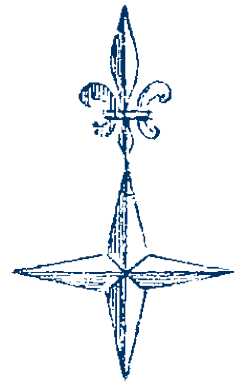


# Transit of Venus



‘Never perhaps in the world’s history did morning dawn on so many waiting astronomers as it did on the 9<sup>th</sup> of December 1874.’

NSW Government astronomer Henry Chamberlain Russell



A transit of Venus is one of the rarest of all astronomical events. It occurs when the orbit of the planet Venus takes it between the Earth and the Sun. Transits occur in pairs separated by 8 years, and then a gap of over 100 years. Only 7 transits have occurred since the invention of the telescope around 1609. This generation is one of the few to witness two Transits of Venus, 2004 and 2012. The next will not occur until December 2117.

Young English astronomer Rev Jeremiah Horrocks was the first to predict and observe a Transit on 24 November 1639. In his “Venus in sole visa” he notes “*The chance of a clouded atmosphere caused me much anxiety, for Jupiter and Mercury were in conjunction with the Sun almost at the same time as Venus... When the time of the observation approached... I directed my telescope ... the Sun’s image exactly filled the circle, and I watched carefully and unceasingly for any dark body that might enter upon the disk of light.*”

In 1716 Edmond Halley pointed out the feasibility of using transits for measuring the distance from the Earth to the Sun, and suggested a method of observation. Sadly he did not live to be part of it himself.

The next recorded observation was in 1761 during the Seven Years War, and was one of the first times the international community cooperated to try and answer one of the leading scientific questions of the day. Unfortunately the weather did not cooperate as well.

Eight years later came the most celebrated historical viewing – that by Captain James Cook and astronomer Charles Green, who travelled to Tahiti aboard HMB Endeavour, sponsored by England’s Royal Academy. Arriving six weeks ahead of the expected date, Cook set up Fort Venus to house the

observation party and the equipment. Cook and his crew were set to observe Venus gliding across the face of the sun, and by so doing measure the size of the solar system, one of the chief puzzles of 18<sup>th</sup> century science. If they failed every astronomer on earth would be dead before the next opportunity in 1874. On 3 June, 1769 they succeeded however, including documenting the ‘black drop’ effect for the first time (see definition below). They then went on to ‘discover’ Australia.

*Black drop* is “an optical effect that disturbed many 18<sup>th</sup>- and 19<sup>th</sup>-century astronomers trying to time the instants that Venus touched the edge of the Sun during a transit. A common manifestation was as a dark thread joining the edges of the planet and the Sun.”

From Lomb, Nick 2011 *Transit of Venus: 1631 to the present*, p.216

In 1874 the British mounted yet another expedition to the Pacific to observe the Transit – this time to Hawaii –while astronomers in Australia were on the lookout at the Observatories in both Sydney and Melbourne. NSW Government astronomer Henry Chamberlain Russell wrote: “Never perhaps in the world’s history did morning dawn on so many waiting astronomers as it did on the 9<sup>th</sup> of December 1874.” In addition to Sydney Observatory, Russell organised three observing stations at Woodford in the Blue Mountains, Eden and Goulburn, all staffed by leading scientists. Used in conjunction with other Commonwealth observations a modern value for the Sun’s distance from earth was determined. By the 1882 transit interest had waned, and bad weather also hampered observations.

On June 8, 2004, Venus crossed the face of the Sun again. The event was recorded as a web cast, broadcast live, and targeted by innumerable telescopes and organisations around the globe. In 2012 “the Hubble Space

Telescope will be aimed at the moon to detect dips in brightness” during the Transit. “We’ll get an idea what earth-size will look like ...and we’d actually be able to measure the atmosphere of Venus ...” (www.transitofvenus.org/education/new-discoveries)

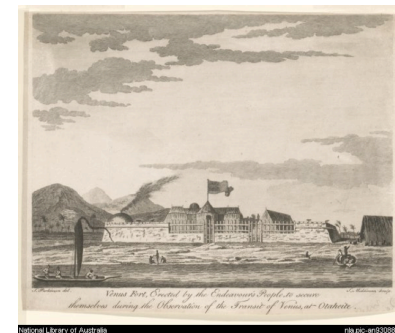
Australia is one of the best places to observe the 2012 Transit. In Sydney it should be visible from 8.16am until 2.44pm EST.

When observing the Transit do not look directly at the sun or through the telescope or finderscope. Instead use the telescope or binoculars to project an image of the sun onto a white surface. Viewing the projected image is quite safe.

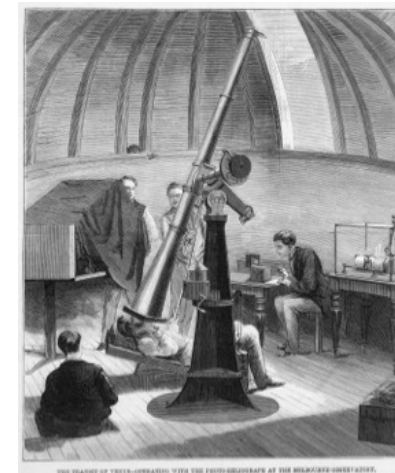
Some believe it is possible that somewhere out in distant space ‘someone’ or ‘something’ may be looking toward our star detecting two planets, Venus and Earth, passing in front of the sun. What do you think?

*Venus Veneris*, in pursuit followed her source from the sea. Translucent in the protoplasmic light, she touched a limb of the sun, pressed, And entering her crescent within the yolk-sac, was visible. Her mirror-back Appeared like she seed in the plexus of reciprocal radiance until After noon when centred in fluid ectoplasm of solar light, Face to face made a conjugation. Objectively, the spectacle conveyed itself along a line of sight Until expelled by the descending sun. The witnesses engaged an intellectual passion Moving like verse (the turn of a plough; a line of words) In the infinite aspect of perspective...

From ‘A Transit of Venus: poems of passage’ by Alex Galloway (p.5)



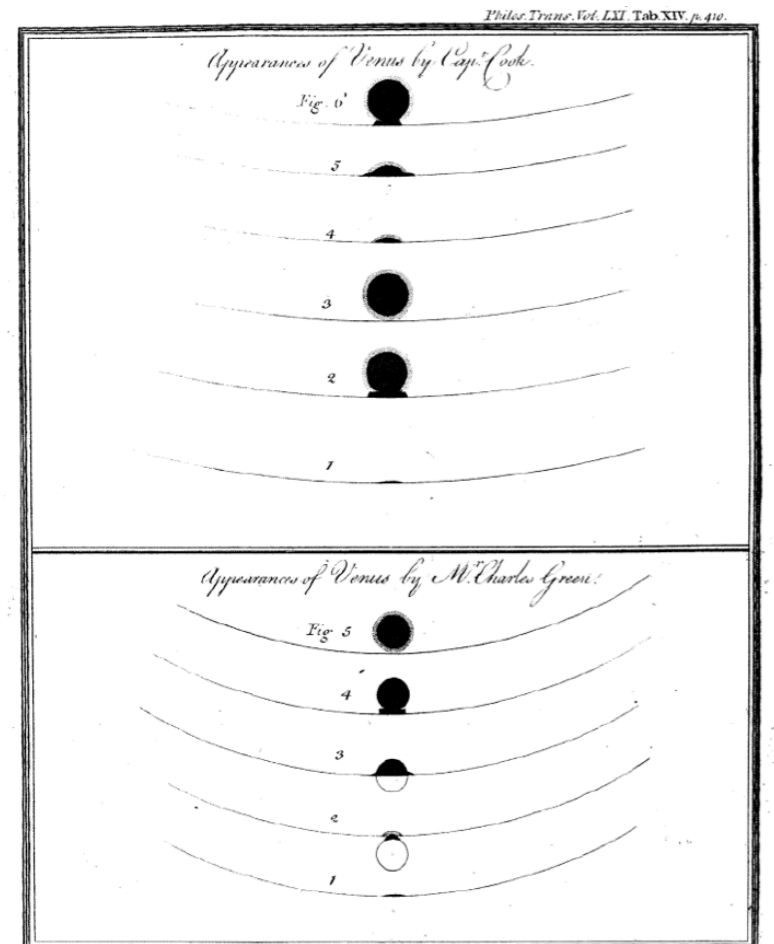
Fort Venus, Tahiti, from Journal of a Voyage to the South Seas, Sydney Parkinson, 1784 ANMM Collection



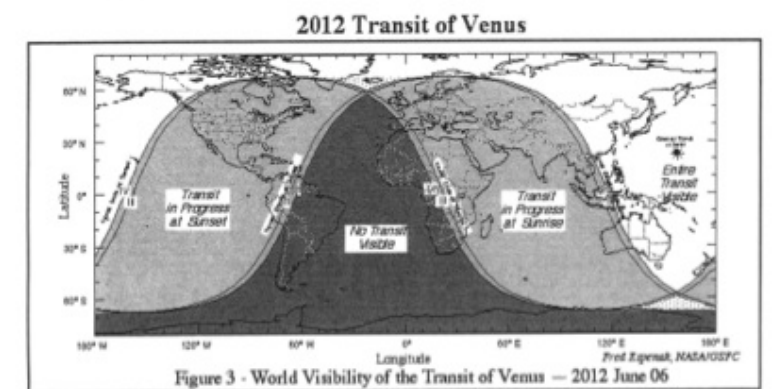
The Transit of Venus – operating with the photo-heliograph at the Melbourne Observatory, December 1874 Courtesy State Library of Victoria

## Further References

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Cook’s and Green’s drawings of the 1769 transit from *Philosophical Transactions of the Royal Society*, 61 : 410 , 1771



Courtesy NASA website (http://eclipse.gsfc.nasa.gov/OH/tran/TOV2012-Fig01.pdf)



HMB ENDEAVOUR

