Nexus Research Group

Space Pioneer: William H Pickering - Rocket Man

A brief history of William Pickering, Explorer 1 engineer, JPL director, kiwi scientist, and patron of the Nexus Research Group.

Written by Michael Fenton, edited by William Pickering (1910 - 2004)

Most New Zealand children, at some stage of their school education, will have heard of Mount Everest conquerer Sir Edmund Hilary and atom splitter Sir Earnest Rutherford. These men symbolise the pioneering and problem-solving spirit of Kiwi culture, neither man willing to blindly accept the perceived limitations of world they lived in. One man conquered the very large, the other the unimaginably small.

Our children learn that being geographically isolated at the bottom of the planet, with relatively few resources, does not have to prevent us from having a major impact on the rest of the world. Movie maker Peter Jackson (maker of *Lord of the Rings*) has shown that from small beginnings, with enough determination, anyone in New Zealand can make it to the top of their profession.

There is one other historic achievement that seems to have gone unnoticed in our school curriculum resources ...that of the work of Dr Sir William Pickering. He played a major role in conquering space - the "final frontier". It was a New Zealander who brought the unimaginably distant planets within our reach.

So what kind of education and training did Bill Pickering have? From his example, is it still possible for Kiwi students to one day make a valuable contribution to Space Research?

The Early Years...

William Hayward Pickering was born in Mount Victoria, Wellington in 1910. His mother died when he was six and he was sent to live with his grandparents in the Marlborough Sounds. Even at this early age Bill already had something in common with Sir Earnest Rutherford. Both men attended Havelock Primary School.

In 1923 he started boarding at Wellington College. Bill found his inspiration to look at the stars from his maths teacher, the founder of the school's observatory. Wireless communications also became a hobby with Bill building an amateur radio station.

Bill eventually made it to the United States, and by 1936, he had received a Bachelor of Science, Master of Science and a Ph.D. in Physics from Caltech.

He joined the Caltech faculty and by 1946 was Professor of Electrical Engineering. During World War II, he conducted research on the absorption properties of cosmic rays with Dr. Robert A. Millikan (Year 12 & 13 physics students - this is the Millikan of the oil drop experiment/charge on an electron fame). Pickering was invited to the Jet Propulsion Laboratory (JPL) in 1944. He was named chief of JPL's Remote Control Section and by 1949, headed the Corporal and Sergeant missile programs. He became Director of JPL in 1954.

Earth Escape

In conventional warfare, if you can control the skies you can control any country. An invading force can have its aircraft fly into another country's skies - its "air space" - and win a battle without the use - or loss - of ground troops.

However, enemy aircraft can be spotted and heard from a distance, anti-aircraft guns can then shoot the invaders down. But what if you had a craft - a satellite - that flew so high in the atmosphere that nobody could see it was there? Even when overhead, they cannot be heard, cannot be seen. They are out of reach of anti-aircraft guns. You can easily invade any air space; spy and take photos of the country below or fire weapons straight down that would strike with no warning or chance to mount a defence.

By the mid 1950's both Russia and America were working on vehicles that could escape the Earth's surface and reach the edges of our atmosphere. Satellites are launched by rockets, able to circle the planet like miniature moons. The race to dominate sky and space began in earnest when the Russians launched *Sputnik* in 1957 using newly developed rockets. Circling the globe every 90 minutes, the *Sputnik* satellite contained a beeping transmitter that could be heard on any short wave radio on earth. The American public knew it was there. In **their** air space! Terror struck the nation and its Government.

Bill Pickering said: "It was only the beeping reality of *Sputnik* that suddenly made the threat of intercontinental atomic warfare with ballistic rockets more than a science fiction story."

The US Navy was given a large budget to challenge the Russians lead in the Space Race. The US **must** have working rockets! A test launch, on December 7th, 1957, was eagerly awaited. Under the full glare of the international media, *Vanguard* blew up on the launchpad.

Meanwhile the Jet Propulsion Laboratory (JPL) had been working since *Sputnik* on their own satellite delivery system, albeit with a smaller budget. Working with Pickering was a cosmic ray expert, Dr James Van Allen, and Dr Wernher von Braun. It was Von Braun's work as a rocket scientist that enabled the Nazi's to launch the deadly V2 rocket that devastated London during World War II.

Their rocket, *Explorer 1,* was launched from Cape Canaveral, Florida on January 31, 1958, less than four months after *Sputnik* and just seven weeks after the *Vanguard* disaster. It was *Explorer 1* that made the discovery that a radiation belt circled the Earth. This would become known as the Van Allen Belt. *Explorer 1* stayed in orbit for the next 10 years.

The launch of NASA...

Once Pickering and his team conquered the earth's orbit, no part of the planet was blind to American eyes, nothing stood between America and the far reaches of space. In 1958 Congress passed the Space Act that established the National Aeronautics and Space Administration (NASA). JPL was transferred to NASA and charged with robotic exploration of the moon and planets.

NASA was given three broad categories for their space missions:

1. **Near Earth Satellites**. To make measurements of: the Earth from space; to explore the near Earth space environment; and explore the cosmos from observing points above the Earth's atmosphere

2. **Deep space missions** to explore the solar system

3. **The development of manned space travel.**

Bill Pickering said in 1993: "JPL argued for, and received, a charter to develop the deep space missions. As a personal aside, I was delighted to hold a contract that said in essence 'go out and explore the depths of the solar system'."

During his 22 years as JPL Director:

- *Explorer I*, the first U.S satellite, was launched
- the *Ranger* missions took the first close-up high resolution pictures of the Moon
- *Surveyor* craft landed on the Moon
- various space craft were sent to Mercury, Venus and Mars
- plans for *Voyager*'s Grand Tour were underway.

Pickering retired from JPL in 1976.

Dr Bill Pickering with *Ranger*, the probe that took TV pictures of the Moon as it crashed into the surface!

The Legacy continues...

Retirement did not mean that Bill's influence was forgotten. Almost thirty years after he retired Bill was awarded the inaugural Francois-Xavier Bagnoud Aerospace Prize in 1993 for his contribution to space science. Congratulated by His Majesty, the Emperor of Japan, Dr Pickering was named a Japan Laureate in 1994, "For inspirational leadership in unmanned lunar and planetary exploration, and for pioneering achievements in the development of spacecraft and deep space communications". Of this prestigious award, the President of Caltech, Dr Thomas Everhart said: "More than any other individual, Bill Pickering was responsible for America's success in exploring the planets - an endeavour that demanded vision, courage, dedication, expertise and the ability to inspire two generations of scientists and engineers at the Jet Propulsion Laboratory." Added Dr Edward Stone, the Director of the Jet Propulsion Laboratory, "The Japan Prize is a well-deserved recognition of Dr Pickering's many contributions to space science and his leadership and vision in shaping JPL as the foremost explorer of the solar system".

NEXUS The Present...

Prior to his death in March 2004, Dr William Pickering KBE was still very active. We appreciated his support as Patron of the Nexus Research Group. He received an Honorary Knighthood and in the Queen’s Birthday Honours 2003 the Wellington-born scientist was made an Honorary Member of the Order of New Zealand. In that same year the Pickering/Rutherford Memorial was unveiled in Havelock; two great scientists to inspire our students!

As a former member of the Nexus Research Group Dr Pickering continues to inspire us today.