

Queanbeyan and District Historical Museum Society.

Iron Lung

Statement of Significance:

The Iron Lung is considered extremely significant to not only the Queanbeyan Museum, but also the local community and indeed the nation. The Museum Society considers the Lung to have very high significance.

Due to what the lung was made of, and what it was used for, even though it has important scientific and technological significance, they were destroyed after they were used and hence it is rare. The lung has huge interpretive potential – just ask anyone under 60 if they have seen one, or know what they do – let alone what polio is (see NMA's use of our lung).

When carrying out research on the Iron Lung, it was discovered that there are less than 20 of this specific type of Iron Lung on public display (that is: recorded in cultural institutions) in Australia - 8 of these being in NSW. The Iron Lung the Queanbeyan Museum has was given to the museum by the Queanbeyan District Hospital in the early 1980's. In this regard it is extremely rare.

It has technological significance because it was an Australian invention that was subsequently transported around the world. It is of very simple structure made of plywood and steel with a rubber air pipe and mattress.

The item still has attached all original brass identification plates, numbers and inscriptions including that it was donated by Lord Nuffield and made by Both Industries in South Australia.

It has original (although perished) rubber work, mattress (provided by Dunlopillow), electricity cord and fittings.

The Lung has important local social (& historic) significance: - It was one of two lungs; donated by Lord Nuffield to the QDH (Lord Nuffield was William Morris, the owner of the British Morris Car company). One was used by the Canberra Community Hospital during the Polio epidemics in the 1940's to early 60's. As polio was a communicable and therefore a notifiable disease, we are able to establish the names of people who died in the lung.

Most noticeable death in relation to the Lung was nursing sister Shakespeare. Shakespeare was the daughter of the owner of the Canberra time and polio nurse at the Canberra Community Hospital. Nurse Shakespeare contracted polio in her work and died from it.

Aesthetically, It looks like a coffin, and patients often described that its use was the only thing that kept them out of a coffin. It is rare because it is made of plywood and was easily destroyed after the threat of polio subsided.

Queanbeyan's Iron Lung – Collected information.

Provenance:

The Iron lung was stored under Queanbeyan Hospital after the polio epidemic had passed. Stored inside it were old, stainless steel surgical implements that had been replaced by more modern types. When the hospital was being tidied up, the lung and its contents were offered to the QDHMS for its hospital display.

Update: Recent checking identifies that there is no official paperwork providing ownership of the lung to the museum. In a phone conversation with the CEO of Southern Area Health, a letter of ownership will be provided.

Both Iron lungs were offered to all hospitals in the Commonwealth who wanted one. Both Queanbeyan and Canberra hospitals applied and got one. During the height of the polio epidemic, Queanbeyan's lung was lent to Canberra. They then had two lungs to service their patients. The lungs at the Canberra Hospital were installed inside the wards, with the bellows on the verandah's outside. Nurses of the day tell how if there was ever a blackout, or the electricity was cut, they would have to manually pump the bellows on the verandah to ensure their polio patients stayed alive. The nurses also explain that the only thing protecting them from polio was a rubber apron and disinfectant, no masks or vaccines.

Several older visitors have come to the museum knowing their siblings have died in an Iron Lung at the Canberra Hospital. There is a good chance (50%) that the lung on show was the one they died in.

Queanbeyan's Iron Lung featured in a polio exhibition at the National Museum of Australia:

World Without Polio: Truly Remarkable.

The exhibition traces the widespread fear that gripped the Australian community when polio peaked here in the 1950s. It also tells the personal stories of Canberra's affected by polio, including Nurse Lyn Cummings, whose colleague Judith Shakespeare died on Acton Peninsula in 1954 just a week after contracting the virus from a patient.

The plywood Iron Lung was invented by Australian Ted Both and was used throughout Australian hospitals since it was lighter and cheaper than earlier American versions.

WHAT: A *World Without Polio* iron lung arrival

WHEN: 11am, Wednesday 24 November 2004

WHERE: Hall, National Museum, Acton

A World Without Polio opens on 9 December - the eve of Rotary's centenary and the end of the polio virus - delayed by a recent African outbreak but expected to be eliminated by 2006.

The iron lung on show in the Hall will be switched on for demonstrations for 15 minutes at 11am and 2.30pm daily. The exhibition in the Nation Focus Gallery includes striking photographs of the worldwide effort to stamp out polio, historic newsreel footage of the disease's impact in Australia and more personal stories of those affected by polio, ranging from *I Can Jump Puddles* author Allan Marshall to Kerry Packer and John Laws.

A World Without Polio was developed by Rotary in partnership with the National Museum and will be **officially opened at 11am on Thursday, 9 December by Kim Beazley**, who had childhood polio. The exhibition is in the National Museum's Nation Focus Gallery from 9 December to 27 February. Entry is free

How the lung works:

The person using the iron lung is placed into the chamber. The head and neck to remain outside the lung, and a sealed, airtight compartment enclosing the rest of the person's body is formed. Pumps that control airflow periodically decrease and increase the air pressure within the chamber, and particularly, on the chest. When the pressure falls below that within the lungs, the lungs expand and atmospheric pressure pushes air from outside the chamber in via the person's nose and airways to keep the lungs filled; when the pressure rises above that within the lungs, the reverse occurs, and air is expelled. In this manner, the iron lung mimics the physiologic action of breathing: by periodically altering intrathoracic pressure, it causes air to flow in and out of the lungs. The iron lung is a form of non invasive therapy.

Poliomyelitis is a viral disease that, in its most severe forms, attacks the central nervous system causing permanent or temporary paralysis. Patients with 'anterior' poliomyelitis are unable to breath and require artificial respiration to keep them alive. The earliest epidemic of poliomyelitis or 'infantile paralysis' in Australia occurred in 1895. The last was to happen in 1961 before the Salk vaccine and the Sabine oral vaccine finally put an end to polio in Australia. Between those years there were a number of outbreaks including three major epidemics, occurring not only in Australia but world-wide, in 1937-38, 1947-48 and 1951-52. The 1937-38 epidemic was the unprecedentedly severe. At that time there were a few American 'Drinker' respirators in Australia, but suddenly there was a need for more. Several inventors devised respirators based on the Drinker model that could be manufactured inexpensively and quickly. The most commonly known of these was the wooden 'Both' portable respirator invented in Adelaide. Both 'iron lungs' went on to be manufactured by Lord Nuffield in England in the late 1930s and distributed all over the British Empire, including Australia. With various improvements they were also copied in

the workshops of several Australian hospitals, while at the Both factories in Adelaide and Sydney they were still being made into the 1950s. The cabinet respirators in Australian museums are not all the same. Most of them are versions of the wooden 'Both' respirator, but they have been manufactured in different places and at different times. Research is needed to tease out the story behind each one. The Queanbeyan Iron Lung is an Original Both. It has its name plate, serial number and a brass plate alerting us to the fact it was donated by Nuffield.

The Drinker 'iron lung'

The Both machine worked on the same principle as the Drinker respirator, which had been developed in the late 1920s by Philip Drinker at the Rockefeller Institute in the USA. The Drinker had gone into commercial production in the early 1930s. It operated on the principle of *intermittent external negative pressure ventilation*. This means that the apparatus was a sealed chamber in which a patient was placed if their respiratory muscles were paralysed. Only the patient's head protruded, and a soft collar around their neck maintained the seal. Inside the chamber the air pressure was rhythmically lowered and restored. The changes in air pressure caused the patient's chest to rise and fall, thus drawing air in through their mouth and pushing it out again. The rhythmic breathing that would normally be produced by a person's chest muscles was instead produced by the machine. The chamber of the Drinker respirator where the patient lay was a larger, cylindrical metal tank. At some stage it was given the nickname 'iron lung' and this term stuck.

The Both 'iron lung'

Although it operated on the same principle of external negative pressure, the Both respirator was much simpler and cheaper to produce than the Drinker. One of its features was that it was made of plywood. This contributed to the cheapness of its manufacture. It also meant that the unit was lighter and, since it was mounted on wheels, it could be moved about. In fact it was called the 'Both portable cabinet respirator'. However, hospital staff and the general public were apparently used to referring to polio respirators as 'iron lungs'. The term continued to be used for Both respirators even though they were not made of iron. Apparently the Both brothers themselves called their machines 'iron lungs'. In addition, some hospital staff even referred to the Both respirators as 'Drinkers'. The mechanism that created the negative air pressure inside the Both respirator was separate from the cabinet. It consisted of an electric motor connected to a large cylindrical bellows mounted on a wheeled stand. The bellows in turn was connected by a wide flexible tube to the patient's wooden cabinet. The rhythmical expanding and contracting of the bellows produced the necessary changes in air pressure inside the cabinet. In some hospitals the bellows of each unit was located on the verandah and the flexible tube passed through the window to the patient's cabinet in the ward.

The Nuffield connection

William Morris, later Sir William Morris, and later still Lord Nuffield, started with a bicycle shop in Oxford, England, but in 1913 he made his first motorcar, the Morris Oxford. He

went on to have a long and fruitful career as a manufacturer of Morris and MG cars and gave much of his resultant wealth to practical philanthropical works. There are still many charities today that bear Lord Nuffield's name.

During the 1930s Lord Nuffield became involved with the manufacture and distribution of Both artificial respirators. Mrs Eileen Both (Edward Both's wife) has written her recollections of how Lord Nuffield came to learn about the Both machine in 1938:

Edward was in London with a direct-writing portable electrocardiograph which he hoped to introduce to the medical profession when he heard an S.O.S. on the B.B.C. radio for an "iron lung" for a poliomyelitis patient. He contacted the South Australian Agent-General ... and offered to produce his own model ... He hired a garage ... and set to work ... Soon he assembled a cabinet and a motor unit in the garage and had it accepted by the health department of the London County Council. One complete unit aroused considerable interest in the South Australian showcase [in Oxford Street, London]. Another respirator was lent to the Radcliffe Infirmary in Oxford, where a film was made of its operation. Lord Nuffield, a motor car magnate, who was a philanthropist, saw the film and was so impressed with the simplicity of operation and its design, he decided to manufacture and give away a "lung" to any hospital who asked. The generosity of the gift was heralded by the press.

Respirators to Both's design were subsequently mass produced at the Morris Cowley works. Professor Peter J. Morris of the Nuffield Department of Surgery at John Radcliffe Hospital in Oxford writes: *Nuffield ... offered to produce 5000 and provide one for every hospital in the British Empire that wanted one, when told that one or two people would die each year because of the lack of one. Until the war brought the production of the iron lungs to a halt **just on 1800 had been built** and distributed to hospitals throughout the British Empire.*

Both Equipment Ltd after the war

After working for the Australian Army Inventions Directorate during World War II, E.T. Both set up an office in Sydney, while his brother continued to manage the factory in Adelaide. Respirators became an important product amongst the many kinds of equipment manufactured by Both Equipment Ltd. The Nuffield model was modified and improved in various ways over the years. There were also baby incubators, and emergency respirators for transport by plane. Eventually E.T. sold the business to Drug Houses of Australia (DHA), which took all the workers, including Donald Both until he retired. Sometimes hailed as 'the Edison of Australia', E.T. Both died in 1987. The story of his many wartime, commercial, sporting and medical inventions is a fascinating one. Because of the role he played in the production of 'iron lungs', he had been honoured with an OBE by King Edward VI. Sadly, however, the Both brothers seem not to have been given the recognition they deserve in their home state of SA.