


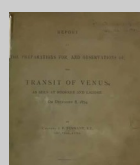








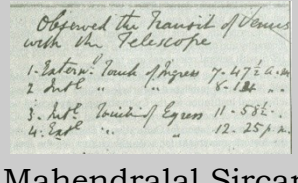
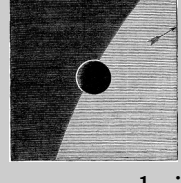
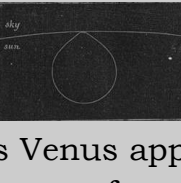




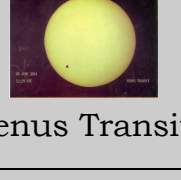
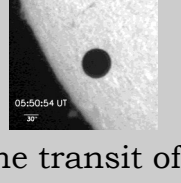


Historical Observations/Expeditions: Transit of Venus observed in India during 1761 - 2004

Christina Birdie, P. Prabahar & B S Mohan

Year, Nature and Place of Expedition	Team Leader	Experiments/Instruments/Results	Images/Remarks
6 th June, 1761 Transit of Venus Fort St George, at Madras	William Hirst	At length, as Mr.Hirst was steadfastly looking at the under limb of the Sun, towards the South, where he expected the planet would enter, he plainly perceived a kind of penumbra, or dusky shade on which he cried out, 'tis a-coming, and begged Mr.Call to take notice of it. Two or three seconds after this, namely at 7h 31' 10" apparent time, happened the first exterior contact of Venus with the Sun, which all the three observers pronounced at the same instant, as with one voice. Mr. Hirst is apprehensive, that to be able to discern an atmosphere about a planet at so great a distance as Venus, may be regarded as chimerical; yet affirms, that such nebulousity was seen by them, without presuming to assign the cause. Ref:Philosophical Transactions (1683-1775), Vol. 52 (1761 - 1762), pp. 396-398, http://www.jstor.org/stable/105639	
6 th June, 1761 Transit of Venus at Calcutta	William Magee	The weather being cloudy for several days before that of observation, there was no opportunity of ascertaining the error of the watch; but, on the day of observation. I found, upon comparing the watch with a meridian line in the town-hall, that when the centre of the Sun's image was on the meridian line, the time pointed by the watch was 4' 10" past twelve. Ref: Philosophical Transactions (1683-1775), Vol. 52 (1761 - 1762), pp. 582-583	
6 th June, 1761 Transit of Venus at Pondicherry	Guillaume le Gentil de la Galaisière 	French astronomer Guillaume le Gentil de la Galaisière was very unfortunate in observing the transit of Venus. In 1761 he was heading for Pondicherry, a prominent French fortified town in India. But before his arrival the town was captured by the British and razed to the ground. In 1769, when Pondicherry was again under French control, Le Gentil set up his instruments in the ruins of the former Governor's palace, but was clouded out on the crucial moment.	 The ruins of Pondicherry in 1769 seen from the north. Le Gentil's observatory was in the structure to the right of the flag pole.
9 th December 1874 Transit of Venus at Roorkee	J.F.Tennant 	At Roorkee in India, James Francis Tennant had a small observatory building from where he observed the transit of Venus. The observatory consisted of a larger building with an altazimuth and a photoheliograph, and a separate tower with a 6-inch equatorial by Cooke and Sons. Tennant using the equatorial, he didn't see first external contact owing to the sun's low altitude, but could secure the other contacts. At the altazimuth was Captain Campbell and at the photoheliograph Captain Waterhouse. Ref: Report on the preparations for and observations of the Transit of Venus, as seen at Roorkee and Lahore on December 8, 1874 by J.F.Tennant, 1877, http://ia600309.us.archive.org/29/items/reportonpreparat00tenuoft/reportonpreparat00tenuoft.pdf	 Report on Transit of Venus
9 th December 1874 Transit of Venus, at Madras	N.R.Pogson 	At Madras Observatory in Madras at Nungambakkam, Government Astronomer Norman Robert Pogson made observations of the 1874 Transit of Venus. It was mostly clouded out.	 Madras Observatory
9 th December 1874 Transit of Venus at Madras	C.Ragoonatha Charry 	As the transit date drew near, Ragoonatha Charry brought out a 38 page booklet – 'Transit of Venus' in English, Kannada and Urdu, explaining the transit to the lay public. Ref: Journal of Astronomical History and Heritage, Vol. 12, No. 3, pp. 201 – 210 (2009)	 Cover Page of Transit of Venus
9 th December 1874 Transit of Venus at Visakhapatnam	A. V. Nursinga Row 	From his extensive private observatory in Daba Gardens at Visakhapatnam in India, astronomer Ankitam Venkata Nursinga Row observed the 1874 transit of Venus. Due to clouds only egress was observed with a 6-inch clock-driven equatorial. Ref: MNRAS, Vol.35, No.6, pp. 317-318 (1875) Current Science, Vol. 100 No. 10, pp. 1575-1581 (2011)	 Indian and European observers of the transit of Venus at Daba Gardens Observatory in Visakhapatnam, India. (Picture courtesy of Royal Astronomical Society Library)
9 th December 1874 Transit of Venus at Muddapur	Pietro Tacchini 	The Italian astronomer Pietro Tacchini included spectroscopy as part of the observational programme of the expedition at Muddapur, India in 1874. This plate of coloured lithographic images comes from a sequence in his report <i>Il passaggio di Venere sul Sole...osservato a Muddapur nel Bengala</i> (Palermo, 1875). The edge of the planet is clearly seen in the thin vertical band in the centre of figures 5 and 6. Ref: Journal of Astronomical History and Heritage, Vol. 4, No. 1, pp. 43-58 (2001)	 Spectroscopic images from the Italian transit expedition to India, 1874
9 th December 1874 Transit of Venus at Muddapur	Fr.Eugene Lafont 	Father Lafont of the St. Xavier's College, Calcutta and Italian astronomer Professor P.Tacchini observed spectro-telescopically the transit of Venus across the Sun's disc and discovered the 'unmistakable signs of the vapour of water in the atmosphere of the Venus.' Ref: Science and modern India: an institutional history, c.1784-1947, edited by Uma Das Gupta, pp.75	
9 th December 1874 Transit of Venus at Muddapur	Mahendralal Sircar 	According to Mahendralal's observation the total time of transit works out to be 4hrs 37minutes 30 seconds. Ref: Gleanings of the past and the science movement by A.K.Biswas, pp.31	 Mahendralal Sircar Diaries (1873-1875)
8-9 th December, 1874 Transit of Venus at Mooltan, Punjab	A.C.Bigg-Wither	Telescope, 4-inch object glass of 5 feet length by Cooke, with powers 55,120, and 300, solar diagonal eyepiece, equatorially mounted roughly without clockwork. The sun rose with the planet half-way on to its disk, and even at internal contact it was too near the horizon to be well seen; with power 55, however, I satisfied myself that the "black drop" was formed, the apparent internal contact being at about 12h 14m 42s Mooltan Sidereal time, the black band with a breadth of about 7" being then apparently broken. Ref: Memoirs of the Royal Astronomical Society, Vol.47, pp. 97-99 (1883)	
9 th December, 1874 Transit of Venus at Himalaya Mountains, Mussoorie, at Mary-Villa Station	J.B.N.Hennessey	The telescope of the equatorial has a 5-inch object-glass with about 60 inches focal length, and is driven by an excellent clock. The eye-end may be fitted at will with an eyepiece of 55, 85,125,200, or 300 power, or with a spectroscope mounting a single prism. Ingress.-With the telescope well and carefully adjusted for focus, I watched for the coming first external contact, but to no purpose; for I did not detect Venus's limb until after it had made an indentation on the sun's limb. The latter boiled sensibly, but by no means violently. It appeared jagged, and as if with minute spikes projecting inwards, all of which were well defined in the bluish field. Ref: Proceedings of the Royal Society of London, Vol. 29, pp. 297-302 (1879) Proceedings of the Royal Society of London, Vol. 23, pp. 254-259 (1875)	 The annual ring of light could be distinguished, in continuation, around the limb of the Sun, but this continuation was rendered visible chiefly by the movement taking place in it, it is necessarily absent here.
9 th December 1874 Transit of Venus at Chakrata	Rev.H.D.James	The instrument used was a telescope by Smith and Beck, the property of Mr. James; object-glass 32- inches and its focal length 4 feet; at ingress, eyepiece 60- power, and field a neutral tint; at egress, eyepiece 100-power, and field red. For timepiece he used his pocket-watch, which has a seconds-hand. The watch "gained considerably, perhaps a minute in 12 hours." Ref: Proceedings of the Royal Society of London, Vol. 23 (1874 - 1875), pp. 378-384	 As Venus appeared at 7h41m 20s, as the internal contact was in the act of ceasing.
9 th December 1874 Transit of Venus at Lahore	Capt.Strahan	Capt.Strahan was supplied with a 6 inch telescope by Mr.Simms. The weather on the morning of the 9th was most favourable. Ingress so far up-country as Lahore was not visible: and for about an hour after sunrise, the limbs of both the Sun and Venus were trembling considerably; but as the Sun. got higher, the definition became better, till, about 15 minutes before contact, the edges of the two bodies were as hardly and sharply defined as the most sanguine observer could have wished. Ref: Report on the preparations for and observations of the Transit of Venus, as seen at Roorkee and Lahore on December 8, 1874 by J.F.Tennant, 1877.	
8 th June 2004 Transit of Venus at Bangalore	R.C. Kapoor  	At the Koramangala campus an arrangement was made to view a 30cm image of the Sun on a screen in a tent formed with a 20cm coelostat system very ably installed by F.Gabriel and his associates from the VBO. The event began at 10:45:31 hrs. The sky was generally cloudy throughout the day but in between the event was possible to be watched whenever the cloud cover got thinner or clear up for a while. Venus appeared against the bright image of the Sun as a dark round spot, 1/30 its diameter transiting across it in over 6 hours. Ref: IIA Annual Report, 2004-2005, pp. 50-54, http://prints.iap.res.in/handle/2248/5389	 Transit of Venus IIAP June 8 2004
8 th June 2004 Transit of Venus at Kodaikanal	S.P.Bagare and S.S.Gupta	All the solar optical observational facilities of the Kodaikanal observatory were geared for a campaign mode of observations for the rare astronomical even; the 15cm telescope for photoheliograms, the Solar Tower Telescope for high resolution imaging with a CCD, and Spectro facility for Hydrogen alpha imaging using a large format CCD. Despite the presence of passing clouds, a significant number of the broadband and narrowband images of the even were obtained intermittently. Unfortunately, the ingress and egress periods were cloudy and could not be recorded. Ref: IIA Annual Report, 2004-2005, pp. 50-54 http://prints.iap.res.in/handle/2248/5389	 The above photograph was taken at 12:20:40 IST by Dr.S.P.Bagare, Dr.S.S.Gupta, and the observing team at the Kodaikanal Observatory.
8 th June 2004 Transit of Venus at Bangalore	JN Planetarium Bangalore	2004 transit as seen from Bangalore at 07:41 UTC, about two hours into the transit. Ref: http://en.wikipedia.org/wiki/Transit_of_Venus,_2004	 The image is inverted compared to the diagram above, so Venus is seen near the top of the Sun's disc.
8 th June 2004 Transit of Venus at Nainital	ARIES, Nainital	Ref: ARIES Annual Report 2004-2005	 Venus Transit as seen from ARIES on June 08, 2004
8 th June 2004 Transit of Venus at Udaipur	Udaipur Solar Observatory	The rare cosmic event of Venus transit of June08, 2004 was observed at Udaipur Solar Observatory using full-disk, as well as, small field-of-view high resolution solar telescopes in H-alpha 6563A. High resolution solar images were taken at a cadence of 3 seconds during the period 05:10 – 05:30 UT of 1st Innd contacts and during the period 11:10 – 11:30 UT covering the IIIrd and IVth contacts. Ref: BASI, Vol.33, pp. 366 (2005)	 The transit of Venus observed on June 08, 2004 at Udaipur Solar Observatory using 15 cm objective on spar telescope. The image is taken with the Halle H alpha filter.