

## Everyday astronomy @ Sydney Observatory

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### Abstract

Catering to a broad range of audiences, including many non-English speaking visitors, Sydney Observatory offers everything from school programmes to public sessions, day care activities to night observing, personal interactions to web-based outreach. With a history of nearly 150 years of watching the heavens, Sydney Observatory is now engaged in sharing the wonder with everybody in traditional and innovative ways. Along with time-honoured tours of the sky through two main telescopes, as well as a small planetarium, Sydney Observatory also boasts a 3D theatre, and offers programmes 363 days a year — rain or shine, day and night. Additionally, our website never sleeps, with a blog, YouTube videos, and night sky watching podcasts. And for good measure, a sprinkling of special events such as the incomparable Festival of the Stars, for which most of northern Sydney turns out their lights. Sydney Observatory is the oldest working observatory in Australia, and we're thrilled to be looking forward to our 150<sup>th</sup> Anniversary next year in anticipation of the International Year of Astronomy immediately thereafter.

In order to understand Sydney Observatory today, it's important to see where it's come from; and the history of Sydney Observatory begins with the history of Australia itself — or at least the European occupation of it.



Figure 1 – First Fleet



Figure 2 – Windmill

All pictures courtesy of Sydney Observatory

In 1788, the first fleet arrived from England and landed in Sydney Cove. Almost as soon as the settlers arrived, an observatory was set up at the foot of the hill, and this was known as Dawes Observatory after the Royal Marine Lieutenant, William Dawes, who set it up. It didn't last too long as the realities of settlement life prevented much attention being given to it.

The first windmill was built atop the hill near the settlement in 1796, as it was the highest natural point in the area. Less than ten years later, it had deteriorated and fell into disuse as other bigger, better windmills were now in use elsewhere. It was at the time known as Windmill Hill, and the name sticks a bit to this day in the surrounding area known as Millers Point.

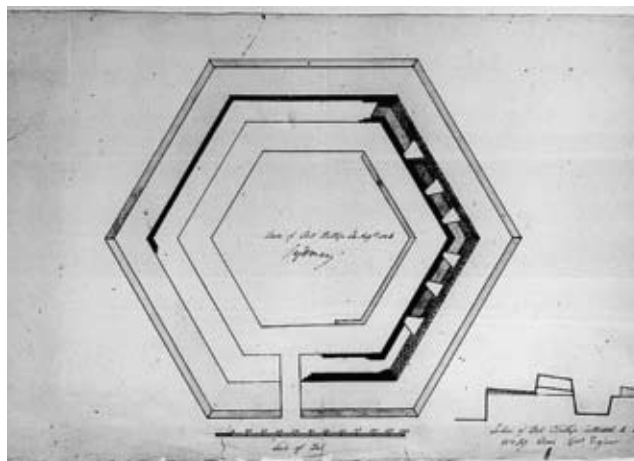


Figure 3 – Fort Phillip-plans



Figure 4 – Signal Station



Figure 5 – Sydney Observatory, 1860

1804 saw the construction of a fort on the hill to protect the nascent colony from the rowdy Irish. Fort Phillip was never completed and no shots were ever fired in defence.

Communication became a priority a few years later and the first flagstaff was erected on the northeast wall of the fort to communicate with ships in the harbour and other signal stations along the waterways to the east and west. By the 1820s, a semaphore mast and a Signal Station were added.

The fort was partially demolished in the 1840s/50s, and a Signal Master's Cottage constructed in 1848. This remains as the oldest building on the hill today. Later (1868), a Messenger's Cottage was added. By this time, the hill was known as Flagstaff Hill.

It was quickly becoming clear that accurate time was an increasingly necessary commodity for ships in the harbour to set their chronometers, and an observatory to determine that time was commissioned and built. On 5 June, 1858, the Timeball on the 58-ft tower dropped for the first time, and daily from then on.

In 1859, Henry Chamberlain Russell was employed as a “computer” — a role he would undertake for eleven years before he was named Government Astronomer in 1870. His 35 years as the head of the Observatory included many improvements to the equipment and buildings. Russell added a Transit Circle Telescope and a 29-cm (11-inch) refractor built in 1874.



Figure 6 – Henry C. Russell



Figure 7 – Transit Telescope



Figure 8 – Refractor Telescope in South Dome

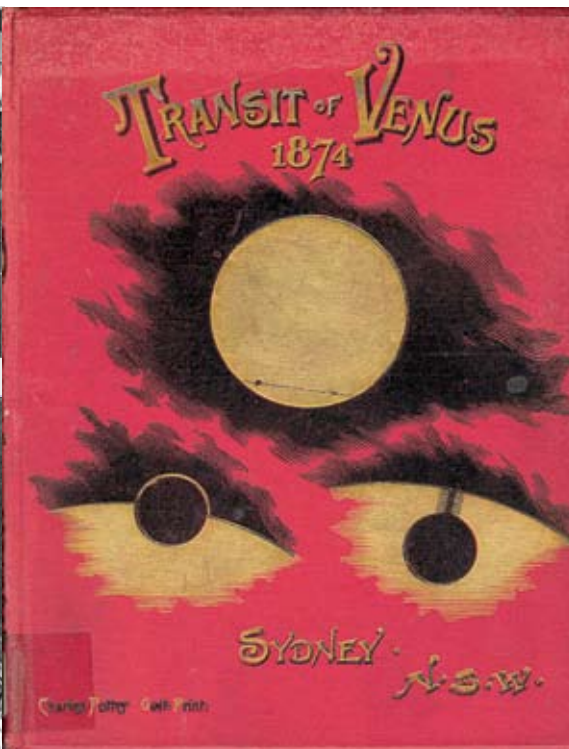


Figure 9 – Cover of 1892 book celebrating observations of 1874 Transit of Venus

The transit of Venus on 9 December 1874 was well observed — including by Russell at Sydney Observatory. The resulting observations were published collectively in a book in 1892.

Russell incorporated meteorology in his work, and published Australia's first weather map in the Sydney Morning Herald in 1877. Also in that year, a west wing was added to the Observatory that included an office and library, as well as another dome for a telescope. In the 1880s, Russell took some of the world's first astronomical photographs.

The Astrographic Congress in Paris of 1887 sought to compile the first completed atlas of the sky, and Russell's attendance there pledged Sydney & Melbourne Observatories. The Sydney section would cover  $52^{\circ}$ – $65^{\circ}$  south declination. Russell returned home to design and construct proper instrumentation, and by 1891, the Astrograph (telescope) was ready to begin the survey at Sydney Observatory. Increasing light pollution in the city, however, prompted the move of the Astrograph to another site (Pennant Hills) in 1899.

By the early 1900s, thanks to the now famous Henry Chamberlain Russell, the hill was now known as Observatory Hill. Russell retired in 1905.

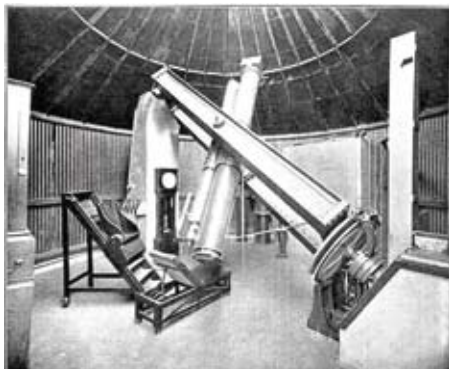


Figure 10 – Astrograph @ Pennant Hills

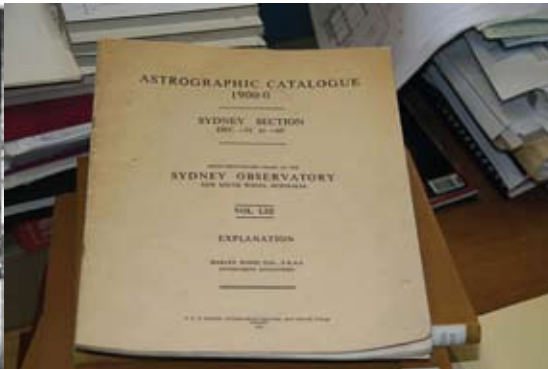


Figure 11 – Astrographic Catalogue – volume 53

In total, the Sydney portion of the Astrographic Catalogue took 80 years to complete within 53 volumes; the last volume was published in 1971. By this time, air and light pollution made astronomical work even more difficult. In 1982, the state of New South Wales converted the Sydney Observatory to a museum of astronomy and related fields as part of the Museum of Applied Arts & Sciences (MAAS) (more commonly known as the Powerhouse Museum).



Figure 12 – Sydney Observatory



Figure 13 – Timeball



Figure 14 – North Dome at night (Geoff Wyatt observing)

To this day, the Timeball Tower remains active. The Timeball drops nearly every day, though now the pips on the radio provide the accurate time (instead of the other way around).

Telescope Tours are offered daily and nightly to school groups and the public, every day of the year except Christmas and Good Friday. These tours include the North Dome with its modern 16-inch Meade LX200, and the South Dome containing the historic 1874 refractor (now the oldest telescope still in regular use in Australia).

The Observatory and attached Astronomer’s Residence buildings now include many exhibitions on astronomy including the Transit Circle telescope, the Transit of Venus, Cadi Eora Birrung — constellations from an Aboriginal perspective, By the Light of the Southern Stars — a history of Australian astronomy, and others.



Figure 15 – 3D Theatre.

Figure 16 – Planetarium.

The Astronomer's drawing room is now a 3D Theatre, where short movies created by Swinburne University's visualisation team are shown as part of the Tours.

The cosy planetarium is probably the only planetarium in the world with a fireplace (having been the Astronomer's dining room). The stars are produced by a StarLab projector atop a tall wooden box pier onto a 2-m dome, and bean bags provide seating for up to 20.

Evening Courses are offered for adults in Astronomical Concepts, Exploring the Heavens, and Understanding Relativity.

Special Events include the annual Festival of the Stars over two nights, with thousands of people taking advantage of great views of the night sky while most of the city's big buildings turn off their lights. The recent total lunar eclipse drew about 1300 people, who brought blankets and picnics to enjoy the slow pace of that celestial phenomenon. Party days encourage attendance during the day when special activities and programmes are offered.

Beyond the walls of the Observatory, outreach extends via the website with a blog and monthly online sky guides and maps.

Sydney Observatory is looking to the future as it celebrates its past. 2008 marks the 150<sup>th</sup> Anniversary of the first dropping of the Timeball. Many preparations are in progress to continue improvements of the site (both building and grounds) for this important milestone year, which leads well into the International Year of Astronomy in 2009.

The splendour of the Universe, and in particular the southern sky, is within easy reach of Sydney Observatory. Visit anytime.