NZASE scientist profile

Jan Wikaira

Jan at Waimairi, her local beach. Photo: Neil McBeth, Avenues magazine, Christchurch Press.

Birth and affiliations

Jan was born in 1944 in Ōtautahi/Christchurch, where her mum and dad grew up.

She identifies as Pākehā and Māori. "I was brought up Pākehā, not knowing about my whakapapa. I was told in my 40s, after my father and grandfather died, that my paternal grandfather was of Māori descent.

"He was born at Blind River near Blenheim. As the oldest grandchild, I spent a lot of time with him and he talked with me in te reo. He never mentioned an affiliation to a particular marae." Finding out about her whakapapa contributed to Jan studying for a BA and a Masters in Māori and Indigenous Studies from 2010 to 2016.

Jan's children also affiliate to Ngāpuhi, Ngāti Raukawa and Ngāti Maniapoto through her first husband. "One of my children was often not recognised as Māori, but my son was singled out by the police and I became very aware of that kind of racism."

Schools and subjects

West Streydon Primary, Christchurch South Intermediate, Cashmere High School.

"I did Biology; after I'd been away with a collapsed lung for several months I was told by the Chemistry teacher that I had no aptitude, so I studied Clothing when the rest of my class did Chemistry. I remind him of this every so often!"

How she got into science

"I've always been interested. My mother never went to high school and was interested in anything to do with nature; we found birds' nests and had a lot of books on science and nature. A Standard 4 teacher encouraged me to start a butterfly collection."

With only four years of high school and no secondary teaching qualifications, Jan taught 7th form Biology at Taumaranui, in a school that was very short of teachers. In her early 40s, when her children were teenagers, she enrolled for her first degree in Chemistry and Economics – "I had such a supportive group in Chemistry that I kept going with just that."

Training and jobs

Jan has taught almost continuously for 60 years, from preschool children to honours postgraduates at university.

Trained Teacher's Certificate, Christchurch Teachers' College, 1963; **Masters in Science**, University of Canterbury, 1989, on the metabolism of morphine by patients with acute renal failure.

PhD, University of Canterbury, 1996.

Primary teacher; **Senior Woman** (now called Deputy Principal); **secondary teacher** in maths and science.

Laboratory supervisor, **contract teaching fellow**, **lecturer** and **senior lecturer**, University of Canterbury. Invited summer school lecturer, Brown University, Providence, USA.

Jan, right, demonstrating chemistry for the NZ Institute of Chemistry in Cathedral Square in 2015.

Field of science

Inorganic Chemistry, X-ray crystallography, Chemistry education.

How she finds things out

In X-ray crystallography, X-rays of a very specific wave length are fired at crystals made from new substances and containing new molecules.

"We try to find out exactly what these molecules are and if they are what the chemist hoped to make. We use a diffractometer, which acts like an electronic microscope. Molecules are visible with X-rays because they're about the same size as the wave-length of the X-rays."

Research topics

Small molecule analysis

For her PhD, Jan used big macrocycles, large molecules that form a circle, with four metals in the centre surrounded by organic molecules. "Such macrocycles could be used to model the active sites of enzymes, and surface chemistry for control of corrosion."

For many years, Jan managed a collection of all single crystal data for other university chemistry departments in New Zealand, as well as Australia, the UK, the USA, Malaysia and Iran. "I supported myself through my PhD by collecting data for all these people."

Jan has since worked with Mark Turnbull in the USA, to make and analyse a set of molecules with magnetic pathways through them. "I do the X-ray crystallography and Mark does the magnetics. We use tetrahalo copper complexes, a complex ion with a central copper atom with

Photo: University of Canterbury.

four chlorine or bromines attached. We vary the organic molecules associated in arrays with those complexes, to induce magnetic pathways through the structures." They have built a library of compounds containing interesting magnetic pathways, "which could be used as room-temperature super conductors."

Determining the strength of timber

"I improved an X-ray technique developed by Ian Cave for calculating the strength of timber, and adapted it for different sorts of timber."

"Cellulose, which makes up a lot of timber, grows in fibrils which are crystalline. These fibres grow at a certain angle to the normal of the tree – the smaller the angle the higher the tensile strength of the timber."

"We needed only a tiny piece of timber instead of cutting down a whole trunk. It was an elegant and simple way of determining tensile strength, and is used all over the place; I get lots of requests to talk about it."

Chemistry lab demonstrator training

"I set up the programme to train postgraduate students as demonstrators for the laboratory components of undergraduate courses. I'm very proud of the training programme and the standard of lab teaching in the department."

Ngā Kupu

Hanga matū – Chemical structure
Hihi-X – X-ray
Konganuku – Metal
Mātai matū – Chemistry
Ōwehenga matū – Chemical composition
Pararopi-kore – Inorganic
Pūhui matū – Chemical compound
Rāpoi ngota – Molecule
Taiwhanga pūtaiao – Science laboratory.

From Paekupu

Mātauranga Māori

Jan says she's not confident using Mātauranga Māori in her work. She believes her timber research has implications for Māori, but the macrocycles work is more theoretical. She was a member of the university's Māori Research Advisory Group for 10 years.

What she likes about science

"The moment you answer a question, there are new questions to answer. There are always more problems to solve – it's fascinated me since I was young."