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A TALE OF TWO TELESCOPES: NORTH QUEENSLAND AND THE 1882 TRANSIT OF VENUS

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Abstract: The 1882 transit of Venus offered the final opportunity for astronomers to use these rare events to pin down the distance from the Earth to the Sun. A British party based itself in southern Queensland, but total cloud cover prevented any observations being made on the critical day. In this paper we trace the preparations of the British party, and then show how they laid the foundations for the development of astronomy in Queensland by selling their two 6-in Cooke refractors before returning to Britain. Both instruments were purchased by a Townsville amateur astronomer, Edwin Norris, and although he installed one in an observatory, he made little use of it. However, he subsequently sold the other telescope to J. Ewen Davidson of Mackay, who also erected an observatory for it. Davidson then used his instrument for cometary astronomy, in the process discovering two new comets, one of which now bears his name. Unfortunately, recent attempts to track down the present whereabouts of the two telescopes have failed.

Keywords: 1882 transit of Venus, British transit team, Jimbour, Townsville, Edwin Norris, The Strand Observatory, Mackay, J. Ewen Davidson, Branscombe Observatory, Charles Sydney Norris

1 INTRODUCTION

The 7 December 1882 transits of Venus would offer astronomers their last chance to use these rare events to try and determine a value for the astronomical unit (Cottam and Orchiston, 2014; Cottam et al., 2012). To plan for this transit an international conference was held in Paris, from 5 to 13 October 1881. The British Delegate, Edward J. Stone from the Royal Greenwich Observatory, reported that Britain would establish transit stations in Bermuda, Jamaica, Barbados, the Cape Colony (3), Madagascar, New Zealand and the Falkland Islands. The conference also discussed the equipment to be used and the nature of observations to be made (The transit of Venus in 1882, 1882; W.H.M.C., 1882). Subsequently, the British decided to discard the Falkland Islands as an observing site (because of the multiple observations expected by American astronomers observing on home soil at similar longitudes), and Brisbane, Australia, was selected as a substitute (Argyll et al., 1882). This would not have been an easy choice for—weather permitting—the entire transit could be viewed from the Falklands whereas only the egress contacts would be visible from Brisbane (see Figure 1). New Zealand and South Africa also offered possible observing sites in the Southern Hemisphere and were part of the British Empire, but—as for Brisbane—only part of the transit would be visible (the ingress from South Africa and the egress from New Zealand).

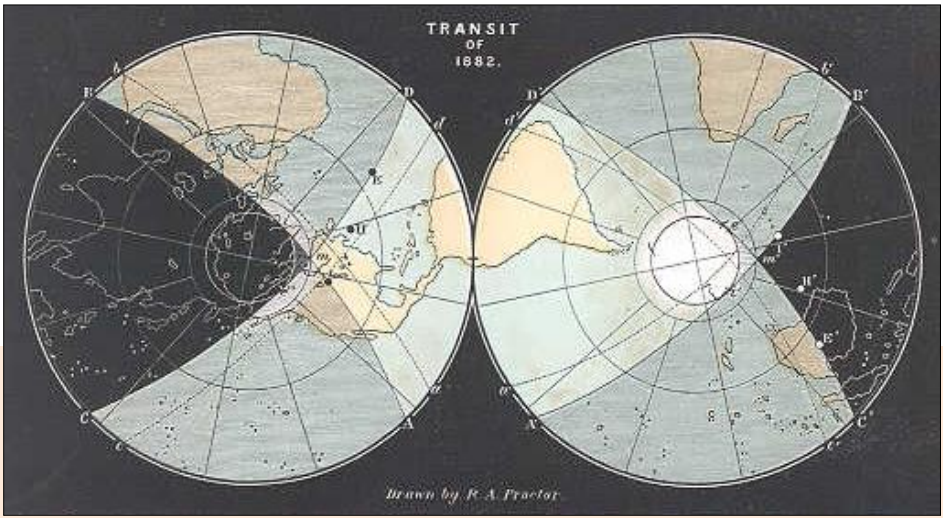

Figure 1: Visibility of the 1882 transit of Venus. The entire transit would be visible from those areas in pale blue and only a part of the transit in those dark blue areas (after Proctor, 1874: Plate VII).

As documented in Orchiston (2004b), the 1874 transit inspired a major Australian enterprise, with observations contributed by three of the colonial observatories, numerous amateur astronomers, and two U.S. transit parties based in Tasmania. Unfortunately, in 1882 only the egress of the transit would be visible from Australia, but even then only from the eastern half of the continent (see Figure 1), yet this did not deter the Adelaide, Melbourne and Sydney Observatories from planning elaborate transit campaigns (Baracchi, 1914), and again using photography as their primary investigative tool (despite concerns expressed following the 1874 transit—see Lankford, 1987). Some of the nation's leading amateur astronomers also planned to make observations, as did the aforementioned British transit party, which ended up in Jimbour, Queensland, rather than in Brisbane. Unfortunately, many hopes were dashed on the vital day when cloudy skies prevented observations being made, and this fate also befell the British visitors at Jimbour.

Successful Australian observations of the 1882 transit have already been reviewed by Orchiston (2004b), so in this paper we will focus on the British transit expedition, the only substantial campaign associated with the colony of Queensland, albeit an abortive one. We will then track two of the telescopes that belonged to that transit party, which were acquired by a Townsville amateur astronomer named Edwin Norris, with one telescope subsequently passing to J. Ewen Davidson, an accomplished cometary astronomy who lived near Mackay. So although from a Queensland and British perspective the 1882 transit itself may have been a disaster and a terrible waste of time and money, it had a fortunate sequel as it would unwittingly play a key role in the subsequent development of astronomy in North Queensland.

2 QUEENSLAND AND THE BRITISH 1882 TRANSIT EXPEDITION

2.1 From Britain to Jimbour

The British delegation sent to Queensland for the 7 December 1882 transit of Venus was sponsored by the Royal Geographical Society, and comprised Captain William George Morris (1847–1935; Plug, 2014), Lieutenant Leonard Darwin (1850–1943; Edwards, 2004), the fourth son of the celebrated Charles Darwin, and 'Gunner' Bailey, all from the Royal Engineers. Joining the official observers were two independent self-funded observers, amateur astronomer Cuthbert (later Sir Cuthbert) Edgar Peek (1855–1901; Grover, 1901; Hollis, 1912) and his assistant Charles Grover (1842–1921; Slater, 2005). All five members of the transit party are shown below in Figure 2.

Figure 2: The British transit party posing at Jimbour House. From left to right are Cuthbert Peek, Charles Grover, Captain Morris, Gunner Bailey and Leonard Darwin (courtesy: John Oxley Library, State Library of Queensland).

The transit party arrived in Brisbane on 26 October 1882 (*The Brisbane Courier*, 1882), six weeks before the transit, and Morris' initial task was to select a suitable site for their observations. Although Brisbane was their intended destination, in order to increase the chance of clear skies on the vital day and facilitate evening observations (for the determination of latitude) he chose to move from coastal hazy, smoggy Brisbane and go inland to Jimbour in the fertile, sunny Darling Downs west of Brisbane (see Figure 3). While Jimbour was not deemed completely ideal because of the low altitude of the Sun at the start of the transit, Peek (1882) felt it would be infinitely better than the hazy skies of Brisbane.

The actual transit station was sited at Jimbour House, a recently-vacated large colonial mansion (Figure 4) that had suitable surrounding grounds for the various telescopes and other scientific equipment and offered an appropriate standard of accommodation for the observers. Morris was responsible for staffing the house, and he would employ a cook and two housemaids to provide for the transit party.

The transit party left Brisbane on 2 November and used a variety of transportation methods for the 2-day trip to Jimbour. The entire party travelled by train to Macalister (see Figure 3). From this point the senior members of the party travelled on a 4-horse wagon for the remaining 12-mile (19-km) journey (this took 2.5 hours) on what was described as " … the roughest possible track …" (Peek, 1882), and in the process they "… had been almost shaken to pieces." Grover and Bailey were given the responsibility of transporting the equipment up to Jimbour House from the railway station. It was late afternoon on the next day, 3 November, before they finally departed, as it had taken them all day to load five drays and hitch up sixty horses so they too could travel across the plains to Jimbour House. Grover (1882–1883) stated that the air was very clear, as they had a good view of the House throughout their entire journey. The drays travelled during the night, arriving at 1 am on 4 November.

2.2 Telescopes and Observatories

Three different equatorially-mounted refracting telescopes were taken to Australia for the transit observations. The Royal Geographical Society supplied the official party with two 6-in (15.4-cm) Cooke refractors and a small transit telescope (Grover and Peek, 1882; Haynes et al., 1993), while Peek brought along the 6.5-in (16.5-cm) Mertz refractor from his father's observatory at Rousdon (Slater, 2005).

Figure 3: The Darling Downs cover the area from just east of Toowoomba to Nanango and Kingaroy in the north, west to between Macalister and Miles, and south to Warwick and just north of Goondiwindi. The British transit party was located at Jimbour (marked by the red bull's-eye) and travelled by rail from Brisbane to Macalister, via Toowoomba and Dalby. For scale, Macalister is 19 km from Jimbour (base map: en.wikimedia.org/wiki/Warrego_Highway#/media/File:Warrego_Highway_1712.svg; map modifications: Wayne Orchiston).

Figure 4: A 2011 photograph of historic Jimbour House (commons.wikimedia.org/wiki/File:Jimbour_House_-_Outside_-_Garden_View_5.jpg).

Figure 5: Jimbour House (left) and some of the temporary observatories of the British transit party. On the far right (with one of the telescopes protruding) are the observatories containing Peek's and Morris' refractors, while the transit telescope was housed in the building in the middle of the photograph. The location of the observatory that housed Darwin's refractor is not specified (after van Roode, 2011).

After settling in at commodious Jimbour House (Figure 4) the next task of the transit party was to erect the necessary observatories in the grounds behind the House (see Figure 5). At this point there was a notable division in labour. Peek and Grover set to work assembling the prefabricated wood and 'roll-off canvas roof' observatory for their Merz refractor (Figure 6) and Morris, Darwin and Bailey took responsibility for erecting the remaining buildings: two more wood and canvas observing huts for the two Cooke refractors (e.g. see Figure 7) and a hut for the transit instrument and an astronomical clock. In each observatory a stone pillar was installed, to support the telescope mounting.

2.3 Astronomical Observations Leading Up to the Transit

Once the transit telescope was operational a local time service was quickly established, and the challenge then was to determine the latitude and longitude of Jimbour House. For latitude, observations of selected stars were made every clear night (The transit …, 1882a; The transit …, 1882b), while the longitude (not just of Jimbour House, but also of Brisbane) was successfully determined via the telegraphic transfer of time signals. To accomplish this, Morris collaborated with Henry Chamberlain Russell (1836–1907; Bhathal, 1991), the Director of Sydney Observa-

tory, and they found that Jimbour Station was almost due north of Sydney (it was a mere two miles east of due north).[1] Morris passed this finding on to Augustus Charles Gregory (1819–1905) in Brisbane, and the two of them then investigated the longitude of the Brisbane Observatory. Meanwhile, Lieutenant Darwin travelled north to Darwin, and oversaw the use of the telegraph to link longitudes determined in Australia with those of England and Singapore (The transit …, 1882b).

In the weeks preceding the transit, Grover (1882–1883) detailed the astronomical observations made with the Merz telescope, including of Saturn and its satellites, Titan, Iapetus, Rhea, Dione and Tethys. He and Peek also observed the Eta Carinae region and found that it did not exactly resemble the drawing published earlier by Sir John Herschel (1847), which indicated that changes in the nebula may have occurred, as controversially suggested earlier by Hobart's Francis Abbott (see Orchiston, 1992). Grover also observed the Moon, and he described the transit of a Jovian satellite.

3 TRANSIT DAY AND BEYOND

In the weeks leading up to the 7 December transit the skies over the Darling Downs were beautifully clear, but on the morning of the transit the astronomers awoke and were shocked to find the whole sky clouded over. This situation did not change throughout the morning, and the heavy cloud cover prevented them from making any observations of the transit. We can only imagine how devastating a blow his must have been after all the careful preparations, following a long and tiring journey from the far side of the globe. The clear skies in the weeks leading up to the transit would not have prepared them for this sad outcome, and it was with heavy hearts that Morris and Peek telegraphed that no observations were possible from Jimbour (W.H.M.C., 1882).

Figure 6: Cuthbert Peek (right) making observations at Jimbour, assisted by Charles Grover (adapted from Slater, 2005: cover illustration).

Armed with accurate longitude and latitude values for Brisbane Observatory, Gregory also planned to observe the transit from Brisbane, but he, too, was destined to fail as there was total cloud cover over the Queensland capital and heavy rain all day.

After the transit the weather remained unsettled, and soon it was time to carefully pack up most of the instruments and transport them back to Brisbane before Christmas. Peek and Grover then travelled back to Britain and returned the 6.5-in Merz refractor to its rightful home at the Rousden Observatory in Devon (Slater, 2005), but even before they could leave Jimbour Morris and Darwin had to dispose of the two Royal Geographical Society Cooke refractors.

Figure 7: Lieutenant Darwin (left) making observations at Jimbour with one of the two 6-in Cooke refractors, with Gunner Bailey in the background (courtesy: John Oxley Library, State Libraryof Queensland).

This course of action had been planned long before the transit, as Peek indicated in a letter penned to his father on 22 October 1882 while the transit party was still in Sydney. In this letter, Peek (1882: 9) indicated that both Cooke refractors were to be sold after the transit, and that the reserve price would be £220, well below the cost price of £315. Interestingly, Peek (ibid.) also commented that he felt sure there would be no one in Queensland interested in purchasing the two telescopes.

On 4 November, nearly five weeks before the transit, Morris had placed the following advertisement in the *South Australian Register*, with an identical one in the *Sydney Morning Herald*:

> INSTRUMENTS FOR SALE—Captain Morris, B.E., Transit of Venus Expedition, has received instructions from the Home Government to sell two 6-inch equatorially-mounted REFRACTING TELESCOPES, with all the usual appliances, manufactured by Cooke & Sons, of York, for the Expedition. Cost price, £300. Applications for purchase will be received up to December 1, but not after that date. The instruments will be delivered at the Transit of Venus Observatory, near Brisbane, to *the purchaser or his agent* on December 10, 1882. (Transit of Venus, 1882; cf. Capt. Morris R.E., 1882; our italics).

Note that the italicised section of the advertisement indicates that this was intended as a single 'job lot'—that is, the purchaser had to buy *both* telescopes and associated equipment.

Given his earlier comments to his father, Peek would have been very surprised when the successful purchaser turned out to be an amateur astronomer named Edwin Norris from the North Queensland city of Townsville (for Australian localities mentioned in the text see Figure 8). So who was Edwin Norris?

4 EDWIN NORRIS AND THE STRAND OBSERVATORY

4.1 Edwin Norris: A Biographical Sketch

Edwin Norris was born in England in Stedham, Sussex, in 1829 to Charles Norris, the proprietor of a large paper mill (Personal report …, 2011). Their different Christian names suggest that Edwin may not have been the eldest son, which could have helped him make the decision to run away to sea while still a teenager (Death …, 1892). In 1848 the vessel he was aboard was ship-wrecked off the southern African coast but he survived, and two years later he arrived in Australia and subsequently made his way to Ballarat to "… make his fortune …" on the goldfields (ibid). Interestingly enough, he was there at about the same time as the amateur astronomer and Ballarat storekeeper James Oddie (1824–1911; Haynes et al., 1996).

By 1855 Norris had moved north to Murrurundi, New South Wales, becoming Chief Constable as well as Inspector of Slaughter Houses and Inspector of Distilleries (Government Gazette, 1855). In 1856 he married Charlotte May

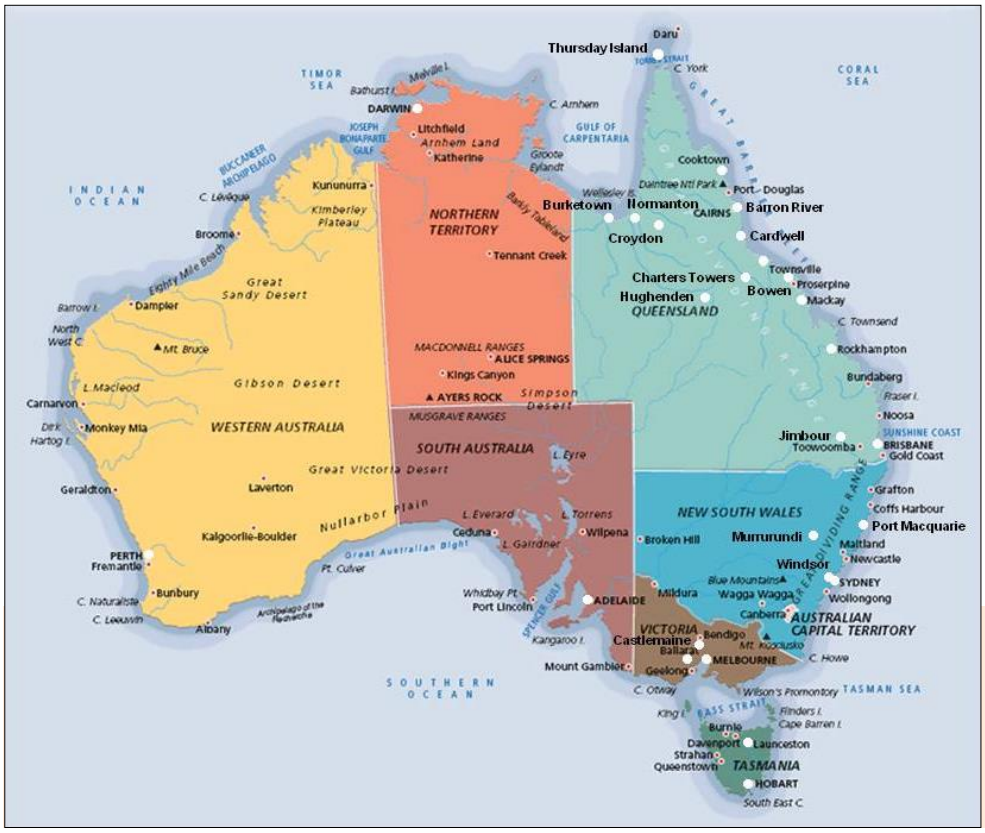

Figure 8: A modern Australian map with localities mentioned in the text shown as white dots (base map: http://www.connectionsworldwide.co.uk/australia-map.asp; map modifications: Wayne Orchiston).

Robertson, and they had their first child a year later.

In late 1857 the young family moved to Brisbane (Births, 1857), and soon after Edwin began to develop an interest in astronomy. His obituary, which dates to 1892, states: "For twenty-five years previously he had taken a deep interest in the study of Astronomy, and for many years was engaged as an amateur in taking astronomical observations in Brisbane, Bowen and Townsville." (Death …, 1892). While living on Wickham Terrace he had a view of the Old Windmill, the site of the time-ball service that commenced in 1861 (Argus Correspondent, 1861). His residence also was within walking distance of the residence of Henry O'Reilly (1824–1877; Figure 9) in Felix Street (Figure 10). Captain O'Reilly, who moved to Brisbane in late 1863 as Manager of the Australian Stream Navigation Company, soon became Brisbane's leading amateur astronomer, and he maintained a well-equipped private observatory (see Haynes et al., 1993). Joy (1984) has suggested that perhaps O'Reilly provided some of the inspiration for Edwin's developing interest in astronomy.

Edwin was appointed as a clerk in the Crown Solicitor's office, and a Commissioner of the Courts (Supreme Court, 1861). Later he managed the office, and then was admitted to the bar in 1864 (Death …, 1892). It was through this position, at the Crown Solicitor's office, that he gained his great depth of understanding of the law.

In 1866 Edwin made a major decision: to take his family north to the 'frontier town' of Bowen (Figure 11) and open his own practice as a solicitor (The Gazette, 1866). By this time, Edwin and his wife had five children, and as we shall see, one of these, Charles Sydney Norris (who was born in January 1859), would inherit his father's passion for astronomy and meteorology. While living in Bowen, Edwin Norris made several attempts to enter local politics, but his lack of success later was attributed to "… deafness which came upon him 37 years ago [in 1855] … [but for which] he would undoubtedly have taken a leading position in political affairs." (Death …, 1892). He also was very much a stickler for the obeisance of rules, and this may have hampered any endeavours within the political realm.

In 1870 Edwin again decided to relocate his family, this time further north to the prosperous city of Townsville, and on 24 September the *Cleveland Bay Express* announced his arrival as both a solicitor and a notary public (Notice, 1870). This coincided with his formal appointment as Commissioner of Affidavits on the same day (Commissioner …, 1870). His business premises were located in Wickham Street (Notice, 1872),

Figure 9: Captain O'Reilly (brisbaneheritage.org.au/meet-captain-oreilly/).

an address that surely brought back memories of his time in Brisbane.

In 1872 medical circumstances forced Edwin and his growing family to move temporarily to Sydney, and while there he probably visited the observatory of Dr Horatio Wright (1827–1901) in Wynyard Square (Norris, 1883). Then on 1 August 1873 the family returned to Queensland, settling in Rockhampton (Clearances, 1873), where he again practised as a solicitor and notary public (*Rockhampton Bulletin*, 1873). But their stay was short-lived, for by the end of the year they were back in Townsville, and Edwin was

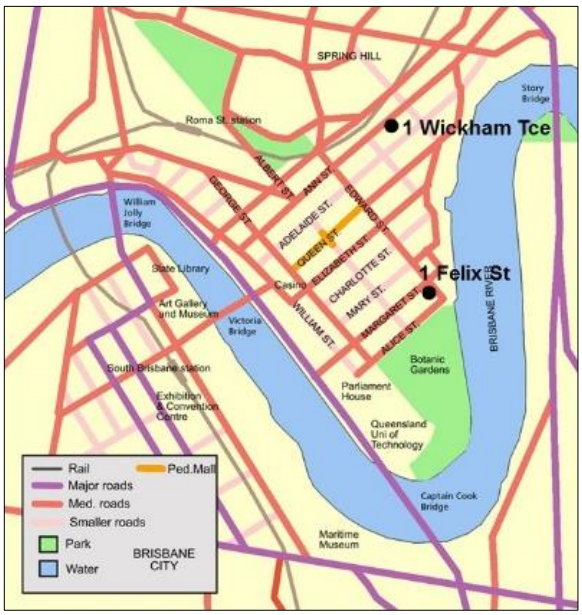

Figure 10: Note the locations of Wickham Terrace and Felix Street as marked, approximately 1km apart (base map: https://commons.wikimedia.org/wiki/File:Brisbane-map-of-the-city-cbd.PNG; map modifications Wayne Orchiston).

Figure 11: A photograph of Bowen in 1867. After busy Brisbane, the Norrises would have found Bowen very quiet (courtesy: John Oxley Library, State Library of Queensland).

working out of his old Wickham Street offices (Notice, 1874). In about 1877 the family purchased land and a house on The Strand (A sure fortune …, 1877), a prestigious location overlooking the sea, and this is where Edwin would erect his observatory after purchasing the transit of Venus telescopes in 1882. Although he was supporting a large family, Edwin Norris' astute business sense not only allowed him to acquire this expensive astronomical equipment in 1882 but also to purchase land in downtown Townsville and erect new business premises there (Death …, 1892).

Despite his hearing impairment, Edwin Norris held a number of positions of importance within the Townsville community, including Town Solicitor. In 1884 he was appointed trustee of the yet-to-be-established Townsville Grammar School (Official notifications, 1884), and a few years later he was nominated for a similar trusteeship position with the Townsville School of Arts (Queensland news, 1887). Thus, by Victorian standards, he was a very successful wealthy businessman, and this allowed him to spend much of 1888 in England (Darlington, 2011).

Edwin Norris died quite suddenly and unexpectedly from heart failure on 13 April 1892, after a short illness (Funeral notice, 1892). Flags were flown at half-mast across Townsville (Funeral …, 1892), and he was buried in the Westend Pioneer Cemetery (see Figure 12). The somewhat austere inscription on his headstone is perhaps reflective of the deceased, and reads:

> Sacred to the memory of EDWIN NORRIS (Town Solicitor) Born at Stedham, Sussex England 17th October 1829. Died at Townsville 13th April 1892. Respected by all who knew him.

4.2 Purchase of the Transit of Venus Equipment

By 1882 Edwin Norris was in a financial position to indulge his passion for astronomy in a major way, and was the successful purchaser of the transit of Venus instruments. What is a little surprising is that his bid was successful, and this has been attributed to an oversight by the Queensland Government of the day that enabled him to make the purchase (Funeral …, 1892). But perhaps it was simply a matter of timing, not oversight, as just one year earlier the Queensland Government had established the Brisbane Observatory, having spent the considerable sum of £225 purchasing a transit telescope, two clocks, a chronograph and two chronometers from the estate of Captain O'Reilly (see Page, 1959). There was also a small refractor involved, so the total purchase price would have been even more. So although the instrumentation at the Brisbane Observatory was definitely inferior to the attractive 'package' offered by Captain Morris, and the Government was aware of the sale, they probably did not feel justified in

placing a bid given their recent substantial outlay in the name of astronomy.

Looking further afield, with the notable exception of Hobart Observatory, the other Australian colonial observatories already possessed instruments of superior aperture to the 6-in Cooke refractors (see Haynes et al., 1996; Orchiston, 1988a: Table 1). However, professionally-manufactured equatorially-mounted 6-in refractors were certainty an attractive proposition for a serious Australian amateur astronomer (e.g. see Orchiston, 1989; 1997b), so it is a little surprising that one of Norris' wealthy astronomical confrères from New South Wales or Victoria did not succeed in making the purchase.

In writing earlier about Norris' acquisition, one of us (Orchiston, 1997b) referred only to one telescope, but the advertisements placed in Australian newspapers by Captain Morris prior to the transit indicate that the 1882 equipment was to be sold in its entirety to a single purchaser (Capt Morris R.E, 1882), so Norris definitely purchased *two* 6-in Cooke refractors, along with their associated attachments (A new observatory, 1884).

This confusion about the number of telescopes that Norris purchased is also reflected in newspaper accounts of the day. For example, when his new observatory was opened in 1884 the *Brisbane Courier* provided details of his purchased equipment but—perhaps as might be expected—there is mention of just one telescope, which was mounted in the observatory. This was described as a "…very fine achromatic equatorial …" manufactured by Cooke & Sons of York (ibid.). The objective was 6-in (15.2-cm) in diameter, with a focal length of 8.5 ft (and therefore the focal ratio was f/17, slightly greater than the more typical f/15 for refractors of around this aperture). The tube was made of a heavy brass, painted grey.

The telescope was mounted on a substantial cast-iron circular pillar, also painted steel grey. This pillar was 6 feet 6 inches (1.98 m) in circumference at the base and was described as being approximately 7 feet 6 inches to the middle of the declination axis when adjusted to the horizontal. The telescope, on this pillar measured approximately 9 feet (2.74 m) to the declination axis when laid horizontal (and this vertical measurement determined the height of the observatory walls). The pillar was divided 3 feet (0.91 m) from the base with a "… means of adjustment in azimuth to any extent." (ibid.). The pillar was purpose built, and was buried deep into the ground to combat any possible vibration.

Further information about the telescope indicated that there were clamping controls for right ascension and declination which could be operated from the "… eye end [of the telescope] with roll and handle." (ibid.). In addition, both the polar and declination axes were manufactured out of steel, with friction-rollers and counterpoises to reduce pressure on the bearings (ibid.).

The telescope was described as being "… driven by a clock." (ibid.). The drive was attached to the south side of the pillar, just below the end of the polar axis. A governor containing billiard-sized brass balls regulated the equatorial motion. A 20-in (50.5-cm) diameter circle was used to switch between sidereal and lunar rates of motion; this was also manufactured out of brass. Slow motion controls in right ascension and declination were present and were accessible from near the eyepiece of the telescope.

Figure 12: The impressive headstone marking Edwin Norris' grave at the Westend Pioneer Cemetery in Townsville (photograph: Vicki Darlington).

The telescope had been designed to operate outside the confines of a purpose-built observatory so it had further attachments (ibid.). A large position circle, was placed near the eyepiece of the telescope and could be read with the aid of a microscope to view the silver graduated scale along with a silver vernier. The microscope had rack and pinion motions and clamps. Further to this, there was a 10-in (25.4-cm) hour circle, with divisions and verniers of silver, read using a microscope. A 17-in (43.2-cm) diameter, solid brass declination circle had both an edge scale that provided coarse measurement of face divisions and a vernier for finer detailed measurement. It was read using a separate microscope clamped at the eye end of the telescope.

Additional attachments were included in the

purchase. A "… prismatic illuminating apparatus …" could be attached to the main tube to enable observation of dark and bright fields when undertaking micrometric observations, and was described as "… an elegant specimen of the optician's art." (ibid.). It consisted of a suspended lamp, to ensure it always hung at right angles to the telescope, along with a prism to reflect light into the tube with the attached diaphragms and coloured glasses that regulated both the quantity and colours of light allowed to enter. The telescope also had both a counter-poise and gravity poise. The eye-end of the telescope had a rack and pinion focussing mechanism, and a dew cap was attached that took the overall length of the telescope to 9 feet. The article described the attached finder as being "… a good sized telescope in itself …", having a 2-inch

Figure 13: Edwin Norris erected his Strand Observatory on the corner of The Strand and King Street, at what is now Number 9 The Strand (shown here in yellow). Norris' residence was next door, on the site of the large white multi-storey apartment building shown in this recent aerial photograph (www.realcommercial.com.au/property-land+development-qld-townsville+city-501662497#).

inch aperture (ibid.). A rack was attached within reach of the observer when using the telescope, and this was used primarily for the collection of filters that came with the telescope, some of which enabled solar viewing. The filters, of graduated dark glass were fitted into metal frames and could be placed in the attached rack without moving from the eyepiece. "A battery of eyepieces of various powers …" (ibid.) also came with the telescope, and

> In addition to the various magnification options other attachments included but packaged separately in a highly polished mahogany case was supplied:
>
> - A transit eyepiece
> - A comet seeker eyepiece,
> - A double parallel wire micrometer graduated on silver
>   - Enabling distance measurements to be made
> - A first surface reflecting prism
>   - To enable the telescope to be used for terrestrial observations as it inverts the image.
> - A star diagonal
>   - The attachment used to make overhead viewing more comfortable for the observer

This same long and detailed newspaper article described this telescope as "… more than twice as large as the telescope at the Government Observatory at Brisbane." (ibid.). This statement was somewhat of an exaggeration as the Brisbane Observatory telescope, originally owned by O'Reilly, had an aperture of either 3.75 in (9.2 cm) (Grover, 1882–83: 39) or 4.5 in (11.5 cm) (Joy, 1874). Norris' Cooke refractor was also described as the largest telescope in Queensland (ibid.), which was indeed true at that time, but proud fellow-Townsville resident, Pio Vico Armati (1997) later erred in describing it as the largest telescope in the Southern Hemisphere. Even within Australia there were larger refractors at Adelaide, Melbourne and Sydney Observatories (Haynes et al., 1996), while one of Sydney's amateur astronomers, leather merchant J.W. Ward, also owned a 6-in refractor (see Orchiston, 1997b: 90–92).

4.3 The Strand Observatory

After purchasing the transit of Venus telescopes Norris finally was in an ideal position to indulge his interest in astronomy. Admittedly, by world standards, 6-in refractors were distinctly modest in 1882, but even so they were capable of good work if properly mounted and placed in the right hands. Thus, Australia's leading astronomer at this time, the Windsor amateur, John Tebbutt, was furnished with only a 4.5-in (11.4-cm) Cooke—which even lacked a drive—yet he was able to carry out a wide range of observations that resulted in a never-ending stream of publications in leading international astronomical journals (see Orchiston, 2004a). And Tebbutt was not alone—there were other Australian amateur astronomers who pursued less ambitious observing programs, but still managed to produce publishable material (see Orchiston, 1989). So Norris also had a chance to contribute to science, and surely he was aware of this.

Norris therefore decided to build an observatory to house one of his Cooke telescopes. This would be located on the Strand, where he owned two adjacent properties, on the corner of King Street and across the road from the Criterion Hotel (see Figure 13). On one of these properties was a large family residence (Notice of Sale, 1897), and the Strand Observatory was erected near it, with a view out across Cleveland Bay.

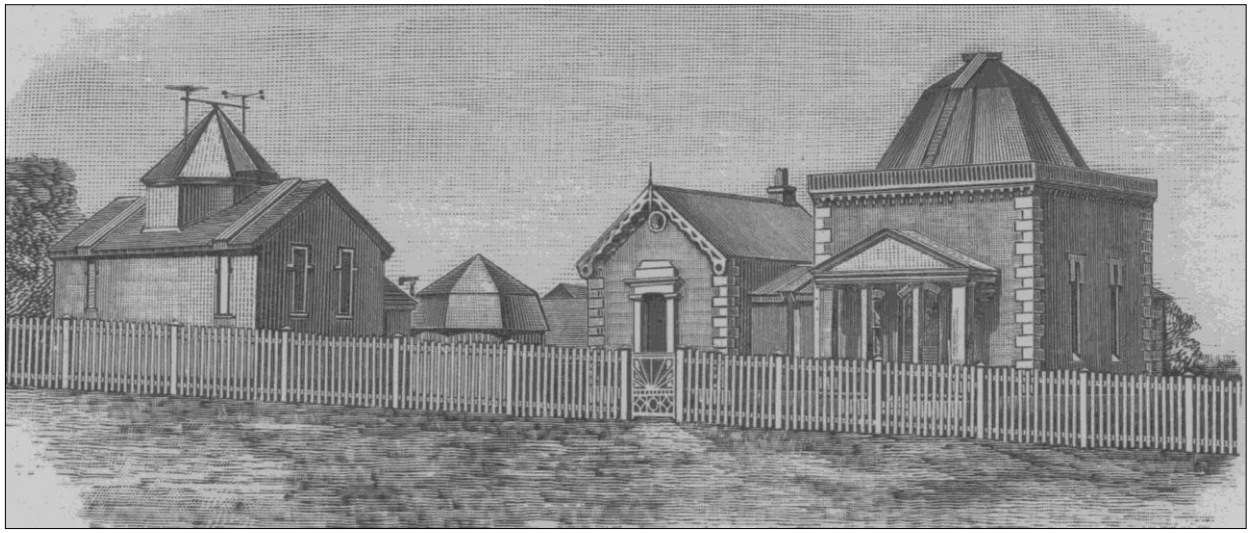

Figure 14: A woodcut showing the three conical domes at Windsor Observatory in 1880 (Orchiston Collection).

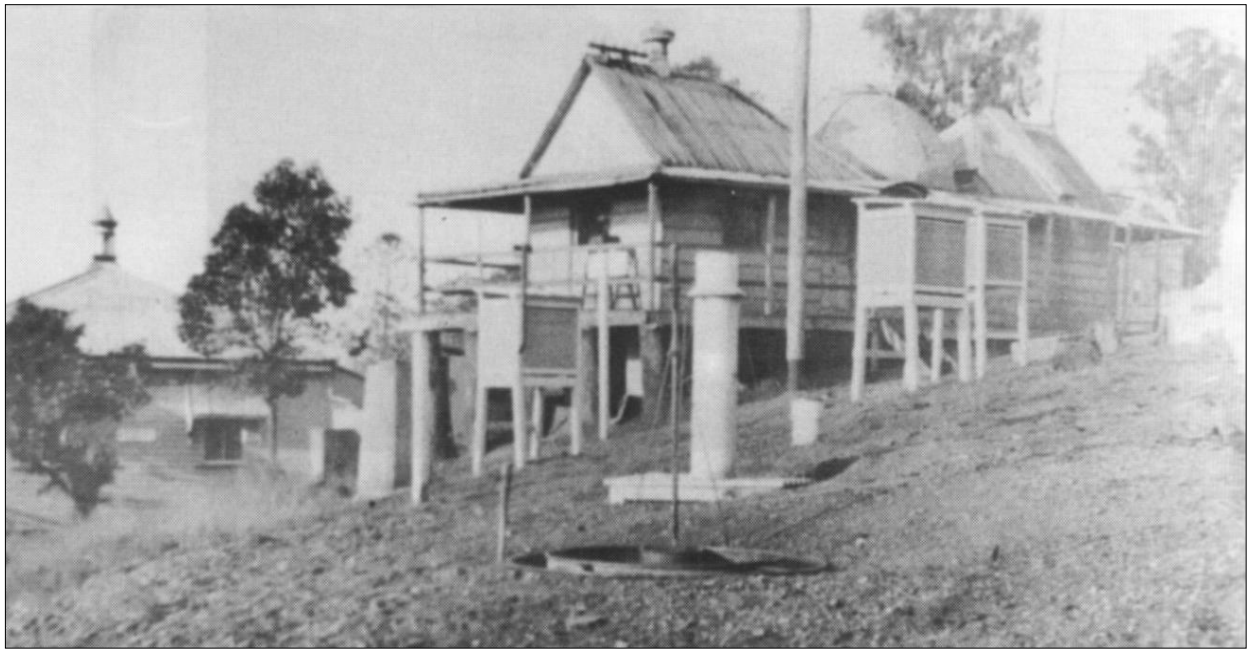

Figure 15: Brisbane Observatory had a small hemispherical dome (after Haynes et al., 1993).

Long before construction of the observatory began, Norris approached various astronomers and observatories to gather information on an appropriate design. Consequently, on 17 September 1883 he wrote to John Tebbutt asking for information on dome and shutter design and construction (Norris, 1883). By this time Tebbutt had designed three different observatory buildings (see Figure 14), all with conical domes (Orchiston, 2001a; 2017: Chapter 8) so was in an ideal position to provide advice. In his letter of enquiry, Norris also mentioned Dr Wright's observatory in Sydney which was located "… on the top of his house …" and had a dome. Norris also indicated that he planned to build a model of the new observatory for the builder's guidance, as there were no such structures within the Townsville region at that time (but we will query this statement later).

In 1884 Norris followed up on this correspondence by travelling to "… the Southern Colonies …" and examining the designs of the various buildings at the Government observatories in Brisbane (Figure 15), Sydney (Figure 16), Melbourne (Figure 17) and Adelaide (Figure 18). He also visited Tebbutt's Windsor Observatory and the observatory maintained by Dr Horatio Wright (Figure 19) in Wynyard Square, Sydney (Death …, 1892). Between them, these institutions offered Norris details of drum-shaped, hemispherical and conical domes, as well as roll-off roof observatories (e.g. see Haynes et al., 1996), and as we shall see, he chose this last-mentioned design for his Strand Observatory. He then proceeded to prepare both a plan and a model of his intended observatory (ibid.).

Norris employed a local builder to construct

Figure 16: Sydney Observatory only had standard hemispherical domes (courtesy: Harley Wood).

Figure 17: At Melbourne Observatory there was the roll-off roof observatory built for the 48-in (1.22-m) Great Melbourne Telescope (courtesy: Harley Wood).

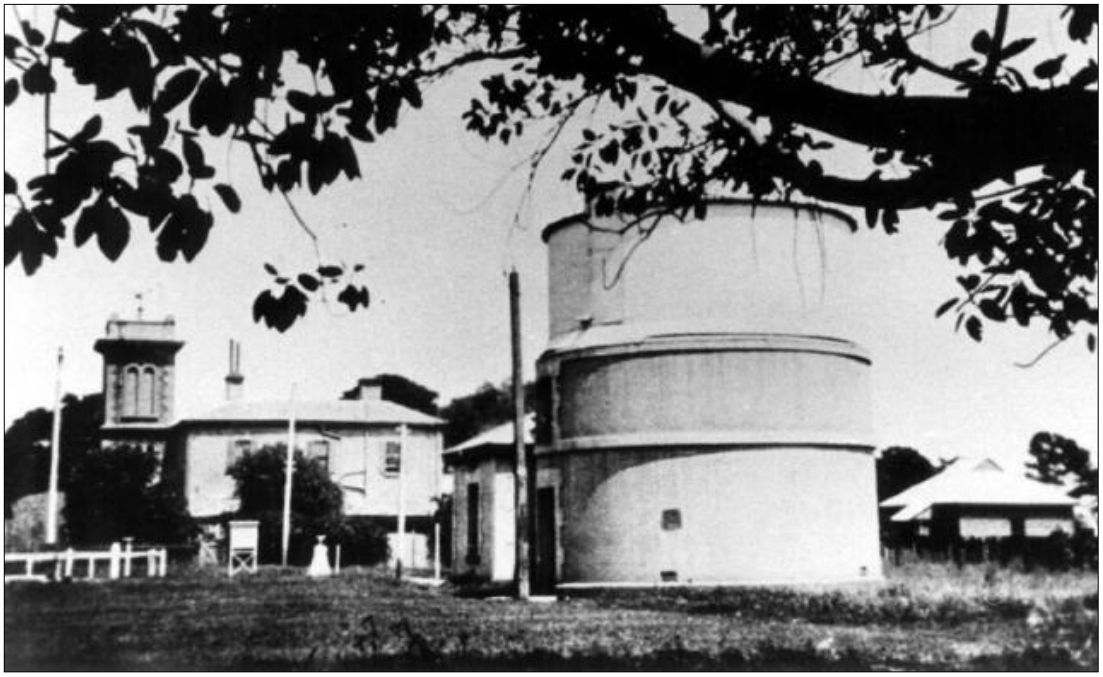

Figure 18: Adelaide Observatory featured a drum-style observatory (courtesy: setterfield.org).

his Strand Observatory. The design was intended to be easy to construct and cool, an important consideration for late nineteenth century tropical Townsville. It also had to contain a minimum of moving parts, to ensure longevity, and it had to provide protection against the weather—and not just tropical rain, as Townsville lay in Australia's notorious 'cyclone belt' (A new observatory, 1884).

This article in the *Brisbane Courier* (ibid.) goes into a great deal of detail about the observatory. The base dimensions were 13 ft × 13 ft (~ 4 m × 4 m), with the walls 8 ft 6in (~ 2.6 m) high when measured from the floor. The telescope measured 9 ft (2.74 m) from the horizontal making it possible to view over the top of the walls when it was in a horizontal position. The wall plates were hardwood and the design had them extending 7 ft (~ 2.1 m) beyond the building both north and south. The wall plates were supported from below and braced. On top of these wall plates rails were placed to hold the eight 4-in (10.2-cm) diameter wheels that had been specially manufactured in the Townsville Foundry. These wheels were fitted into frames to support the movable roof structure, and were mortised into place (ibid).

The roof frames were built of Oregon Pine and the ceiling boards were 3.5-in × 1-in (8.9-cm × 2.5-cm) tongue-and-grooved boards of American Pine. The frame was topped with galvanized iron. The movable roof formed a circle with a split down the middle dividing the eastern and western walls. The roof was described as being "… separated easily by the observer …" (ibid.). A canvas sheet or screen was used to cover the unused opening. This design was employed to "… always attain a good meridian altitude." The entire roof structure could be rolled back to provide complete open-air viewing and help combat the tropical temperatures. Sliding windows were present on the northern wall of the observatory, which enabled the observer, using a terrestrial eyepiece, to have good views of Cleveland Bay. This same newspaper article mentioned that a transit annex, with associated instruments, was still to be added to the observatory (ibid.). Unfortunately, we were unable to locate any photographs of the Strand Observatory.

Contrary to Norris' claim, it would appear that the Strand Observatory was not the first astronomical observatory erected in Townsville. Early cadastral records dating to 1873 (Armati, 1997) show an observatory on the property owned by John Melton Black and Robert Towns on what is now Melton Hill (see Figure 20). Originally, Black (1830–1919) was in partnership with the wealthy Sydney businessman Robert Towns (~1794–1873), who only visited Townsville once —even though the city is named after him (Doherty, 1934). In contrast, Black was one of the first Europeans to settle in Townsville, and a residence was constructed for him around 1865. This was the first house erected in Townsville, and is shown in Figure 21. We suggest that part of the small white-painted building behind the house probably was his observatory. But it is unlikely that this observatory was still in existence when Norris erected his Strand Observatory, for Black

> … came to a coastal creek in North Queensland and planted a city. He planned the erection of the first wharf, surveyed the first allotments and superintended the erection of the flrst buildings. In the course of three years be figured as a stockman, merchant, surveyor, newspaper editor and pioneer of the meat industry. For the first two terms he was Mayor of the Municipality ... (ibid.)

At the end of 1867 he left Townsville and returned to London, where he lived until he died. So even if Black's observatory still existed, as a

Figure 19: Dr Horatio Wright (adapted from Russell, 1892b: Frontispiece).

building, in 1884 it certainly was not operational at that time.

4.4 Astronomy at the Strand Observatory?

Edwin Norris' enthusiasm for the study of astronomy is mentioned in his obituary. He was described as

> … an inveterate student … [and having] For twenty-five years previously … taken a deep interest in the study of Astronomy, and for many years was engaged as an amateur in taking astronomical observations in Brisbane,[1] Bowen and Townsville. (Death …, 1892).

This interest in astronomy could have originated during his youthful days as a seaman—if he learnt the rudiments of marine navigation—and as we have seen may have been encouraged through contact with Captain O'Reilly during his Brisbane years. By 1884 his passion for astronomy was well known outside Townsville, with confirmatory evidence appearing in Melbourne's

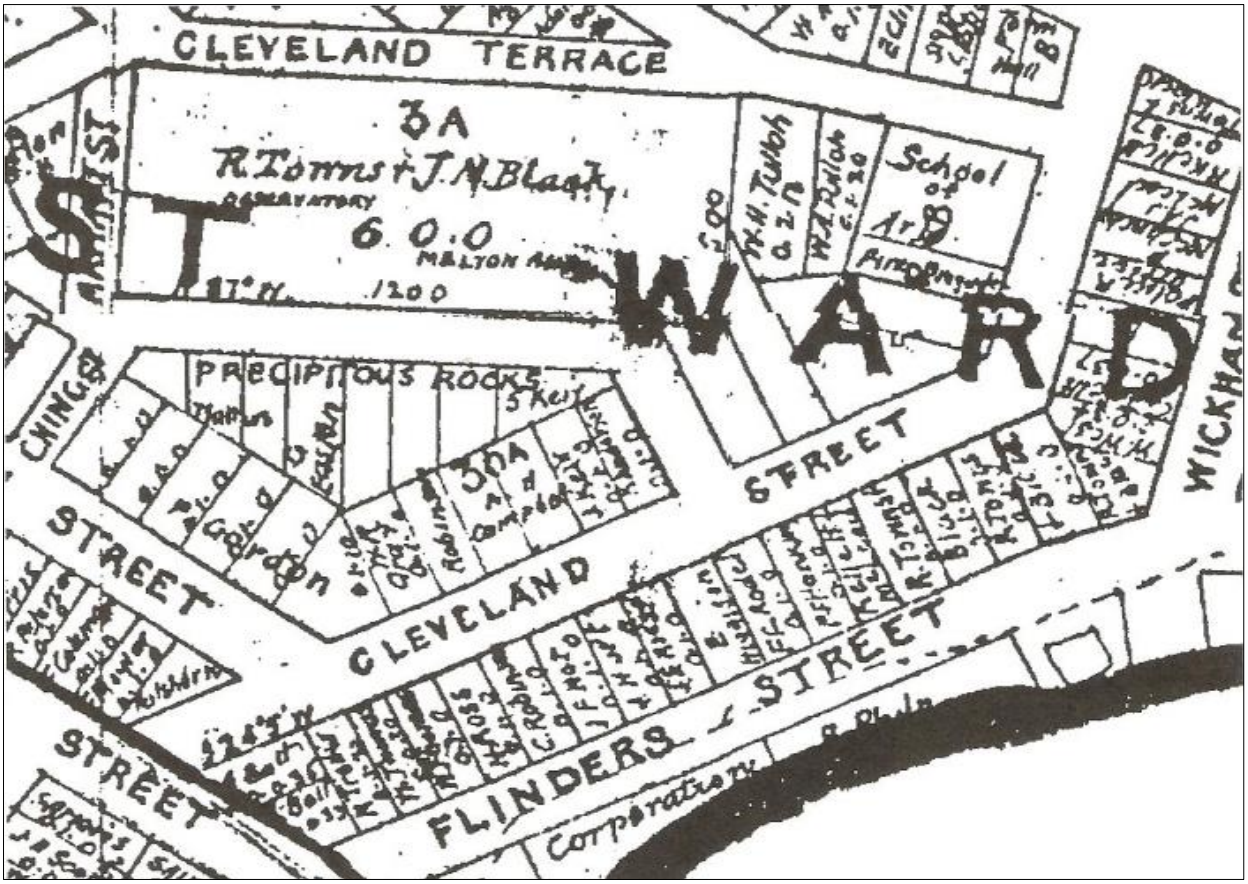

Figure 20: By far the largest property shown on this map is Allotment 3A, which was owned by Robert Towns and John Melton Black and is shown as containing an observatory (after Armati, 1997).

Figure 21: A view of Melton Hill in Townsville, looking north. We suggest that the small structure with a verandah to the rear of Black's house included his observatory. The mountain in the far distance on the extreme right is Cape Pallarenda, the beach on the right is The Strand with the suburb of North Ward; and the small hill at the end of the beach is Kissing Point (courtesy: National Museum of Australia: Richard Daintree Collection).

The Argus newspaper and *The Brisbane Courier* (The Vagabond …, 1884; Vagabond, 1884).

Armed with an observatory and 6-in equatorially-mounted refractor with all the necessary accessories, Norris was now in an ideal position

to carry out serious astronomical observations. Inspired by other leading Australian amateur astronomers furnished with similar instruments he could have pursued any one or combination of the observing programs listed in Table 1, and

Table 1: Principal research programs undertaken by leading Australian amateur astronomers (1880–1889).

- Transitory Events
  - Eclipses of the Moon
  - Eclipses of the Sun
  - Lunar occultations of planets
  - Lunar occultations of stars
  - Jovian satellite phenonema
  - Transits of Mercury
  - Transits of Venus
- Short-term Monitoring Projects
  - Comets (positions and appearance)
  - Planets (positions)
- Long-term Monitoring Projects
  - Double stars (separation and position angle)
  - Planets (appearance)
  - Variable stars (magnitude variations)
- Search Programs
  - New double stars
  - New variable stars

Figure 22: Francis Abbott seated in front of a doorway, ca. 1860 (courtesy: Allport Library and Museum of Fine Arts, Tasmania Archives and Heritage Office, Hobart, 607375).

ideal Australian role models included Francis Abbott (Figure 22), Alfred Barrett Biggs (Figure 23), Dr William Bone, William Macdonnell (Figure 24), Ebeneler Reginald Morris, David Ross (Figure 25) and of course Australia's leading astronomer at that time, John Tebbutt (Figure 26). Information on these amateur astronomers and their instruments is listed in Table 2.

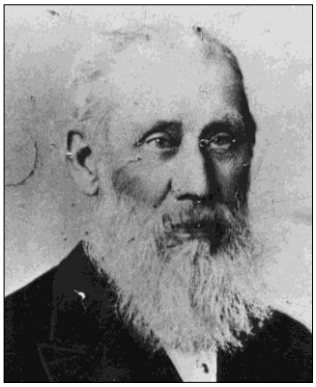

Figure 23: Alfred Barrett Biggs (Orchiston Collection).

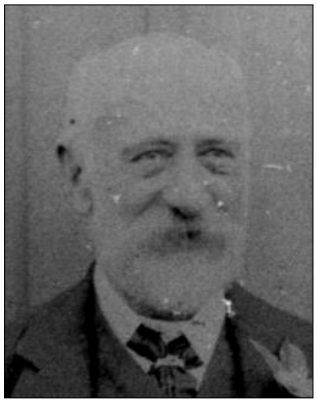

Figure 24: William Macdonnell (courtesy: Port Macquarie Museum, William Macdonnell's Photo Album, A 57).

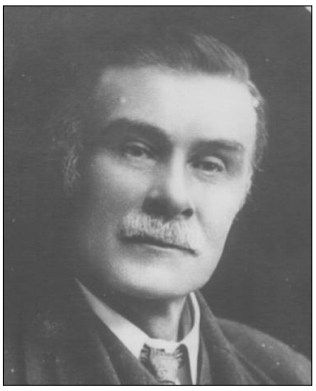

Figure 25: David Ross (Orchiston Collection).

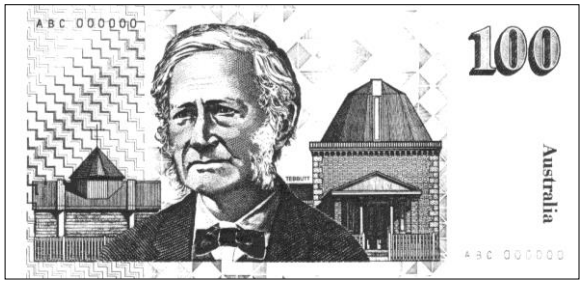

Figure 26: John Tebbutt and the $100 note (Orchiston Collection).

Table 2: Leading Australian observational amateur astronomers, 1880–1889.

Name	Location	Main Telescope*	Reference
Francis Abbott (1799–1883)	Hobart (Tasmania)	4.5-in OG	Orchiston (1992)
Alfred Barrett Biggs (1825–1900)	Launceston (Tasmania)	8.5-in spec	Orchiston (1985)
Dr William Bone (1836–1885)	Castlemaine (Victoria)	8-in OG	Orchiston (1987b)
William Macdonnell (1842–1910)	Port Macquarie (NSW)	6-in OG	Orchiston (2001b)
Ebeneler Reginald Morris	Sydney (New South Wales)	8.5-in spec	Orchiston (1987a)
David Ross (1850–1930)	Melbourne (Victoria)	3-in OG	Orchiston and Brewer (1990)
John Tebbutt (1834–1916)	Windsor (New South Wales)	8-in OG	Orchiston (2004a; 2017)

* Key: OG = refractor; spec = reflector

Norris needed a functioning transit annex in order to time solar eclipses, lunar occultations, Jovian satellite phenomena, and transits of Mercury and Venus, but even so he could have observed and reported on lunar eclipses, searched for new double stars and variable stars, tracked Jupiter's changing belts and transitory black and white spots (not to mention the Great Red Spot) and made variable star magnitude estimates. He also could have used his telescope and micrometer to record the positions of comets and selected planets. So there was much useful astronomical work that he could have accomplished but there is no evidence he did anything. Rather he would appear to have been a recreational astronomer who made no attempt to contribute to research astronomy, despite possessing suitable facilities that would have allowed him to do so if he had wished to.

Most of the role models mentioned above also were committed to bringing astronomy to the public (see Orchiston, 1997a), and did so through one or a combination of the following:

- Offering public nights at their observatories
- Supplying astronomical, and sometimes meteorological, information to individuals
- Supplying astronomical, and sometimes meteorological, information to local newspapers
- Delivering public lectures
- Presenting courses of lectures
- Writing books, booklets or chapters of books about astronomy

Perusal of the local Townsville newspaper and other Queensland newspapers indicates that—as with research—Edwin Norris made little if any commitment to astronomical education. While his hearing impairment may have made lecturing difficult and dissuaded him from running public sessions at the Strand Observatory, this would not have prevented him from supplying written information to individuals and newspapers or writing more substantial pieces on astronomy. That he did not do so could indicate a lack of interest, or that he was a busy public figure and simply did not have the time.

The US astronomer Dr Tom Williams (2000) has analysed amateur astronomers, and he distinguishes between those who actively contributed to science and those who engaged in astronomy for recreational purposes only. It is clear that Edwin Norris belonged to this latter category.

Canadian sociologist and amateur astronomer Professor Robert A. Stebbins has published on amateur astronomy and amateur astronomers (e.g. see Stebbins, 1980; 1981; 1982a; 1982b; 1987), and would go further. Using 'dedication' as a criterion, Stebbins distinguishes 'devotees' from 'dabblers'. Devotees were individuals who were happy to make a substantial commitment to astronomy in terms of both time and money, but although Norris certainly made a very substantial outlay in order establish his Strand Observatory he would appear to have been a 'dabbler'.

Using another dimension, 'knowledge and involvement', Stebbins differentiates between 'active' and 'armchair' amateur astronomers. Active amateur astronomers were engaged in observational or mathematical astronomy, or in instrument-making, and each individual lay somewhere within an 'apprentice – journeyman – master' continuum. Apprentices were beginning their astronomical avocations, while masters were the acknowledged experts who were capable of making a meaningful contribution to science and could communicate effectively with professional astronomers. Given the existence of the Strand Observatory, we can presume that Norris had the potential to be an active amateur astronomer but, using Stebbins' criteria, we would have to class him as an armchair astronomer.

5 J. EWEN DAVIDSON AND BRANSCOMBE OBSERVATORY

In 1888, nearly six years after the 1882 transit of Venus and four years prior to his death, Edwin Norris sold a 6-in refractor to J. Ewen Davidson of Branscombe (Death …, 1892), near Mackay, ~330 km to the south of Townsville (see Figure 8). This must have been Norris' second Cooke telescope, not the one in his Strand Observatory, because Norris died intestate and at the sale of all of his possessions in 1897 it was stated that at the time he died Norris still owned a

> Large Astronomical Telescope (on stand, with all necessary mechanism), and Four smaller telescopes, Binoculars, Sextant, Microscope

and Pocket Aneroids. (Notice of Sale, 1897).[2]

So who was this proud new owner of the second of the two British transit expedition Cooke refractors?

5.1 J. Ewen Davidson: A Biographical Sketch

John Ewen Davidson (1841–1923; Figure 27; Mills, 1981) was born in London, his father being a successful merchant and associated with the Davidsons of Tulloch Castle in Scotland. He was educated at Harrow, and graduated with an Oxford University B.A. in 1863 after specialising in science.

After examining sugar plantations in the West Indies and British Guiana he came to Australia in 1865 and the following year began working a sugar plantation near Cardwell, in North Queensland north of Townsville (see Figure 8). The following year he moved to coastal Mackay (south of Townsville) where he teamed with Thomas Henry Fitzgerald (1824–1888) and established a sugar and cotton plantation on the fertile flood plain of the Pioneer River to the west of the city. Having proved that sugar-growing was a commercially-viable proposition, in 1868 they built the first sugar mill in the district (Roth, 1908).

Davidson went on to become a 'sugar baron' and a prominent pioneer of the Australian sugar industry, but he also played a leading role in 'local politics'. Consequently,

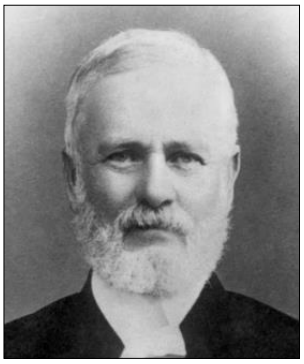

Figure 27: J.E. Davidson (http://www.archivessearch.qld.gov.au/Image/DigitalImageDetails.aspx?ImageId=3055).

> As chairman of the Pioneer Shire Divisional Board for many years and of the Mackay Planters Association in 1878-83, he helped improve shipping facilities in the port and river, and eventually became a member of the Mackay Harbour Board. He also was on the committee of the Agricultural Pastoral and Mining Association. (Mills, 1981).

He also was an active sportsman: he "… played in Mackay's first cricket match … and was also the founding president of the Mackay Cricket Association." (Sugar pioneer …, 2009).

Over the years Davidson personally owned or managed a number of different sugar plantations in the Mackay district, and one of these was Branscombe, where he lived and operated a sugar mill (see Figures 28 and 29) at the time he purchased the Cooke telescope from Norris.

Figure 28: A modern map showing the location of the centre of the Branscombe Estate sugar plantation (marked by the red bull's-eye) in relation to the centre of Mackay. For scale, Branscombe Estate is ~12 km from Mackay Airport (base map:www.weather-forecast.com/locations/Mackay; map modifications: Wayne Orchiston).

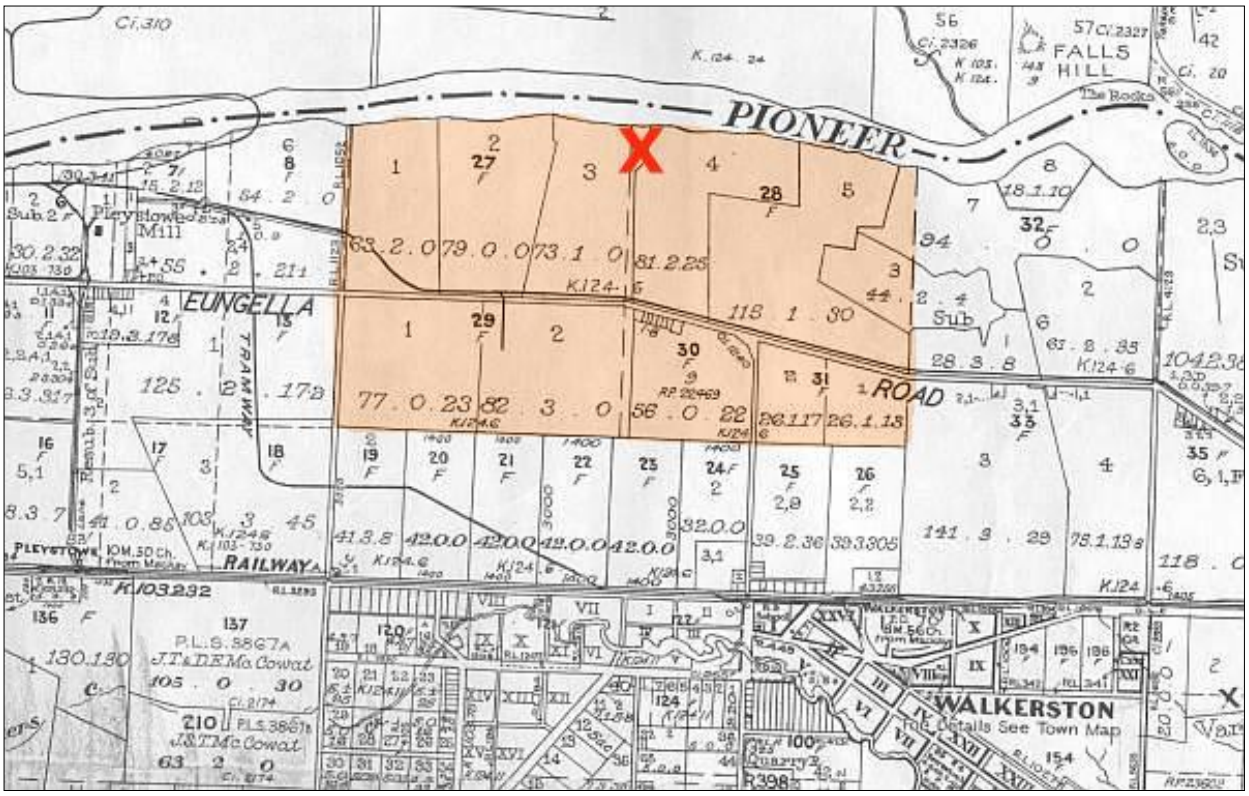

Figure 29: A 1974 Greenmount Parish map showing the location of the Branscombe Estate sugar plantation (in pink), with the site of the sugar mill on the banks of the Pioneer River marked by the large red cross (after Branscombe Sugar Mill, 1871–1884).

Following the depression of the early 1890s, Davidson found himself in an untenable situation:

> The approach of Federation, the impending collapse of the coloured labour system [which Davidson had championed] and the introduction of government-sponsored central mills led to the breaking up of the sugar estates. The system of which Davidson had been so much a part was dying. (Mills, 1981).

There also were climatic extremes that made any form of farming risky (e.g. see Kennedy, 2002: 111). Davidson's response was to retire. He moved back to England in 1900, settled in Oxford, and died there in 1923 at the age of 85 (A sugar pioneer, 1923).

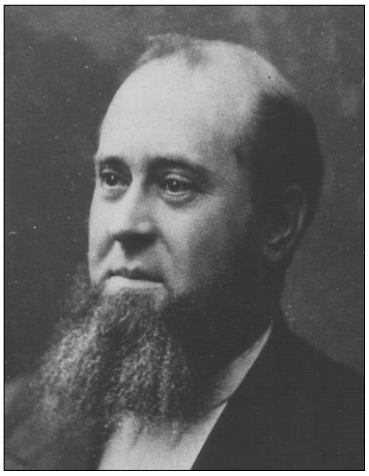

Figure 30: Henry Chamberlain Russell, 1836–1907 (courtesy: Harley Wood).

5.2 Branscombe Observatory and Cometary Astronomy

Davidson's new telescope was described as "… a splendid telescope, brought out to Australia by scientists some years ago to observe the transit of Venus." (A peep …, 1889). Soon after acquiring it, he erected an observatory near the homestead on his Branscombe property. We have been unable to trace any photographs of the homestead, or archival sources that pinpoint the location of the observatory within the estate.

Although no description of Branscombe Observatory has been published, a *Sydney Morning Herald* newspaper article mentioned that rather than featuring a dome, it had a roof that "... folding back ..." (A peep ..., 1889). Nor did Sydney Observatory Director, Henry Russell (Figure 30), provide any details when he wrote to the Secretary of the Royal Astronomical Society on 17 September 1889:

> It may be of interest to state that Mr Davidson has purchased the Cook [*sic*] 6in Equatorial which the 1882 transit of Venus party sold in Queensland[3] and he has established a small observatory with transit instrument chronometer, micrometer for Equatorial &c upon his Sugar Plantation near Mackay in Queensland, and he finds time amidst the pressing duties of a Planter's life for some study of the heavens. (Russell, 1889b).

Instead, we must rely on a photograph of the Observatory that exists in the Lick Observatory

Figure 31: A view of Davidson's Branscombe Observatory (courtesy: Lick Observatory Records UA 36, Accession No: ua0036-pho-2051).

archives, and this is reproduced in Figure 31. This shows a transit annex and adjacent square-shaped roll-off roof observatory, but with a single high-pitched roof. Note that this roof differs markedly in design from the one that was constructed by Norris, and was well adapted to deflecting the heavy rainfall that the Mackay region received each year during the wet season.

Note, also, that this photograph reveals that the Observatory was sited some distance from the Branscombe Sugar Mill. Meanwhile, if the hill directly behind the Sugar Mill in this photograph is Falls Hill (shown near the top right hand corner in Figure 29) and Branscombe Observatory was aligned east-west, with the gable roof sliding off to the west, then the orientations indicated in Figure 31 show that the Observatory was located somewhere in the north-western area of the Branscombe Estate, and most likely in the allotment number 1 shown in Figure 29 that lies north of Eungella Road (that runs more-or-less east-west through the Estate), and probably quite close to the north-south road that marks the boundary of the Estate. A second, though less likely, possibility is that the Observatory was situated somewhere in neighbouring allotment number 2.

Finally, since we can expect that the Observatory was located reasonably near Davidson's homestead, even though there is no record of its location, a search should now be made to see if there is a surviving cluster of old trees somewhere in allotments 1 or 2, (bearing in mind that the site of the Branscombe Sugar Mill on the river bank is marked by old mango trees—see "Branscombe Sugar Mill 1871-1884").

Davidson's interest in observational astronomy certainly predated his acquisition of the Cooke telescope. Thus, in January 1886 he wrote to *The Queenslander* newspaper about the cause of the previous November's prominent Leonid meteor shower,[4] and went on to explain the links between meteor showers and specific comets. He also mentioned that at that time he was watching for the reappearance of Biella's Comet (Davidson, 1886), which indicates that he already possessed an astronomical telescope prior to purchasing the 6-in Cooke refractor. However, this instrument—which was never described—either was portable and simply taken outdoors when observations were intended, or else was mounted outdoors but under a cover of some kind. On the basis of Russell's (1889b) letter reproduced above, we know that it was not housed in an observatory.

Once Davidson's new Cooke telescope was operational he continued his romance with comets, and

> He told the editors of the Mackay Mercury and the Mackay Standard that at 9pm on the night of Monday, July 22 [1889], he observed a comet in the constellation Centaurus in a region where there were no conspicuous fixed stars. He said that it was visible to the naked eye as a hazy star. He gave the exact location of the comet and said that it was travelling at the rate of four degrees per day in a north-westerly direction towards Virginis, which it would reach in about 10 days …
>
> Mr Davidson did not know whether any of the southern observatories had seen the comet … He advised that if the night was clear the comet could be seen nightly in the western sky

between seven o'clock and 11 o'clock. (Sugar pioneer …, 2009).

Overseas astronomers heard about the new comet when they opened the 1 August issue of the British scientific journal *Nature*, which announced "… the discovery of a bright new comet by Mr. Davidson, of Queensland, on July 21." (Our Astronomical Column, 1889). Apparently, "The comet was found accidently when Examining the heavens in the neighbourhood of Eta Argus [now Eta Carinae]." (Russell, 1889b), and at the time it had a "Bright nucleus about 5th magnitude, 5 minutes diameter, no tail, but extension of nebulosity …" (Ellery, 1889). Meanwhile, the August 1889 issue of *The Observatory* incorrectly reported that "Mr Davidson, *of the Melbourne Observatory*, discovered a bright comet on 21 July." (Comet e …, 1889: 334; our italics). When he saw this, Davidson was quick to correct the error:

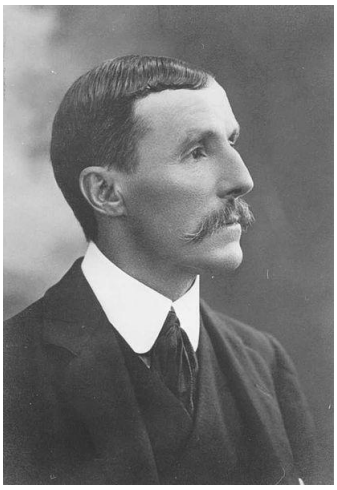

Figure 32: A Royal Society of Victoria Presidential photograph of Pietro Baracchi (en.wikipedia.org).

> Will you kindly allow me to correct … [the error]? The Comet e, 1889, was discovered by me *here*, Lat. 21° 9′ S., on July 19, 1889, was wired by me to the Sydney Observatory the following day, was not seen on account of clouds till the 22nd, when it was wired to Melbourne, and from thence to Europe.
>
> The matter is unimportant, except that Queensland being a young colony,[5] and this being the first comet discovered from her territory, she ought at least to get the credit, and, as a colonial paper puts it, "enter into the comity of nations"! …
>
> P.S. Beyond being slightly acquainted with Mr. Ellery, I have no connections with the Melbourne Observatory. (Davidson, 1890).

After being advised of the discovery, Sydney Observatory Director, Henry Russell, told Davidson of a comet reward and asked him to describe his *modus operandi*:

> I duly received your telegram re comet on Sunday for which I am very much obliged. On the Sunday evening it was cloudy and wet … but on Monday evening I found it without difficulty … I got a good set of observations and published the position in our local newspapers stating that you had sent me a telegram about the comet. I have since that: had a cablegram sent to Europe announcing the discovery, and if it prove that you are the discoverer, you will have the honour: and if you like to claim it: a reward offered by an American citizen for the discovery of comets.[6] *I should like to know how you discovered it i.e. whether you were searching the heavens or whether you found it by accident. and if you are an astronomical worker. I should be glad to know something of your work and observatory*. (Russell, 1889a; our italics).

Subsequently, Davidson was credited with the discovery of this comet, which is now known as C/1889 O1 (Davidson).

This new comet quickly attracted the attention of Australian cometary astronomers, both professional and amateur. At Melbourne Observatory, Pietro Baracchi (1851–1926; Figure 32) made 10 micrometric measures of the comet's position between 23 July and 18 August (inclusive) and published these in *Monthly Notices of the Royal Astronomial Society* (Baracchi, 1889; cf. Ellery, 1889).

Using an 8.5-in (21.6-cm) With-Browning reflector, Launceston's Alfred Barrett Biggs (Figure 23) reported:

> The comet was first observed here on 26th July, faintly visible without telescope. Tail about 1deg. in length … Nucleus, sharp and starlike, about 7 mag, surrounded with considerable nebulosity ... The star comparison measures were all taken with a *Bar* Micrometer … owing to persistent cloudy and unsettled weather, very few opportunities for star measures were afforded. (Biggs, 1889).

After hearing about the comet on 23 July, Biggs' mentor, John Tebbutt (Figure 26), observed the comet and published a brief account of it in the respected German journal *Astronomische Nachrichten*:

> It was observed here [i.e. Windsor Observatory, near Sydney] on the evenings of the 23rd and 24th, but the observations on the latter date were made with difficulty in consequence of the hazy state of the sky. The comet was a conspicuous object to the naked eye, being fully as striking as a star of the 4th magnitude. In the telescope the nucleus was small and not brilliant, and was surrounded with an extensive coma. (Tebbutt, 1889).

Tebbutt (1890) later published a further paper, where he reported 12 different micrometric positions of the comet made between 27 July and 15 August (inclusive) using his 8-in Grubb refractor.

Although C/1889 O1 (Davidson) was discov-

Table 3: Australian cometary discoveries, 1880–1889 (adapted from Orchiston, 1999b: 213).

Year	Designation	Discoverer	Reference(s)
1880	C/1880 C1 (Great Southern Comet)	Dr William Bone	Orchiston (1987b; 1997c)
1881	C/1881 K1 (Great Comet: Tebbutt)	John Tebbutt	Orchiston (1999a; 2010)
1883	-----	H. Clevers/ L.C. Thirlwall	Orchiston (1983)
1884	C/1884 A1 (Ross)	David Ross	Orchiston and Brewer (1990)
1889	C/1889 O1 (Davidson)	J. Ewen Davidson	This paper; Baracchi (1914)

ered in the southern sky, in Centaurus, it quickly moved north, and from 25 July was visible to Northern Hemisphere observers. It then became yet another example of a comet that experienced nuclear splitting:

> A. Ricco (Palermo, Italy) was the main observer of the double nucleus. Observing between August 3 and 11, using a 25-cm refractor, he reported that the separation between the components became more distinct every day until August 8, with the fainter and larger component following the brighter one. Between the 8th and 11th, the separation increased to about 16 arcsec, but the secondary nucleus became larger and fainter and was not seen by Ricco after the latter date … While observing with a 38-cm telescope in late August, F. Rens also discovered a secondary nucleus on August 28, and reobserved it on September 2. (Kronk, 1984: 81).

Sekanina (1979) included C/1889 O1 (Davidson) in his analysis of comets with possible multiple nuclei, and found it to be a likely candidate.

Meanwhile, on 31 July and 1 August 1889 James E. Keeler (1889) obtained spectra of Davidson's comet using the Lick Observatory 12-in (30.5-cm) and 36-in (91.4-cm) refractors, and he noted three bright carbon emission bands. According to Marsden and Williams (1996: 22), the final recorded telescopic observations of this comet were made on 14 November 1889.

We should note that while this was Queensland's first comet discovery, it was by no means Australia's first (e.g. see Haynes et al., 1996). However, the 1880s were halcyon days for Australian cometary astronomy (see Table 3) because "… Australians accounted for more than 10% of all new comets discovered worldwide during the period 1881–1889 inclusive." (Orchiston, 1999a: 43), and this figure does not allow for Bone's priority in independently discovering and reporting the Great Comet of 1880, which was advanced elsewhere (Orchiston, 1997c).

Davidson was fortunate in independently discovering a second comet, on 9 November 1892, but on this occasion he was not the first to detect it (see Table 4) and consequently his name was not assigned to it. On 21 November Davidson wrote to Henry Russell about what became known as the 'Andromeda Comet', and Russell quoted from his letter in forwarding Davidson's discovery details to the Royal Astronomical Society:

> On the 9th of November I discovered the Comet now visible in Andromeda, it was Cloudy and I could not vertify the position for a week owing to cloud and rain, it is just visible to the naked eye, and is now … 8′ in diameter and moving nearly due South about 6′ per day, there is no Nucleus and faint stars are visible through even the centre of it. (Russell, 1892a; Davidson's underlining).

As Australia's foremost cometary astronomer, Tebbutt (1893a; 1893b; 1893c) used his 8-in Grubb refractor (acquired in 1886) and occasionally his 4.5-in Cooke refractor to make a long series of micrometric observations of this new comet. These extended from 28 November 1882 through to (and including) 19 June 1893. Tebbutt (1893a: 125–126) noted that

> In November and December the comet had a fairly bright condensation … [which subsequently] grew fainter but at the same time smaller … A faint tail was occasionally perceptible in the telescope during November, December and January … [By] April 20 the comet was seen as a faint condensed point.

By 1892, Tebbutt and other leading Australian amateur astronomers "… were so enterprising that increasingly the professional [Australian] observatories left cometary astronomy to their exclusive attention." (Orchiston, 1999b: 212). Consequently, on 22 November 1892 Melbourne Observatory Director, Robert Ellery (1827–1908), advised Tebbutt that "The Andromeda Comet is just within our reach but we are not observing it as we know you are looking after it." (Ellery, 1892). Note that Ellery specifically refers to this as the 'Andromeda Comet' rather than 'Davidson's Comet'.

Subsequently this new discovery was shown to be a periodic comet, and is now known as 17P/Holmes. It has a relatively short period

Table 4: Independent discoverers of Comet 17P/Holmes, in chronological order.

Discoverer	Location	Date (1889)
Edwin Holmes	London, England	6 November
Dr Thomas David Anderson	Edinburgh, Scotland	8 November
Mike Brown	Wilkes, USA	9 November
J. Ewen Davidson	Branscombe, Australia	9 November

(6.88 yrs), which was first investigated by Kreutz (1892) and Searle (1892a; 1892b). After being observed during the 1899 and 1906 apparitions this comet was lost, and was only recovered in 1964 by Elizabeth Roemer (1964), thanks largely to predictions provided by Brian Marsden (1963). However, Comet 17P/Holmes' prime claim to fame is the major outgassing event that occurred in 2007:

> Although normally a very faint object, Holmes became notable during its 2007 return when it temporarily brightened by a factor of about half a million, in what was the largest known outburst by a comet, and became visible to the naked eye. It also briefly became the largest object in the solar system, as its coma … expanded to a diameter greater than that of the Sun … (Comet Holmes, 2010).

Figure 33: Charles Norris at the age of 45 (after Mr C.S. Norris, 1897).

Comet 17P/Holmes turned out to be Davidson's last cometary discovery but obviously he anticipated further success for we find that in early 1897 he was being coached in the calculation of orbital elements by the noted Sydney mathematical astronomer and comet specialist, Charles James Merfield (1866–1931; Merfield, 1897; Orchiston, 2015). But no new comets came Davidson's way and, as we have seen, eventually he became disillusioned with Australia and in 1900 decided to return to England. This effectively ended Queensland's initial romance with cometary astronomy.

5.3 Countering the Isolation: The Role of Astronomical Societies

As an active observational astronomer, one of the ways that Davidson tried to counter the geographical and intellectual isolation of living in country Queensland was to join international astronomical societies. Thus, when the Astronomical Society of the Pacific was formed in 1889 (Bracher, 1989) he was one of the first Australians to join. The following year the British Astronomical Association (BAA) was established in London (e.g. see Kelly, 1948; McKim, 1990), and Davidson was the first Queenslander to join, in early 1891 (see Candidates ..., 1891). In 1895 a New South Wales Branch of the BAA was founded in Sydney, and during its formative years this vibrant group included some of the nation's leading observational and mathematical astronomers and telescope makers, and it played a key role in the development of astronomy in Australia (see Orchiston, 1988b). Despite his distant domicile, Davidson joined the Branch and sometimes sent reports that were read at the Branch's monthly meetings (e.g. see Davidson, 1897a; 1897b).

Much closer to home, a Brisbane Astronomical Society was founded in 1897, three years before Davidson returned to Britain, but unlike the NSW BAA Branch, this Queensland group was not research and observationally orientated (see Orchiston, 1998), and there is no evidence that Davidson was ever an active member (or even that he joined the Society). We must remember that in the days before rapid air travel, accessing Brisbane from Mackay involved a long voyage by steamer and an overnight stay in Brisbane, which made attendance at society meetings a formidable challenge.

As we saw towards the end of Section 4.4, the Canadian sociologist-astronomer Robert Stebbins proposed a range of criteria that can be used to categorise amateur astronomers. Edwin Norris did not rank highly, but Davidson is another story. Despite leading a busy life, he clearly was a 'devotee' (not a 'dabbler') and definitely was an 'active' (as opposed to 'armchair') amateur astronomer. By the time he made his second comet discovery, in 1892, Davidson could probably be classified as a 'master' rather than a 'journeyman'.

6 DISCUSSION

6.1 Charles Sydney Norris: Evidence of a Norris Astronomical Dynasty?

Charles Sydney Norris (Figure 33) was born in 1859 in Brisbane, the second child of Edwin and Charlotte Norris, and was the only one of their nine offspring with an interest in astronomy and meteorology. Charles moved with his parents to Bowen in 1866 and then to Townsville in 1870. Initially he was schooled in Townsville before being sent to Sydney Grammar School where he completed his education.

In 1878 Charles Norris returned to Townsville to take up a position as an articled clerk, and on 8 March 1887 he was admitted to the bar (Supreme Court of Queensland Library, 2007a). As a result, six months later he accepted a partnership in his father's law firm. When

his father died in 1892 Charles was appointed acting Town Solicitor. He was part of a growing legal community within the Townsville region, and was appointed Deputy Sheriff on 12 February, 1909 (Official notification, 1909), performing this role in addition to holding the position of Court Registrar, Town Council Solicitor and running his own law firm. By this time his older brother, Edwin Henry Norris, had joined the firm, after relocating from Cooktown (Supreme Court of Queensland Library, 2007b).

Like his father, Charles Norris was a prominent member of Townsville society. He inherited his father's interest in yachting, and was a leading member of the Cleveland Bay Sailing Club, serving for a time as Commodore. He also was a gifted swimmer and athlete (Mr C.S Norris, 1897).

At the end of 1915 Charles was promoted by the Queensland Government and had to move to Brisbane (Public curator, 1915). He retired in 1924, and died on 24 December 1935. Because he never married his estate was divided amongst his relatives, but there was no mention of any scientific instruments or an astronomical library (Solicitor leaves £10,688, 1936).

While he was still living in Townsville, an 1897 article in the *North Queensland Herald* mentioned that Charles Norris was an "… enthusiastic astronomer and meteorologist, especially the latter for the past eighteen years." (Mr C.S. Norris, 1897), and this statement is supported by a number of meteorological reports that were published in this newspaper over the years (see Darlington, 2011: Appendix 8.1). Meanwhile, Charles' interest in astronomy was apparent in February 1882—more than 9 months before the transit of Venus—when he sent John Tebbutt information about a trip he made to Adelaide and Port Louis, Mauritius, in mid-1881 (Norris, 1882). As we have seen, Charles had a passion for sailing, and this 1881 journey coincided with his entry of a half-size model of a centre board yacht in the Melbourne International Exhibition (for which he took second place for 'all-comers'). After travelling to Melbourne for the exhibition Charles may then have continued on to Adelaide to embark on the voyage to Port Louis.

At that time Mauritius was a centre for sugar refining, and both Charles and his father had purchased land in the Barron River region near Cairns that they planned to plant in sugar cane (From the past …, 1930; Land, 1897). Charles informed Tebbutt that during this trip he had an opportunity to view the "… 5-inch Cook [*sic*] telescopes …" at Adelaide Observatory and in Mauritius. In fact, there was no 5-in (12.7-cm) refractor at Adelaide Observatory at this time, and undoubtedly what Charles saw was the 4.5-in (11.4-cm) Cooke that had recently been acquired from the late B.H. Babbage (see Edwards, 1993) and a little over nine months later would be used to view the 1882 transit of Venus (Edwards, 2004). During his visit it is also likely that Norris saw the Observatory's principal instrument, an 8-in (20.3-cm) Cooke refractor, which was operational by this time.

Mauritius was a British colony in the Indian Ocean ~2,000 km off the African coast, due east of Madagascar. The Royal Alfred Observatory which Charles visited had been established in 1870 and was located at Pamplemousses nearly 10 km to the northeast of the capital, Port Louis. The main building was "… a handsome stone structure standing in eleven acres of Crown land, tastefully laid out with palms and other tropical trees." (Macmillan, 1914: 192), and although the Observatory functioned primarily as a meteorological, geomagnetic and seismological institution, there also were two 3-in transit telescopes and a 6-in equatorial telescope (ibid.) —which obviously is the instrument that Norris saw and mistook for a 5-in refractor.

Notwithstanding this purported interest in astronomy, just like his father there is no evidence that Charles Norris ever made any serious observations with the 6-in telescope in the Strand Observatory. There are no papers by him (or his father) listed in the leading astronomical journals of the day, *Astronomische Nachrichten*, *Monthly Notices of the Royal Astronomical Society* or *The Observatory*, and apart from Charles' occasional meteorological reports most newspaper references to him—and his father—relate to their legal activities or yachting interests and prowess.

Nor is there any indication that the transit annex that Edwin Norris planned to erect as part of the Strand Observatory was ever set up by him or by his son, which would indicate that the Norrises never provided a time service for Townsville. Thus the Strand Observatory never functioned as a *de facto* city observatory in this sense (cf. Orchiston 1989). Instead, Brisbane Observatory supplied Townsville with a time service, via a telegraphic link (By telegraph …, 1891).

The accumulated evidence clearly shows that there never was a Norris astronomical or meteorological dynasty in Townsville. In this regard, the Norrises are somewhat of an enigma. They were independently wealthy, one of the prerequisites for a successful amateur astronomer in nineteenth century Australia, and this allowed Edwin to purchase two significant telescopes (plus accessories) and construct an observatory for one of these instruments. Yet both Edwin and Charles Norris squandered the research potential of this wonderful facility, and in the eyes of the public what little observational astronomy

that they did accomplish was probably viewed as a private indulgence.

6.2 The Ultimate Fate of the Two Cooke Refractors

Edwin Norris' estate was auctioned in Townsville on 9 February 1897, and there is no record of the purchaser of the Cooke refractor in his Strand Observatory, or for that matter of the other smaller telescopes that were for sale. It is unlikely that the large telescope was purchased by a member of the family. Even though Charles Norris remained in Townsville and continued to run his Flinders Street legal practice, he was a bachelor and moved every few years. There is no evidence that he purchased the telescope, let alone rehoused it after the sale of The Strand property. Apart from Charles, none of Edwin's other children ever showed an interest in astronomy, and following his death most of them, along with their mother, relocated to Brisbane.

It may simply be a coincidence, then, that in May 1897—several months after the auction of the Norris estate in Townsville—Dr E. Sandford Jackson (1860–1938; Love, 1975), the Medical Superintendent of the Brisbane Hospital, announced he had received a "… large telescope …" as a gift from an anonymous donor (An anonymous gift, 1897). This was to be given to the Lady Lamington Nurses Home. While the term "large telescope" is ambiguous, and to the average layman could mean a 4-in (10.2-cm) refractor or an 8-in (20.3-cm) reflector, nonetheless, could this possibly be the ex-Norris 6-inch Cooke refractor?

We are in no better a situation regarding Davidson's Cooke telescope, which presumably returned to England with him in 1900. Although we know that he lived in Oxford, we do not know whether he remounted the telescope or whether it remained in storage, and unfortunately we know nothing of its fate following his death in 1923.

6.3 Townville's Third Observatory

As we have seen, Edwin Norris established Townsville's second astronomical observatory, on The Strand, in 1884. The town's third observatory was erected in 1892 (the same year in which he died), but it was not a 'conventional' astronomical observatory in that it was designed for the type of astronomy associated with the trigonometrical survey of Queensland.

It should be remembered that Queensland originally was part of the colony of New South Wales, and only became a separate colony in 1859. However, it was not until 1883 that "… the Government commenced a trigonometrical survey [of the colony], under direction of the Surveyor-General, Mr. McDowell …" (Ellery, 1900: 45). The aim of the survey, conducted by the Lands Department, was to determine the position of Queensland's boundaries, and the locations of lighthouses along the coast and various settlements established in the colony. The Survey also would provide reference points for a range of utilitarian purposes, such as land subdivision, and road and railway construction. It is interesting that the 1882 transit of Venus played an important part in this:

> The astronomical datum [for the trigonometrical survey of Queensland] is the position of the station at Jimbour as determined by Capt. Morris, R.E., and Lieut. Darwin, when preparing to observe the transit of Venus in 1882, the longitude being deduced by the telegraphic exchange of time signals with Sydney. (Spowers, 1912: 41).

Because of the topography of expansive inland Queensland, the procedure of establishing a baseline and then a succession of first, second and third order trig stations—as practised in neighbouring New South Wales (see Baracchi, 1914; Orchiston, 1987a)—would not work, so the focus was on establishing a succession of first order stations.

In May 1891 the Chief Surveyor of Queensland, Robert Hoggan (1852–1929),[7] began the trigonometrical survey of North Queensland (see Queensland latitudes …, 1891), with the following settlements identified for first order trig stations: Burketown, Cairns, Charters Towers, Croydon, Hughenden, Normanton and Townsville (The Public Lands …, 1892; see Figure 8 for locations). The equipment supplied for this survey was

> … a 12-inch altazimuth [theodolite], by Troughton and Simms, a chronograph, a mean solar and a sidereal chronometer, furnished with electrical attachment for automatically sending the time signals. (ibid.).

Time was supplied telegraphically by a small observatory in Brisbane with a 30-in transit telescope (Ellery, 1900).

The prefabricated portable observatory set up at each North Queensland first order trig station consisted of a circular tent observatory and an adjacent tent for associated equipment. Figure 34 shows the general appearance of the 'Charters Towers Observatory' in May 1891, which would have been similar, if not identical, to the observatory established in Townsville in 1892.

The location of the Townsville Observatory is well known: it was erected on the top of Stanton Hill, some distance from Black's observatory on Melton Hill and Norris' Strand Observatory (see Figure 35), and currently is

> … on the northern boundary of a home units complex which occupies the summit of Stanton

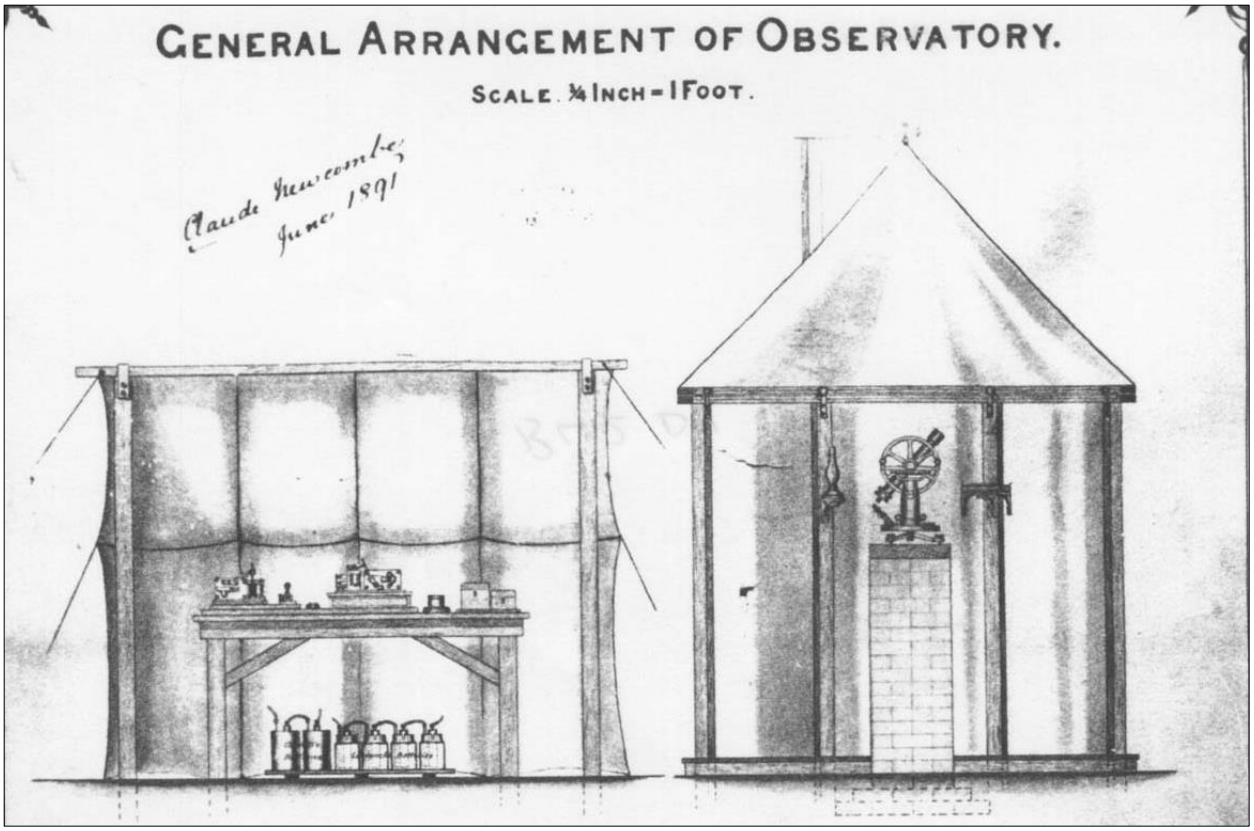

Figure 34: A cut-away side elevation of the Charters Towers Trigonometrical Observatory (courtesy: Museum of Lands, Mapping and Surveying, Queensland, acc. No. M 134).

Hill.

> It is constructed of concrete and is cone shaped. The pillar stands 1.5 metres high by 0.3 metres in diameter with three holes on the top, which supported the theodolite.
>
> A paved area and gardens surround the trig station. (Townsville Astronomical Trigonometrical Station, 2013).

The thing that sets the Townsville trig station apart from other trig stations is that

> Most of the Queensland trig stations were timber posts, only remnants of which survive, erected to support a theodolite … [but] At Townsville and Thursday Island, concrete pillars rather than timber posts were erected, and these have survived largely because of their more substantial construction.
>
> While surveyors no longer need to use the Townsville trig station it is still in serviceable condition. (ibid.).

Because of this, the Townsville Observatory site is historically important in the context of land surveying in nineteenth century Queensland.

7 CONCLUDING REMARKS

For Queensland the 7 December 1882 transit of Venus was a great disappointment, with those areas occupied by observers either clouded out or rained out. However, the transit did leave a welcome legacy: two 6-in equatorially-mounted Cooke refractors and associated accessories would remain in the colony and had the potential to contribute in a valuable way to astronomical research and/or education.

Both telescopes were purchased by the wealthy Townsville solicitor, Edward Norris, and although he erected an observatory for one of the telescopes, its research and educational potential were squandered. Norris had an obvious interest in astronomy and was willing to outlay a considerable sum of money for the purchase of the telescope and construction of the Strand Observatory, but he had no serious observational aspirations with this research-class telescope. Rather, he was a 'dabbler', and astronomy was a personal indulgence. Unfortunately, the fate of this telescope after the auction of Norris' estate in 1897 remains unclear.

One of Edwin Norris' sons, Charles, also was interested in astronomy, and even more so in meteorology, but like his father he made no scientific contribution to either discipline. Thus, father and son were wealthy pioneers from Australia's colonial era, and their affluence provided them with opportunities to participate in serious avocational scientific pursuits outside of their regular business endeavours, but they chose not to do so.

As partial compensation for this rather unsatisfactory state of affairs, Norris' second 6-in Cooke refractor fortunately fell into safe hands when it was sold to the Mackay sugar 'baron' J.

Figure 35: A modern map of downtown Townsville, Castle Hill, The Strand and Cleveland Bay, showing the positions of Townsville's first three astronomical observatories (the red circles with crosses). From left to right they are: the Townsville (Trigonometrical) Observatory (on Stanton Hill), John Melton Black's observatory (on Melton Hill) and Edwin Norris' Strand Observatory (base map: https://divezone.net/travel/townsville; map modifications: Wayne Orchiston).

Ewen Davidson in 1889. Once housed in his Branscombe Observatory near Mackay, Davidson used the telescope very effectively to discover and then track two different comets, one of which now bears his name. Yet once again we have no knowledge of the current whereabouts of this telescope, though we presume that it returned to England when Davidson retired and moved to Oxford in 1900.[8]

Finally, we should note that although Jimbour did not afford the visiting British astronomers views of the transit of Venus on 7 December 1882, the site later served as the datum point for the colony's trigonometrical survey. So in the end the transit was able to play a valuable—even if unintended—role in the development of colonial Queensland science.

8 NOTES

1. Professor Nick Lomb (pers. comm., 2017) is impressed with this value, as it agrees almost exactly with modern calculations.
2. Note that the sums only just add up. The obituary, written in 1892, states that Norris began observational astronomy 26 years earlier, which means in 1866, the very year that he left Brisbane and moved to Bowen. We can presume, though, that his astronomical 'apprenticeship' began earlier, before he became an observer.
2. This auction was the result of court action brought on by a disagreement between Charles Norris and his sister, Charlotte Alice Knapp (1867–1950), over the division of their father's considerable estate. His Honour Justice Chubb appointed J.N. Parkes as auctioneer to dispose of *all* of Edwin's property, including personal and business premises (Notice of Sale, 1897).
3. This would imply that Russell was unaware that two 6-in Cooke telescopes were sold, which is reinforced by the following details included later in his letter:

> It is satisfactory also to know that the Cooke Equatorial has fallen into his [Davidson's] possession [as] the Mr Norris who bought it from Capt Morris has I believe never used it. (Russell, 1889b).

Russell's Victorian counterpart, Robert Ellery (1900), also made this same mistake in thinking that Norris only purchased one telescope, which subsequently passed to Davidson.

4. This was a typical annual Leonid meteor shower, not one of the captivating Leonid 'meteor storms' that occur every 33 years. At the time, the next storm was due in 1899 —see Dick (1998) for further details.
5. Prior to 1859, Queensland was part of the colony of New South Wales and not a separate colony in its own right.
6. We presume this was the new Donohoe Comet Medal awarded by the Astronomical Society of the Pacific (ASP) and endowed by the wealthy San Francisco businessman Joseph A. Donohoe (d. 1895). Since the decision to establish this medal only was made at the 27 July 1889 meeting of the ASP (Meeting …, 1889: 335) and Russell already knew about this prize by 25 July (when he wrote to Davidson), we must presume that at an earlier date one of his American colleagues forewarned Russell of the plan to establish this new award.
7. Hoggan was an ex-naval captain, who was trained in the technicalities of trigonometrical survey astronomy at the Royal Greenwich Observatory (Haynes et al., 1993).
8. Surprisingly, the existence of this telescope was unknown to those British colleagues listed in the Acknowledgements who are familiar with the history of Oxford astronomy, and we are grateful to them for trying to track down information about it.

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