PATRICIA WHITELOCK

AWARDS, HONOURS AND ACHIEVEMENTS

- Gold Medal from the South African Institute of Physics (2018)
- Being asked to coordinate the Strategic Plan for Astronomy (2000)
- Messages from students on the National Astrophysics and Space Science Programme (NASSP) about how the project had changed their lives

DEFINING MOMENT

In 1974 she was observing in Tenerife and was asked to assist John Menzies and a colleague, both from the University of Oxford, who would be using the telescope for the first time. John Menzies was to become her husband.

WHAT NOT MANY PEOPLE KNOW ABOUT ME

"I'm very dyslexic. The hardest thing I did in my life was learning to read."

A LIFE FOR THE STARS

Patricia Whitelock's first science teacher was her father, an engineer who specialised in the construction of power stations. It was a time when the country of Whitelock's birth, the United Kingdom, was investing in nuclear power. "My father talked to me about things like the structure of the atom," says the astronomer, who for the past 40 years has called South Africa her home.

With such a start in life, school science came as something of a disappointment for young Whitelock. "It was so banal," she recalls. Still, in her last years of schooling her science teachers were excellent and her interest in astronomy took root in her early teens. After finishing school, Whitelock attended the University College London, followed by a PhD from the Imperial College of Science and Technology (now Imperial College London). Had times been different, she might have done something more physical with her life. Piloting, say, or helicopter engineering. But back then women didn't do those jobs. "There were limited numbers of jobs open to women. At least women could be scientists."

For her doctoral thesis on ground-based infrared photometry, published in 1967, Whitelock spent six months at a telescope in Tenerife on the Canary Islands. There she met an Australian astronomer based in Oxford and later, Preston who was to become her husband. Keen to forge a life together, and with Whitelock back at the University College London for a postdoctoral position, the two young astronomers discussed their future. Whitelock remembers saying she'd go anywhere in the world where there were good telescopes and clear skies – "But not South Africa."

It was the 1970s and in Whitelock's and many other Britons' minds, South Africa was synonymous with the human rights abuses of the apartheid regime. But on a visit to the country to make astronomical observations in the mid-1970s, Whitelock met local astronomers who were not regime-backers – quite the opposite. "None of them were pro-apartheid and some strongly protested against it. I thought, I could live with these people."

Whitelock relocated to South Africa in 1978, settling at the South African Astronomical Observatory (SAAO) in Cape Town. Her first job was to look after the instrumentation used for optical photometry on its telescopes. She also got into coding for telescope and instrument control. Being based at SAAO, she had excellent access to South Africa's optical telescopes at Sutherland in the Roggeveld Karoo. She became fascinated with what happens to stars when they age and die – a dramatic but poorly understood process.

A DYING STAR

Towards the end of stars' lives their fuel reserves – the hydrogen that is converted into helium in their hearts goes through a process called nuclear fission – start to run out. As this happens, the outer layers of the star fall in, the density increases and another type of nuclear reaction starts turning the helium into carbon and oxygen, the building blocks of life, inside the star. Somewhat later, stars with the mass of our sun or up to ten times more, expand dramatically and begin to pulsate on timescales of hundreds of days; material from the core of the star comes up to the star's surface and eventually escapes into space. This process enables heavier elements, including carbon, to become available to form planets and even create life on planets.

Whitelock was able to observe these stellar pulses with the telescopes at her disposal, creating data sets stretching over decades – long enough to detect

and describe the cycles of dying stars accurately. She also participated in influential observations of the variability of Eta Carinae – a giant star about 100 times the mass of our sun which can only be observed from the southern hemisphere. This star underwent a spectacular brightening in the early 1800s, a phenomenon studied by astronomers who were in South Africa at the time, including British astronomer John Herschel. Whitelock and her colleagues studied this star over many decades using the telescopes stationed at Sutherland, once more cataloguing a steady increase in its luminosity. Observing this star for the next decades or centuries will teach astronomers about what happens to such massive stars as they approach the ends of their lives.

In addition to her research work, Whitelock has also held several administrative appointments at SAAO. She helped to develop its postgraduate training programme, an activity that led to the establishment in 2003 of the NASSP. The programme was designed to address the lack of homegrown South African astronomers, especially black and women scientists. "It was in recognition of the fact that at that time almost all the astronomers in this country were born outside of it," she says. To date, the programme has trained over 270 Honours and 180 Master's graduates. Over half were black, and many were women. More than half of them have gone on to study for a PhD.

Whitelock also held several senior positions at SAAO, including Acting Director for 18 months from 2002 to 2003 and Director from 2011 to 2012. Since 2006 she has combined her work at the observatory with a professorship at the University of Cape Town (UCT). She was the first astronomer to head the South African Institute of Physics, from 2001 to 2003. In this role, she started the "Future of Physics" initiative and chaired the first South African Institute of Physics (SAIP) transformation committee in 2001.

Whitelock has played a vital role in many of South Africa's recent major astronomy investments. Although she was not behind the bid to host the Square Kilometre Array (SKA) radio telescope in South Africa, it was her idea that South Africa should get involved in the international project in the first place. "It was clear to me that if we wanted to be active in radio astronomy, we needed to be part of that," she says. And it was she who persuaded Justin Jonas to lead South Africa's involvement in the project.

At SAAO, Whitelock also participated in a bid to the International Astronomical Union to host the Office of Astronomy for Development (OAD) in South Africa. The bid was successful and Cape Town became the epicentre for work to use astronomy to benefit society in developing countries. The OAD has since established many regional offices, including in Ethiopia and Zambia. The OAD Office won the Edinburgh Medal in 2016.

Whitelock is not keen to retire, even though she has reached retirement age. She currently holds a five-year consultant astronomy post at SAAO and plans to keep doing research in astronomy for the foreseeable future. She wouldn't have it any other way – solving astronomical challenges is what she loves to do. "It keeps me out of trouble."

2020

Legends of South African Science II

Academy of Science of South Africa (ASSAf)

Academy of Science of South Africa (ASSAf)