

# CHANGING PERCEPTIONS OF

# IN SCIENCE, ENGINEERING AND TECHNOLOGY



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The information in this book was compiled by the South African Agency for Science and Technology Advancement (SAASTA), a business unit of the National Research Foundation.

The research into the career histories of the women profiled was done by the Institute for Women's and Gender Studies, University of Pretoria. SET4W is a permanent national advisory committee of NACI which aims to provide advice on how to achieve equality between women and men in Science, Engineering and Technology by integrating a gender equity perspective into policy-making, and implementation of the National System of Innovation. NACI is a statutory council which is regulated by the National Advisory Council on Innovation Act (Act No. 55 of 1997) and is appointed by the Minister of Science and Technology to advise him (and through him, the Ministers' Committee and the Cabinet) on the role and contribution of innovation (including science and technology) in promoting and achieving national objectives.

#### National Advisory Council on Innovation – SET4W Committee Members

Ms Luci Abrahams, Director: LINK Centre, University of the Witwatersrand; Prof Judith Bishop, Department of Computer Science, University of Pretoria; Prof Cheryl de la Rey, Chief Executive Officer, Council on Higher Education; Dr Steve Lennon, Director: Resource and Strategy, Eskom; Dr Romilla Maharaj, Executive Director: Institutional Capacity Development, National Research Foundation; Dr Linda Makuleni, Chief Executive Officer: South African Weather Services; Ms Khungeka Njobe, Group Executive: R&D Outcomes & Human Capital Development, Council for Scientific and Industrial Research; Dr Yolisa Pakela-Jezile, Manager for Sustainable Rural Livelihoods, Agricultural Research Council; Ms Jacqueline Williams, National Coordinator for Women in Oil and Energy South Africa.

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In the Facts and Figures study previously published by Science, Engineering and Technology for Women (SET4W), the data revealed that considerable improvements in women's participation rates in science, engineering and technology (SET) had been achieved within the first decade of democracy. Currently, the overall participation rates compare favourably with many European and North American countries where attempts to redress gender imbalances have had a much longer history. But, although there has been an overall growth in the total number of women in SET, a closer examination of the data reveals that there is a pattern of decreasing percentages as the level of study moves upward from undergraduate to doctoral levels. Also, women are severely under-represented in many fields in the natural sciences, engineering and technology. So, while we have seen improvements in the numbers of women entering into SET areas, we still have a long way to go to achieve equality in several areas.

SET4W is a permanent national advisory committee of the National Advisory Council on Innovation. Our object is to provide advice on how to achieve equality between women and men in SET by integrating a gender equity perspective into policy-making and implementation of the National System of Innovation. In the project *Changing perceptions of women in science* our objective is to learn from the experiences of successful women in science, engineering and technology careers.

What can we learn from these life experiences, and how can these lessons be used to develop policies and interventions that may successfully attract and retain more women in SET careers? By telling the stories behind the statistics, we hope that the study will assist in identifying more nuanced and focussed strategies to improve the participation and success of women in SET careers. The case studies covered issues such as the role of family and teachers, obstacles experienced and strategies for success.

In this booklet some of the women who participated in the study share extracts from their career histories. We believe that these stories will give us greater insight into the challenges and ways to bring about positive changes that will encourage many more women to pursue their career goals in SET. We also hope to raise awareness, encourage debate and change the public perceptions of science and gender.

#### Professor Cheryl de la Rey Chairperson: SET4W



STUDYING ENGINEERING IS A CHALLENGE, BUT IF YOU STAY MOTIVATED AND HAVE THE RIGHT SUPPORT, IT CAN BE DONE."

# **BRONWYNNE FERREIRA**



Bronwynne Ferreira is a chemical engineer and Principal Metallurgist of Anglo American's Anglo Research Division. Anglo American is a world-wide group of companies, originally founded in South Africa as a mining enterprise.

#### What Bronwynne does

She is a specialist researcher in the field of electrochemical engineering. Her work spans from developing new technologies in the laboratory, writing project proposals, building demonstration units or pilot plants, to designing and commissioning the final plants. She is currently developing new technology for an electrochemical reactor.

#### Bronwynne's inspiration

Her mother instilled a passion for science and maths in Bronwynne from a young age. "My mother had the demanding task of being a home-maker with a large family and initially I wanted to follow in her footsteps," she says. But her mother had to go back to work to supplement the family's income, and started representing a company that supplied heat exchangers and oil coolers to the large industries in their home town of Empangeni / Richards Bay. "My mom came back from work with fascinating stories about the engineers she encountered and their rewarding and exciting careers."

Her mother, as well as the large industries in her home town therefore subconsciously had a large influence on Bronwynne when she decided on a career and applied for a scholarship for further studies after matric.

#### What do you find most rewarding about your career?

"It is extremely rewarding for me when an idea or concept becomes a reality.

"I do believe that I am making a difference in South Africa," says Bronwynne. "The country needs chemical engineers, I am passionate about what I do, and I am continuously striving to improve myself."

#### What are the challenges of your job?

"My biggest challenge currently is to find a better balance between my work and personal life."

Her job is demanding and she has long work hours, so she considers herself extremely fortunate in that she has a very supportive husband who does not mind her working long hours or travelling often for her work.

#### What are your goals for the future?

"I would like to head a department at Anglo Research that is dedicated to electrochemical processes."

Bronwynne's father taught her loyalty and commitment to the work place. She shares this sense of loyalty for her company and would rather stay and constantly improve herself there than jump from one work place and job to the other.

#### On stereotypes

"I believe that men and women are equal, but at the same time I acknowledge that they are different and that the business world is better tailored for men. Men can separate their work and personal issues, but most women cannot. Women are emotional and compassionate beings and this extends to their work. I still have to learn to be less emotionally attached to my projects.

"But I do believe that the passion and emotions women bring to the work environment is making companies adapt and is making them stronger, giving them soul.

"The women engineers of the previous generation had major challenges. They broke down the barriers with the result that companies are now much more receptive to women in the work environment," says Bronwynne. "But women still need to work a little harder and do a little more to get recognition in the work place.

"Because women have some physical constraints, we have to work smarter. If you can't open a valve because it is too tight, open it with a lever. If you can't carry heavy items don't hurt yourself, use a trolley."

### What would be your advice to prospective female students in your field?

When Bronwynne was awarded a scholarship from Anglo American one of the conditions was that she spends an "exposure year" shadowing a chemical engineer. It gave her excellent exposure to chemical engineering and an appreciation for what the job entails. Working on a plant also gave her a good foundation for her studies. She would advise any prospective engineering student to take a year off after matric to do the same.

"Women should not overlook engineering as a career," says Bronwynne. "Studying engineering is a challenge, but if you stay motivated and have the right support, it can be done. To be an engineer is not always equal to working in a hard hat and boots. There are fields of engineering that women excel in, such as chemical, electrical, civil, and process engineering. Find out what the different fields of engineering entail and if you are passionate about it, you will do well.

"Choose your partners wisely because that will have an impact on your career."

#### Favourite pastimes?

Scuba-diving, action netball, puzzles, crosswords, and board games. To relax, she heads to the ocean, spending time with her folks.

## What does one need for Bronwynne's current position?

Characteristics: Confidence, passion for the job and problem-solving capabilities.

**Qualifications:** Matric maths and science; BSc (Chem Eng) degree and a Master's degree in chemical engineering.

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# ANUSUYA CHINSAMY-TURAN

Anusuya Chinsamy-Turan is a Palaeobiologist at the University of Cape Town (UCT).

"LET YOURSELF BE HEARD AT YOUR WORKPLACE; BE ASSERTIVE."

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### Anusuya Chinsamy-Turan is a Palaeobiologist and a Professor at the University of Cape Town (UCT).

#### What Anusuya does

Anusuya has an academic position at UCT that involves lecturing, research, supervision of postgraduate students and various administrative roles both within her department and within the Science Faculty. By studying the biological signals recorded in the microscopic structure of bones of extinct and extant (modern) animals she is able to deduce aspects of the biology of extinct animals, such as their developmental growth patterns.

She has done research on both modern animals such as crocodiles and other reptiles, and birds, as well as on fossil animals such as dinosaurs. During life bone records various processes of growth, and therefore by examining the bone microstructure of modern animals, she is able to make deductions about what factors (e.g. seasonality, nutrition, disease) affected the growth and development of the animal.

She did groundbreaking work on the development of growth curves of dinosaurs and the factors that affected their growth, and is still contributing widely to the field of palaeobiology. Together with co-workers she has recently published the first ever growth curve for a pterosaur (a flying reptile), thus providing a better understanding of their longevity and developmental patterns.

Anusuya is active in communicating science to the public. "Promoting science should not only happen at university level, but should start at primary school. Children are naturally curious, but they seem to lose that curiosity during their school years," says Anusuya.

She has recently written a book on African dinosaurs aimed at primary school children and has incorporated an unsolved mystery into each chapter. "It is important that children realise that science is a body of knowledge that continues to grow and to which they can also contribute. We scientists need to make sure they don't lose their fascination of the natural world and that they have access to correct information."

#### Anusuya's inspiration

Her inspiration firstly came from her parents and especially her father, whom she describes as a very 'liberated' Indian man, a school headmaster in the suburb of Laudium in Tshwane where she grew up. He had three daughters and wanted only the best for them, especially a good education. Contrary to the norm in the Indian society they grew up as outspoken, questioning, independent young women who were allowed to make their own choices in life.

Her mother, who did not have the opportunity to be well educated, understood the value of a good education and always motivated them to excel at their studies.

"I wanted to become a successful teacher like my father and eldest

sister (and most other people I looked up to), so after I had obtained my BSc Honours degree I enrolled for and completed a Higher Diploma in Education. Although I have never taught officially in a school, I benefited enormously from the skills I developed during this diploma, and I still enjoy giving lectures at the university."

#### On stereotypes

Anusuya feels that she experienced more discrimination as a black person than as a woman. Growing up and studying in the apartheid era she had to overcome several obstacles. She attended the local government school, which was not well-equipped, although her teachers were dedicated and motivated her to do well. Unlike these days, at that time, there were very few bursaries available for black students, and it wasn't until her Honours year of study that she was able to secure funding.

As an Indian person she had to get special ministerial consent to attend the University of the Witwatersrand in Johannesburg. Since the residences were not completely integrated she had to stay at her home in Pretoria, which involved a daily two-hour commute to and from University. "There were so many obstacles that we faced as black students that it is no wonder very few of us made it to our final year," she says.

"Today the situation has changed drastically. There are many more opportunities for bursaries for talented black students, and at university there is much more academic support such as bridging courses and tutorials."

#### Advice to prospective female students in your field?

"Make sure you find a partner who is supportive of your career, especially if you intend to have children. My husband is extremely supportive and we share the chores of raising our two boys. I also have very good domestic help and I have a study at home where I can work if I need to. Flexibility is an advantage of an academic career.

"Learn to manage your time well then you will be able to balance a successful career and family life.

"Talk to successful women in science and ask them how they manage. You don't have to reinvent the wheel," she says. Employers are generally supportive of women in science. At UCT, for instance, there is a crèche on campus which is a great advantage for women with young children.

"Let yourself be heard at your workplace; be assertive."

#### Favourite pastimes?

Reading, pottery, mosaics and jewellery design and manufacturing.

#### What does one need for Anusuya's current position?

Characteristics: Confidence in your abilities; ability to voice your opinion; capacity for hard work and to manage time efficiently. Qualifications: Matric maths, science and biology; BSc, Honours and Master's degrees in zoology; PhD in palaeobiology.

# Ryneth Nengovhela

Ryneth Nengovhela is a scientist at Exxaro Resources Company, a South African-based mining group and the fourth largest coal producer in the country.

"I took up the challenge to prove them wrong. I felt I had to do my bit about the lack of women studying science."

#### Ryneth Nengovhela is a scientist at Exxaro Resources Company, a South African-based mining group and the fourth largest coal producer in the country.

#### What Ryneth does

She works in the Research and Development division at Exxaro headquarters, where she provides technical assistance to all Exxaro business units (the Coal, Mineral Sands and Base Minerals units). "Presently I am busy looking into ways in which waste water resulting from washing coal plants at the mines can be purified and re-used in the plants. I am also involved in the project called 'value from waste', which has a focus on establishing technologies to recover useful products from Exxaro's solid wastes."

She is currently finalising her PhD degree. She completed her Master's degree at the University of Pretoria while working for the Council for Scientific and Industrial Research.

#### **Ryneth's inspiration**

No one specifically inspired Ryneth to study chemistry, but she did well in science at school and was eager to further her studies at university. "It was only when I started studying for my degree at the University of Limpopo (previously known as the University of the North, or Turfloop) that I noticed how few young women were in our class in relation to the number of women doing other courses on campus," she says. "When I asked my friends who were studying other degrees (e.g. BAdmin) about this they said women who do science, especially chemistry and physics, do not have a life because they spend the whole day in the laboratory conducting experiments.

"I took up the challenge to prove them wrong. I felt I had to do my bit about the lack of women studying science."

#### What are the challenges of your job?

"Working in a laboratory is not very glamorous. Some of my friends tease me since I cannot paint my nails or wear fancy clothes because of my work! I work with dirty substances like coal (even though my boss likes to say that coal is not dirty, but black) and acidic waste water, so I have to wear personal protective equipment like a hard hat, overall, gloves and safety shoes all the time."

#### What are your goals for the future?

"When I receive my PhD degree later this year I will have completed my formal studies in science. My next goal is to become a technical manager at the company where I am working, so my focus will be on acquiring technical, conceptual and interpersonal skills through training and mentorship programmes. There has never been a black woman in such a high position in the technical field, and I find that challenging. I am working towards that position."

#### On stereotypes

"Most people I know perceive that science is for men. It is still a very male dominated field and women are often treated as a rare species that does not belong, especially in the mining industries."

Even at university Ryneth experienced that many men were of the opinion women do not belong in the sciences. She does, however, find that the situation has improved a lot and that many more women are following exciting careers in science, engineering and technology.

"We don't have to be the secretaries and administrators and only work in the offices any longer. Science is no longer a 'males only' field."

## What would be your advice to prospective female students in your field?

"Don't be afraid of taking science and maths at school. It is not much different from the other subjects like accounting. Try to understand the subjects or courses and commit yourself to your studies. Take up the challenge!

#### "One needs a certain amount of passion for science otherwise you will not enjoy your studies or the work.

"Let the fact that there are few women in science work in your favour. Women tend to be focused and are often better organised than men, so there is merit in having more women in research positions where these qualities are often requirements for success."

Ryneth manages to balance her professional and personal lives with

good time management and the support of her hus-

band and a domestic worker. She would rather finish her work late at the office during the week than let it interfere with the time she spends with her family during weekends.

**Favourite pastimes?** Shopping, travelling.

## What does one need for Ryneth's current position?

Characteristics: Commitment, dedication and a passion for science, drive and determination to achieve what women have not done before. Qualifications: Matric maths and science; BSc, Honours, Master's degrees in chemistry.



"Women have to learn to make things happen for themselves and take responsibility for their own careers."

# KATHY SOLE



Kathy Sole is a Technical Specialist who runs the Separation and Refining Processes section in the Extractive Metallurgy department at Anglo Research. Kathy Sole is a Technical Specialist who runs the Separation and Refining Processes section in the Extractive Metallurgy department at Anglo Research, a member of the Anglo American Group. Anglo American is a world-wide group of mining companies, originally founded in South Africa.

#### What Kathy does

Kathy acts as a consultant for the larger Anglo American group on solvent-extraction separation techniques used in hydrometallurgy. She also heads a section in the organisation's Extractive Metallurgy department. A group of six women metallurgists, technologists and technicians reports to her.

"Our main focus is on developing new technologies that can be implemented in different parts of the Anglo Group. We also assist with troubleshooting and routine test work for various reasons for different plants, mostly to improve or optimise the processes," she says. Kathy's time is divided between technical work and managing the section.

#### Kathy's inspiration

She attributes her interest in a career in science to her parents, who both have science degrees, and to her excellent science teachers at school. She initially did not have female role models at work, but had extraordinary mentors in male colleagues for whom gender was irrelevant.

"When I was studying overseas I had a group of women friends, all studying or lecturing, who provided an incredible support structure. I still have contact with them," says Kathy. She believes that one realises the importance of such support all the more as you get older.

"It was interesting to note that women actually set higher standards for their female counterparts than they do for the men," observes Kathy. She tries avoid this trend and to be very supportive to the women in her environment.

#### What do you find most rewarding about your career?

Kathy enjoys the freedom to organise her work day, the projects in which she is involved, and the good remuneration. She is very loyal to and feels responsible for the excellent group of people who work with her.

#### On stereotypes

At the outset Kathy did not experience many challenges as a woman in her career. When she later moved from chemistry to engineering and started visiting plants however, she did experience some discrimination. At a plant in Central America the men were horrified that her company could send a woman to assist them. She had to ask a male colleague to negotiate with the clients until she had established more credibility.

"I think it takes women longer to build their credibility and they are watched more closely than the men in this type of job," says Kathy.

"One has to learn that older men sometimes act subconsciously in certain ways and don't really try to be patronising. You have to take things in context from where they come, " she says. But she will not stand for discrimination in the younger male generation and once had to fire a young man who would not take instructions from a young woman.

She now experiences that she has to fight harder to secure good projects or opportunities for the young women working under her. She actually knows of only one very large metallurgical project in Brazil that is currently led by a young woman – which confirms that this is a global problem.

She fills the possible gaps in her own professional experience with involvement in the professional community outside her job, such as organising an international conference, involvement on editorial boards of various journals, and interactions with graduate students at universities around the world.

## What would be your advice to prospective female students in your field?

"I would encourage girls to take proper maths (not maths literacy) right through their school years and not to give up science or biology too early," she advises. "This will allow them to keep their study options open for as long as possible. It is almost impossible to keep up on the science at university if you did not have it for matric." She advises that girls should find someone to help and encourage them with these subjects if they find them difficult. "If one is determined, you will find a way to do it.

"The negative perceptions around maths and science at school should be addressed by showing learners the applications and relevance of these subjects. And girls need to realise that it is fine to be clever," she says.

She found her holiday jobs as a bursar at Mintek very helpful in learning more about the work.

"Women scientists tend to sit back and hope they get noticed for promotion when they have done a good job. Men are much more aggressive in getting where they want to be in their careers," says Kathy.

#### Favourite pastimes?

Running and organising races at her running club (she has completed two Comrades marathons), hiking and backpacking, working in her garden, and especially spending time with family and friends.

#### What does one need for Kathy's current position?

Characteristics: Determination, perseverance.

**Qualifications:** Matric maths and science; A BSc degree in chemistry and physics; Honours and Master's degrees in chemistry, and a PhD degree in metallurgical engineering.

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# Stella Nkomo

Stella Nkomo of the Graduate School of Business Leadership at the University of South Africa (UNISA) teaches leadership, management and organisation studies.

"DO NOT LET YOUR RACE OR GENDER PARALYSE YOU FROM PURSUING YOUR DREAM."

#### Stella Nkomo is a Professor at the Graduate School of Business Leadership at the University of South Africa (UNISA) has been in her current position for eight years. She teaches leadership, management and organisation studies.

#### What Stella does

She is engaged in teaching, research and academic service. "I teach primarily leadership and change management to Master's students in Business Leadership and Business Administration," she says. Stella also serves as promoter for doctoral candidates in the field of leadership and organisation studies. Her active research agenda focuses on leadership in organisations, and the effects of race and gender on access to leadership.

"Currently I am working on understanding how leaders lead change in African organisations. I am also working in collaboration with a colleague abroad on understanding the special leadership talents multicultural women bring to their leadership roles."

She actively serves on editorial boards of journals in her academic field and often participates in conferences. "I also engage in consulting and community service, especially on issues of change and women's advancement," she says.

#### Stella's inspiration

Her parents stressed education as a vehicle to overcome racism and they were always very supportive of her goals. She had a number of mentors along her career path who recognised her talent and motivated, encouraged and supported her to succeed even when the going was difficult.

She believes education shaped her life and therefore decided in her early 20s to become an educator. Business education had always interested her. Her husband, who is also an academic, has been one of her major sources of strength and support.

#### **On stereotypes**

Stella found it difficult as a black woman to achieve her position in a field dominated by white men. "When I came to work at the Graduate School of Business Leadership, I was the first senior black woman with whom the other professors had ever worked at the School."

Another hurdle was that her research was focused on race and gender in organisations. She was told early in her career that it was not a topic of interest to the field, nor would it allow her to be successful in publishing or getting promoted. "I persisted and did quality work, and that is why I was able to achieve success," she says.

# What would be your advice to prospective female students in your field?

"Be confident – you can achieve!

"The most important is passion for what one is trying to achieve. I am very committed to helping women and other non-dominant groups achieve equality and parity in the workplace. Social justice is very important to me. No one should be denied the opportunity to achieve or succeed because of their gender or ethnicity. This passion has driven me to achieve success in my career."

Stella did not find a crystal staircase taking her to the top. "It is important to have a strong network of supporters and to ensure one understands the conventions of one's profession, what the markers are for success.

"It is hard to always maintain a balance between personal and professional but I try to make sure that I have social outlets and a broad circle of support from my family and friends to alleviate difficult passages."

"Stand up for yourself when necessary," she advises. "Do not let your race or gender paralyse you from pursuing your dream. I have a favourite quote:

#### 'Lift others as you climb.'

### We must support each other and give to others! The more women who succeed, the better for all women.

"Young girls need to have confidence in their abilities and to believe in themselves. I use my own life story to indicate that one does not have to be born rich to succeed. I came from a very poor background and was told on several occasions that I would not be able to go far in life, but I took that as a challenge."

#### **Favourite pastimes?**

Gardening, travelling and reading history.

#### What does one need for Stella's current position?

Characteristics: Passion for what you are trying to achieve; ability to work in a collegial environment; ability to set goals and achieve them without direct supervision.

**Qualifications:** To become a professor in a business school, one needs a Doctorate in management studies (e.g. organisational behaviour, leadership, etc.); proven high quality research output, strong teaching ability, and practical experience in business and organisations.

# NADINE VAN TONDER



"Set your goals and go for it," she says. "Don't let anyone make you believe you cannot do it."

Nadine van Tonder is an electrician who works for Eskom. She is the first female electrician to work on the live networks in the Western Cape.

#### What Nadine does

She is a high voltage operator who, together with her colleagues, maintains and develops Eskom's live electrical networks in the Vredenburg area. It requires the use of specialised equipment and certain stringent procedures need to be followed to minimize the dangers of the work.

#### Nadine's inspiration

Her father, an electrician who also works for Eskom, was Nadine's role model. From a young age she took an interest in his job and all things electrical. He encouraged her not only to do tasks in the home like washing the dishes, but also to work in the garden which was conside-red the boys' domain. "He instilled in me the belief that I can do anything I wish to do in life," says Nadine.

"My boyfriend has been very supportive of the decisions I make and has faith in me to accept and conquer all the challenges thrown my way," she says.

At school she was under the impression that only the brightest learners did maths and science, but later she realised that it was actually not so hard and that once she had put her mind to it, she enjoyed these subjects.

#### What are the challenges of your job?

Nadine's job can be physically demanding and sometimes involves long hours, but she enjoys working in the country air.

"I have to prove myself time and again and convince the men that I am in the job for the long haul," says Nadine. The long hours, sometimes for 24 hour stretches, and the time she needs to be on stand-by through the night can be taxing.

Nadine is not married and is working on finding a balance between her personal and professional lives. "At the moment I am just living for my work, knowing that every time there is a storm my team might have to go out to fix the lines, and trying to assist all my colleagues as far as possible," she says. Her current job will not be easily compatible with a family life, especially with having small children. She has however seen

that men also take some strain when they have young children, but that a supportive partner can make a big difference.

#### What are your goals for the future?

Nadine finds her job very fulfilling. She has previously declined a promotion because she first wanted to prove that she could be successful in her current job, but is now considering applying for a manager's position.

#### On stereotypes

She has not really experienced discrimination as a woman from her colleagues and finds that most of them welcome her into their midst. Sometimes the men won't allow her to do the tough jobs. "I do not appreciate that, because I want to gain the experience and learn from it," she says. "You must have the courage to tell them to back off and do the job yourself."

Although most people react positively when they hear about her



#### What would be your advice to prospective female students in your field?

Girls need to have the right mindset and should never think they can not do maths. "Even though I was not particularly smart at maths, I really wanted to become an electrician and that spurred

me on to work hard at it. I believe if you put your mind to something you can achieve it," she says.

She believes girls should not be held back, whatever career they choose. "Set your goals and go for it," she says. "Don't let anyone make you believe you cannot do it."

#### Favourite pastimes?

Horse riding, spending time at the beach, reading.

#### What does one need for Nadine's current position?

Characteristics: The will to work hard, the right attitude towards the job, enthusiasm.

Qualifications: Matric maths; N4 Electrical Studies.



# TEBELLO NYOKONG



Tebello Nyokong is the Department of Science and Technology/National Research Foundation Chair of Medicinal Chemistry and Nanotechnology at Rhodes University and Director of the Nanotechnology Innovation Centre.

> "You have to realise that you will not get much support and that you will mostly be on your own, but let that serve as a challenge."

Tebello Nyokong is the Department of Science and Technology/National Research Foundation Chair of Medicinal Chemistry and Nanotechnology at Rhodes University and Director of the Nanotechnology Innovation Centre.

#### What Tebello does

As Professor she teaches classes on her subjects to students, from the first year to PhD candidates and supervises numerous PhD studies. She is actively involved in research into the development of drugs for cancer and sensors for early detection of disease.

She has supervised students who are now lecturers and professors in their own right, and others who are working in industry.

#### Tebello's inspiration

Her father, who taught her that only hard work pays, was her first role model. He inspired her never to give up once she has set a goal in life.

Her teachers at high school, especially her science teacher who made the subject come to life, had also been a great inspiration.

Tebello loves teaching. "I want to see Africa and South Africa in particular to become less dependent on the West and to find solutions to our own problems through science. By teaching and supervising doctoral students I am contributing to the science knowledge pool of our country," she says.

## What advice do you have for attracting girl learners to the sciences?

"Girls need positive role models so that they can again become good role models for the future generations."

She believes young women need more support now than even she did when she was a young student. "I think they experience more pressure now than we did," she says. By supporting and motivating young women science students she believes the cycle of isolation of this group can be broken.

#### On stereotypes

Tebello did not have much support as a woman working in science, but she overcame that by simply working harder.

She describes the problems she faced of being a female trying to establish herself as a researcher: "I had no one to talk to among my peers when things went wrong with my research, neither when I got very excited about my research. I had and still have academic loneliness. At the start of my career I used the international reviewers' comments on my work to help me improve, even though it was hard.

"The positive thing of being a woman is that criticism does not affect us badly as it would affect men. I have learnt from my international peers through their criticising my work."

### What would be your advice to prospective female students in your field?

"You have to realise that you will not get much support and that you will mostly be on your own, but let that serve as a challenge. Balancing a career and a family is not easy, but try to persevere. Stepping out of a research position and re-entering the job market after years is not

possible. You will never catch up. Learn from your mistakes and stay humble," she advises.

#### Favourite pastimes?

Gardening and walking.

# What does one need for Tebello's current position?

Characteristics: Tenacity, capacity for hard work. Oualifications: Matric maths and

science; BSc, Honours, Master's and PhD degrees in chemistry.



# DIANE HILDEBRANDT

Diane Hildebrandt is co-founder and director of the Centre of Material and Process Synthesis at the University of the Witwatersrand, Johannesburg (Wits).

"Engineering is a very flexible career with a large number of roles for women to play – from technical design to sales management, depending on what best suits you and your circumstances." Diane Hildebrandt is co-founder and director of the Centre of Material and Process Synthesis at the University of the Witwatersrand, Johannesburg (Wits). She leads the Centre's academic and consultant research teams and supervises 40 Master's and PhD students.

#### What Diane does

Diane is a chemical engineer who has world-wide acclaim for her research into developing industrial processes that minimise wastage of natural resources like water, oil and coal. Her findings point the way to the highest efficiency that can be obtained in processes, and in turn determine the best design for a process including the equipment and how it should operate.

The Centre of Material and Process Synthesis provides a consulting service to a broad range of industries. The novel problem solving technique they use, is called process synthesis. The Centre also provides fundamental analysis, experimental measurements, modelling and optimisation services for existing processes. Diane is, for instance, currently coordinating the development of novel technology for a Fischer Tropsch plant in China which will have reduced carbon dioxide emissions.

The group of postgraduate research students supported by the Centre, especially those from previously disadvantaged backgrounds, has grown significantly over the years. "The group cares for the 'whole student' and provides a surrogate family," says Diane.

#### **Diane's inspiration**

The first proper science teacher Diane had at high school was convinced that girls could not do science. He tried his best to get rid of the three girls in their science class, which in her case had the opposite effect and served as strong motivation for her to continue with the subject. By matric there were five girls in her science class and they all excelled at the subject. She claims it was her stubbornness that eventually led her to grow a liking for science. She does not, however, think it will be wise to only appeal to people's stubbornness to convince them to study science, engineering or technology!

At university she first registered for a BA degree, then realised she was going to dearly miss science and changed to a BSc course to study nuclear physics. At the end of her first year she decided to change to engineering, and the fact that the chemical engineering department was the only one that was prepared to take her as a second year student turned out to be a lucky coincidence.

#### What do you find most rewarding about your career?

"The training of students is important for reaching the long term goals of our research into finding environmentally friendly solutions for industrial chemical processes. Even though we might not find the final answers, we are providing stepping stones for people to develop such more efficient processes in future. That makes my work worthwhile.

"Seeing the students develop and eventually obtain their PhDs is extremely rewarding. I also work with some of the smartest minds in the world, which is a great privilege."

#### What are the challenges of your job?

"My job is quite flexible, but consists of weekly meetings with all the research students, trouble shooting technical hitches on the plants, and finding the work and investors.

"Being a working mother is a balancing act in which one has to re-evaluate your priorities all the time. At one stage when my children were small, I managed to do a lot of work on my laptop and cell phone while they played on the jungle gyms at the local fast food outlet!"

#### What are your goals for the future?

"I believe it is very important for the African continent to develop highly trained people at PhD and Masters level. These people one day need to run our industries and serve in our government. At our Centre we are producing top class PhDs by people from all over Africa. I think it is becoming more and more important to look after our environment. Since the chemical industry has a fairly large output of carbon dioxide emissions, it is our duty to address this problem. I am proud of what our Centre has already achieved in this area, but obviously much more needs to be done in the near future."

#### **On stereotypes**

Apart from challenging her science teacher's perceptions at school and learning to ignore the derogatory comments from male students in her first year at university, Diane did not find it particularly difficult to achieve success in her career as a woman.

When she started her career she stood out as a woman because there were so few in her field, but since then many more have joined the profession. With her first project as a qualified engineer working on the mines she was not allowed to work underground. Fortunately she had fairly open-minded superiors and colleagues, and learnt to ignore the others. Diane has found academia a comfortable place to work as a woman. She feels that women bring a facet into engineering as a career that men often do not. They tend to focus on how they can contribute to society and the environment in their tasks.

#### Your advice to prospective female students?

"Take science at school and do not drop it early, because that will close many options for you. Look at careers that can expand and change according to how you develop and what interests you. You might be a very different person at 25, 40 or 50 from who you are now.

"People are seldom told that it is a very creative career. Try not to be put off by the image of engineers working on big plants or major projects costing billions of dollars. There are many more manageable projects that you can identify with more easily."

#### **Favourite pastimes?**

Painting, reading, music and beaches.

#### What does one need for Diane's current position?

Characteristics: Perseverance, flexibility.

Qualifications: Matric with maths and science, a Bachelor's and Master's degrees in chemical engineering and a PhD in chemical engineering.

# JUDITH BISHOP

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Judith Bishop of the Department of Computer Science at the University of Pretoria teaches and heads a research group of 14 staff and students that focuses on the application of programming languages to distributed systems and web-based technologies.

"Do not be discouraged and never make your being a women an excuse for not giving your best."

Judith Bishop of the Department of Computer Science at the research group of 14 staff and students that focuses on the application of programming languages to distributed systems and web-based technologies.

#### What Judith does

As a professor of computer science Judith teaches courses, supervises postgraduate students and undertakes research. The research projects are devised by herself in conjunction with students and industrial partners and lead to the production of research papers and books.

As leader of the group, Judith is responsible for obtaining the funding that supports the students, and enables the whole group to travel to conferences and research visits overseas. A large part of the management of the group revolves around obtaining and maintaining the latest computer equipment that keeps the work at the cutting edge.

Apart from these activities that would be expected from someone in her position, Judith serves on international conference programme committees, which means reviewing about 50 papers a year, and she represents South Africa on technical committees overseas which discuss the latest unpublished breakthroughs in her field. Her group is known for organising Summer Schools at the Cape, where 100 postgraduates get together for a week and are taught by international experts.

#### Judith's inspiration

"I was born and brought up in the academic environment of Grahamstown where my parents constantly exposed their children to the outside world of science and art," says Judith. "My family's pride in my achievements spurred me on."

Judith claims she was inspired to take up maths at high school because that gave her an opportunity to chat to the boys in their language about their interests, something on which her girl friends missed out!

She was fortunate to study computer science at Rhodes University in the very first class offered in 1970. "I was fascinated by the computers and all they could do and enthused by the vision of the professors and lecturers who were exposing the science behind the machines."

She wanted to further her studies overseas, but many of the scholarships were closed to women in those days. Even though her parents, who had seven children, could hardly afford it, they encouraged her and paid for her first year's studies in the UK.

#### **On stereotypes**

"The men I have come across in my career were quite open minded,

but I don't think the same can be said for selection committees and grant awarding bodies, " she observes. In the 1970s and 1980s, she believes that women were at a disadvantage, and often had to be somewhat abrasive and push their way in order to succeed. Such behaviour was not always appreciated by colleagues. Attitudes have changed now, and women are much more accepted as equals.

When she started her career, women were not expected to speak up in the workplace and she often had to revert to putting her ideas across through a male colleague simply to get them out in the arena. She did not let it bother her that she had to work from the back benches. She does, however believe this has changed to a great extent in the past ten years and finds that there now are many more enlightened people at the university.

## What would be your advice to prospective female students in your field?

"Do not be discouraged and never make your being a woman an excuse for not giving your best. Look for open doors, rather than closed doors. Do not choose (or let someone make the choice for you) to drop science and maths too early in your school career.

"As role model to my students I am organised, outgoing and helpful and I show them how much I enjoy my career. I share with them how I traveled with small children and how I tried to create a seamless interface between home and office when I had small children. I was one of the first people to have an Internet connection from home to the university, which was rare in those days. I believe one can use strange hours at home to pick up on jobs you have been unable to do at the office. It would be very helpful for women with families if government could reinstate a tax rebate for home offices.

"I observe that the successful young women with small children in my department all have excellent support systems at home."

#### Favourite pastimes?

Judith regards her greatest achievements as her two sons, and gets her enjoyment from being with them. They cook and travel together, go to operas and rock concerts, and she helps them with their careers, as her parents helped her. She loves putting her photos on the Internet, reading, wine tasting, and keeping in touch with friends and family around the world.

#### What does one need for Judith's current position?

Characteristics: Drive to succeed. Qualifications: Matric maths; BSc, Honours, Master's and PhD degrees in computer science.

# BEVERLEY SUKHDEO

Beverley Sukhdeo is General Manager of Sappi's Adamas Mill in Port Elizabeth. Sappi is a global producer of paper products.

"At Sappi we have many women scientists and they are doing very well," she says. "The women are thorough and tenacious in finding solutions to problems."

#### Beverley Sukhdeo is General Manager of Sappi's Adamas Mill in Port Elizabeth. Sappi is a global producer of paper products.

#### What Beverley does

As General Manager she is responsible for the short term and long term profitability of the Adamas paper operation. She manages about 300 workers at the mill which runs 24 hours a day, all year long.

Sappi Adamas Mill produces 40 000 tonnes of paper per year. Adamas Mill offers a wide range of uncoated speciality and industrial grades paper in reels and sheets, across a broad range of weights. Value offerings are made available to customers through this wide range of products. This is supported by an extensive sales and distribution network.

Beverley carries overall responsibility for human resources, finances, technical, risk, production, and the engineering component of the mill. She has to ensure effective use of resources in delivering the required output. She needs to keep abreast of the marketing, environmental and technology changes that may impact the environment within which Adamas Mill operates.

With the shortage of skills in the country, it is important to create a learning organisation where skills development is a key focus. Sustainable change is only possible if there is ownership, discipline and an environment in which people can thrive. With degrees both in sciences and in management she is well equipped to manage this large enterprise.

#### **Beverley's inspiration**

According to Beverley she selected the sciences almost by a process of elimination rather than directly choosing it. She always enjoyed applying her knowledge of science and using it as a tool to understand how things work and to get things done, rather than doing 'blue sky' research.

She did well in the science subjects at school, but it was only at university that she was really inspired by brilliant lecturers. "They sparked my natural curiosity of how things happen the way they do," she claims.

#### How has a science background benefited your career?

"My science background helps me make business decisions more effectively," she says. She believes a background in science and business is a very powerful combination since it gives a person an understanding of the operations of a business and the ability to base business decisions on that understanding.  $``\ensuremath{\mathsf{I}}$  believe science is an excellent platform for any body in any area of the business. ``

#### **On stereotypes**

Beverley has not encountered discrimination against women at Sappi. "I know from time to time the people I work with may have been apprehensive about my being a woman in a predominantly male environment, but I never let that bother me. I just focus on what needs to be done. As with all people, you earn credibility with the results you produce," she says. "Even in extremely challenging situations one has to remain focused on defining a solution that moves the organisation from one level to another."

## What would be your advice to prospective female students in your field?

"Absolutely anything is possible. Do whatever you really want to do in life, irrespective of your background or your circumstances. You cannot define your life by what other people think of you. Reaching your goalwill take hard work and much effort.

#### "Young women must be assertive and make sure their voices are heard. They need to work hard to build their credibility in the workplace, perhaps more so than their male counterparts.

"At Sappi we have many women scientists and they are doing very well," she says. "The women are thorough and tenacious in finding solutions to problems."

She believes that any woman can combine family life with a demanding career if she manages her life well. She has never found the need to make compromises and has succeeded in creating a good balance between work and her home life. "If you manage it well, you can have it all. Why settle for less?" she asks.

Beverley has excellent support from her husband and family who have always encouraged her to follow her choices in life.

#### Favourite pastimes?

She enjoys spending time doing things with her family, from watching movies, spending time on the beach, shopping, playing golf ... the list is endless.

#### What does one need for Beverley's current position?

Characteristics: Tenacity, assertiveness, focused on results; humility (you have to achieve results through the people that you manage). Qualifications: Matric maths and science, BSc degree in chemistry, Executive Master's degree in Business Administration. "Once you are in a job, build your professional reputation among your colleagues and people outside your organisation. Be very professional in your interactions with others."

# JUDY COATES

Judy Coates is head of the Biomedical Research Programme at Mintek, South Africa's national mineral research organisation Judy Coates is head of the Biomedical Research Programme at Mintek, South Africa's national mineral research organisation. The programme is a partnership between Mintek and Harmony Gold, aiming to find novel industrial applications for gold.

#### What Judy does

Gold is a metal with therapeutic value and Mintek's Biomedical Programme is currently doing research on the discovery of gold-based drugs for the treatment of HIV, cancer and malaria.

Research has shown that the inclusion of gold in drug discovery can offer various advantages. The research team based at Mintek primarily focuses on gold-based drugs for HIV treatment. The programme was started in 2002 through various university collaborations. Judy joined Mintek in 2003 and was one of two staff members in the programme. Today she heads a group of six researchers at Mintek and is overseeing the greater consortium of 32 researchers at local universities.

#### Judy's inspiration

"I had a very passionate science teacher at school who ignited and fueled my love for science. When I was in matric and was torn between studying accounting and doing science, a family friend said I was the type of person that needed challenges and that a career in science would offer new challenges every day. She was correct.

"At university I had a role model in my first year chemistry lecturer. In my second year I started assisting her in practical sessions. I worked closely with her through my years at university and, in fact, we are still close friends."

#### What do you find most rewarding about your career?

"During the course of doing my Doctorate I was indecisive whether I should stay in the academic field and lecture, which I enjoy very much, or should start a research career in industry. I am very blessed that I now have the best of both worlds: I still interact closely with the university and I am involved in research projects at Mintek.

"Seeing the students I interact with closely grow into well-rounded scientists and reach their goals is awesome. Seeing that my colleagues in the Biomedical Programme are enjoying their careers – that just does it for me! I believe one measures success by the respect and trust one earns from those you interact with, not by a long CV or awards."

#### What are the challenges of your job?

"As a woman, I am experiencing the normal challenges, such as combining long hours at work with duties at home. I find that women need to put in more hours to show commitment and prove themselves in a job. My husband stuck with me through the rough times though, so we did manage to find a workable solution!"

#### What are your goals for the future?

"My most immediate goal includes seeing our research programme reach new heights locally through further funding and our research endeavours. Longer-term goals include growing our research team and efforts to compete more actively internationally."

#### **On stereotypes**

"At universities there always seemed to be a preference for males in positions of power. However, at Mintek I have never experienced that type of discrimination and here women have equal chances of advancing their careers."

## What would be your advice to prospective female students in your field?

"If you enjoy science at school, consider studying it further at university. In the pre-graduate years you will study many generic subjects, but over your Master's year you will start specialising and that is when science becomes really exciting.

"Once you are in a job, build your professional reputation among your colleagues and people outside your organisation. Be very professional in your interactions with others. Network, collaborate on projects, and earn respect in your workplace. Go that extra mile to prove yourself. Stick to your instincts and do what you know is right.

#### "Get the balance right between your career and your private life. I'd rather work later, but I don't take work home."

#### Favourite pastimes?

Spending quality time with her husband and family, her church, reading, and learning to play golf so that she can join her husband on the golf course over weekends.

#### What does one need for Judy's current position?

Characteristics: "You need to have a passion for science. Science is exciting, but it has its disappointments and you need determination to complete your studies."

**Qualifications:** Matric maths and science; a three-year BSc degree majoring in chemistry and physics, an Honours in chemistry, and Master's and Doctoral degrees in organic chemistry.

"WITHIN THE WORKING ENVIRONMENT THERE IS ACCEPTANCE IN TERMS OF GENDER EQUALITY."

# ISABEL FICK



Isabel Fick is a Grid Manager for Eskom Transmission.



#### Isabel Fick is a Grid Manager for Eskom Transmission. Eskom is the largest South African electricity utility. As grid manager she manages the Southern Grid – one of eight national grids of the electricity transmission network.

#### What Isabel does

Isabel manages one of the eight geographically based Eskom Transmission grids in which South Africa's national transmission network is divided. The transmission network transports bulk electricity from the power stations to the distribution and municipal networks.

Hers is a highly specialised field which includes the strategic and operational management of various plants, including maintenance, the staff and all the technical aspects.

#### Isabel's inspiration

"Both my parents were a great inspiration. They taught me from a young age that there is nothing I could not do and that I could be whoever I wanted to be. I made my career choice in standard seven (now grade 9) when I was fascinated by an exhibit of missiles by the then Kentron (now Denel Dynamics, a division of Denel Pty Ltd). Two of my school teachers had faith in my abilities even though I was not the top student in my class.

"I had a great mentor while I was a trainee engineer. He literally made me do everything, from work usually performed by electricians and technicians to analysing oil with the chemists. At the time I could not understand why I had to do all the hands-on stuff, but it is a great advantage to have had that experience. I still like to get my hands dirty on the job once in a while. As an added advantage it works wonders in good working relationships with staff and colleagues!

"My husband and my two young sons' support, even when I have to be away from home, is a blessing and inspiration."

#### What do you find most rewarding about your career?

"I absolutely love what I do! I love the fact that I do not have a routine desk job; I am a very busy person and have never felt 'locked in' in this job.

"I love the challenges. The energy industry is currently experiencing many problems, so I can see a future for myself in this industry and know I can make a positive contribution.

"I enjoy working with wonderful people who have heart and are always willing to do whatever it takes."

#### What are the challenges of your job?

"After working in the technical field for a few years I had the opportunity to move into the field of management. I grabbed the opportunity because I have always liked working with people. I was appointed operational manager of a very technologically complex area. There were many challenges, varying from technical issues such as improving availability of plant and telecommunication systems, to people issues like taking disciplinary action. It was a great learning experience. "Currently the challenges of my job involve a greater strategic focus. I am responsible for emergency preparedness, for example, which involves being able to react to any emergency and have all the plans and resources available up-front.

"Balancing a career like mine and a family life can be challenging. My family will always come first. In my current role, I have to travel extensively and this has an impact on the family – even though they support my career every step of the way."

#### **On stereotypes**

"The fact that I am a woman engineer often initially catches people off-guard. When I started working as engineer some men, and even more women had issues with the fact that I am a woman working in a technical field. I am comfortable with who I am - a Christian, a woman, a wife, and a mother who just happens to be an engineer and manager.

"Within the working environment there is acceptance in terms of gender equality and one's actual performance and ability will determine the way your colleagues perceive you - not your gender."

#### Your advice to prospective female students in your field?

"I am a strong believer that one determines your own destiny with the choices you make. If you want to follow a career in engineering, believe in yourself and just do it. Forget about all the perceptions of careers women should and should not follow.

"But, get to know what you are letting yourself in for. Engineers, and especially technicians, do not only do design work, but sometimes have to visit remote sites on their own. Remember too that you might want to start a family one day and that they will require a lot of your time and attention. But it can be done!

"I would advise anyone wanting to follow a career in engineering to attend an engineering school for grade 11s and 12s before they take the final decision. This is where you really get a more accurate perception of what engineering is about. Once in the job, learn to network and build relationships with various people in your line of work."

#### Favourite pastimes?

Spending quality time with the family; day-trips on a boat with a braai or picnic, reading, camping.

#### What does one need for Isabel's current position?

Characteristics: Resilience, ability to handle stress and pressure well, drive and focus on your career goals, love for what you do. Qualifications: Matric maths and science; a four-year engineering degree plus three years' in-job training after university to register as a professional engineer. A Government Certificate of Competence (GCC), which is required by law for people to operate plants and machinery; and a Master's degree in Business Administration, which is not a requirement but an added advantage in any senior management position.

# VINOTHA BHEEM

Vinotha Bheem is programme leader of product development and nanotechnology at Sappi Ltd, a South African paper and pulp company.



"WE ALSO NEED TO CHANGE THE PERCEPTION THAT SCIENTISTS AND ENGINEERS ARE GEEKS, THAT SCIENCE AND MATHS ARE DIFFICULT SCHOOL SUBJECTS."

Vinotha Bheem is programme leader of product development and nanotechnology at Sappi Ltd, a South African paper and pulp company.

#### What Vinotha does

"I was trained as a chemical engineer, but currently my job entails mostly research and development of innovative paper products. Our group is seen as a leader in development and innovation in this field.

"The new technology we develop is taken from our laboratory to the mills where the products are produced and then to the market, which means I am constantly in contact with technicians, engineers at the mills, and marketing people at head office.

"I act in a mentoring role to two colleagues academically and in a work environment. I endeavour to share my knowledge with them and help them grow in their careers."

#### Vinotha's inspiration

"My parents felt strongly that their daughters need to be self-sufficient and encouraged their children to do science and maths at school. My sister and I had to mow the lawn and wash the car to prove we could do anything a boy could! At school the 'clever' kids were also expected to take these subjects – it was quite elitist to do science and maths. Later, the group of friends with whom I hung out had an influence on my decision to study engineering."

#### What do you find most rewarding about your career?

"It gives me a great sense of pleasure to develop a new product in the laboratory and then one day see this new product, such as a new type of paper, in a shop.

"I am also flexible and able to balance my work, my social life and my studies, which are very important factors to me."

#### What are the challenges of your job?

"One has to realise that this type of job is not posh, especially when you are starting your career. A paper mill is not always very inviting because of the hectic activity, noise, oil and dirt that are all part of this work environment. It is not clean, clinical and is definitely not suitable for Barbie doll-types. We wear gum boots to walk around on the plant! The same goes for power plants. But I find it a very challenging and exciting environment.

#### What are your goals for the future?

"I am having a baby soon and am trying my best to be a good role model to my now unborn child. It is a challenge to me to maintain a balance between a healthy, happy family life and a career that is also healthy and fruitful to myself and those around me."

#### **On stereotypes**

"One of the companies I worked for did not have bathroom facilities for women. When a woman was appointed as production manager, the men could not believe their ears when she told them they should not throw their cigarette butts on the floor! She eventually made a huge contribution to change perceptions of their work environment and of women.

"When I started my career I experienced lots of resistance from older men because they felt uncomfortable with me and did not know how to respond to my being a female engineer. They felt threatened, often did not want to share information with me and made nasty comments about black women being fast-tracked. But I gained their trust, even though it was quite hard.

"The younger engineers do not feel threatened at all. Perceptions about women engineers and technicians have really changed and I believe it will still become easier for women in SET to work in industry.

# What would be your advice to prospective female students in your field?

"Work hard and persevere. Many of the things you learn during your training will not have applications when you start work, but you need to go through the process to sharpen your analytical thinking. Don't expect to start your career working on huge engineering projects – there are not enough of those going around to give employment all the newly qualified people. Be prepared to start at the bottom and work your way up.

## "Get to know the industry so that the work environment does not come as a surprise to you.

"Working in a production environment can cause havoc to family life, as the hours can be long and unpredictable. There are, however, excellent opportunities for women engineers with young families, i.e. in research."

#### Favourite pastimes?

Keeping fit and healthy by swimming, playing squash and going to gym classes. "I joined a running club late last year and will possibly try to run the Comrades in the next year or two, but had to stop running for a while now that I am going to have a baby."

#### What does one need for Vinotha's current position?

Characteristics: Perseverance, being humble, being able to work under stressful circumstances.

Qualifications: Matric maths and science; a B Engineering degree.

# Patricia Berjak

Patricia Berjak is Professor Emeritus and Senior Research Associate at the University of KwaZulu-Natal. She is an expert on seeds that can not be dried, called recalcitrant plant seeds. She has a career history punctuated by several breakthrough discoveries that established her at the cuttingedge of plant science.

"Science is a matter of discovery, and I find that very exciting."

Professor Patricia Berjak is Professor Emeritus and Senior Research Associate at the University of KwaZulu-Natal. She is an expert on seeds that can not be dried, called recalcitrant plant seeds. She has a career history punctuated by several breakthrough discoveries that established her at the cutting-edge of plant science.

#### What Patricia does

Patricia is involved in research and research supervision of a large number of postgraduate students. Her own PhD work addressed the problem of maize seed deterioration in air-dry storage. She rapidly gained recognition in the field of seed research during the three years she spent in the UK immediately after completing her Doctorate.

Patricia has made several highly significant contributions to knowledge about the physiology, biochemistry and pathology of recalcitrant seeds that are difficult to store. Her research group is considered as one of the foremost working on seed desiccation sensitivity in the world, and is considered internationally as a major centre of expertise on seed recalcitrance.

Patricia and her research team have put South Africa firmly in the international arena in terms of the improved handling and short-term storage of recalcitrant seeds and long-term cryoconservation storing (storing under very low temperatures) of the genetic resources of the many species concerned.

Most of the seed types she has studied are native South African species and therefore her investigations are also considered as conservation biology research.

#### Pat's inspiration

She believes serendipity had a big role in her choice of career. When she left school Patricia wanted to become a medical doctor like her father, but she soon decided against it and rather opted for biological sciences. She did an Honours degree in biochemistry.

Microscopy fascinated her and the microscopy expert at her university happened to be a seed scientist and through his influence she became involved in seed research.

"I still see with students today that the successful ones are those whose interest is tweaked by something along the way," she says.

#### What do you find most rewarding about your career?

"Science is a matter of discovery, and I find that very exciting," says Patricia.

She also finds the excellent progress her group is making with research and their standing in the international research community as well as locally very rewarding. The National Research Foundation awarded her an A-rating which distinguishes her as a world leader in her field of research. She was elected a Fellow of the University of Natal in 1994, a Fellow of the Royal Society of South Africa in 1996, and was awarded the Silver Medal of the South African Association of Botanists for research excellence in 2001.

#### On stereotypes

The only time Patricia experienced discrimination in her career was when she applied for work as a teaching assistant after she had obtained her Masters degree. She was overlooked for the job, made enquiries from the head of the department and was told they would only look at applications from women if they were really forced. Patricia took this as a challenge. She believes this incident was the best thing that could have happened because it encouraged her to look at other avenues to forward her career. It gave her the drive to do her PhD and work in the UK while her husband completed his Doctorate.

"I was determined to show them I was not only as good as the male students who got the jobs as teaching assistants, but better," she says. After that, she never again encountered discrimination against her as women in her career. She believes it is even much easier today for women to follow careers in science.

### What would be your advice to prospective female students in your field?

"I'm probably among the few professional women to have a (long-term) husband who is not only also an academic, but also a plant scientist," she says. Her husband, Professor Norman Pammenter, a highly-regarded whole-plant physiologist, became involved in her work on recalcitrant seeds, with the result that they are often involved in teamwork.

"He is incredibly supportive. My advice to young women would be that, if you want to become involved with someone, find someone who will be supportive, who is actually pleased by your endeavours and achievements," she says.

She believes if any student has the potential, is enthusiastic about the subject and is determined to work hard there is very little that can keep her from being successful in a career in science.

#### **Favourite pastimes?**

Patricia and her husband have also succeeded in maintaining a balanced view on life. "My husband and I used to fly light planes and drive speedy cars, but that became too expensive to do," she says. Ballroom dancing has been their long-standing hobby.

#### What does one need for Pat's current position?

Characteristics: Determination, hard worker, enthusiasm. Qualifications: Matric maths and science; a BSc degree majoring in chemistry and botany; Honours, Master's and PhD degrees in botany or biochemistry. "Do not believe the perception that all scientists walk around in LAB coats, With glasses, messy hair and have no social skills!"

# Belinda Reyers



Belinda is a conservation biologist who is currently principal researcher and research group leader at the CSIR.

#### Belinda Reyers is a conservation biologist who is currently principal researcher and research group leader at the Council for Scientific and Industrial Research (CSIR).

#### What Belinda does

Belinda works in conservation science. Her work spans the entire research spectrum from curiosity-driven research on issues such as how biodiversity is related to human wellbeing, to the application of this knowledge in policy development and management strategies. She manages a group of 10 researchers that among other things works with government departments, universities and research councils, informs new policies, and advises natural resource managers on issues such as fire management, alien invasive plant control and water management.

Much of her work focuses on the links between nature and people; not just the aesthetic, spiritual links, but actual links such as where our water comes from and how our climate is regulated.

As group leader she overseas the research done by her group and is also responsible for writing proposals and securing funding for research projects. Her group has recently been awarded a large research contract to study the social and ecological aspects of the depletion of natural resources in the Baviaanskloof of the Eastern Cape Province, as well as the rebuilding of the natural capital in this area.

#### **Belinda's inspiration**

From a very early age Belinda encountered really fortuitous opportunities that set her on her path as scientist. Her parents, a veterinary clinical pathologist and physiotherapist, made maths and science fun and approachable by inventing exercises, like calculating the bill when they went to a restaurant, or sampling the water quality of their neighbourhood rivers. They were her role models and inspiration and motivated her to enroll at university for veterinary science. Excellent zoology lecturers made her swap courses and continue her studies in zoology.

Two zoology professors at university acted as Belinda's mentors, role models and inspiration. When she took part in a global four-year long project called the Millennium Ecosystem Assessment, her mentor and several other successful women scientists all played an important role in her early career development

#### What do you find most rewarding about your career?

"The work keeps me challenged, it is never boring, and I love solving problems. I enjoy the fact that at the CSIR I can do cutting-edge research as well as more applied work. The organisation provides an excellent work environment for me, stimulating, rewarding and supporting."

#### What are your goals for the future?

"To keep doing what I am doing with perhaps a greater focus on research and mentorship. I think it is important to build up our science capacity in South Africa and I see this as something in which I would like to play a role in the future."

#### **On stereotypes**

Belinda feels that currently the benefits of being a woman in science (funding and other opportunities) outweigh any costs, although this is from her perspective as a woman without children.

But perceptions were a challenge when she was younger. When she was at primary school, a teacher told Belinda's class that girls can't do maths, but she has proven her wrong. During her early years at university she found that many of the mundane tasks came her and her young female colleagues' way, and would not be expected of the male students. The reason given was that women are more nurturing, better organisers or have neater handwriting. Belinda does not believe one can generalise like this in any direction.

She has found the CSIR a most empowering environment for women.

## What would be your advice to prospective female students in your field?

#### "Do not drop science and maths as subjects, because that will close many doors for your future options.

"Do not believe the perception that all scientists walk around in lab coats, with glasses, messy hair and have no social skills! There are many young women scientists who can act as your role models. You will find that scientists can be young, fun and be interested in things like art, sport and fashion. You can be successful if you work hard and have a good head on your shoulders.

#### "Do not let the perceptions stand in your way if you want to study science. There are many opportunities, and interesting and passionate people working in science."

#### Favourite pastimes?

Hiking, mountain biking, reading.

#### What does one need for Belinda's current position?

Characteristics: Hard worker, aptitude for science and maths, good social, management and presentation skills. Qualifications: Matric maths, biology and science; a bachelor's, Master's and PhD degrees in zoology.

"Although many women break through the glass ceiling and advance successful careers in Science and Technology many obstacles still remain, preventing young women from becoming major contributors in the field."

The Minister of Science and Technology, the Honourable Mr Mosibudi Mangena at the 2007 Women in Science Awards ceremony, August 2007



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"The lack of critical mass of prominent women scientists as role models has hampered not only public understanding of science, engineering and technology, but also the participation of women at all levels within the science system."

The Minister of Science and Technology, the Honourable Mr Mosibudi Mangena at the 2nd Annual Women in Science Awards, August 2004



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