

# | DAYA REDDY |

## TOP THREE AWARDS

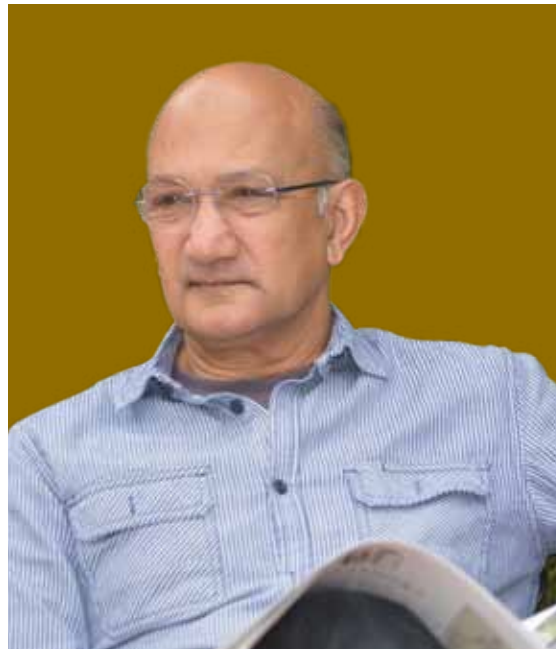
- Georg Forster Research Award from the Alexander von Humboldt Foundation, Germany, 2012
- Fellowship of the International Association for Computational Mechanics, 2008
- National Order of Mapungubwe (Bronze), 2004

## DEFINING MOMENT

Being chosen as the next President of the International Council for Science (ICSU) at its general assembly in New Zealand in September 2014. It was “humbling and a great honour” to be only the second African elected for the post since ICSU was founded in 1931.

## WHAT PEOPLE DO NOT KNOW

I started learning to play the piano when I was around 40 years old, at the same time as my son started to learn. He’s much better at it than I am.



## A CHAMPION FOR SCIENCE

Professor Batmanathan Dayanand (Daya) Reddy isn't one to buckle under pressure, but his knowledge of things that do buckle under pressure is second to none. Finding out why and how things deform under strain has been a focus of his career in engineering and applied mathematics. A talented inter-disciplinary scientist, he has also worked with clinical scientists to develop models aimed at devising new therapies for heart disease, among other things.

A passionate science advocate, Reddy is one of South Africa's chief exports to the world of international science advice. Having served on several committees drafting evidence-based science advice on issues like climate and health, he is set to become President of the global International Council for Science (ICSU) in 2017, the second ever African to do so since the council was founded in 1931.

In addition to this, the University of Cape Town (UCT) Professor has also helped set up the Cape Town-based African Institute for Mathematical Sciences (AIMS) that trains graduates from all over Africa, and has given a fresh lease of life to UCT's Centre for Research in Computational and Applied Mechanics, Cerecam.

How on earth does he do it all? "I have great support," he says. His scientific colleagues and the excellent administrative staff and secretariats in the various organisations he works with have helped him to stay on top of his duties. He is also diligent and highly motivated – a prerequisite for someone who had to overcome racist policies under apartheid to get to where he is today.

## EARLY LIFE AND EDUCATION

The son of a general store owner, Daya Reddy was born in 1953 in South End, near the Port Elizabeth waterfront. He had a happy childhood, but in his early teens his family had to move when South End was declared 'white' under the Group Areas Act. Not wanting to move to the area designated for Indians in PE, the family decided to emigrate to England. But the move didn't work out, and four months later they were back.

While their parents decided where to settle, Reddy and his younger brother lived with family members in the Johannesburg suburb of Vrededorp (which later was to suffer the same fate as South End). There, Reddy attended Lenasia Indian High School. He was a good student at high school, and especially talented at mathematics. It was his mathematics teacher, unqualified but gifted and dedicated, who suggested Reddy go on to study engineering at university. "I had never met an engineer. But the opportunity to use mathematics in my daily working life attracted me," Reddy recalls.

After finishing his matric, Reddy moved to Cape Town where his family had ended up settling. However, continuing with his education in Cape Town was tricky for Reddy. According to apartheid laws he was to study at the University of Durban-Westville on the other side of the country. But the Reddys could not afford to support him away from home.

Reddy had to apply for a special dispensation, or permit, to study at UCT. Permission was granted by the Department of Indian Affairs (as the relevant government office was called at the time), and he was able to enrol for a civil engineering degree at UCT. The university, he recalls, was "a different place" back then. He and the other black students, who were in a small minority, kept to themselves. "We had no social life whatsoever to speak of within the university," he says.

To start with his post-degree plans were straightforward. The bursary he had obtained from a construction company for his engineering studies came with a work obligation, and he intended to join the company upon graduation. But the head of civil engineering at UCT, Professor John Martin, had another idea. Martin, a South African, had returned after a PhD at the University of Cambridge in the UK and ten successful years at Brown University, an Ivy League institution in the USA. If Reddy was interested in postgraduate studies, why didn't he look into going overseas?

Reddy did. He applied to a few universities in America as well as to Cambridge, and was awarded the Smuts Trust Bursary for graduate research at the latter.

Reddy arrived at Cambridge in mid-1974. It took him a while to settle in. Initially he missed home. But in due course his social life picked up. He played cricket at college level, and toyed with the idea of rowing but was put off by the early mornings. He also enjoyed attending the debates at the Cambridge Union.

He found being a postgraduate student much more enjoyable than his undergraduate degree. Cambridge encouraged independence in research, and this suited him. "The freedom of not having all those courses and projects was such a relief," he says.

## ACADEMIC LIFE AND RETURN TO SA

Reddy was awarded his PhD degree from Cambridge in 1977. He was only 24 years old. At the time, he thought he might return to South Africa. He had kept in touch with John Martin at UCT, and wrote to him about opportunities. Martin encouraged him to apply for a position that was advertised in his department. Reddy did so and was offered the position, but then declined it. "It wasn't about not wanting to come back to apartheid South Africa. I just felt like staying on," he says.

Instead, he spent a year at University College London as a postdoctoral researcher, investigating the circumstances under which thin bodies buckle. The work, which was closely related to his PhD research, addressed a problem in the North Sea oil industry. The oil was transported to land using pipelines on the seabed. The pipelines were fed off a boat, but if they curved too severely they would kink and buckle. Obviously, that was something that the oil companies wanted to avoid.

But the postdoc didn't work out too well for Reddy. His vision was at odds with that of his supervisor, who found Reddy's approach to be too theoretically oriented. After about a year, Reddy once more contacted John Martin at UCT. He was told that the position he had been offered had not yet been filled, and that if Reddy was still interested, it was his.

Reddy moved back to Cape Town in 1979 to a position straddling the departments of applied mathematics and civil engineering at UCT. The joint

appointment was the brainchild of Martin and George Ellis, at the time head of applied mathematics; the two had for some time been keen on building interdisciplinary bridges between engineering and applied mathematics. Reddy took up the joint appointment, and by 1987 was an Associate Professor. In 1988, however, he felt the time had come for him "to choose one home". He opted for applied mathematics, where he has been a full Professor since 1989.

Throughout the 1980s, Reddy toyed with the idea of going abroad again. But he enjoyed being close to his family, and shortly after returning from the UK had met his wife-to-be, Shaada, a librarian at UCT. They married and have a son, Jordi.

What is more, work kept him busy. He relished using mathematics to solve problems that cropped up in engineering. He would as readily participate in conferences organised by mathematicians as those run by the engineering community. His engineering background meant he could 'speak engineer', while also having the mathematical background to bring to bear in the study of problems arising in engineering applications.

Such an approach was closely linked to the domain of computational sciences, an area that has grown rapidly with the advent of more powerful computers. This peer methodology, existing alongside theory and experiment, allows automobile or aircraft manufacturers, for example, to simulate complex situations in design processes, thereby reducing the need for expensive experimentation.

However, Reddy's work soon went far beyond the inanimate. Together with colleagues in cardiovascular surgery and in industry he developed a research programme aimed at simulating the behaviour of artificial heart valves and other implants. This work has translated to real medical benefits, by informing the design of stents and valve implants.

Reddy has also used his applied mathematics wizardry to help palaeontologists understand aspects of the behaviour of extinct mammal-like reptiles. The collaboration came about as a result of a chance conversation with a UCT palaeontologist, he says, and has resulted in some well-cited work.

They shared a postdoctoral researcher. "She was working on mammal-like reptiles, and ended up spending three years here at Cerecam. That was real multi-disciplinary work, bringing together anatomical expertise, imaging based on CT scans of fossils, and computational simulation of mechanical behaviour."

## DEMOCRACY, DEANSHIP AND DEVELOPMENT

Reddy's life as an academic and as a South African changed as the country went through its political upheavals. During the late 80s and early 90s, even as a staff member at UCT, he considered himself somewhat of an outsider in the white-dominated faculty. That began to change in the early 90s as South Africa's apartheid regime was dismantled. Nevertheless, the changes weren't always as rapid as he would have hoped. The Reddys enrolled their son at the South African College School (SACS) in Newlands, one of the province's best, but with an overwhelmingly white student body. This was in 1992, not long after formerly white schools became open. Although their son thrived, Reddy himself often despaired at the unwillingness of the leadership and many of the parents to embrace change.

Between 1999 and 2005 Reddy was Dean of UCT's Faculty of Science. He then decided to focus once more on teaching and research, rather than continue in the world of university leadership and management. He was awarded a research chair in 2007 in computational mechanics. He was part of the group responsible for establishing the Centre for High Performance Computing, a national facility. He threw his energies into resuscitating UCT's Centre for Research in Computational and Applied Mathematics. Under his leadership, Cerecam has blossomed, with students and staff hailing from a dozen African countries.

Mindful of the challenges facing bright students in the rest of the continent, he also worked with others to help establish the African Institute for

Mathematical Sciences, or AIMS, in Muizenberg. Students from more than 20 African countries have enrolled at AIMS for a postgraduate qualification, and many have gone on to study further at universities around the world. He is passionate about teaching and supervision, and loves seeing his students succeed. He has also spent stints abroad as a visiting professor in the USA and Germany, where in addition to collaborative research he has been closely involved in the work of his colleagues' students, some of whom have spent time with him at Cerecam.

In recent years, Reddy has become a champion of science and technology in wider society. In 2012, he became President of the Academy of Science of South Africa. The year after, he was elected Co-Chair of the InterAcademy Council, and also represents South Africa on the executive of the IAP, formerly the InterAcademy Panel and now the InterAcademy Partnership.

As he sees it, the task of these organisations is to strengthen the scientific enterprise generally, to promote science in broader society, and to provide evidence-based science advice to policymakers. He wants to increase ICSU's African membership and ensure greater involvement of its existing African members, believing that it's time that the continent starts to feature more prominently in the international science community.

There isn't much time left in Reddy's day once all his work duties are done. In spare moments he likes to read. Not about science, but good literature, both fiction and non-fiction. He enjoys the challenge of learning a new language. And he likes to listen to music, classical and also 70s Rock. But even while reading, enjoying his music or out walking, he rarely stops thinking about his work. It's just the way he is, he admits. "This dog has got to have a bone to chew all the time".