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Transit of Venus Observations and Relics in South Africa

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Abstract: Apart from local observations, two international expeditions observed the 1882 Transit of Venus from South Africa. The British/South African efforts observed from four stations, using a total of 11 telescopes while the Americans employed 7 instruments, including the telescope of the ladies seminary where they stayed.
Very few relics survived to this day. Most well known are the two concrete piers in Touws River. A Dallmeyer equatorial mount was recently discovered at a school in Somerset West which may have originated at the Touws River site.
At SAAO Cape Town, a typical "transit of Venus" 6-inch Grubb equatorial, used by Sir David Gill, is still in working condition. The wooden tube 7-inch Merz refractor, used by George Maclear (son of Sir Thomas), today serves as a finder telescope and its original "cannon ball bearing" dome and equatorial mount still exists.
The site at Aberdeen Road in the Eastern Cape was recently located using a GPS fix and the area examined for possible relics. Unfortunately none were found but the position of the site with respect to Aberdeen Road raises some questions.
The position of the site of the American expedition to Wellington could since be located within metres after obtaining Simon Newcomb's report, showing that my previously assumed position was wrong. His report further revealed some interesting details not known before.

1. Introduction

South Africa was well placed to observe the Transit of Venus of 1882 which drew two international expeditions, one from England and one from America. The British party observed from Montagu Road (Touws River today) and the Americans from Wellington. Locally, Dr (later Sir) David Gill, Astronomer Royal at the Cape, also arranged a number of local expeditions, observing from Durban, Aberdeen Road and the Cape Observatory.

This paper is a follow-up with subsequent findings since my two previous papers (Koorts 2003, 2004) where all these expeditions were covered in detail with the information available at the time. The reader is referred to these articles for more background since I will only briefly refer to them here where needed.

2. The British Expedition

Probably the best known Transit of Venus relic in South Africa can be found in Touws River where two concrete

piers survived (Figure 1). Their survival was most probably due to the fact that one pier is beautifully hand-inscribed with the names of the members of the party where they ended up in its courtyard when the Douglas Hotel was literally built around them in 1902. Thanks to the efforts of H.E. Wood of the then Union Observatory in Johannesburg, these relics were proclaimed a national

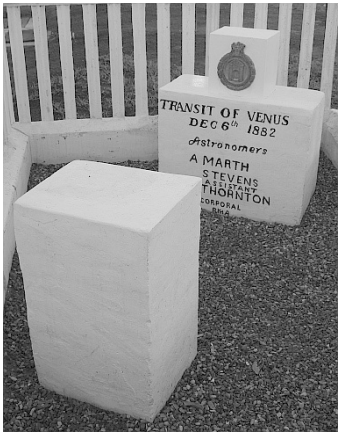
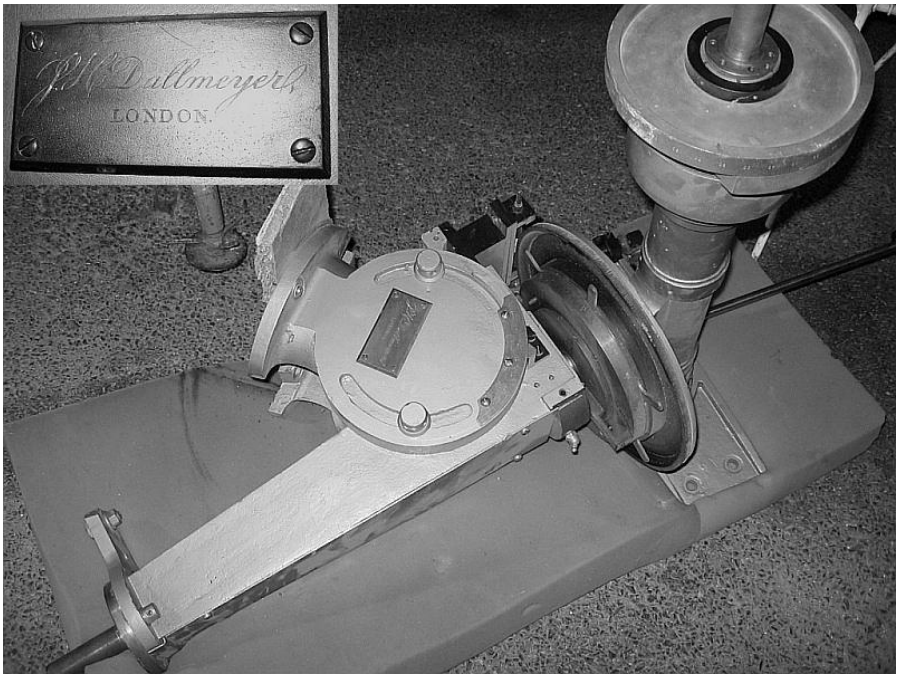


Figure 1 (left) The two surviving piers in Touws River. The block carrying the National Monuments plague was later added to the far (south) pier. The piers are orientated N-S with the north pier slightly higher – the opposite to a standard equatorial set-up in the southern hemisphere. (Picture: Prof George Tucker)

Figure 2 (below) The Dallmeyer equatorial mount, recently found at the Hottentots Holland High School, Somerset West. The insert shows a close-up of the beautiful Dallmeyer signature on the side of the equatorial head.



monument in 1938. This ensured their survival when the Douglas was demolished in 1982.

Two equatorial telescopes were sent to Montagu Road: a 6-inch Grubb and a 4½-inch Dallmeyer. Each telescope was housed in its own hut, made from their transport crates, suggesting they could not have been located too close to each other, at least not as close as the two piers today. It is puzzling exactly how the telescope(s) mounted on these two piers. Although they are oriented north-south, the north pier is the taller of the two, the opposite to a southern hemisphere equatorial set-up supporting the ends of a polar axis. The difference in height is only slight, not in relation to the 33° latitude of Touws River.

A Dallmeyer equatorial mount was recently found at a school in Somerset West (Figure 2). Prof Brian Warner, who originally told me of this mounting, suspected it being a Transit of Venus relic. Only two Dallmeyers are known to have ever been in South Africa – this 4½-inch Transit of Venus telescope and the De la Rouge photoheliograph, currently at SAAO Cape Town. The latter is known not to be on its original mounting any more, so this Dallmeyer mount could have belonged to any of these two telescopes.

To check for a possible match, their telescope mounting flanges were compared. The Dallmeyer mounting has a flange with four holes (two visible in Figure 2) on a grid of 56mm x 291mm (2.2″ x 11.5″), in comparison to the mounting bolts of the Dallmeyer photoheliograph being on a grid of 76mm x 305mm (3″ x 12″). This mismatch strengthens Warner's suspicion that this Dallmeyer mounting may have originated from Touws River.

Before going to Somerset West, this mounting was at the University of Cape Town (UCT) where it was stored with a telescope of about the correct aperture and was suspected to be the Touws River Dallmeyer refractor. Shortly before last year's Venus transit, this telescope was found in Fishhoek. However, at closer inspection, it seems much too modern since it has an aluminium tube and does not carry any markings identifying its manufacturer, not even on the lenses or lens cell which had to be fully disassembled to clean and remount. The colour of this telescope does not match the Dallmeyer mounting either. Either way, a crude mounting for this telescope was lashed up and it gave great views of the transit from Wellington.

3. Local Observations

Supplementing the British expedition, Gill arranged some local observations. This included a party observing from Aberdeen Road, the start of the Natal Observatory in Durban as well as observations from the Cape Observatory.

3.1 Aberdeen Road

This station was manned by Gill's First Assistant, William Henry Finlay, and Third Assistant, Mr. R.T. Pett, equipped with two 6-inch Grubb equatorial telescopes. Except for this, very little was known about this station until recently.

Towards the middle of 2005 I got into contact with Fiona Hobson from Graaf-Reinet. Since Graaf-Reinet is not very far from Aberdeen Road, I approached her with the request: "…for someone with a camera and a GPS, who goes past Aberdeen Road one day, to take some pictures of the area at the site's coordinates and maybe check for any relics left there". I was pleasantly surprised when Fiona enthusiastically replied that she drives past Aberdeen Road weekly, and that she will gladly do me this favor.

While she was trying to find someone with a GPS, I did some preparation and, using GPS software, investigated the position of the site on computer. It was surprising how far the site was from Aberdeen Road itself. As seen in Figure 3, the site is about 1.5km from Aberdeen Road and 370m from the railway line.

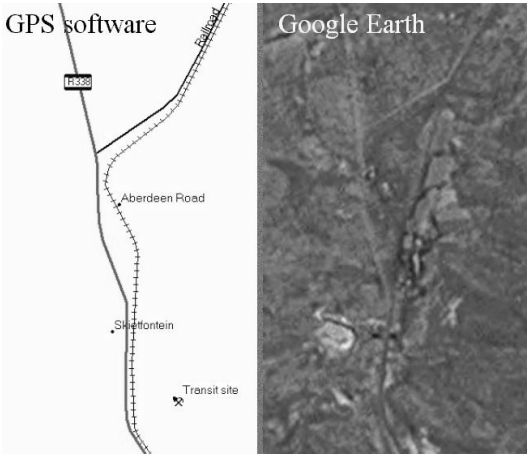


Figure 3 (top) Using GPS software, the position of the site is plotted with respect to Aberdeen Road. Figure 4 (bottom) From the entrance gate to Skietfontein, the site (arrowed) is near the foot of the hills across the veld.

Their method for determining longitude was by means of time signals, telegraphed from the Cape Observatory to synchronize and rate their chronometers. One can assume that the closest telegraph office was at Aberdeen Road station which meant they either took their chronometers there or simply tapped onto the telegraph line which probably ran along the railway line.

Before long, Fiona's enthusiasm spread to her husband, Rob as well as the owners of Skietfontein, Hennie and Joan Barnard, on who's farm the site is, and Fiona soon got them all involved in

site-hunting. Using Hennie's GPS, on Saturday, 11 June 2005, they set out to do a GPS fix of the site.

Fiona described the excursion as follows: "It was great fun, I must say. Hennie set off with the GPS, and it told him what direction to walk, and how long it would take us to get there at the speed we were walking. We walked for five or six minutes from the house [Skietfontein homestead]. Hennie finally stopped and said: "It's here". He walked around a bit, coming at the spot from different directions, but seemed quite sure of the place. We made a cairn of stones there, and looked around for a while, but didn't find anything other than natural veld. No trees nearby, just low Karoo bushes and lots of stones. And a beautiful view northwards of the vast open plains in front of us and the Aberdeen and Graaff-Reinet mountains in the distance. The site was actually on a very flat area, nice and open, perfect for astronomy." (Figure 5)

Figure 5 The Aberdeeb Road site in the foreground, marked with a cairn of stones, with Skietfontein on the left horizon and Aberdeen Road to the right. The unobstructed northern horizon is clearly visible.

Their site selection is still puzzling. Fiona found out that the railway station was opened in February 1879. Several of the buildings in Aberdeen Road dates from the 1880's, eg the foundation stone of the Oatlands church was laid on 12 November 1882, three weeks before the transit. One wonders if Skietfontein had anything to do with the site selection. Unfortunately, the farm has only been in the Barnard family since the 1970's. The previous owners were Haywards but she was unable to trace any Hayward relations.

For interest's sake, an unconfirmed story has it that Gideon Scheepers, a Boer War leader, was taken by train from Graaff-Reinet and executed secretly at Aberdeen Road.

3.2 Cape Observatory

A total of six observers observed the 1882 transit from the Cape Observatory with a variety of instruments. Similar to the two telescopes in Aberdeen Road, Gill used a 6-inch Grubb, which is still in existence at SAAO, Cape Town today. The most exotic instrument was the 4.2-inch Dun Echt Heliometer, used by W.L. Elkin from the site occupied by the 18-inch reflector today.

The largest telescope was a 7-inch Merz refractor, manned by George Maclear, observing from the "North-West" dome, erected in 1849, today housing the Dallmeyer photoheliograph.

This Merz telescope also survived to this day, now the guider telescope for the 18-inch reflector, on the same site but with a different dome from where Elkin observed. The tall painted tube of the Merz always inconspicuously blended in with the 18-inch. The lens of the 7-inch recently needed cleaning and when removing the cell, Dougie Metcalfe, mechanical technician at SAAO, Cape Town, realised that it has a wooden tube. Since the rest of the telescope was in a sad state of neglect, it was decided to refurbish the 7-inch Merz completely.

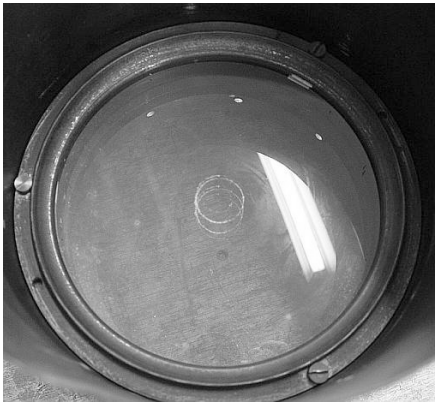


Figure 6 The objective lens of the 7-inch Merz. Unfortunately some damage in the centre of the front surface is visible, probably caused by a badly fitting lens cap. One of the postage stamp stub separators can be seen at the top right.

Figure 7 After stripping off several layers of paint, Dougie Metcalfe (white coat) and Malcomb Henricks prepared the tube for varnishing. The construction of the tube is quite interesting with a lighter wood core, covered with mahogany veneer, probably all hand made. Take into consideration that the tube tapers down from front to back.

The lens cell was carefully stripped and cleaned. It was found to be an air-spaced doublet, separated in the traditional way of using postage stamp edging strips. After cleaning them, all the lens components were reassembled in exactly the same relative orientations with respect to each other.

Stripping the paint from the tube was not easy. Dougie counted seven layers of admiralty grey, which, when spread over the age of the telescope, means it was repainted about every 20 years. After cleaning all the brasswork, fittings and brackets, the Merz was remounted on the 18-inch where its beautiful varnished wooden tube is now a real eye-catcher.

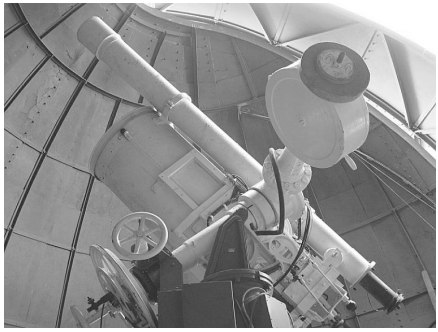


Figure 8 The tall, slightly tapering tube of the 7-inch Merz, mounted as the guider for the 18-inch, before (top) and after (below) restoration.

4. The American Expedition

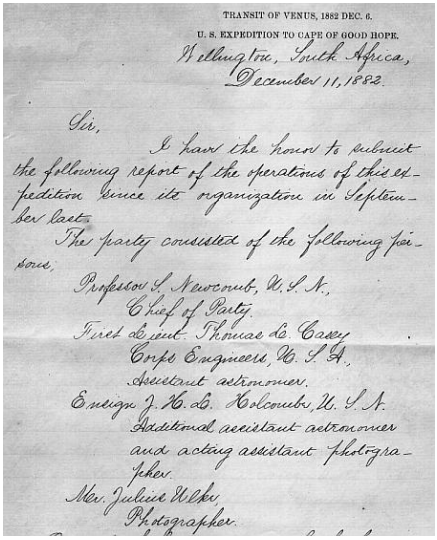
At the time of writing my previous article on the American expedition (Koorts 2003), one vital piece of information was still outstanding – the report of the expedition leader, Prof Simon Newcomb. Very early on in my research, I learned that this report is in the National Archives in Washington DC, but getting hold of a copy finally took almost 7 years! Eventually, less than five months before the 2004 transit, Margaret Kelly, Research Chemist at NARA (National Archives and Records Administration) sent me a copy of this report. This was entirely thanks to Prof George F. Tucker, professor of physics and astronomy, The Sage Colleges, New York, who previously contributed considerable pro bono work to NARA, justifying the extra effort by Maggie to search the archives for Newcomb's report. Newcomb's beautifully handwritten 22-page report (Figure 9) uncovered a number of interesting facts and an accompanying map revealed that my previously assumed position of their observing site was wrong.

4.1 Newcomb's report

4.1.1 Itinerary

It is clear that the decision to send out American expeditions came very late, leaving no time to practice or even try out the instruments in Washington. New-

comb's party had to ship their material by 15 September 1882 with some items still outstanding. Ensign Holcombe accompanied the shipment and the rest of the party would follow later. To speed up the travel time for the equipment, some land transportation was necessary. Their itinerary was: Washington (15 September), New York (20 September), Liverpool (1 October), overland to Southampton (5 October) and Table Bay (27 October). A further delay on arrival was due to quarantine regulations because of a small-pox epidemic in the Colony. However, with the influence of Gill, he arranged that Newcomb could land on their night of arrival already. (Newcomb 1882: 2-4)



TRANSIT OF VENUS, 1882 DEC. 6.

U. S. EXPEDITION TO CAPE OF GOOD HOPE.

Wellington, South Africa,
December 11, 1882.

Sir,

I have the honor to submit the following report of the operations of this expedition since its organization in September last.

The party consisted of the following persons.

Professor S. Newcomb, U. S. N.
Chief of Party.
First Lieut. Thomas L. Casey
Corps Engineers, U. S. A.
Assistant astronomer.
Ensign J. H. D. Holcomb, U. S. N.
Additional assistant astronomer
and acting assistant photographer.
Mr. Julius Wilke,
Photographer.

Figure 9 The front page of Newcomb's report with its special "letter head" for the expedition, listing the party members and their duties.

4.1.2 Site selection

While the rest of party oversaw the storage the equipment in the "Queen's Warehouse", Newcomb's first and most urgent business at hand was to select a suitable site. Gill previously undertook to collect metrological records for him, which they immediately started studying. Gill, as well as his predecessor, Edward James Stone, previously recommended that they go to Beaufort West. However, the 300-mile journey, the possibility of afternoon thunder storms, intense heat as well as blowing sand and dust worried Newcomb. He was about to send Lieut. Casey there when "…a gentleman suggested Wellington as an eminently suitable place. This town is the seat of the Huguenot Seminary, an institution under an American principal, and conducted largely by American teachers." (Newcomb 1882: 5)

On Tuesday, 31 October, three days after arrival, Gill accompanied Newcomb to Wellington. Gill had regular contact with the Seminary, lecturing the Astronomy class of the principle, Miss Ferguson. He has also just finished helping them install a 6-inch Fitz refractor in a small observatory on the Seminary grounds. Newcomb liked what he saw straight away, even noticing "…a spot in the Seminary grounds offering an excellent site for a station, being quite level, sheltered by trees, and situated on the margin of a passing stream.". The principle, Miss Ferguson "…entered most cordially…" into his plans and soon got the blessing of their Trustees (Newcomb 1882: 6). Newcomb did not even return

to Cape Town and immediately sent for the rest of the party and the equipment.

4.1.3 Setting up

Further difficulties were experienced in setting up the site: "…the problem of erecting the necessary buildings proved to be less simple than I had anticipated, because the colony produced no lumber and wooden buildings are seldom erected." (Newcomb 1882: 7). He could actually not find anybody in Wellington to erect the buildings for the transit and photographic houses and had to recruit a carpenter in Cape Town, causing a further two-week delay. The equatorial house proved even more troublesome. Although he had brought along the frame for it, he could not get someone to cover it with wood. To prevent further delay, he eventually had it covered using corrugated iron.

On 6 November, exactly a month to go to the transit, all the buildings were ready and the whole party permanently in Wellington. The most urgent job was to get the processing of the photographic emulsion under control which required the photoheliograph to be in position and set up. The efforts of every member of the party were thus concentrated towards this goal, which was finally reached by 20 November, a mere two weeks before the transit. Luckily the first photographs of the Sun proved that the emulation was in good order.

The work was now divided in three portions; determination of time and position, operations concerning the photoheliograph and observations of contacts.

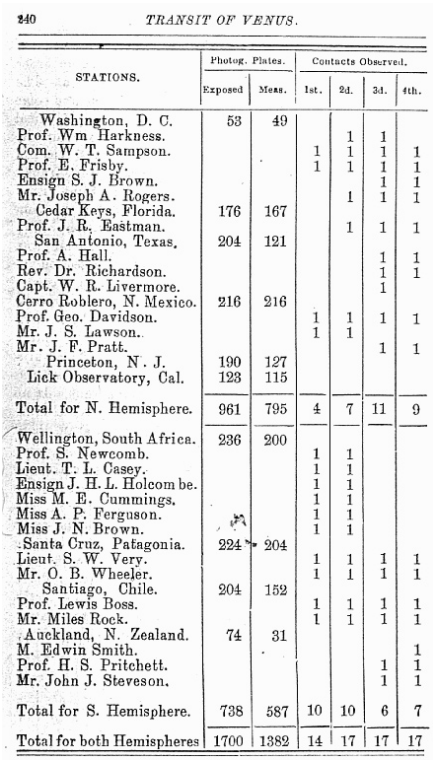
As with the local and British parties, Gill also offered the use of time signals to the Americans. Towards the end of his report, Newcomb expresses his gratitude to the General Manager of Telegraph of the Colony for: "…the free use of all the lines of telegraph under his control, a privilege of which extensive use was made" (Newcomb 1882: 21). Due to the distance, it was decided not to extend telegraph lines to the site. Instead, the chronometer was taken to the telegraph office on the prearranged dates and times (four nights, 27-30 November inclusive). Lieut. Casey was responsible for determining the latitude of the station by "Talcott's method" (Newcomb 1882: 10).

Newcomb described at length the numerous experiments they performed in order to improve better definition of the solar images. Because of the open-tube nature of the horizontal photoheliograph, convection currents from the ground in the intense summer heat of Wellington, caused serious problems. Newcomb ended up "…enclosing the whole space between the transit and photographic houses with a cotton awning" (Newcomb 1882: 11). This helped a great deal but further tweaking continued until right up to Transit day, 6 December 1882. The day before, he still had branches cut and put over the awning and on the morning of Transit day he found that covering the metal surfaces below the heliostat mirror with white paper on cotton and by cooling other surfaces with water, cured the last of his problems.

One problem probably not foreseen by the designers of the instrument was,

due to the high altitude of the Sun in Wellington's summer sky, the heliostat mirror was too small to completely fill the objective lens. Gill offered a solution when he visited Wellington on 1 Desember, suggesting to stop down the objective to 4½-inches, which was the way used from then on.

Even though photography was the main observing method for the American expeditions, the importance of contact observations were not neglected. The Commission supplied each party with a single 5-inch Clark refractor, meant for the Chief of the Party. In addition, Newcomb brought along two more telescopes, a 3½-inch and a 3-inch for Casey and Holcomb. To practice contact observations "… I had brought along a model transit, and practiced all the observers upon it to a greater or lesser extent" (Newcomb 1882: 18).



240 TRANSIT OF VENUS.

STATIONS.	Photog. Plates.		Contacts Observed.			
	Exposed	Meas.	1st.	2d.	3d.	4th.
Washington, D. C.	53	49				
Prof. Wm Harkness.				1	1	
Com. W. T. Sampson.			1	1	1	1
Prof. E. Frisby.			1	1	1	1
Ensign S. J. Brown.					1	1
Mr. Joseph A. Rogers.				1	1	1
Cedar Keys, Florida.	176	167				
Prof. J. R. Eastman.				1	1	1
San Antonio, Texas.	204	121				
Prof. A. Hall.					1	1
Rev. Dr. Richardson.					1	1
Capt. W. R. Livermore.					1	
Cerro Roblero, N. Mexico.	216	216				
Prof. Geo. Davidson.			1	1	1	1
Mr. J. S. Lawson.			1	1		
Mr. J. F. Pratt.					1	1
Princeton, N. J.	190	127				
Lick Observatory, Cal.	123	115				
Total for N. Hemisphere.	961	795	4	7	11	9
Wellington, South Africa.	236	200				
Prof. S. Newcomb.			1	1		
Lieut. T. L. Casey.			1	1		
Ensign J. H. L. Holcomb.			1	1		
Miss M. E. Cummings.			1	1		
Miss A. P. Ferguson.			1	1		
Miss J. N. Brown.			1	1		
Santa Cruz, Patagonia.	224	204				
Lieut. S. W. Very.			1	1	1	1
Mr. O. B. Wheeler.			1	1	1	1
Santiago, Chile.	204	152				
Prof. Lewis Boss.			1	1	1	1
Mr. Miles Rock.			1	1	1	1
Auckland, N. Zealand.	74	31				
M. Edwin Smith.						1
Prof. H. S. Pritchett.					1	1
Mr. John J. Steveson.					1	1
Total for S. Hemisphere.	738	587	10	10	6	7
Total for both Hemispheres	1700	1382	14	17	17	17

Figure 10 A summary of all the observations of the American effort worldwide. The names of the three Seminary ladies are the only amateurs amongst all the professionals.

4.1.4 Contact observations

Only ingress was visible from Wellington in 1882 which happened in the late afternoon. Everyone except the photographer, Mr Ulke made visual contact observations as Venus moved onto the solar disk.

Newcomb's report echoes other sources on the way the Seminary ladies were involved in doing their own contact observations. He reveals the reason for something I have wondered about before – the order of the names in which the three Seminary ladies were credited. It is quite unusual for that time, to list the name of the principal, Miss Ferguson, below that of a junior teacher, Miss Cummings (Figure 10). Newcomb explains that "…Miss M.E. Cummings, a teacher in the Seminary was selected to observe with the large [6-inch Fitz] telescope. Two smaller ones were employed by Miss Fergoson and Miss Brown, but their mounting was far too unstable to admit of accurate observation. I shall however transmit all the observations" (Newcomb 1882: 18).

For the reasons discussed in some detail in Koorts (2004), it was not uncommon to find that contact timings could differ by up to 52 seconds between observers on the same site. Wellington was no exception with Newcomb and Lieut. Casey's observations agreeing well, but "…those of Ensign Holcombe and Miss Cummings are, respectively, some 30s and 40s earlier" (Newcomb 1882: 19). Newcomb contributes this to "…a suspicion I had previously entertained that contact observations by inexperienced observers are of comparatively little value" (Newcomb 1882: 20).

I cannot help but wonder tongue-in-cheek how anyone can become an experienced observer of such a rare phenomena!

Either way, judging from the enthusiastic correspondence by Miss Cummings (Koorts 2003:205) it is not too surprising that she was given the honor to observe with the 6-inch Fitz. When she, years later, wrote down her reminiscences of her decade as teacher at the Seminary, she highlighted the transit observations explaining how "…there was considerable excitement when it was found that the results obtained by the amateurs were more accurate than those of the professionals. Prof Newcombe, the chief of the party, said this was due partly to good fortune and partly 'to the quickening of the faculties which comes with intense interest'" (Gamble 1933). It seems that he never had the heart to spoil their enthusiasm by revealing what was in his report.

4.1.5 Photographic observations

As soon as everybody could get into position after the contact observations, photographic observations commenced and continued for about two hours until the Sun got too low. During the trail runs, Newcomb found that Lieut. Casey was "…so expert in managing the exposures and keeping the record, that this duty was assigned to him" during the transit (Newcomb 1882: 16). Ensign Holcombe managed the plates and Mr Ulke did the development. As can be imagined "…the operation was physically a most trying one. The temperature ranged from 97° to 99°[F] and three men were hard at work during two hours in a dark and nearly air tight cubicle box, measuring 10 feet on each side. The precision of the work done and the accuracy of the record kept under these circumstances by the assistant astronomer is worthy of special notice" (Newcomb 1882: 16).

In total 236 plates were taken of which Newcomb thought about 200 should be good enough to be measured.

4.1.6 Site map

I cannot help but share Newcomb's high regard for Lieut. Casey's work when studying the thorough job he did on recording the position of their observing site. Although the Commission only required them to produce a map so that the position of the site can again be found to within 100 feet, he did a full blown survey. He even laid out a 1000-feet baseline from which ends he measured all possible angles (accurate to a minute of arc) to surrounding landmarks as well

as their site (Figure 11). A big bonus for me was that he also included the position of the Seminary observatory which was most useful to tie up with my previous research.

My first glance at Lieut. Casey's map, made me realise that my previously assumed position of their observing site was wrong. The only clue I had before was an aerial picture dating from about 1937, showing a stand-alone post not far from the Seminary observatory. This post was suspected to be the one planted shortly before the picture was taken, after a visit by H.E. Wood from the then Union Observatory, marking the spot where a foundation of one of Newcomb's piers was found. From the same picture, it could be determined that the Seminary observatory was where there are tennis

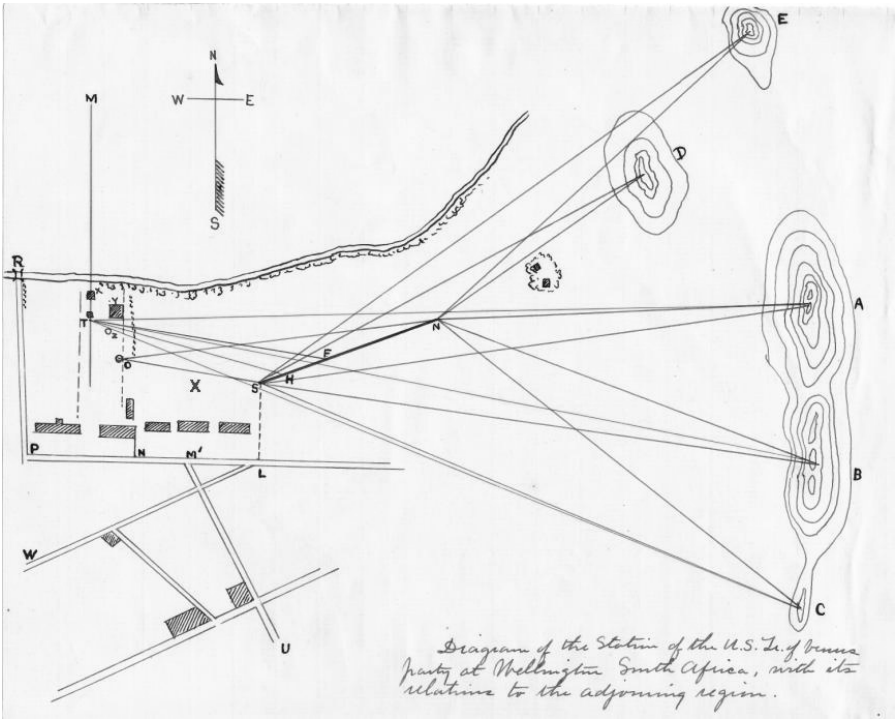


Figure 11 Lieut. Casey's excellent map of their observing site relative to its surroundings. The photoheliograph was laid out on the meridian line M with T the position of the transit instrument, X the photographic house, Y their store room, Z the equatorial house and O the Seminary observatory. The line S-N was his 1000-feet baseline. I added the larger X at the spot where I previously thought the site was. Footpaths are indicated by dotted lines; of particular interest the footpath running past O and Y.

courts today. Casey's map indicated that their observing site was on a present day hockey field behind the College hostels.

In order to pinpoint the site accurately, a survey was done. Unfortunately not all the distant landmarks which Casey used can be seen from the site today, some being cut off by buildings or trees. We still managed to set up on a spot from where most were visible and we did a full survey of the surrounding area.

Because Lieut. Casey did such a thorough job, I could replicate his entire survey on computer, using CAD software. By superimposing our survey on top of Casey's, excellent registration was possible, yielding the position of their transit instrument within metres on the hockey field, basically on the eastern quarter line, just north of the middle of this line (Figure 12). Since all American sites were laid out the same, the objective pier must have been 14 feet due north from this point and the photographic pier a further 40 feet north. The position of the Seminary observatory was also confirmed to be on the centre tennis court.

Part of the footpath shown on Casey's map, still exists today in essentially the same position and was therefore included in the survey which yielded more confidence in the accuracy of the match.

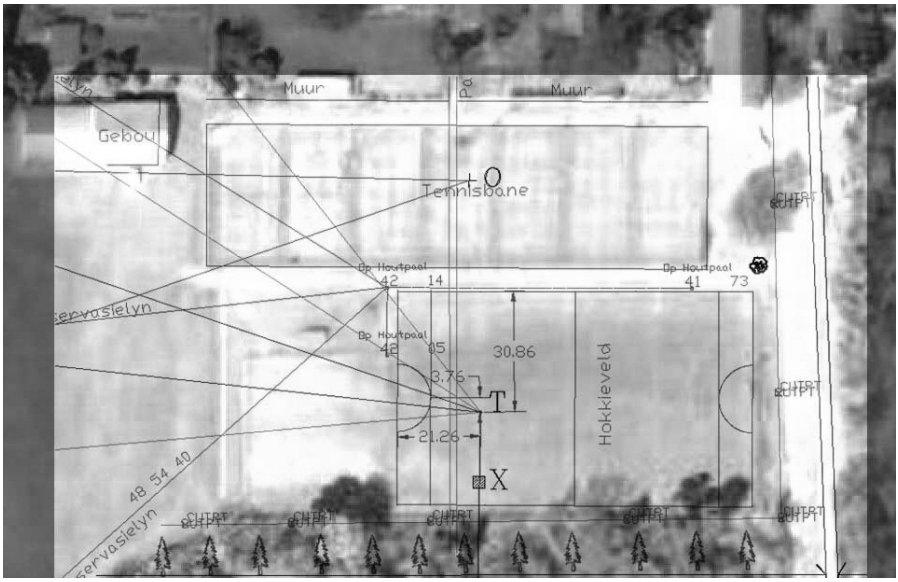


Figure 12 By superimposing the survey on a Google Earth image of the campus, the positions of Newcomb's site and the Seminary observatory can be seen. Ignore the hockey field quarter lines and circles since they are drawn incorrectly – they can just be made out on the aerial picture. At the top of the image, the good registration between the old footpath and a current stairway is visible.

5. Observations in 2004

Re-enactments were performed from three of the five historic sites on 8 June 2004, namely Touws River, Cape Town and Wellington.

A week-long Venus Festival was arranged in Touws River, culminating on transit day. Extensive TV coverage, including live feeds, were transmitted from there. About half a dozen amateur telescopes gave views of this rare event to more than a hundred locals, mainly school kids who were given part of the day off to see it. Since the monument is too closed in, making it impossible to observe the Sun from it, it was not re-used in the re-enactment.

From Cape Town, Gill's 6-inch Grubb was fitted with a camera, producing a live webcast of the whole event, manned by Dr Stephan Potter. He and Dr David Laney did timings of 3rd and 4th contact from these images. George Maclear's 7-inch Merz was manned by Dr Ian Glass, timed by J.P. Kotze and recorded by M. McIntyre, also doing 3rd and 4th contact timings. Two of the other non-1882 related telescopes were used for contact timings, namely the 18-inch Maclean Visual refractor and the already mentioned Dallmeyer Photoheliograph.

Fairly bad weather was experienced in Wellington allowing only occasional visual observations of the transit in

Figure 13 Prof George Tucker (left) and the author at the position of Newcomb's Transit pier. The stairway to the footpath is visible over Prof Tucker's right shoulder and the Seminary Observatory was on the tennis court behind his head.

progress which was already underway at sunrise and ended at 13h29. However, what was lost due to the weather, was made up historically. The first thing I did on arrival on site on the morning of 8 June, was to pace out Newcomb's site on the hockey field and, staying with tradition, marked the position of the transit pier with an iron post. The positions where Newcomb's objective and photographic piers would have been were also marked using bricks. A handful of telescopes were set up near this imaginary American site on the hockey field.

Two very special people were present that day. Prof George Tucker (Figure 13) who was instrumental in obtaining Newcomb's report for me from the Washington Archives visited both Touws River and Wellington during the event. Finally, the granddaughter of Miss M.E. Cummings, carrying her names, namely Mrs Mary Elizabeth Cummings (Beth) Kruger also came to observe the event near the spot from where her grandmother witnessed it more than 120 years ago.

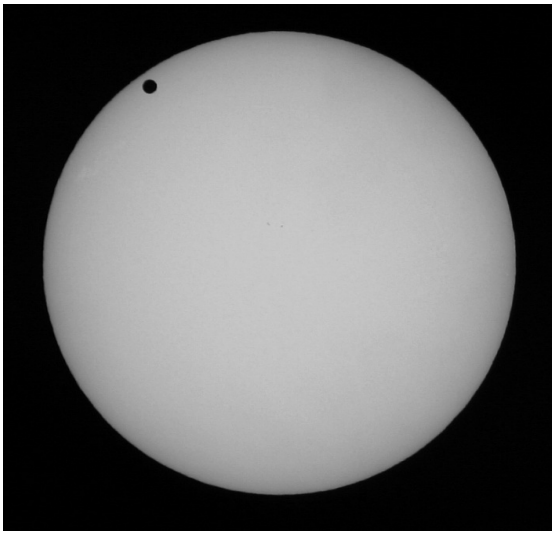


Figure 14 Venus on the Sun, imaged by Prof George Tucker shortly before egress.

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