
Lindiwe Nkosi
Jacques Pienaar
Michelle Prinsloo
Sarah Ramage
Tjaart Schutte
Sheila Sikhale
Madelein Smit
Marc Stocks
Lorraine Swanepoel
Robyn Thomas
Keotshepile Tladi
Thabiso Twala
André van Greuning
Paul Whelpton

At the FabLab

"Oh, I have met the State Herald! I never knew there were so many sciences behind the making of a new National Flag".

Marike

State Herald Fred Brownell, designer of the new South African Flag

Fred Brownell, Prof Alex Duffey with a moon rock, ?, Helga Nordhoff and Rudi Horak

The Africa puzzle at the 6th Science Centre World Congress in Cape Town, 2011

Africa:
a Grade 12 project

The Africa puzzle pieces were cut at the FabLab by Helga

Prof Cheryl de la Rey at Sci Enza

UP with Science in the News

TREE PROTECTION NEWS
Newsletter of the Tree Protection Cooperative Programme - University of Pretoria
NO 8 NOVEMBER 2004

Fun with science:

UP with Science day – 30 June 2004

The UP with Science programme is a science enrichment programme for secondary school learners who show an interest in science as a career. Selection of the learners to participate in this programme is fairly competitive. Each secondary school in the Pretoria region may nominate two learners based on their academic potential and interest in science. From these nominations 50 learners are selected each year to participate in the programme.

The UP with Science programme is designed to run over a period of 6 years. The first 3 years are completed in Grade 10-12 and consists of monthly classes on Saturdays and a winter school during the June/July holidays. Upon successful completion of this phase the learners can enroll in a course of their choice in the Faculty and Natural and Agricultural Sciences. The University of Pretoria covers the tuition fees of these students.

Staff and students of FABI and the TPCP have always actively participated in this event. On 30 June 2004, we hosted the Grade 10 learners for, in some cases, their first exposure to Genetics and Mycology. Forty-eight learners from a number of schools in the greater Pretoria region arrived at FABI at 9h00 in the morning. While loads of fun, the activities were designed to give learners an idea of what "real scientists" do in FABI. These included DNA extractions, Mendelian genetics, mushroom tasting and fungus weeding.

Renate and Sabine presented a hands-on DNA extraction using house-hold chemicals. Every learner was given a lab coat and had to extract DNA from wheat germ using common household chemicals. This proved to be a huge success with the learners and everybody enjoyed it. After completion of the experiment, everybody could take an eppendorf tube with DNA home. Learners were also taken on a tour of the state of the art sequencing facility at the University of Pretoria.

The second activity was an exploration of Mendelian genetics in which learners were taught how inheritance works. Prof. Brenda Wingfield presented this in a fun and practical way. Each learner had to draw a "monkey" face based on a number of given characters. These characters were determined by flipping a coin to determine if the given character for the parents are dominant or recessive. Learners were impressed by the number of different options that can result from a single set of parents.

The mycology section was presented by Dr. Karen Jacobs. Most of the learners only had exposure to the world of fungi through their contact with bread mold. The mycology course started with a short talk on edible and harmful fungi, followed by a film on the dispersal methods and ecology of fungi. Most learners enjoyed this as it opened up a new (microscopic) world to them that they did not know existed. A number of common molds were shown to them under the microscopes. The activity was ended with a mushroom tasting event. A number of edible mushrooms are available in South Africa, although very few people are aware of this and fewer have tried these. A team of "chefs" which included Karen Muller, Renate, Thia, Thato, Mellissa and Dr. Jacobs prepared some dishes with the mushrooms for the previous evening. These included Portabello mushrooms with Feta, Pontini

Mohammed Abdo (middle) explaining DNA extraction protocol to the learners.

"We had to get our hands dirty by making slides to view under a microscope. Some used protein as a specimen, others bread mould".

Sibusiso

At Food Science

At Genetics

UP maak WETENSKAP pret

Communications Challenge

In die Jaar van Fisika, ontwerp hoërskoolleerlinge heel gepas 'n heerlike kaartspeletjie waarmee kinders van alle ouderdomme speel-speel kan leer oor die wetenskap, van Newton tot Einstein.

Hierdie is maar een van die talryke inisiatiewe wat voortspruit uit die *UP with Science*-program, 'n wetenskaplike verrykingsprogram wat deur die Ontdekkingsentrum @ Tuks en die onderskeie skole van die Universiteit se Fakulteit Natuur- en Landbouwetenskappe vir hoërskoolleerlinge aangebied word.

Sowat 50 Graad 10-leerders wat potensiaal en 'n belangstelling in wetenskap toon, word jaarliks gekies om aan die *UP with Science*-program deel te neem. Vir drie jaar neem hulle deel aan die program wat 'n Saterdagklas een keer per maand, asook 'n jaarlikse winterskool insluit. Die fokus is daarop om die wetenskaplike leerproses lekker en vol pret te maak. Leerders vanuit onder meer Pretoria, Soshanguve, Bronkhorstspruit, Eersterust en Laudium neem deel aan die program. Befondsing, onder meer vir middagetes en vervoer, kom van borge soos First National Bank, Foschini, Murray & Roberts, Russels, Standard Bank en ander.

Hierdie program van die Universiteit van Pretoria (nie gekoppel aan die skoolkurrikulum nie) is daarop gemik om jongmense se wetenskapvaardighede, -belangstelling en -vaardighede te verbreed en in die proses, studente vir UP se Fakulteit Natuur- en Landbouwetenskappe te werf.

Volgens me Helga Nordhoff, *UP with Science* koördineerder, is die Fakulteit baie tevrede met die sukses van die program, wat in 1998 afgeskop het. Gemiddeld 60% van die leerders skryf na voltooiing van hulle skoolloopbaan by UP in en die Universiteit kan spog met 18 nagraadse studente wat deel was van die *UP with Science*-program. In 2004 het 27 van die oorspronklike groep van 50 Graad 10-leerders as studente by UP ingeskryf. In 2005 het 23 leerders as studente geregistreer. Wat verder verbysterend is, is die toename in studente vanuit voorheen benadeelde gemeenskappe.

Indien leerders die *UP with Science*-program suksesvol deurloop het, kan hulle gratis onderrig by UP in studieprogramme van die Fakulteit Natuur- en Landbouwetenskappe ontvang, nits hulle aan die gewone toelatingsvereistes voldoen.

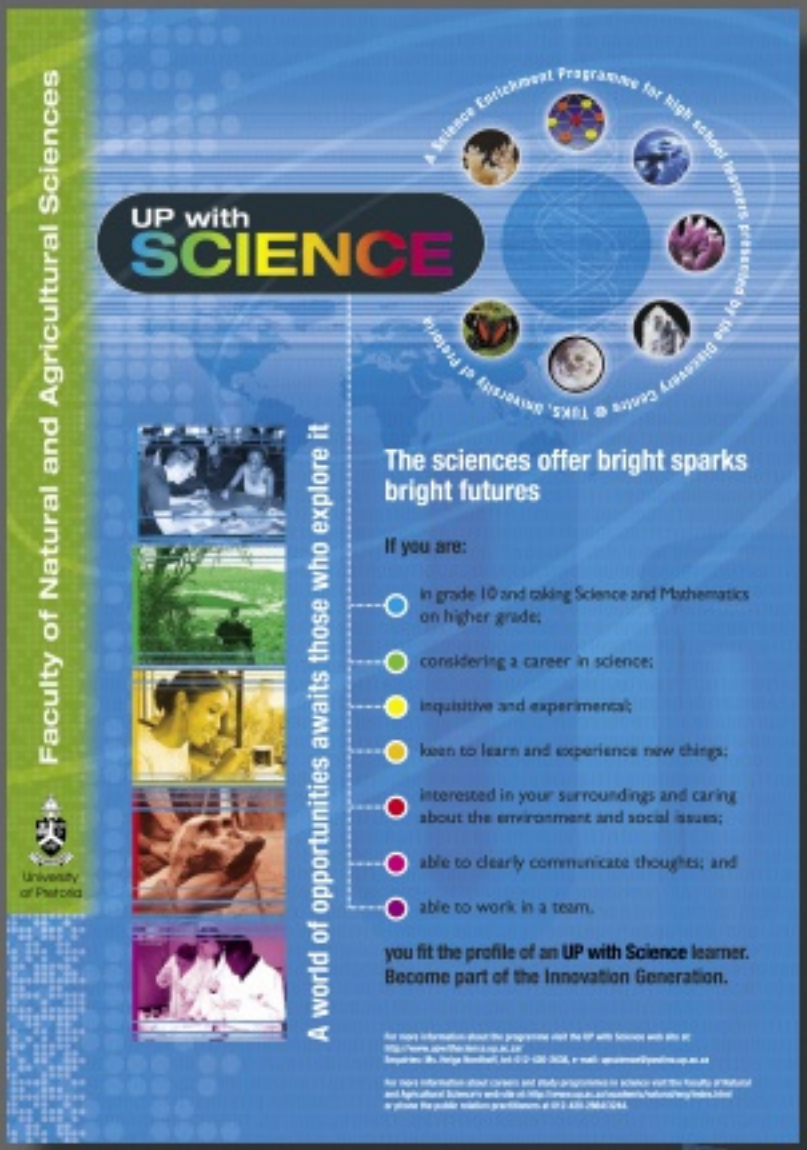
In die eerste jaar neem Graad 10-leerders deel aan die wetenskapverrykingsaktiwiteite en -ervarings wat UP se Ontdekkingsentrum @ Tuks bied. Dit sluit in praktiese laboratoriumwerk en die bywoning van aanbiedings deur wetenskaplikes vanuit die Fakulteit Natuur- en Landbouwetenskappe. Sommige departemente betrek nagraadse studente, met wie die leerders aanklank vind omdat hulle dieselfde taal praat.

In die program se tweede jaar, neem die Graad 11-leerders deel aan mini-navorsingsprojekte en 'regte wetenskap' saam met navorsers van UP in wetenskaplaboratoriums. Hulle ley ook die geleentheid om wetenskapaanbiedings te ontwerp en by laerskole aan te bied.

Tydens die derde jaar, bykomend tot die eerste twee jaar se aktiwiteite, kry Graad 12-leerders die geleentheid om wetenskaplike verslae op te stel en word touwys gemaak ten opsigte van internetgeletterdheid en rekenaarwerk.

Wie weet, dalk lewer UP with Science nóg 'n Newton op ... ●

2005

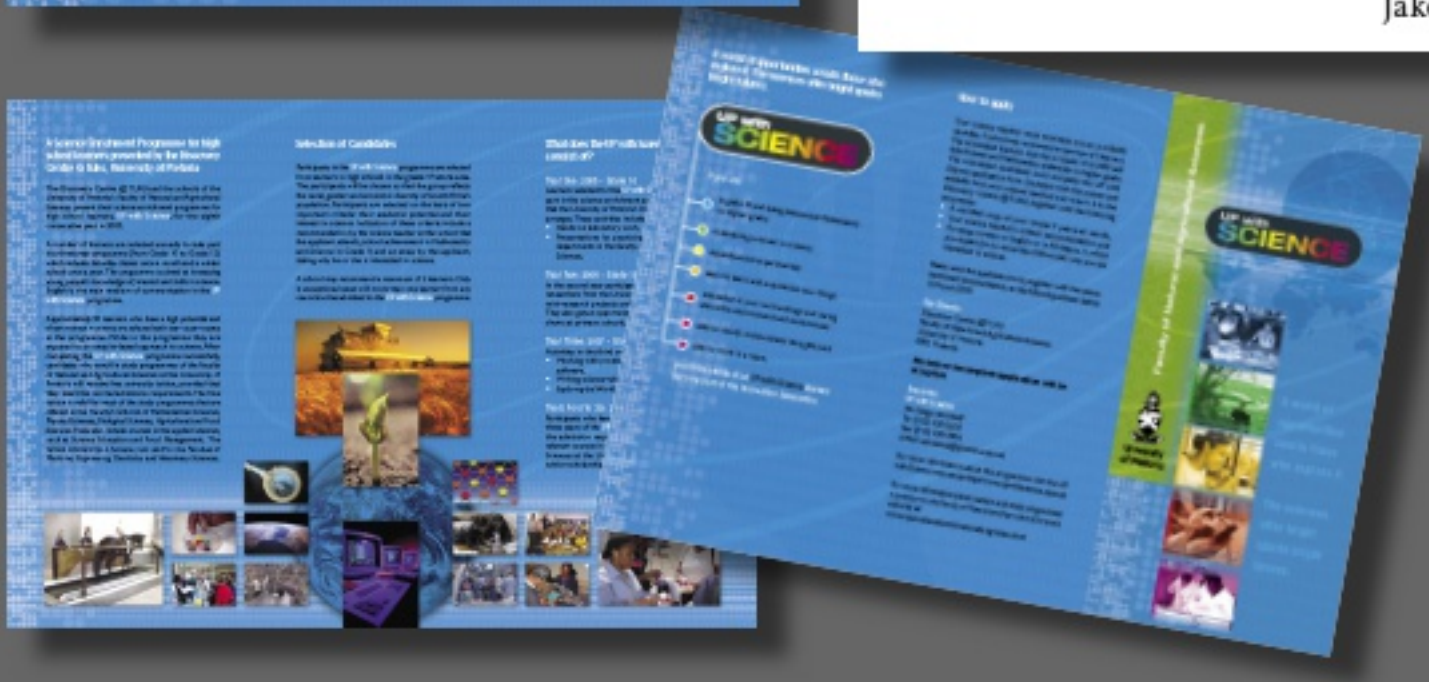


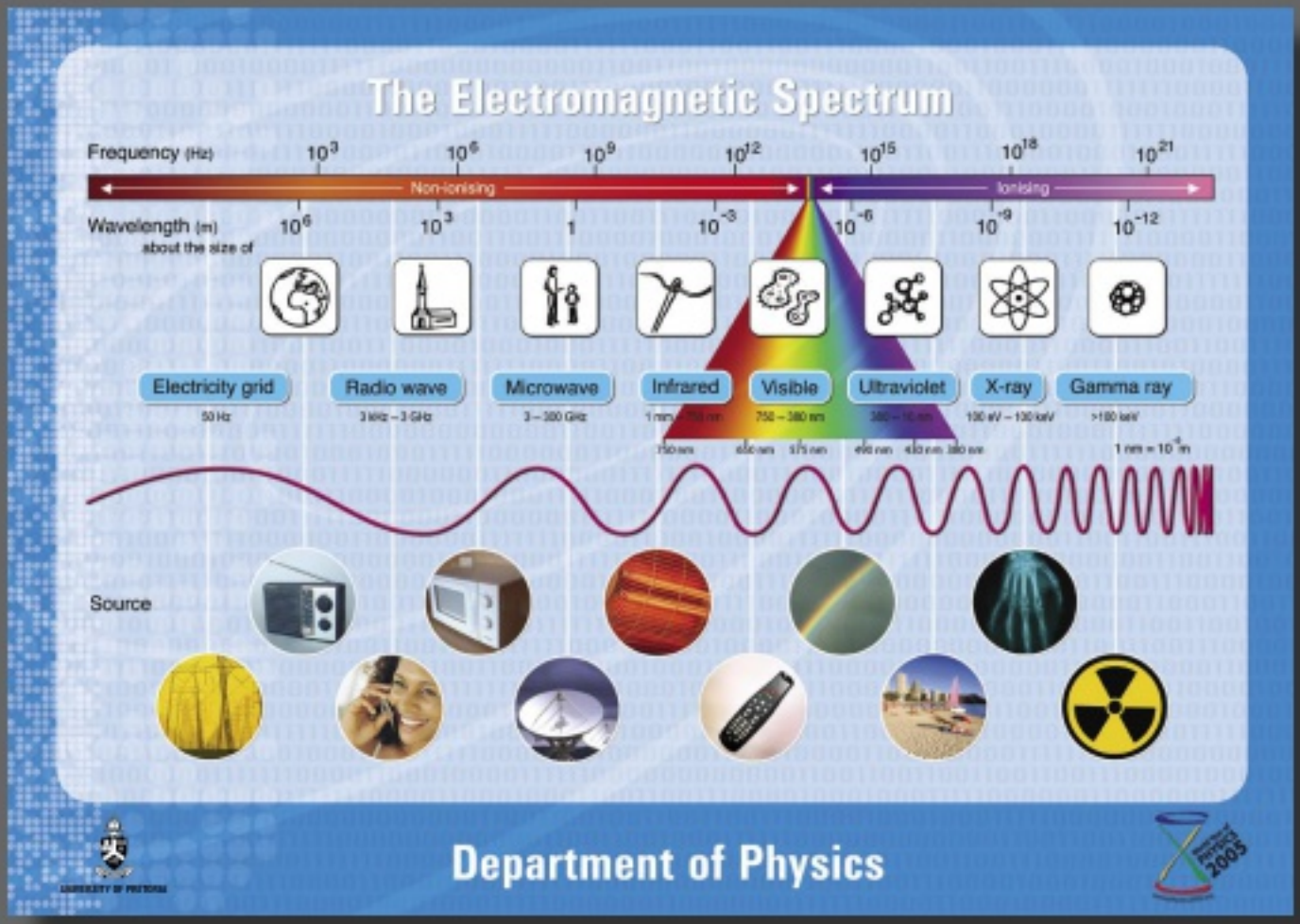
Departments visited

Biochemistry
Chemistry
Food Science
Genetics
Geography (Meteorology)
Microbiology &
Plant Pathology
Physics
Soil Science
Tswaing Crater
(Geology & Plant Science)
Veterinary Science
Zoology

"The most interesting part of visiting the soil sciences building was when we were able to view the equipment used to test soils. It was amazing to see that there was so much more to soil science than I could ever have imagined."

Jake





Housings for the radios built at Physics

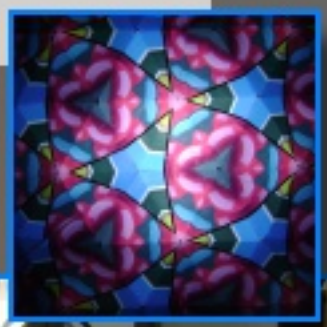
Group H
Research Projects

Botany:	Medicinal plants Do we sustainably harvest endangered plant species?
Chemistry & Physics:	The Electromagnetic Spectrum
Genetics:	Fungi @ FABI
Geology:	Rocks & soil
Mathematics:	Bits of linear algebra and graph theory; and the Google search engine.
Plant Pathology:	Soil-borne potato diseases
Plant Production and Soil Science:	Production of selected vegetables under shade netting
Zoology: Entomology:	Biodiversity and conservation

At Ezemvelo

The Science of Toys
Grade 12 Projects

Ferrofluids
Sundial
Galilean Thermometer
Drinking Bird
Kaleidoscope
Telescope



Group H (2005 intake)

Yumna Abed
Brandon Allen
Chantal Beukes
Lesego Bogoshi
Karin Briel
Daan Burger
Kerry Callaghan
Izaan de Jager
Nola de Klerk
Mias de Lange
Suzan Diatshwana
Patience Diphofa
Nikita Edwards
Emile Giesler
Zama Hlabangane
Nomsa Jiyane

Clair Learmonth
Elliot Mabasa
Mduduzi Machika
Thembisile Mahlangu
Lennè Marnewick
Kearabetswe Mataboge
Tebogo Maubane
Oratile Mekgwe
Antoinette Moos
Kevin Mootane
Queen Mosoane
Piet Motaung
Sibusiso Msiza
Sumaya Mukadam
Cynthia Nkosi
Daniel Nowack

Courage Ratsoene
Madaleen Saaiman
Kavani Sanasi
Reinhard Schiel
Teresa Scott
Thabo Selemela
Christian Starke
Marisa Stols
Hannelie Sung
Adriaan Swanepoel
Fiona Tse
Jake van der Merwe
Hendrik van Niekerk
Brendan van Schoor
Johan van Staden
Channel Zietsman

2006

Departments visited

Agricultural Economics
Biochemistry
Botany
Chemistry
Genetics
Geography, Geoinformatics & Meteorology
Mathematics
Physics
Plant Pathology
Tswaing Crater (Geology & Plant Science)
UP Farm (Animal Science, Plant pathology & Plant production)
Zoology & Entomology

"Goodness gracious, the mathematics was amazing! They are really clever. From encrypting a crypto message to the counting technique was really interesting. I will make sure myself that nobody will ever again play the Lotto, because you have a 1/13983816 chance to win.".

Marike

SCI-ENZA

WETENSKAP IN AKSIE! HANDS-ON SCIENCE!

Visiting hours
Weekdays: 8:30 - 16:00
(excluding school holidays)

Contact & Bookings
Tel: (012) 420 2805
E-mail: scienze@up.ac.za

Group I Research Projects

Botany:	Devil's Claw: The People's Remedy
Bio-informatics:	Mutating Deca-alaninea
Chemistry:	Rockets!
Genetics:	Answering *Ophiostoma* questions: PCR and beyond
Geology:	Earthquakes and the Earth's interior
Mathematics:	Reading characters with Markov chains
Meteorology:	Temperature lapse rates in the atmosphere
Physics:	The flight of a Coke bottle!
Plant Pathology:	Practical Plant Pathology
Zoology:	Urban Birds – There's a pigeon on my stoep!

At Hydrotech

Science of Photography

Grade 12 Projects

The early days of photography
(from the camera obscura to a permanent image)
Black and white photography
(1850 1905: from glass plate to roll film)
Colour photography
(1905 1930: the science of colour film)
High speed photography
(1930 : Strobe photography)
Digital photography

The learners are waiting patiently for their cyanotype prints to develop in the sun.

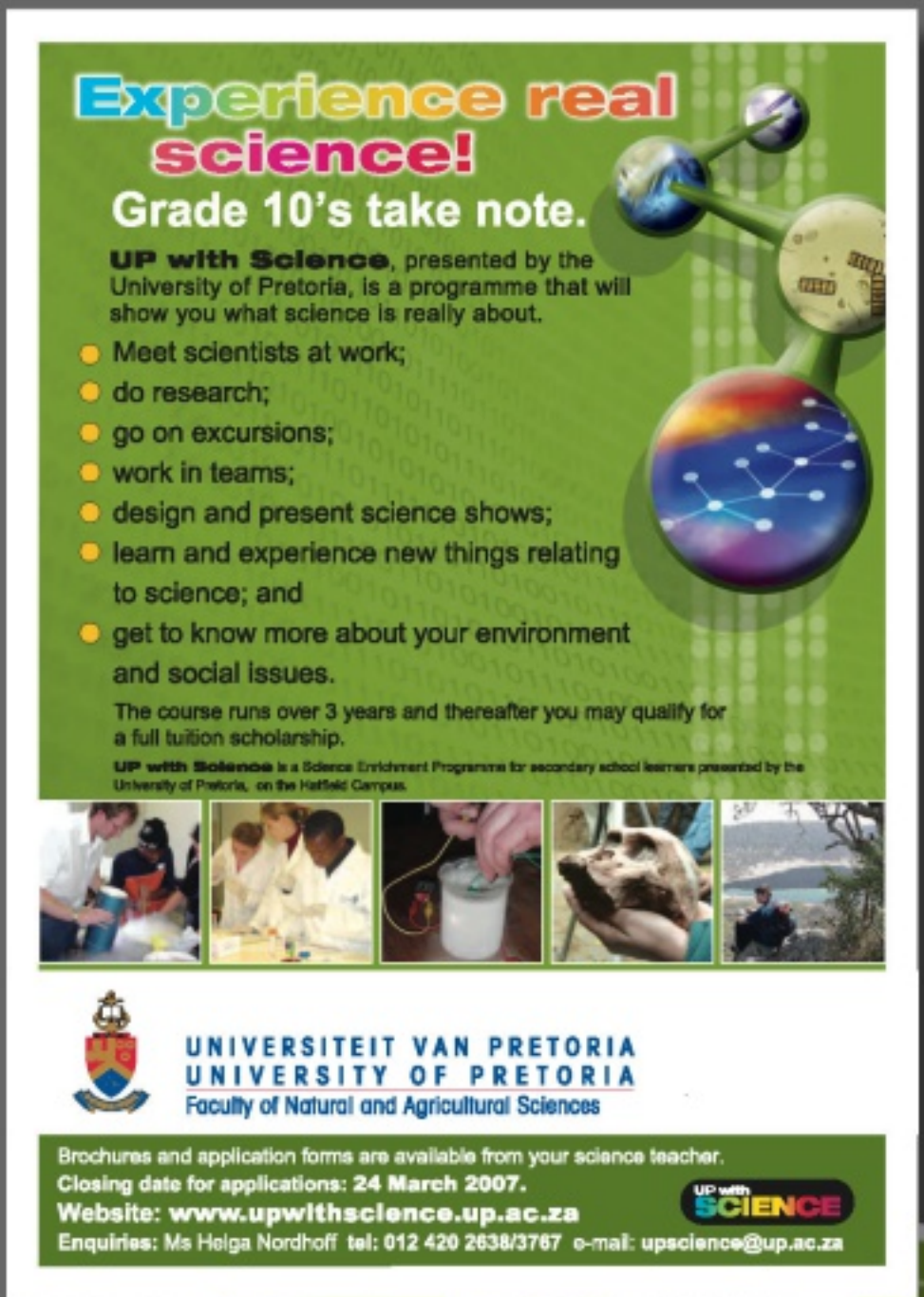
Group I (2006 intake)

Mohammed Akbar
Harriet Baloyi
Kevin Barnes
Andrea Beyers
Cathrin Bissbort
Marike Bogenhofer
Iris Bokaba
Rixaka Chabalala
Robert Conrad
Cameron de Bruyn
Romandi de Jongh
Sven Dressler
Chantel du Raan
Reinette Ebersohn
Camilla Essop
Bernard Haasbroek
Nasreen Hamdulay

Malcolm Howse
Tineil Hurter
Raeesa Jeewa
Michael Koroma
Tebogo Machaka
Lethabo Maela
Portia Makhubedu
Tshegofatso Malatsi
Shoki Maleka
Duncan McDougall
Musa Mmotsa
Oarabile Mogase
Mmaphoko Mohlake
Laura Motiang
Thabiso Mwale
Monique Nieuwoudt

Naailah Parbhoo
Alex Pearce
Khanya Qabaka
Grace Radingoana
Safiyyah Razak
Roberto Rocha
Wilhelm Schönfeldt
Kabelo Sebothoma
Mmamagase Shaku
Sizongoba Sonny
Ryan Swart
Elna Swart
Diner Thipe
Karabo Tlaka
Marquerit van der Merwe
Tildie van der Westhuizen
Lourens Yzel

2007



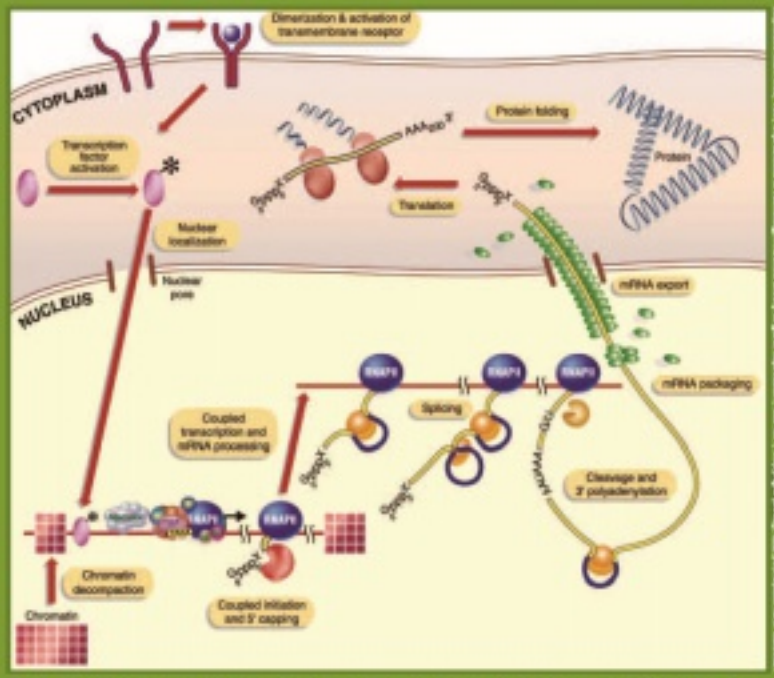
Departments visited

Agricultural Economics
Animal and Wildlife Sciences
Chemistry
Food Science
Genetics
Geography (Meteorology)
Geology
Mathematics
Physics
Plant Production & Soil Science
Tswaing Crater (Geology & Plant Science)
Zoology

"Everytime I learnt something new that I could apply in my school work. I also have a broader general knowledge; from learning about bats to doing a PCR test which helped me in biology."

Anelle

The Central Dogma of Molecular Biology DNA to RNA to Protein



Bioinformatics and Computational Biology Unit

UP with SCIENCE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
Faculty of Natural and Agricultural Sciences

Photo Workshop, Exhibition sponsored by SAASTA

Group J
Research Projects

Botany:	*Spirostachys* Uncovered
Chemistry:	Natural soap - 'Natural' fragrances
Genetics:	A Forensic investigation into a minute world
Geology:	Colours in Minerals
Mathematics:	Deriving Kepler's laws of motion of planets around the sun
Physics:	Faraday's Law and a Basic Seismometer
Plant Pathology:	Practical Plant Pathology
Plant Production:	Impact of light quantity and quality on the morphology and physiology of spinach leaves

Visit to the Sterkfontein Caves and Maropeng

Group J (2007 intake)

Mary Aphane
Anelle Barnardt
Pierre Basson
Kerry Bodenstein
Zachariah Bundred
Precious Chauke
Romeo Chauke
Lauren Damm
Duane de Villiers
Reamogetse Gill
Murray Heymann
Tiani Janse van Rensburg
Loreal January
Christian Jooste
Thato Kgapola
Ofentse Khoza
Marona Koshane

Jan Lombard
Hlalefi Mabotha
Seitebaleng Makgai
Makgosi Maleka
Keena Marima
Johannes Moatatse
Nthabiseng Mogashoa
Magouta Mphahlele
Sibusiso Mtshweni
Lungile Nduna
Craig Neuper
Langa Nhlapo
Elsie Nolte
Muhammad Adil
Nurmahomed
Thamsanqa Nxele
Kobus Oosthuizen

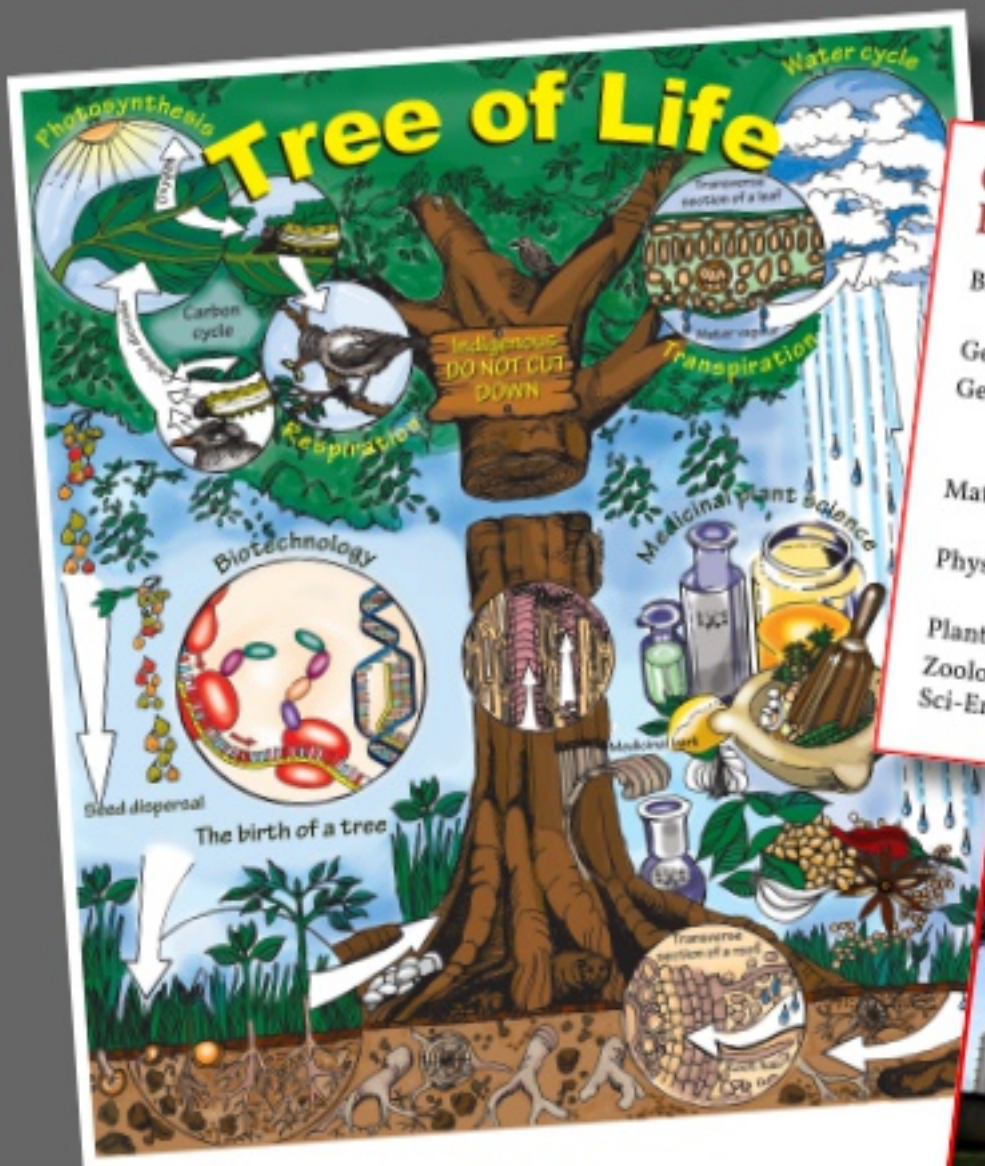
Jandré Potgieter
Jeanique Pretorius
Violet Rabalao
Merese Rocs
Esmeralda Sayagues
Safiyyah Seedat
Aubrey Seroka
Lerato Sewelo
Nthabeuseni Sigidi
Mafelo Sikhali
Salndave Skosana
Marike Snyman
Thabiso Tsamai
Clement Tshoba
Carla Ubbink
Ilne van Niekerk
Mylennie van Straaten

2008

Departments visited

Chemistry
Earth Sciences
Food Science
Genetics
Geography
Mathematics
Physics
Tswaing Crater
(Geology & Plant Science)
UP Farm
(Animal Science,
Plant pathology &
Plant production)
Zoology

"It was truly amazing to know more about the insects I always see around the world."
Nelisiwe



Group K Research Projects

Biochemistry:	The chaos and order when oil meets water
Genetics:	Funny mushrooms
Geology:	Factors controlling the development of textures during crystallization
Mathematics:	The mathematics of perspective
Physics:	The Electric Field Mill & Earth's Electric Potential
Plant Pathology:	Practical Plant Pathology
Zoology & Sci-Enza:	Amalulwane (Bats)

Solving the bat problem on the Groenkloof campus

Tree planting with GreenUP at Klapperkop and Groenkloof Nature Reserve

"I have learnt a lot from our mentors and it was an honour working with them. Helga, Puleng, Irene, Tumi and Nadine,
I'd like to say thank you, for your time, efforts and your smiles."

Kearabilwe

Group K (2008 intake)

Radiyyah Ahmed
Bianca Booysen
Justin Briggs
Jacques Cloete
Sulette de Villiers
Jaco Delport
David Dixon
Jadine du Plessis
Miranda Erasmus
Yasmin Gafoor
Annemi Goosen
J.W. Hurter
Fadila Ismail
Nisanne Janse van Rensburg
Chanel Liebenberg
Sfiso Mahlangu
Olivia Makhafola

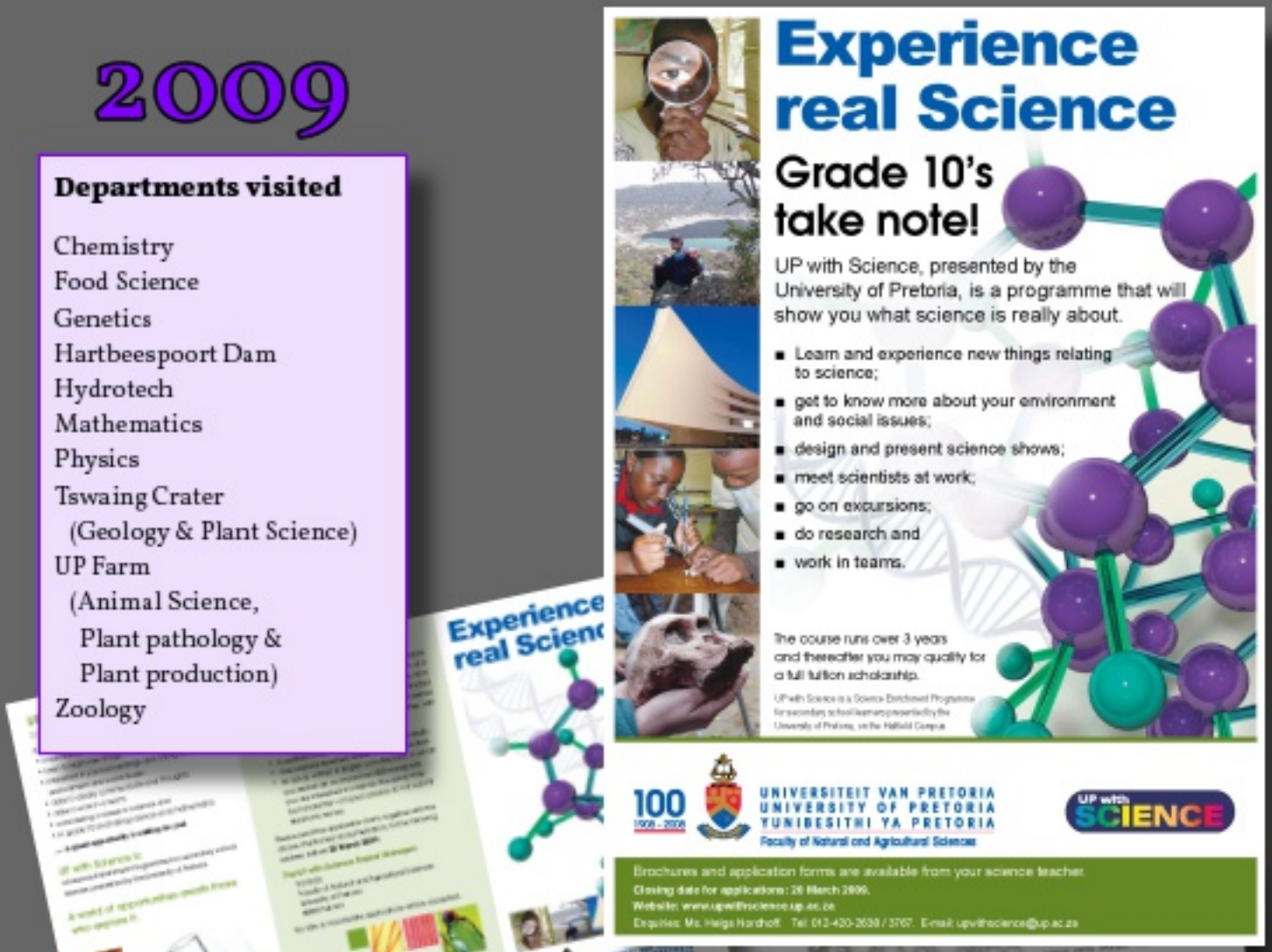
Charné Manten
Carla Maré
Evo Masango
Kamogelo Masupha
Christie Matsepe
Pamarin Meyer
Thabang Moeng
Itumeleng Mogoba
Irshaad Mokaddan
Matome Mokgetlhe
Mpho Molokomme
Amos Mosiane
Nanas Moyo
Nelly Mthimunye
Emanuel Naidoo
Kearabilwe Ngobeni
Fortunate Nkhwashu

Tahnee Otto
Tshego Pege
Emma Perridge
Daisy Ramantshwane
Louié Roux
Carlien Sadie
Prudence Sebothoma
Mpho Segoe
Candice Sharp
Keemetswe Shiang
Revelation Sithole
Hanaa Solomon
SriHari Swaminathan
Tshegofatso Tenehi
Anike Truter
Susan van Graan
Jandré van der Westhuizen

2009

Departments visited

Chemistry
Food Science
Genetics
Hartbeespoort Dam
Hydrotech
Mathematics
Physics
Tswaing Crater
(Geology & Plant Science)
UP Farm
(Animal Science,
Plant pathology &
Plant production)
Zoology



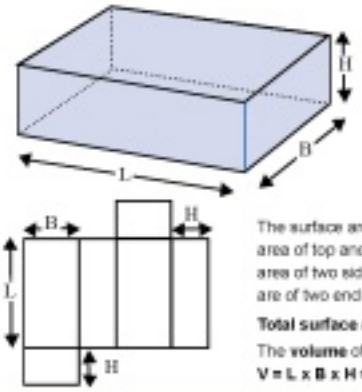
Group L Research Projects

Biochemistry:	Egg-straction, Ei-solation and Inn-Ova-tion
Genetics:	Murdered Biotech: Making a case for practical science!
Geology:	Igneous and Metamorphic Rock Forming Minerals
Mathematics:	Euler's formula for polyhedra
Physics:	The Physics of Stereoscopic Images
Plant Pathology:	Practical Plant Pathology
Plant Science:	Weedbusters: Taming the Lantana mOnster
Zoology & Sci-Enza:	Practical Zoology

With **Jeanne de Waal**,
one of the winners of the 2011 L'Oréal-UNESCO Regional Fellowships for Women in Science in Sub-Saharan Africa

Solids: Surface Area and Volume

Rectangular Prism

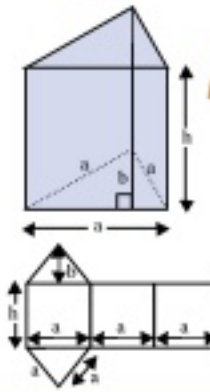


The surface area of a rectangular prism is:
area of top and bottom = 2 (L x B) plus
area of two sides = 2 (L x H) plus
are of two end pieces = 2 (B x H)

Total surface area: SA = 2 LB + 2 LH + 2 BH

The **volume** of a rectangular prism is:
V = L x B x H = LBH

Triangular Prism

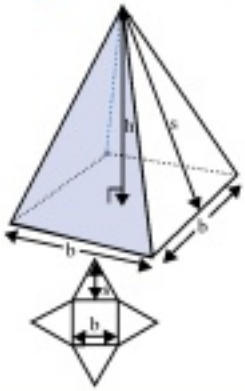


The surface area of a triangular prism is:
area of the three sides = 3 a x h plus
area of two end pieces = 2 x ½ a x b

Total surface area: SA = 3 ah + ab

The **volume** of a triangular prism is:
V = ½ abh

Square-based Pyramid

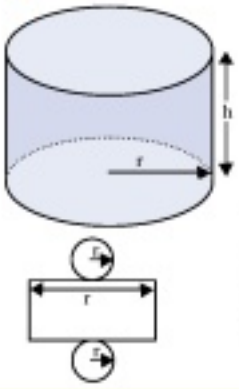


The surface area of a square-based pyramid is:
area of the base = b x b plus
area of four triangular sides = 4 x (½ b x s)

Total surface area: SA = 2 bs + b²

The **volume** of a square-based pyramid is:
V = ⅓ b x b x h = ⅓ b² h

Cylinder

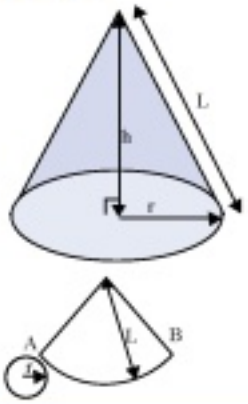


The surface area of a cylinder is:
area of the top = πr^2 plus
area of the bottom = πr^2 plus
area of the side = $2 \pi rh$

Total surface area: SA = $2 \pi r^2 + 2 \pi rh$

The **volume** of a cylinder is: **$V = \pi r^2 h$**

Cone



The length of arc AB = $2 \pi r$, the circumference of the base.
The curved surface area of a cone is: $\pi r L$ (where L is the slant height).
The base is a circle with the area: πr^2.

Total surface area: SA = $\pi r L + \pi r^2$

The **volume** of a cone is: **$V = \frac{1}{3} \pi r^2 h$**

Tips:

When working with surface area and volume, remember that:

length × length = area
length × area = volume
area × height = volume
area ÷ length = length
volume ÷ area = length
volume ÷ length = area

Formulas:

Some rules to help you when working with formulas for area or volume:

A formula, in which two lengths are multiplied, is for an area, for example l x h or r^2

A formula, in which three lengths are multiplied, is for a volume, for example l x b x h or r^3

100
1908 - 2008

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and Agricultural Sciences

Department of Mathematics and Applied Mathematics

- Mathematics
- Applied Mathematics
- Financial and Actuarial Mathematics

Phone: 012 420 2520
E-mail: maths@up.ac.za
Website: www.up.ac.za/maths

Removing aliens from the Innovation Hub koppie with GreenUP

Group L (2009 intake)

Hina Abdul Ghaffar
Sarah Adam
Thabo Aphane
Lee Bonehill
Chani Brits
Camille Castelyn
Sipho Congolo
Jaco De Lange
Eugene Duvenage
Dorett Erasmus
Martinus Green
Carli Grobbelaar
Nadia Grundlingh
Miznah Haji Abdul Karim
Marjeanne Hamman
Farhanaaz Ismail
Josua Joubert
Ya'eesh Khan
Kelefilwe Kungwane
Margaret Mabeleng
Elizabeth Mahlaola

Molebogeng Makgaka
Bafana Malatsi
Nabeela Mansoor
Thapelo Marema
Annah Mashego
Karabo Mathosa
Tregy Mokhabela
Nkamogeleng Mothobi
Lettah Mpayi
Mafori Mphahlele
Renée Myburg
Tebogo Ndala
Ndikhoda Nemutanzhela
Kagiso Nkwana
Thuso Ntamu
Tshegofatso Petje
Estian Rademeyer
Kgosithebe Sebeela
Sewela Selahla
Serena Shunmugam
Mpho Sitoe

Kenneth Skosana
Aqueel Tayob
Mohloagae Tsiane
Jason van den Oever
Angelique van der Westhuizen
Louis van der Westhuizen
Bianca van Rooyen
Ernest Yzel

"The day ended off on a high note, as we were taken on an excursion to the farm. I managed to learn a lot of interesting facts about cows and sheep and was amazed to see the size of the cows. (They are a different breed, not the ones we get on our farms)."

Farhanaaz

Harties, Metsi a me - "My Water"

Biological Remediation Programme

'UP WITH SCIENCE'
verryk leerders en gemeenskap deur kennis en onderrig

Helga Nordhoff

Tukkie

Article in the 'TUKKIE'

2010

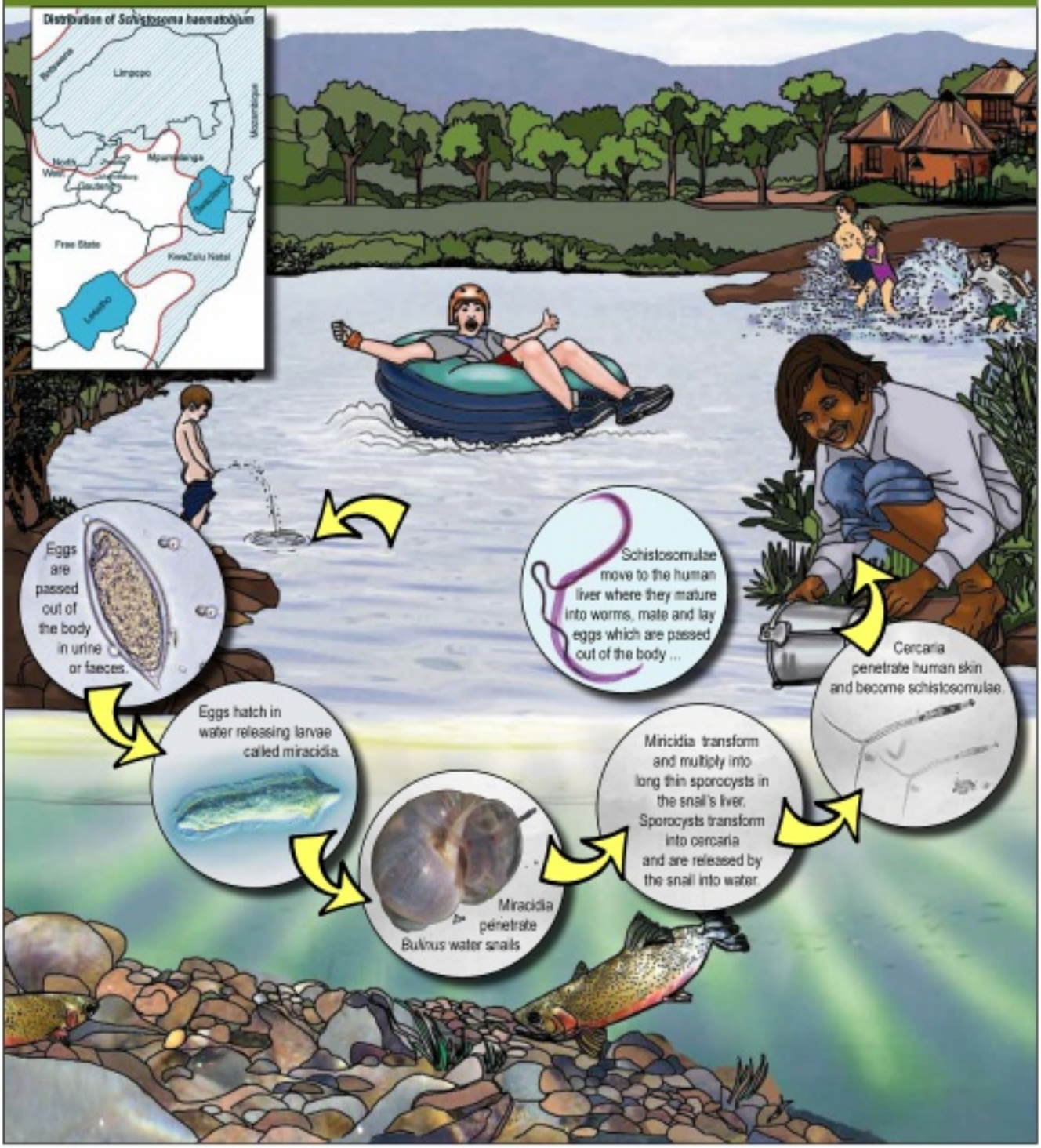
Departments visited

Agricultural Economics
Chemistry
Food Science
Genetics
Geography, Geoinformatics & Meteorology
Human Physiology
Mathematics
Physics
Tswaing Crater (Geology & Plant Science)
UP Farm (Animal Science, Plant pathology & Plant production)
Zoology

Group M Research Projects

Animal and Wildlife Science:	Milk goats for prevention of protein malnutrition in children in South Africa
Biochemistry:	Egg-straction, Ei-solation and Inn-Ova-tion
Environmental Sciences:	TAP that (A closer look at bottled water)
Genetics:	Fun with Fungi: DNA, PCR, Barcoding and Biodiversity!
Geology:	Geology as a driving force in creation and shaping the Earth
Mathematics:	The Matrix and the Symbol
Plant Pathology:	Plant Health is Life – Too Hot to Handle?
Physics:	Understanding Energy
Plant Science:	GM Maize: Do you know what you are eating?

The Life Cycle of Bilharzia (Schistosoma)



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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and Agricultural Sciences

Department of Zoology and Entomology
Contact: Prof. Sue Nicolson 012 420 3233 E-mail: swnicolson@zoology.up.ac.za Website: www.up.ac.za

Communicating Science
with Pixton Comics

The UP with Science group visited "Dialogue in the Dark" at Sci Bono; an experience that provided a better understanding about the real life situation of blind people.

Assignment:
Create a Pixton comic about a 'Green Living' related topic. The main message of your comic should encourage the readers to change their life styles.

"Except for the science, I learnt to interact with diverse groups and learnt people skills that I would not have gotten anywhere else."

Liezl

Group M - Murray & Roberts

(2010 intake)

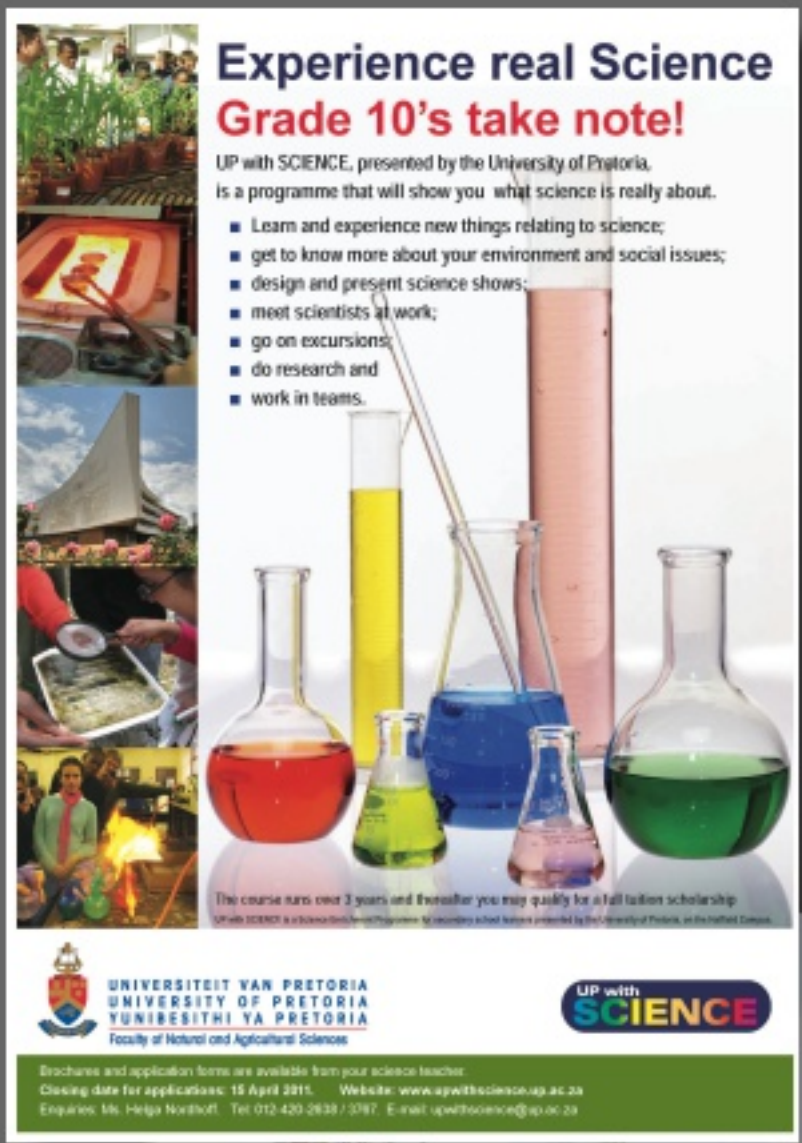
Fatima Aboo
Kgothatso Baloyi
Kyle Benkenstein
Brenton Bester
Muhammad Carrim
Jean-Dré Crouse
Kyereba de Heer Menlah
David de Lancey
Annemarie de Wet
Mari du Plessis
Liezl Ferreira
Marnus Ferreira
Janice Geel
Monique Gerber
Kathleen Godfrey
Nadia Gordon
Caroline Hannweg
Jacqueline Henning
Chloe Howell
Baatle Kgosiemang
Benjamin Kheitsane

Randy Khoele
Gregory Laycock
Charity Mabona
Gregory Makama
Lailan Malan
Phenyo Mapotse
Given Matjeke
Terrence Methula
Elias Mndebele

Murray & Roberts

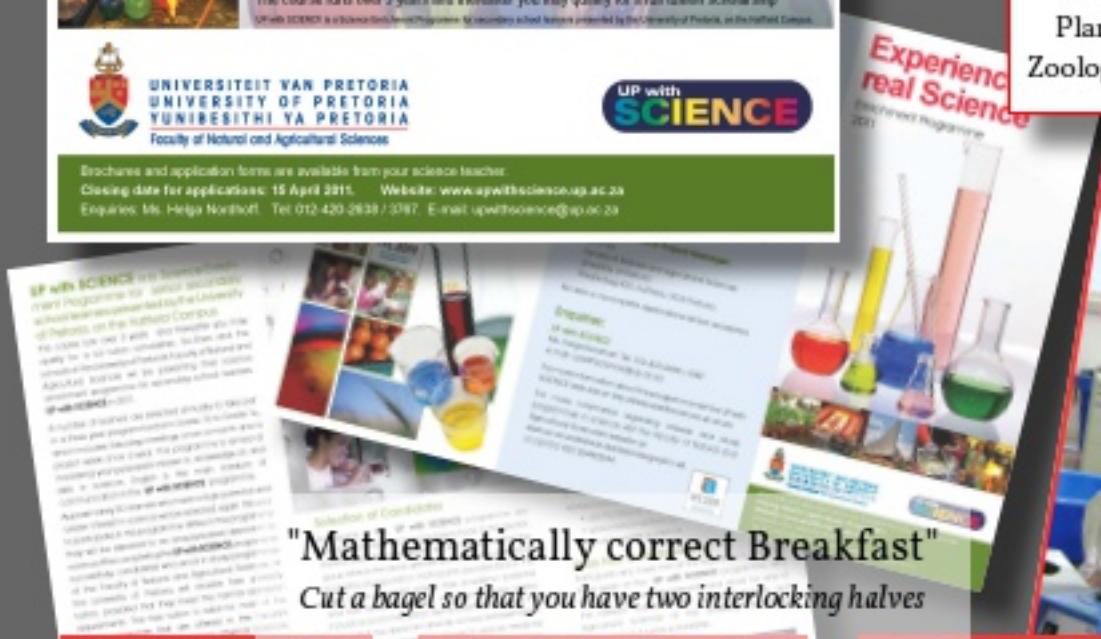
Nkgameleng Mokhonoana
Boipelo Molebale
Kutlwano Mswetsa
Amina Muhammed Akoo
Odirile Ntshudisane
Ruani Oberholzer
Christina Panayotakis
Kgaogelo Photoane
Jokobina Qambela
Brendan Quinn
Mapule Rantlha
Danielle Scheepers
Richan Schwellnus
Lesego Seabi
Goratileona Sekudu
Koketso Shuping
Marko Svicevic
Lona Taba
Elizabeth van der Westhuizen
Gina Wilkins

2011



Departments visited

Agricultural Economics
Biochemistry
Chemistry
Electron microscope
Food Science
Genetics
Geology Museum
GIS
Mathematics
Microbiology
Physics
Tswaing Crater
(Geology & Plant Science)
UP Farm
(Animal Science,
Plant pathology &
Plant production)
Zoology



2011 International Year of Chemistry

IYC 2011
International Year of
CHEMISTRY

Marie Sklodowska Curie
Polish-born French physicist and chemist.
(7 November 1867 – 4 July 1934)

Marie Curie was a pioneer in the field of radioactivity and she discovered the elements polonium and radium.

She was the first female professor at the University of Paris and the first woman to be awarded a Nobel Prize. In 1903 she, her husband Pierre Curie and Henri Becquerel jointly received the Nobel prize in Physics. A hundred years ago, in 1911, Marie was awarded the Nobel Prize in Chemistry.

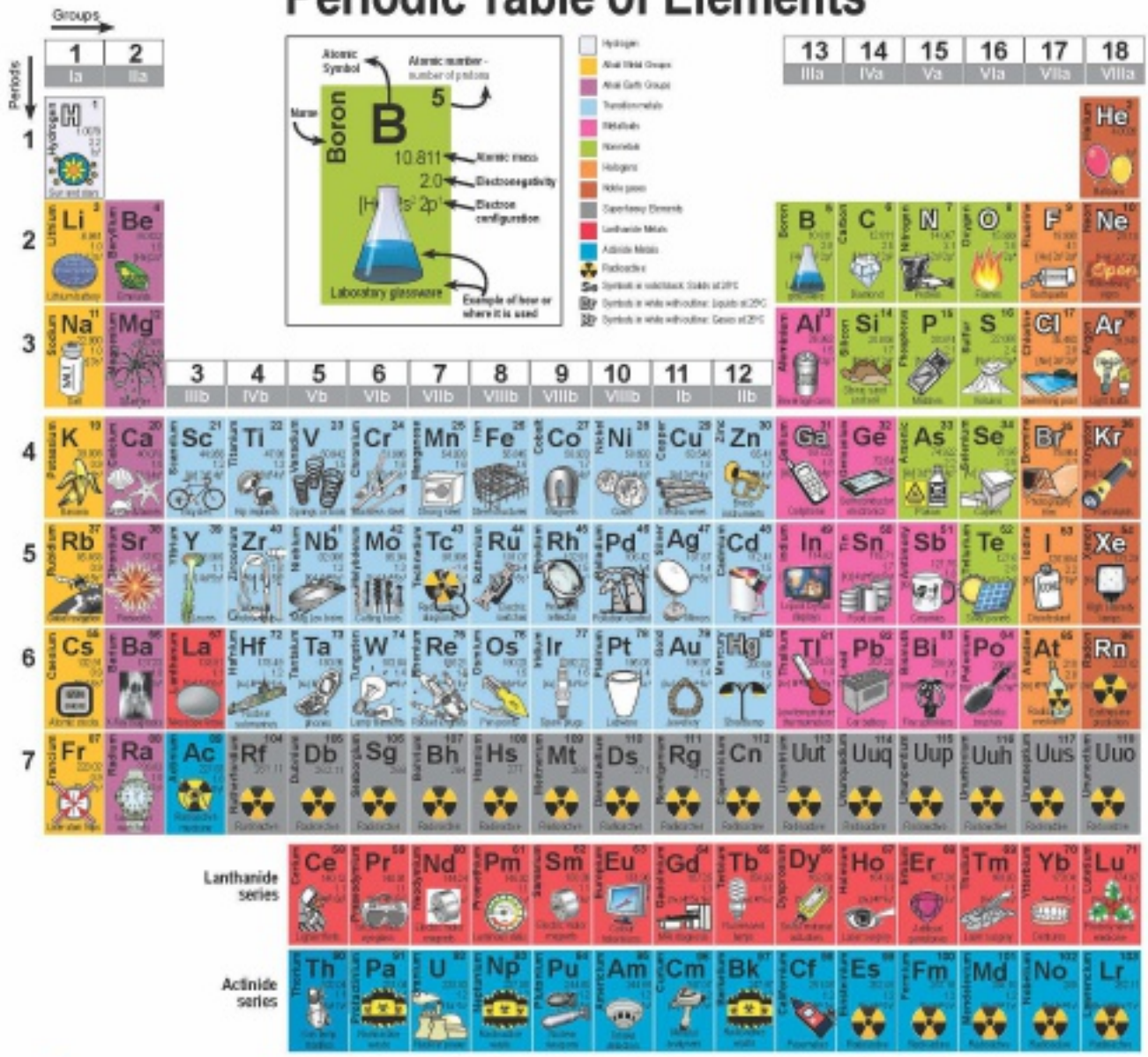
Curium (Cm), synthetic element 96, was named after Marie and Pierre Curie.

Dmitri Ivanovich Mendeleev
Russian chemist.
(8 February 1834 – 2 February 1907)

Mendeleev was one of the first to notice that elements showed regular repeating properties if they were listed according to their atomic mass. His "periodic table of elements" is regarded as the backbone of modern chemistry.

Mendelevium (Md), element 101, was named after him in 1955.

Periodic Table of Elements



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Faculty of Natural and Agricultural Sciences

Department of Chemistry
Contact: Prof Egmont Rohwer 012 420 2512. E-mail: egmont.rohwer@up.ac.za. Website: www.up.ac.za

Elemental card game

Group N Research Projects

Biochemistry:	Biochemistry and the business of Tuberculosis
Genetics:	Microbe Mythbusters: Fungi vs Bacteria
Geology:	Who's your daddy?
Mathematics:	Solving best-path problems with simple calculus
Plant Pathology:	Practical Plant Pathology
Physics:	Simulating and measuring projectile motion
Plant Science:	Antibiotics from natural origin
Zoology:	Invertebrate biodiversity on campus

Challenges & Rewards

"I have understood my strengths, weaknesses and where my interest in science lies."
Thandeka

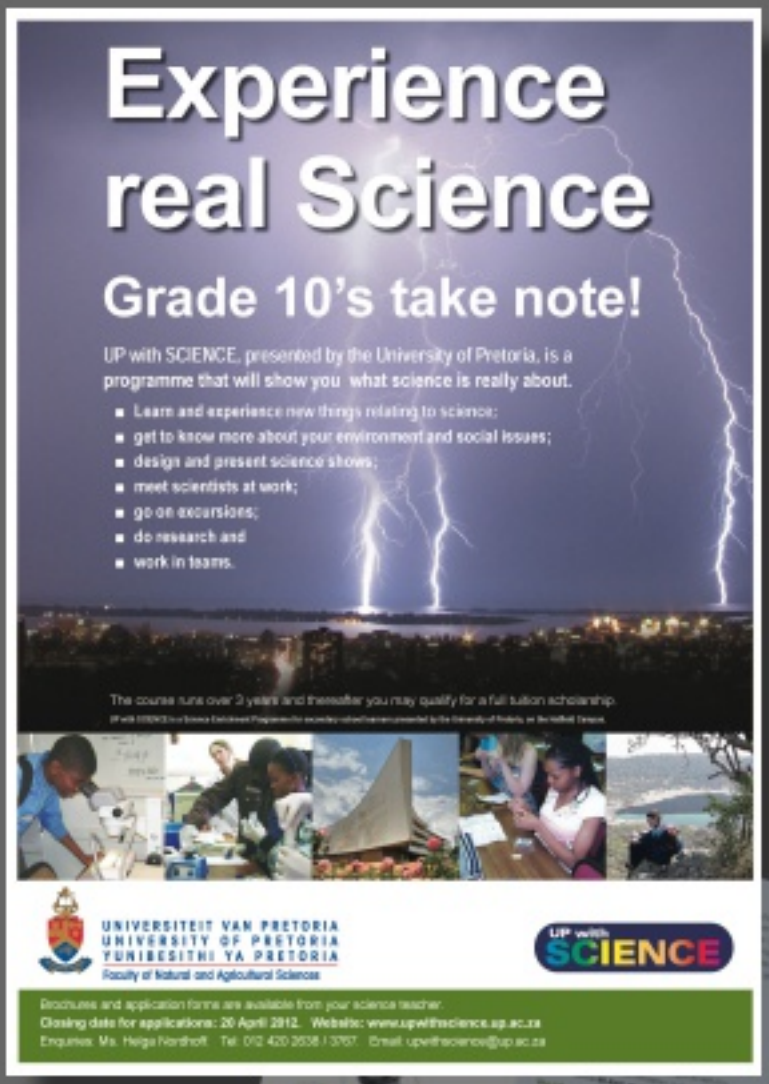
Group N (2011 intake)

Thandeka Babedi
Jessica Bender
Karen Bezuidenhout
Bennie Botha
Hanco Britz
Zukisani Charleman
Jason Cloete
Johan Coertze
Elmien Coetser
Zaleekhah Dawood
George de Kock
Alexander de Koning
Duncan Dean
Morongwa Dikotope
Marnus Els
Luveshnie Gounden
Nonhlanhla Hlope

Ashley Jones
Petrus Joubert
Miché Kannemeyer
Marisca Lindford
Lucia Makinta
Raymond Malema
Mathabo Masemola
Boikanyo Matsha
Lungile Mbazima
Success Mbonde
Emily-Rose Miller
Ofentse Mogoatlhe
Neo Moima
Dineo Mokone
Kgomotso Motshoane
Tebogo Mphelo

Nompumelelo Mthimunye
Khani Mukansi
Damon Munday
Zamokuhle Nkosi
Hildsley Noome
Annette Opperman
Shannon Parker
Tshifiwa Ramaleba
Quintin Retief
Johannes Sekgabi
Alphie Shikwambana
Sanele Sibeko
Nqobile Sibiya
Capathia Skhosana
Zanne Terry
Tshegofatso Thipe
Harshan Vallabh

2012



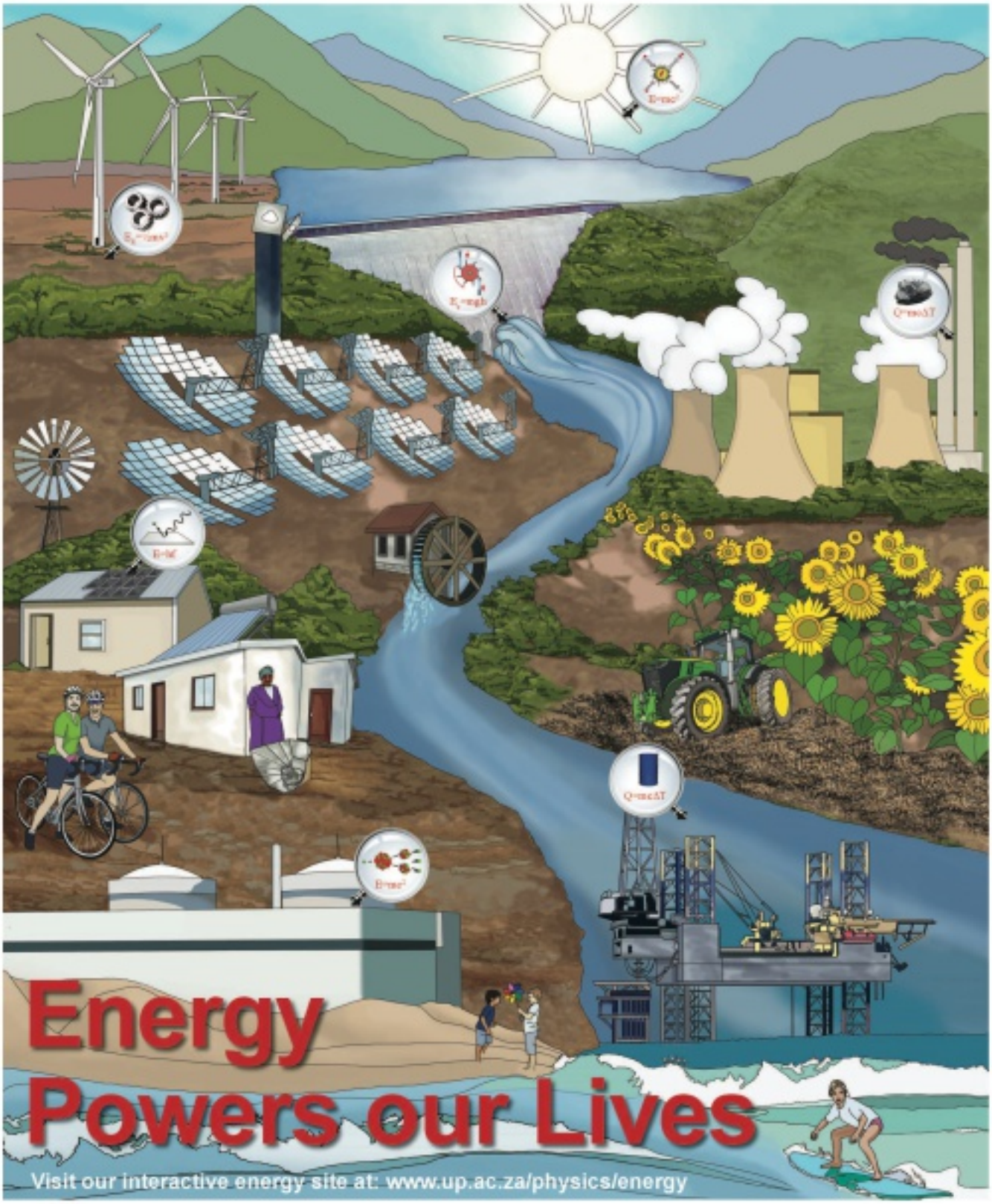
Departments visited

Agricultural Economics
Biochemistry
Chemistry
Food Science
Genetics
GIS
Mathematics
Microbiology
Physics
Plant Pathology
Soil Science
Tswaing Crater
(Geology & Plant Science)
UP Farm
(Animal Science,
Plant pathology &
Plant production)
Zoology (and visit to the Zoo)

Biochemistry
Prof Verschoor
at his best

"The Professor touched a sensitive point when he brought up the connection between God and the Big Bang theory; this was very interesting, because this topic started a lively debate which continued long after the end of the lecture.."

Megan



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Faculty of Natural and Agricultural Sciences

Department of Physics, 1912 - 2012, Centenary Celebration.
Contact: Prof Chris Theron. Tel: 012 420 2455 Website: www.up.ac.za/physics

Group O Research Projects

Biochemistry:	Being positive about attracting germs: Development of a germ biosensor
Chemistry:	Water Quality and Environmental Health
Genetics:	Mighty bacteria in a civilized world
Geology:	Mapping rocks
Mathematics:	The Monty Hall puzzle and related mathematics
Plant Pathology:	Evaluating virulence of selected plant pathogens and induction of plant resistance by plant growth promoting rhizobacteria
Physics:	Physics in a Flash
Plant Science:	Doing it nature's way: sterilization of the beast *Lantana camara*
Zoology:	Campus from the Ground UP: Small Things that Run the World

Visit to the CSIR

Nanotechnology
Wind tunnel
Laser Centre

"The wind tunnel that involved aeronautics was the most interesting part of the excursion for me. The wind tunnel which was massive was very intriguing and I thought the prototypes were quite cool. I also learnt how fast moving air will exert high pressure on an aircraft once it is airborne."

Matthew

Group O (2012 intake)

Nkateko Baloyi
Stephanie Bender
Dirk Bodenstein
Ammarah Cassim
Na'eem Davis
Shane de Beer
Joanel de Clerck
Olivia de Kock
Megan Fowlds
Francois Groenewald
Eric Heyl
Itumeleng Kola
Kaamilah Joosub
Kirsten Knoll
Andrij Kocur
Moakedi Kola
Juan-Pierre Kotzé

Shalona Krishna
Vraschik Lalla
Charlene Lau
Marinda le Roux
Gerhard Maré
Nkabaneng Marule
Tshepiso Masango
Matthew Mashava
Mathew Mashiga
Keneilwe Mathe
Karabo Mathebula
Pheladi Mokoena
Kealeboga Mothusi
Lucender Motsoene
Ayanda Mthimunye
Sachin Narsai
Katlego Ncube

Kagiso Ngale
Promise Ntuli
Rubendri Pillay
David Pym
Michél Robbertse
Celeste Ryan
Renate Schoeman
Simon Scholtz
Izahn Schönken
Obakeng Sepeng
Dhivyaa Swaminathan
Morné van Biljon
Heinrich van Deventer
Danielle van Wyk
Nesrae Williams
Lethabo Zwane
Lindo Zwane

Experience real Science

Grade 10's take note!

UP with SCIENCE, presented by the University of Pretoria, is a programme that will show you what science is really about.

- Learn and experience new things relating to science;
- get to know more about your environment and social issues;
- design and present science shows;
- meet scientists at work;
- go on excursions;
- do research and
- work in teams.

The course runs over 3 years and thereafter you may qualify for a full tuition scholarship.

UP with SCIENCE is a Science Enrichment Programme for secondary school learners presented by the University of Pretoria, on the Hatfield Campus.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and Agricultural Sciences

UP with SCIENCE

Brochures and application forms are available from your science teacher.
Closing date for applications: 10 April 2013. Website: www.upwithscience.up.ac.za
Enquiries: Ms. Helga Nordhoff Tel: 012 420 2638 / 3767 Email: upwithscience@up.ac.za

2013

Departments visited

Agricultural Economics
Biochemistry
Chemistry
Consumer Science
Electron Microscope
Genetics
Geology Museum
Mathematics
Microbiology
Physics
Tswaing Crater
(Geology & Plant Science)
UP Farm
(Animal Science,
Plant pathology &
Plant production)
UP Nutrilab
Zoology

Physics
Liquid Nitrogen
and
Instant Ice Cream!

"It was a long yet interesting day at Physics. A lot of things have been clarified for me about physics; what you can study at university and what you can do for your country and the world.."
Kgaogelo

YOUR FUTURE CAREER IN PLANT PATHOLOGY

In Plant Pathology, students are trained as specialists in plant health. To keep plants healthy, they study organisms that cause diseases, how plants are affected by pathogens, and how plant diseases can be controlled. With this knowledge, they are able to help growers to produce healthy, safe and nutritious plants for retailers, food manufacturers and exporters.

CAREER OPPORTUNITIES

Becoming a Scientist:
Do experiments in the lab or field using basic or molecular methods.

Researcher:
Performs experiments and provides technical support to research teams.

Procurement agent, risk assessor:
Works for big retailers or government dealing with risk assessment and quality management.

Auditor/ Inspector or regulator:
Inspects import or export food or plants for international quality and safety standards.

Lecturer:
Teaches courses at university or technikon level.

Senior executive level :
CEO, marketing manager, quality manager, etc. at a biotechnology firm, agricultural farm, agrochemical- or fertiliser company, retailer or exporting company.

Consultant:
Advises large estates, farmers, retailers, exporters or agricultural businesses.

PLANT PATHOLOGY CAREER

Doctoral Degree

Masters Degree

BSc (Agric) Plant Pathology

Subjects included in your undergraduate degree:

- Introduction to crop protection
- Principles of plant pathology
- General plant pathology
- Plant disease control
- Host-pathogen interactions
- Plant pathology research project
- Advanced plant disease control
- Current concepts in plant pathology

UNIVERSITY

Matric

- 50-59% Afrikaans/English
- 50-59% Additional HSC Language
- Physical Science
- Mathematics

(60-69% for one of the two subjects, 50-59% for the other subject)

- 50-59% Two other HSC subjects

Grade 10

- Physical Science
- Mathematics
- 2 Other subjects (preferably one of the subjects should be Biology)

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Where can I obtain more information?

Phone Prof Lise Korsten at 012 420 4097 or send an email to lise.korsten@up.ac.za for further inform

Group P Research Projects

Biochemistry:	Crowd-sourcing the collective consciousness to cure cancer
Chemistry:	Water Quality and Environmental Health
CTHB:	What's in a tree?
Geology:	Geology rocks
Mathematics:	The quickest path from A to B
Plant Pathology:	The Vegetable Garden and Plant Pathology
Physics:	The Radio Universe
Plant Science:	What did your steak have for lunch?

Zoology
Scorpions, Snakes, Spiders and other Scary Creatures

Consumer Science
In the kitchen!

Geography
First lessons in surveying!

Group P (2013 intake)

Jessica-Amori Ackron
James Adam
Ashraf Aly
Kaylen April
Nawaaz Babamia
Rian Badenhorst
Thokozile Bapela
Ashiya Darki
Felicia Dhlewayo
Tasmia Gani
Le-lani Janse van Rensburg
Leané Joubert
Ayesha Khan
Morné Kloppers
Alicia Koekemoer
Ruan Kruger
Walt Laurence

Thabang Lesufi
Lexi Ligeti
Nokukhanya Magagula
Joëlle Mandile
Sharon Mashishi
Onthatile Masombuka
Johannes Matsimbi
Kgaogelo Mohlala
Kgomotso Mosupyoe
Brent Nel
Otsile Ngale
Khanyisile Ngcobo
Katie Ngobeni
Serelle Odendaal
Jessica Olivier
Jován Otten

Gopika Ramkilawon
Boitshoko Rammuki
Kaylan Reddy
Marion Reynolds
Taylor Schürmann
Thabang Seabi
Mmathabang Sekoala
Pretty Serumula
Charles Sithole
Wayde Thomas
Jeanette Tshehla
Renske van Rooyen
Zelda van Staden
Marlise van Tonder
Fernando Ventura
Nadia Verster
Carien Visser

jT
juniorTukkie

Articles in the JuniorTukkie Magazine

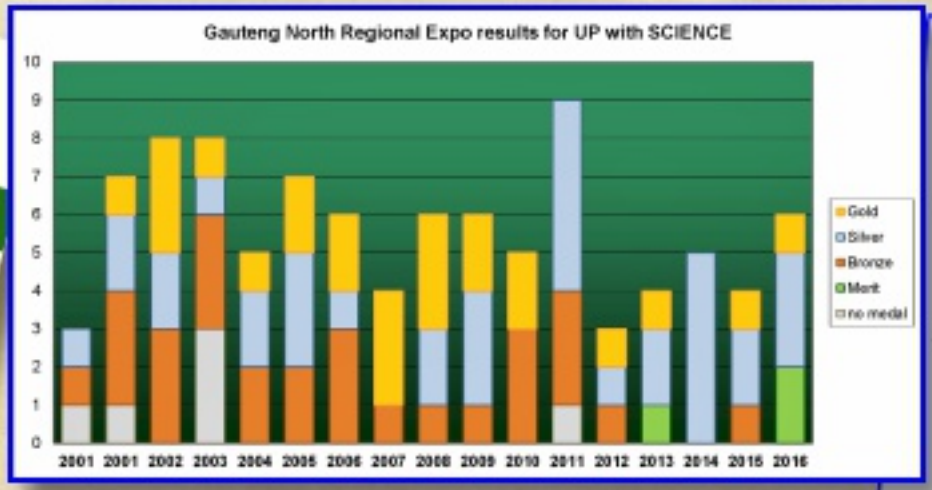
JuniorTukkie and UP with Science have collaborated for many years, but since 2013 the Grade 11 UP with Science learners have participated in the Empowerment Week and from 2015 UP with Science received financial support from JuniorTukkie.

Expo


Walter with Sadika & Zuleikha (2003)

UP with Science learners are encouraged to enter the Northern Gauteng Science Expo and their projects generally do very well. The graph below shows the medals their projects have received in the last sixteen years.

Often projects are selected for the National Expo and occasionally they get the opportunity to represent South Africa at an International Science Fair.



UP with Science projects at the National Science Expo

2000 Eating habits of African teenagers and adults in Pretoria
(Represented South Africa at the International Expo in France)

2001 Heavy metal absorption by plants
(Jacqueline Meyer & Rethabile Mohapi)

Taxonomy and distribution of medically and agriculturally important rodents
(Manuel Goncalves, Lerato Mabena & Kenosi Rapoo)

Walk through time
(Jacob Modiba & Gloria Shabangu)

The effect of temperature and the resistivity of semi-conductors and conductors (metals)
(Moses Mokwena, Bongile Nethanando & Cynthia Tjatji)

2008 Newton, Kepler and simulating orbits
(Johannes Moatatse & Muhammad Adil Nurmahomed)

2010 Taming the Lantana Monster!
(Sipho Congolo & Eugene Duvenage)

2012 Simulating and measuring projectile motion
(Nqobile Sibiya & Harshan Vallabh)

2013 The Monty Hall Problem and Related Mathematics
(Na'eem Davis & Izahn Schönken)

2016 Bacterial community structures in South African dams
(Jacqueline Janse van Rensburg & Zamazimba Madi)

Nqobile & Harshan

Izahn & Naeem

2014

Departments visited

Agricultural Economics
Biochemistry
Chemistry
Consumer Science
Food Science
Genetics
Geography, Geoinformatics & Meteorology
Hydrotec (In2Food)
Physics
Plant Pathology
Tswaing Crater (Geology & Plant Science)
UP Farm (Animal Science, Plant pathology & Plant production)
Zoology

"The science show was my favourite of all the activities as I was able to give back to the community what I have learned. It opened my eyes to the sad truths that many people face and motivated me to be part of the change I want to see in the world.."

Ebrahim

INSECTS AND MICROBES

a tree's friends or foes?

Some insects have brightly coloured larvae, sometimes called caterpillars. Caterpillars are eating machines! The Poplar Emperor Moth eats the leaves of Camel's Foot and the Common Coral Tree, as well as oaks, poplars, eucalypts, Black Wattle and pine trees. Without leaves the tree can't carry out photosynthesis and convert atmospheric carbon dioxide to sugar and oxygen which it needs to live.

Pollinators carry pollen from the male part of the flower (the anthers) to female part of the flower (the stigma) to fertilise the plants. Without being fertilised the plants can't make seeds which grow into new plants. Without bees there would be no trees!

The larvae of some wood boring insects live inside the trunk of the tree where the xylem and phloem that transport water and nutrients are found. The larvae eat the wood and make burrows called galleries. These galleries prevent movement of water to the trees leaves. A famous wood boring insect in South Africa is the woodwasp *Sirex noctilio*, which kills trees to grow plantations.

It can be difficult for plant roots to get food from the soil, but it's a lot easier for fungi. These mycorrhizal fungi, like *Amanita*, are found growing on the roots and help the plant get what it needs to live out of the soil. When you see mushrooms, that's the fungus growing on the outside of the tree, the rest is growing on the roots.

Some fungi are parasites of trees, like the fungus *Armillaria* which lives on the roots of trees and causes them to rot. Some species of this fungus are thousands of years old and so big that they are measured in square kilometres (the biggest is 8 km^2!), but you can't see them because they live on the roots under the ground. The mushrooms you see are the fungus growing above ground.

Nitrogen is an essential element for life. People get nitrogen from eating protein, but plants can only get it from the air, which is not easy! To do this they need the help of special nitrogen fixing bacteria like some species of *Rhizobia*. These bacteria live in special nodules on the roots and give the plants nitrogen in exchange for food and a place to live.

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tpcp Tree Protection Co-operative Programme

CTHB DST-NRF Centre of Excellence in Tree Health Biotechnology

FABI

Contact details:
Ms Heidi Fysh (CTHB Administrator). Tel: +27 (0)12 420 3855. Email: heidi.roos@fabi.up.ac.za or FABI web-page http://fabinet.up.ac.za

Plant Science

Making tone gel cream with *Greyia flanaganii*

Plant science. As soon as we were informed that we were going to be making a cream I was certain that no face shone brighter than mine because it had been my childhood dream to be able to create my very own product. It was great fun mashing leaves, measuring the chemicals so that they were spot on and continually stirring as the cream magnificently thickened."

Ummi

Group Q (2014 intake)

Ebrahim Ahmed
Amogelang Baloyi
Stefan Beukes
Meyer Botha
Alex Bruhns
Koketso Chabalala
Thato Diale
Evadné Engela
Mario Ervedosa
Renaté Grobler
Roenita Grové
Carla Hollamby
Jireh Janse van Rensburg
Tiego Kau
Fatima Khan
Jared Khayyam
Juline Magwaza

Khanyisile Mahlangu
Thabisile Mahlangu
Reabetswe Maifadi
Sibongile Mandlati
Lourenço Marques
Tebogo Mogase
Resego Molele
Botlhale Moobi
Neo Motloutsi
Reratile Motsaathebe
Ripsiy Mvulane
Adri Nel
Gcina Nkomzwayo
Naledi Nkwanyana
Monja Nortje
Clarice Odendaal

Christo Opperman
Alainah Parker
Ifrah Rage
Lize Reinecke
Tamara Ricci
Deane Roos
Hajira Sikander
Wendy Simelane
Vrishti Singh
Ryno Smith
Lesego Sono
Nadia Strydom
Marissa Swart
Tsholofelo Tshenkeng
Alexander van Heerden
Bjorn Venter
Wihan Wampach

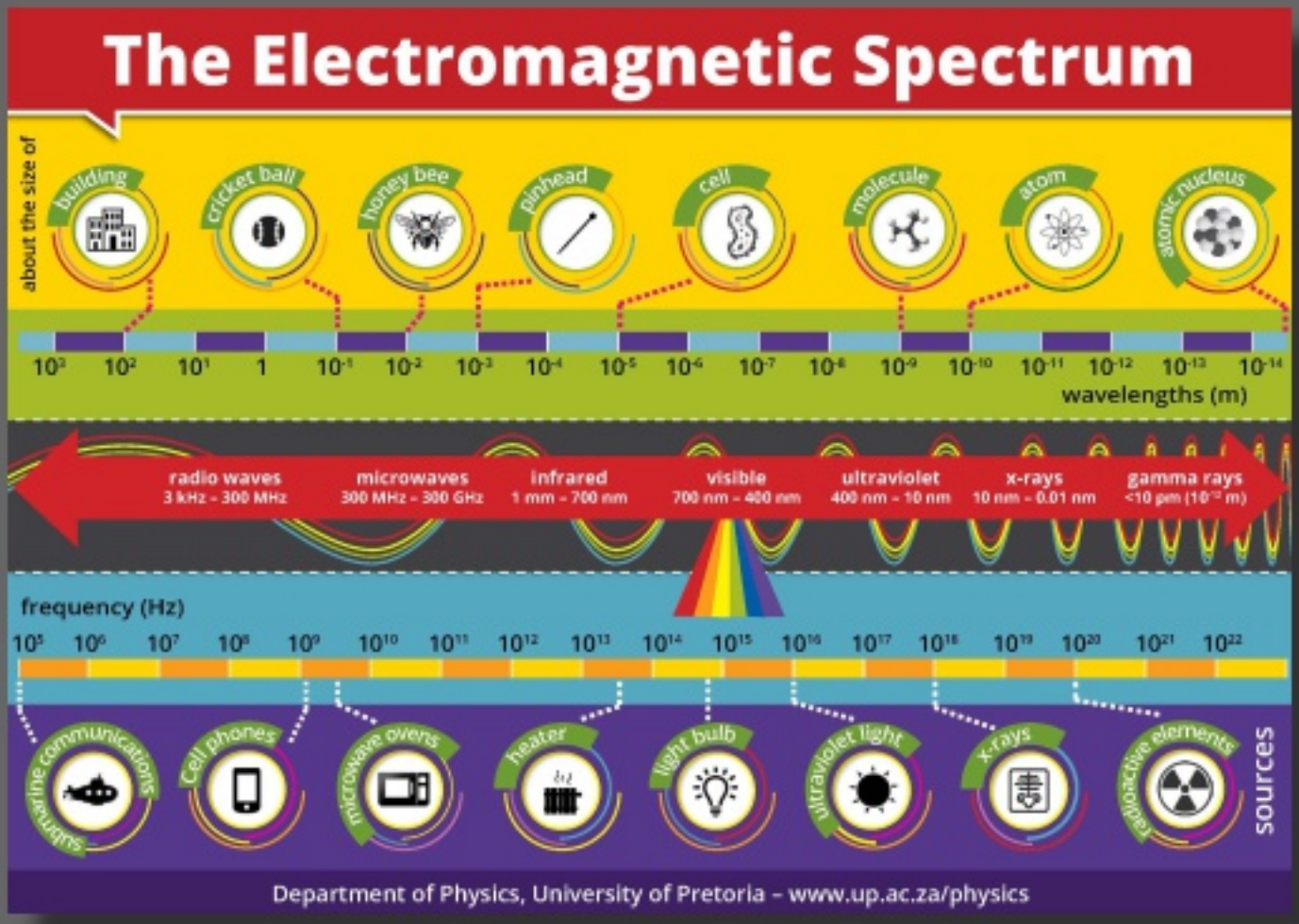
2015

Departments visited

Agricultural Economics
Biochemistry
Centre for Tree Health and Biotechnology (CTHB)
Chemistry
Consumer Science
Food Science
Genetics
Geography, Geoinformatics & Meteorology
Physics
Plant Science
Random Harvest Indigenous Nursery
Sakata
Tswaing Crater (Geology & Plant Science)
UP Farm (Animal Science, Plant pathology & Plant production)
Zoology

"Our subsequent visit was to Retail Management. The erudition about science of clothes was fascinating; the cell structures of different fabrics and how to determine the physical properties. We were even given the opportunity to view the cell structures of some fabrics through microscopes.."

Karabo


The Electromagnetic Spectrum
about the size of
building
cricket ball
honey bee
pinhead
cell
molecule
atom
atomic nucleus
10^{3} 10^{2} 10^{1} 1 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8} 10^{-9} 10^{-10} 10^{-11} 10^{-12} 10^{-13} 10^{-14}
wavelengths (m)
radio waves
3 kHz – 300 MHz
microwaves
300 MHz – 300 GHz
infrared
1 mm – 700 nm
visible
700 nm – 400 nm
ultraviolet
400 nm – 10 nm
x-rays
10 nm – 0.01 nm
gamma rays
<10 pm (10^{-12} m)
frequency (Hz)
10^{5} 10^{6} 10^{7} 10^{8} 10^{9} 10^{10} 10^{11} 10^{12} 10^{13} 10^{14} 10^{15} 10^{16} 10^{17} 10^{18} 10^{19} 10^{20} 10^{21} 10^{22}
submarine communications
cell phones
microwave ovens
heater
light bulb
ultraviolet light
x-rays
radioactive elements
sources
Department of Physics, University of Pretoria – www.up.ac.za/physics


Meet an
UP with Science
alumnus
UP WITH
SCIENCE
Grade
10s...
this
is for you!
UP with
Science,
2015


Spiders


Disecting a seal


At Geography

Tie dying at
Chemistry

Toffee apples at
Consumer Science

Group R Research Projects

Agricultural Economics:	The South African Futures Exchange (SAFEX) Simulation Game
Biochemistry:	Egging it on with cholesterol
Geography, Geoinformatics, Meteorology:	Simulating Flooding Risk in Magnolia Dal, City of Tshwane 2016
CTHB:	The life and times of *Syzygium cordatum*. From a small wound to a dead tree
Genetics:	Using genetics to investigate cyanotoxins in the Vaal Dam
Mathematics:	Perplexing problems
Physics:	Capturing energy from the sun
Plant Science:	Why bother with grassland rehabilitation?
Statistics:	Can you Gangnam style with statistics?

Luvhani Budeli

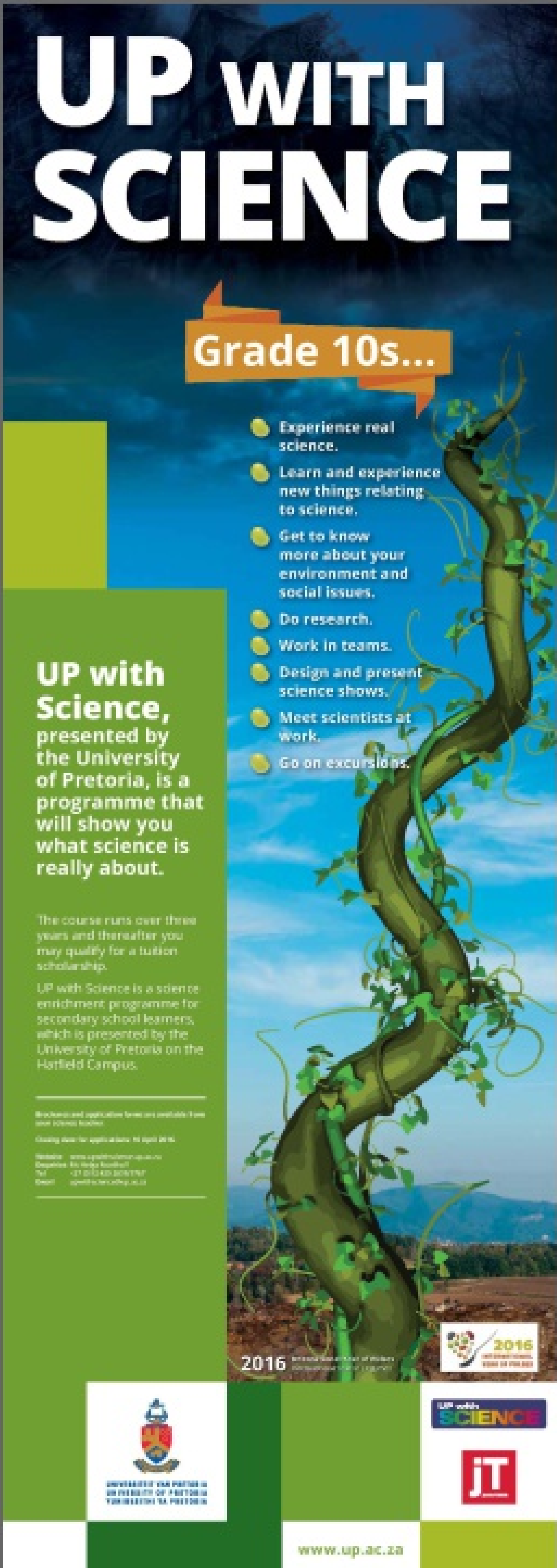
Jacqueline Janse van Rensburg and Zamazimba Madi at the Gauteng North Expo. They participated in the National Expo and were selected to represent South Africa at the Intel ISEF in Los Angeles in 2017.

Group R (2015 intake)

Shula Arendse
Savannah Bennet
Jonathan Birch
Carmel Botha
Luvhani Budeli
Magdalena Cilliers
Francois Conradie
Johannes Conradie
Courtney Cooper
Abdullah Darki
Samira Fanami
Zixolile Gara
Shanay Gungudoo
Mikeila Jacobs
Jacqueline Janse van Rensburg
Saalimah Joosub

Karabo Khwinana
Ruben Kriel
John Kutu
Warren Machio
Zamazimba Madi
Makgwale Makena
Masilo Makola
Malebo Maphutha
Mpho Mautla
Carla Meyer
Lehlohonolo Mhlongo
Tshiamiso Moagi
Goitse Modisane
Katlego Monyela
Ummi Moosa
Keneilwe Ndhlovu
Vaughn Nel

Pearl Ntshana
Marni Oberholzer
Jason Pillay
Jordan Pym
Seyuri Rajaruthnam
Molebogeng Rampa
Kholofelo Ramphekwa
Lwazi Rantjie
Amogelang Sedibe
Angelina Shai
Prevail Sithole
Zené Smit
Pieter Snyman
Anja Turner
Mekayla van Huyssteen
Albert Wilken


UP WITH SCIENCE
Grade 10s...
Experience real science.
Learn and experience new things relating to science.
Get to know more about your environment and social issues.
Do research.
Work in teams.
Design and present science shows.
Meet scientists at work.
Go on excursions.
UP with Science, presented by the University of Pretoria, is a programme that will show you what science is really about.
The course runs over three years and thereafter you may qualify for a tuition scholarship.
UP with Science is a science enrichment programme for secondary school learners, which is presented by the University of Pretoria on the Hatfield Campus.
2016
UP with SCIENCE
www.up.ac.za

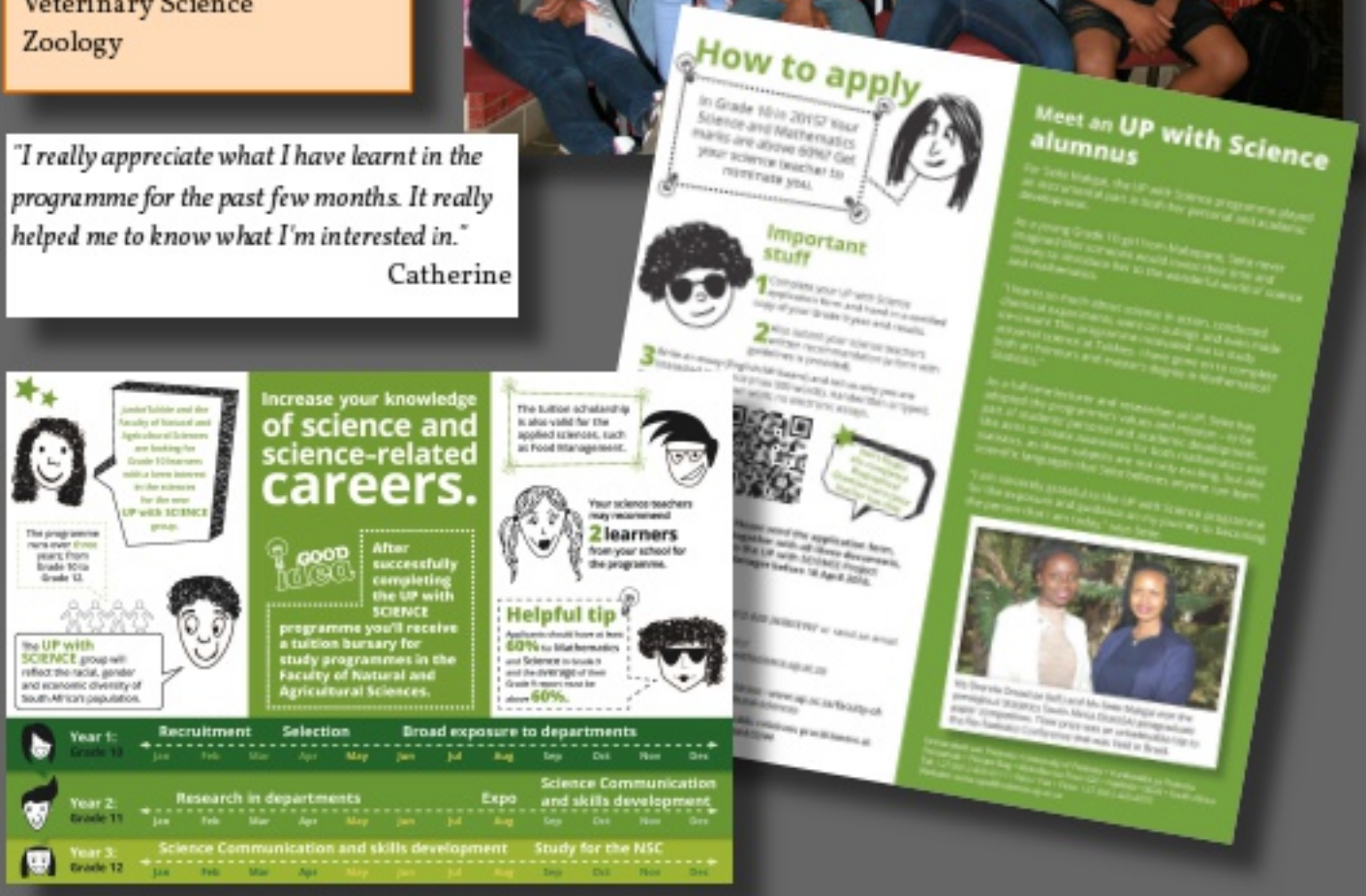

"Evil giants"
Mycotoxins
Bacterial plant pathogens
Fungal plant pathogens
Insects
The effect of fungal pathogens on legumes can be devastating. Ultimately the seed is diseased beyond repair and unable to germinate and grow.
Uses of legumes
Medicinal
Life cycle of the bean
Cancer bush
Liquorice
Animal fodder
Anatomy
Leaf
Have you ever wondered what it looks like on the inside?
Stem
Root
Best survival food
The nitrogen cycle
Atmospheric nitrogen
Animals
Plants
Nitrates
Decomposers
Ammonium
Nitrites
Department of Plant Science

Group S

Departments visited

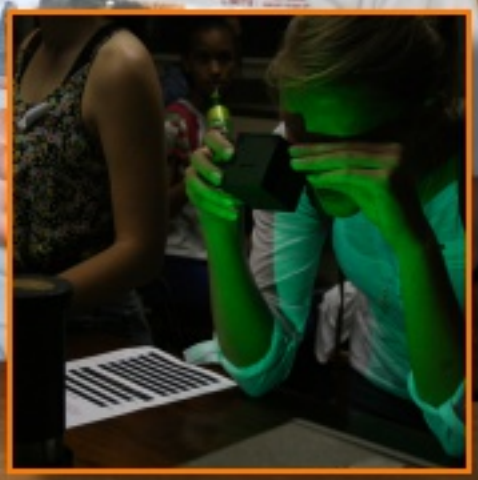
Agricultural Economics
Biochemistry
Centre for Tree Health and Biotechnology (CTHB)
Chemistry
Consumer Science
Food Science
Genetics
Mathematics
Physics
Plant Science
Tswaing Crater (Geology & Plant Science)
UP Farm (Animal Science, Plant pathology & Plant production)
Veterinary Science
Zoology

"I really appreciate what I have learnt in the programme for the past few months. It really helped me to know what I'm interested in."
Catherine



Physics

Building a spectroscope and observing light spectra



"UP with Science is an experience of a life time and I will never forget my time here."

Caythlin

"Thank you for all you have done. You have really confirmed my desire to study science."

Nompumelelo

At Onderstepoort

Group S (2016 intake)

Tyrice Arries
Taleah Ayob
Johannes Boon
Alta Bruwer
Chetana Chatergoon
Cornelius Daniels
Anize de Vos
Abigail Erasmus
Johan Ferreira
William Florence
Kaamila Gani
Craig Green
Neels Haasbroek
Natasha Hlongwane
Fatima Ismail

Caythlin Jacobus
Katlego Kolotsi
Rehauhetsoe Lebone
Itlotleng Leso
Daniël Lotheringen
Mooketsi Mabula
Busisiwe Mahlangu
Katleo Makhanya
Lethabo Maredi
Mlamli Modikoane
Tashriq Moerat
Devash Moonsamy
Tiisetso Morake
Kenalemang Motiang
Cathrine Mpobane

Nompumelelo Msiza
Shenaiya Naidoo
Oratile Nkwashu
Phakamile Nyakale
Zeenat Patel
Saroné Pretorius
Kabeer Shamsoodeen
Sibusiso Sigasa
Karabo Skhosana
Stéphan van Biljon
Yané van der Westhuizen
Chantelle van Wyk
Sumé van Zyl
Tyrick Welcome
Tshegofatso Zaza

Science Shows

From 2002 the UP with Science learners presented science shows at primary schools, often schools that one of the learners attended. Originally the shows were presented in the second semester by the grade 11 learners, but from 2010 this outreach activity was moved to the first semester for the grade 12 learners.

2005

- Laerskool Akasia
- Laerskool Bakenkop
- Laerskool Paratus
- Laerskool Suiderberg

2009

- Laerskool Akasia, Arcadia
- Laerskool Paratus, Thaba Tshwane
- Mogale Primary School, Mamelodi
- Walton Jameson Primary School, Atteridgeville

2008

- Laerskool Gener
  Smit, Daspoort
- Kutung Primary
  Soshanguve
- Refithlile Pe
  School, Shosh
- Sunnyside Pri

2007

- 2 Primary schools in Mamelodi
- Primary school in Teresapark
- Walton Jameson Primary School, Atteridgeville

2011

- Bajabulile, Primary School, Mamelodi
- Burgher Right Primary School, Pretoria West
- Doornpoort Primary Schoo
- Marematlou Primary S
  Atterridgeville

2004

- Lefofa Primary School,
  Hammanskraal
- Kgetseyatsie Middle Sc
  Hammanskraal
- Laerskool Uniefees, Pyr
- Laerskool Louis Leipold
  Lyttleton Manor

2003

- Laerskool Magalieskruin, Magalieskruin
- Laerskool Pretoria Oos
- Walton Jameson Primary School, Atteridgeville
- Waterkloof Primary School

raal Nicolaas
School,
le Primary
anguve
mary School

2002

- Motswatemeng Technical School
  Makapanstad, Moretele Distric
- Prestige College

2016

- PS Fourie Primary School,
  Eersterust
- Laerskool Magalieskruin
- Nantes Primary School,
  Eersterust

2012

- Laerskool Westerlig, Danville
- Laudium Primary School
- P.S Fourie Primary School,
  Eersterust
- Walter Sisulu Primary School,
  Olievenhoutbos, Centurion

2013

- Generaal Beyers P
  school, Danville
- Kekana Primary sch
  Hammanskraal
- Lyttelton Primary
- Norridge Primary S
  Eersterust

2014

- Brindhaven Primary School
- Laerskool Kwaggasrand
- Laerskool Nantes
- Pienaarsrivier Primary

hool,
rami
t,

2015

- Cullinan Combined Schc
- Laerskool Akasia
- Laerskool Haakdoorn
- Phuthaditshaba Primary
- Pretoria Chinese School
- Rekopantse Primary Scho

2006

- Dr. I.M. Monary Primary
  School, Mamelodi
- J.J de Jong Primary Scho
- Vukani Mawethu Secondary
  School
- Walton Jameson Primary
  School, Atteridgeville

Anton Ströh

John Rogan

Max Braun

Johan Engelbrecht

Robin Crewe

Johan van Staden

Geoffrey Matsepe

Walter Mayer

Marthán Bester

Roan Fraser

Johan Jv Rensburg

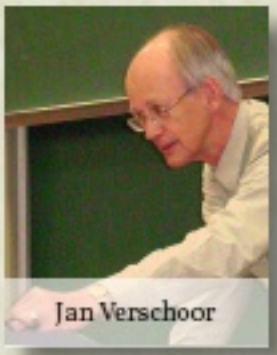
Mia Ackermann
Terry Aveling
Juanita Avontuur
Robert Bagnall
Werner Barnard
Irene Barnes
Carl Baumeister
Nigel Bennett
Marthán Bester
Paulete Bloomer
Jan Boeyens
André Botha
Max Braun
Anele Brits
Pieter Burger
Barbara Castleman
Chris Chimimba
Eugene Cloete
Roelf Coertze
Jan Coetzee
Martin Coetzee
Carlo Combrink
Teresa Coutinho
Elsie de Meyer
Hannes de Meyer
Pierre de Villiers
Sybrand de Waal
Danita de Waal
Petunia Degashu
Miranda Deutschländer
Mmantsae Diale
Jules DjokoKamden
Barbara Dombrowsky
Wilma du Plooy
Cornél du Toit
Michael Ellis
Freddy Els

Francois Engelbrecht
Monica Galliford
Anabella Gaspar
Taffy Gomwe
Veloshinie Govender
Joha Grobbelaar
Leylani Grobler
Wiebke Grote
Alan Hall
Tracy Hall
Piet Hammes
Gerda Harmzen
Bianca Hinze
Rudi Horak
VVH Iccharam
Johan Janse van Rensburg
Barend Jansen van Vuuren
Alta Jooste
Fourie Joubert
Angelique Joubert
Lizandé Kellerman
Godfrey Kgatle
Lise Korsten
Quenton Kritzinger
Nic Labuschagne
Peter le Roux
Tamzyn Level
Amelita Lombard
Maggi Loubser
Wolfgang Maier
Seite Makgai
Thulani Makhalanyane
Stanley Manzini
Christine Maritz
Jacques Marneweck
Vusani Mathada

Marietjie Potgieter

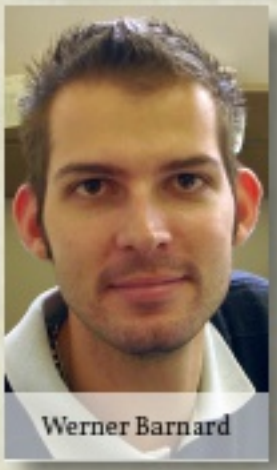
People passionate about promoting science

Some people who assisted with UP with Science are listed below; there were many more! Thank you all for your support for these 19 years.



Jan Verschoor

Egmont Rohwer



Werner Barnard

Photo: Facebook

Rudi Horak

Petrus Lombard

Chantal Scholtz

Jacquie van der Waals

Philani Mavimbela
Roland Merkle
Engela Meyer
Amanda Minnaar
Mase Mokhele
Calvin Mophuting
Rethabile Motloung
Lutendo Mugwedi
Kershney Naidoo
Thomas Nembudani
Helga Nordhoff
Almarie Nordier
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Nicky Olivier
Ulonka Olivier
Rudi Penzhorn
Shadrack Phophi
Zelda Pieterse
Theresa Pretorius
Linda Prinsloo
Victoria Rautenbach
Belinda Reyers
Martin Rigby
Grant Roberts
Mark Robertson
John Rogan
Egmont Rohwer
Jolanda Roux
Quentin Santana
Deon Scheepers
Thomas Schmidt
Irene Schoeman
Franci Siebert
Gilbert Siko
Melissa Simpson
Melissa Simpson

Puffy Soundy
Kitty Stamhuis
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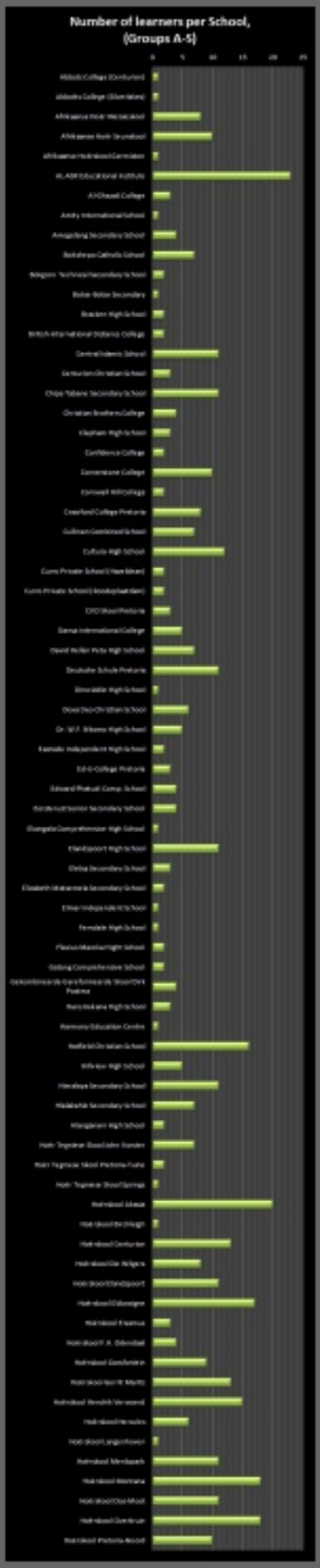
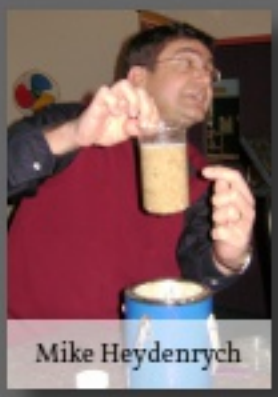



Brenda Wingfield


Mike Heydenrych


Tali Hoffman


Mary Scholes

Talks & Workshops

Dr Brenda & Dr Mike Wingfield (UP)
The life of a scientist

Dr Mervyn Mansell (ARC)
Forensic Entomology

Arnold Greyling (SAPS)
DNA Forensics

Pieter Pretorius
LEGO dacta Workshop (Gears & Levers)

Charles Mugerwa & Yonah Zhoya (UP)
African Drumming and Marimba Workshop

David Muller
'Imagining Einstein' – one-man play

Dr Alison Bentley (Wits)
Sleep!

Fred Brownell (State Herald, retired)
The new South African Flag

Niel Malan (UP)
Ice, Antennas and Aurora:
Working as a Scientist in Antarctica

Case Rijsdijk (ASSA)
Physics in Film

Dr Heinz Wirz
Bank notes

The Palaeontological Scientific Trust (PAST)
Walking Tall - Evolution Play and Workshop

Nico de Bruyn & Cheryl Tosh (UP)
Marine Mammal Research on Marion Island

Thea & Henning Holm
Our only Home, our Only Earth

Dr Elisabeth Lickindorf, Editor of QUEST Magazine
Let 'Your Science' tell the story

Andreas Rüsch
Agricultural Economics: What's in it for me?

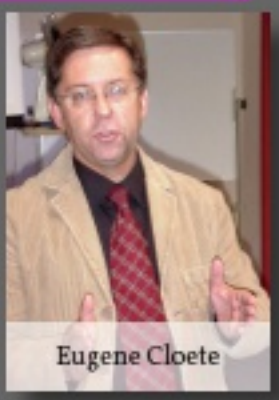
Prof Mike Heydenrych (UP)
Beer Brewing

Dr Mervyn Mansell (ARC)
Forensic Entomology

Michael Paul
What's up in the sky?

Prof Mary Scholes (Wits)
Climate Change: It's worse than you think


Fred Brownell


Eugene Cloete

Mervyn Mansell

Henry Throop

Jeanne de Waal

Nithaya Chetty

Eddie Jansen

Sherwin Gabriel

Talks & Workshops

Marion West (HartRAO)
Astronomy

Zuleikha Ahmed
Study methods workshop

Santjie du Toit (UP)
Antarctica

Angelique Kritzinger (UP)
Mystery Circles in Namibia

Johnny Rizos (CSIR)
The uses of satellites and the importance they have in our daily lives

Refentse Shinner (SAB)
Responsible Alcohol Consumption

Thomas du Plooy (CSIR)
Laser Technology

Dr Jeanne de Waal (SU)
Nematodes as biological control

Lucky Sikhwivhilu (CSIR)
Nanotechnology

Thokozile Malaza
HIP2B2

Prof Nithaya Chetty (UP)
Astronomy in South Africa

Duduzile Ntuli
Food labels and diabetes research

Sci-Bono
Dialogue in the Dark

Matthys Dippenaar (UP)
Pretoria's Fountains - Arteries of Life

Dr Renée Hlozek (was in Group B)
Astronomy

Dr Tali Hoffman
MammalMap

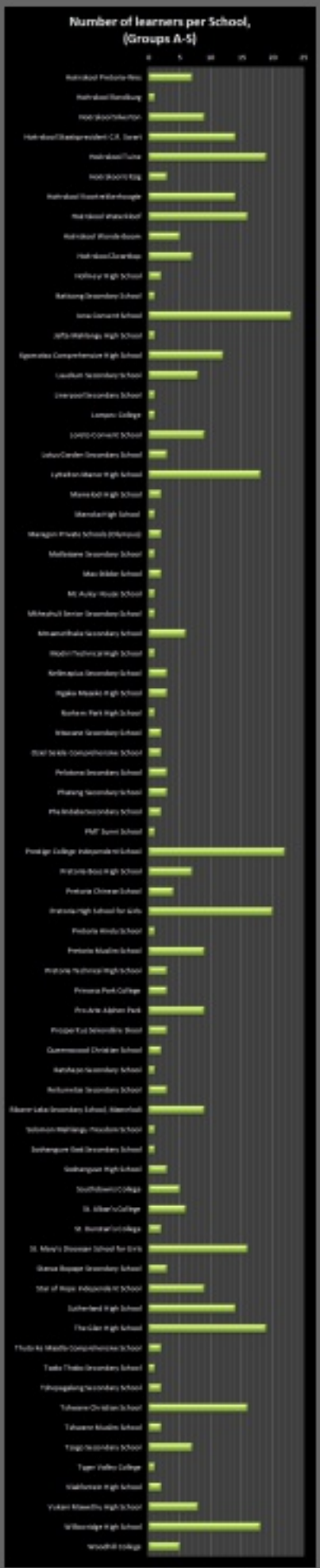
Dr Henry Throop (UP)
NASA: New Horizons spacecraft flying to Pluto

Prof Cowan (UP)
Living, working (and playing) in Antarctica

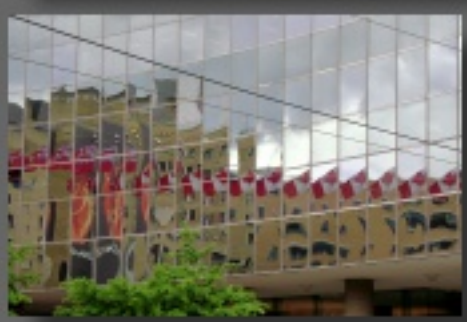
Patricia Gouws (Unisa)
Robotics workshop

Jacques Pienaar (was in Group G)
Dark Matter

Stefan Nordhoff
Money skills for students



5th Science Centre World Congress, Toronto



Papers and Presentations at Conferences

- VM Baloyi, HI Nordhoff, MHW Braun, E Gaigher, WE Meyer. 2013. **Correlation between the social background of a selected group of grade 10 learners and their views on the nature of science.** Presented at the SAIP Conference 2013.
- H.I. Nordhoff. 2011. **HELP! What are Scientists trying to tell me and should I care?** Presented for the panel discussion at the 6th Science Centre World Congress in Cape Town.
- H.I. Nordhoff. 2010. **Improving the Image of Science: Science Communication for Grade 12's**. Presented at the 13th SAASTEC Conference 2010.
- H.I. Nordhoff. 2009. **Green Living – Play & Learn! Lessons learnt during the development of an educational game.** Presented at the 12th SAASTEC Conference 2009 – *Reach for the Stars.*
- H.I. Nordhoff. 2008. **UP with Science: Motivating Scientists for Africa.** Poster Presentation at the 11th SAASTEC Conference 2008, *Developing Scarce SET Skills – How Science Centres Can Make a Difference.*
- H.I. Nordhoff. 2008. **UP with Science: Motivating Scientists for Africa.** Poster Presentation at the 5th Science Centre World Congress in Toronto, Canada.
- H.I. Nordhoff. 2007. **"UP with Science" Carbon Footprints.** Presented at the 10th SAASTEC Conference 2007, *Science Centres and Sustainable Living - does your life style cost the earth?*
- H.I. Nordhoff. 2006. **Africa - A Puzzle!** Poster presentation about the design of an Africa Puzzle for Sci-Enza. Presented at the 9th SAASTEC Conference 2006, *Science Centres: Interacting with the World!*
- H.I. Nordhoff. 2005. **From Newton to Einstein - Developing a card game as an outreach activity.** Presented at the 8th SAASTEC Conference 2005, *Education and Change through Science and Technology Centres.*
- H.I. Nordhoff. 2004. **Touch me! The construction of a hands-on exhibit as an outreach activity.** Presented at the 7th SAASTEC Conference 2004, *Science Centres for the Advancement of Science and Technology Education.*
- R. Horak & H.I. Nordhoff. 2003. **From WOW to AHA: The Science Show as Teaching Tool.** Presented at the 6th SAASTEC Conference 2003, unpublished.

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2005	Department of Science and Technology / First National Bank / Russells (JD Trading)
2006	Russells (JD Trading)
2007	Russells (JD Trading)
2008	Russells (JD Trading)
2009	BoE / Russells (JD Trading) / SAB
2010	Murray & Roberts / SAB
2011	Murray & Roberts
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2013	___
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2015	JuniorTukkie
2016	JuniorTukkie

Without the financial assistance of the Donors & Sponsors it would not have been possible to run the UP with Science programme for these 19 years. **Thank you for your support.**

"This morning I was filled with gratitude when I saw my student account has been paid. I thank u from the bottom of my heart. This year has been a rough one but I can safely say that I finished my degree and am so grateful to you for giving me this opportunity. I owe so much to you, UP WITH SCIENCE and Murray and Roberts."

Gina

The UP with Science programme was terminated with the retirement of Helga Nordhoff at the end of 2016.

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We shall start a programme to motivate young people to study science
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