IX. *A Determination of the exact Moments of Time when the Planet* Venus *was at external and internal Contact with the Sun's Limb, in the Tranſits of* June 6*th*, 1761, *and* June 3*d*, 1769,

By SAMUEL DUNN.

Read Feb. 22, 1770. IN the year 1761, I preſented to the Royal Society an obſervation which I made of the external and internal contacts of the planet Venus with the ſun's limb, containing ſeveral unexpected phænomena in thoſe contacts, which were ſufficient to render them uncertain ſeveral ſeconds of time. In that paper I took no notice of that lucid annulus which alſo appeared to me to extend outwards from the circumference of Venus to the breadth of about 5 ſeconds of a degree, but was particular in deſcribing a certain narrow wateriſh penumbra near the limb of Venus, which ſeemed not to exceed a tenth or twelfth part of the breadth of the lucid annulus, becauſe it appeared to me of a hazy and indiſtinct colour, and extended itſelf towards the limb of the ſun as the planet approached it, growing more and more dark and broad, ſo that before Venus's real limb ſeemed to be at contact with the ſun's limb internally, the thread of light was

broken, though faintly. Another circumſtance was, that the limb of Venus, near the point of contact, left its circular form. But the inſtant of time when the thread of light was broken being the object in view, I omitted a detail of thoſe particulars.

In the late tranſit, June 3d, 1769, I carefully obſerved ſeveral circumſtances attending that phænomenon, which ſeem to me abſolutely neceſſary to be attended to, in order to the exact determination of the time when the internal contact happened; a particular account of them is as follows; viz.

Receiving an invitation from the preſent Aſtronomer Royal to be at the Royal Obſervatory at Greenwich, at the time of the late tranſit, I determined to be there, rather than any where elſe, thinking that the experience which I had had of the former tranſit would enable me to make ſuch an obſervation as might be acceptable to poſterity.

The time came, and the weather proved favourable for making that obſervation, with all the exactneſs that could be wiſhed for or deſired. Several hours before the tranſit, having a very diſtinct idea of the circumſtances which appeared in forming the internal contact of Venus with the ſun's limb, June 6, 1761, and being almoſt certain ſomething of the ſame kind would now happen, I drew out ſmall circular diagrams, repreſenting Venus at ſeveral near diſtances within the ſun's diſc, with the like obſcurity near the point of contact as I had obſerved in the tranſit of 1761, and requeſted Mr. Hirſt, Mr. Dollond, and Mr. Nairne, who were likewiſe to obſerve, to uſe their utmoſt endeavours for determining whether any ſuch impediment occurred

or not; and if it did, to note the circumſtances of it.

The clocks to be obſerved by, were ſet by the Aſtronomer Royal, but we were not acquainted with the time they were too faſt or ſlow; and the teleſcope which I obſerved with was an excellent achromatic teleſcope, magnifying 140 times, inverting the object, and made by Mr. Dollond.

The teleſcope being properly adjuſted, and having a moſt clear and diſtinct ſight of the ſun's limb where the external contact was expected to happen; at $11^h\ 56'\ 32''$ per clock (which, reduced by the Aſtronomer Royal to apparent time, is $7^h\ 10'\ 33''$), whilſt I was moving my eye gently along that part of the ſun's limb where the contact was expected, there appeared as though a kind of lucid wave of tranſparent matter, of the colour of that part of the lucid annulus (which afterwards appeared round Venus), which was neareſt to the limb of Venus, and taking up the ſpace of about a fifth part of a minute of a degree along the ſun's edge, this lucid wave ſeemed to ſtrike gently againſt the ſun's limb, and in an inſtant the little tremulous vibrations on the ſun's limb were totally ſtopt, and that part of the limb was rendered thereby a little obſcure. A ſecond and half of time after this, at the ſame place of the ſun's limb, aroſe, firſt gently, and then more violently, a ferment, or boiling, very different in colour as well as magnitude, from the tremulous vibrations at other parts of the ſun's limb, for it was darker and much more violent, and at $11^h\ 56'\ 36''$ per clock, or $7^h\ 10'\ 37''$ apparent time, this fermentation was enlarged along the limb of the ſun, and

the limb of Venus was entering on the ſun's limb as in Fig. 20. TAB. III.

My attention being at this time engaged in examining the place around the point of contact, I endeavoured to ſee a kind of brown penumbra precede the limb of Venus, but ſaw none; inſtead thereof a kind of whitiſh light, at firſt very faint, and afterwards as it advanced on the ſun's diſc becoming more ſtrong, preceded the limb of the planet; which light gradually diminiſhed nearer to Venus, and formed a narrow margin of lucid matter, whereby the limb of the planet became a little ill defined. Almoſt the ſame circumſtances happened in the exterior contact 1761, but with this difference, the lucid border then following, the limb of Venus was more clear and tranſparent. I was the more particular in theſe circumſtances, to be able to determine what differences might ariſe from obſervations made with teleſcopes and eyes equally good, and conclude from the phænomena, that two ſuch obſervers, with but little inequality in their judgments, might differ from each other ten ſeconds of time. Before this contact and a little after it, I endeavoured to find a faint illumination on the exterior limb of Venus; but could find none, till the time of internal contact drew near. Another circumſtance attending the phænomenon was this; the limb of Venus which firſt entered on the ſun's diſc appeared to be the arch of a very ſmall circle; but as the planet advanced onward on the ſolar diſc, that ſame preceding part of Venus appeared to enlarge and expand itſelf, and the ſubſequent part of Venus which was on the ſun's limb, appeared as though it was the portion of a ſmaller

circle

circle; and thus the planet appeared to the time of central ingreſs, at which time half the planet appeared a ſemi-ellipſis, the conjugate diameter forming the notch in the ſun's limb. After the time of central ingreſs, whilſt the latter half of the planet was paſſing over the ſun's limb, the like appearances occurred, ſo that, although that circumference was really concave to Venus's centre, a little after the central ingreſs, it appeared a little convex to that centre, and ſo the planet advanced, that part of it which was neareſt the ſun's limb appearing contracted, but enlarging itſelf a little farther on the diſc.

The planet being conſiderably paſt the central ingreſs, and being at broad black contact with the ſun's limb, but of an irregular form on account of the abovementioned circumſtances, and it being hard to judge what kind of contact would appear, I perceived a very faint luminous creſcent exterior to the limb of the ſun; and nearly coinciding with the preceding limb of Venus continued over the ſun's limb. See Fig. 23. This creſcent was very faint, but ſteadily defined at certain fits and returns till $7^h\ 28'\ 30''$ apparent time. When this creſcent being come near to the limb of the ſun, it vaniſhed, and ſeemed to fall in with a kind of confuſed ſlight illumination in the limb of the ſun itſelf, where the internal contact was to happen. At the ſame time a kind of partial and very faint illumination took place, both a little without, and a little within the ſun's limb, as well as in the limb itſelf, where the contact was to be, and a gentle ebullition or boiling aroſe a little without the ſun's limb on the limb of Venus, which

continued

continued till the dark body of the planet was wholly within the ſun's diſc, or 7^h 29′ 28″ apparent time, when Venus's circumference was not paſſed coinciding with the ſun's circumference above three or four ſeconds of time. Whilſt I was attentively viewing this, and judging it difficult to determine the exact moment of circular contact, on account of the circumſtances deſcribed, the ebullition or boiling between the limb of Venus and the ſun became more violent, and the partial illumination increaſed; and at 7^h 29′ 38″ I ſaw the planet as it were held to the ſun's limb by a ligament formed of many black cones, whoſe baſes ſtood on the limb of Venus and their vertexes pointing to the limb of the ſun. Theſe cones put on various poſitions, and as Venus advanced they alternately contracted themſelves towards the limb of Venus, and expanded themſelves towards the ſun's limb, performing their undulations always regularly and in the ſame time, as the planet advanced on the diſc, till 7^h 29′ 48″ apparent time. At the end of this interval, the agitation or fermentation was exceeding violent, for the whole limb of Venus would ſometimes librate towards the limb of the ſun, and ſometimes the limb of the ſun would turn convex in yielding towards Venus; but the thread of light was not yet formed, for ſtill three or four broad parts of the ligament never had yet broke from the ſun, and therefore the thread of light was not yet formed. I carefully examined the ſides of thoſe black cones connected with the limb of the ſun, and ſaw the fiſſures or ſpaces between them to be filled with a ſteady illumination, of the colour of twilight compared with the light

of

of the ſun; and whilſt I was ſteadily attending to theſe circumſtances, I ſaw the pure and genuine light of the ſun break in between ſome of thoſe fiſſures like ſtreaks of lightening, which made the partial light become in two or three ſeconds of time, of the ſame colour as the light of the ſun, yet ſtill the undulating ligament though reduced was not broken. And now,

In an inſtant, the northern part of the divided ligament withdraws itſelf from the ſun's limb about half way towards Venus, and inſtantly but gently it returns and again unites the limbs of the ſun and Venus; inſtantly after, another leſs northern part of the ligament does the like, and then breaks off again, and ſo doth each part of the divided ligament, till $7^h\ 29'\ 51''$ apparent time, when the ends or vertexes of the black cones between Venus and the ſun's limb appear to be ſeparated from the ſun's limb, retreating to that of Venus, and diſſolving or dying away like a drop of tinge thrown into water, and now the thread of light becomes compleat.

The internal contact being paſt, and Venus being wholly on the ſun, I examined the ſpace ſurrounding Venus, and ſaw ſuch a lucid annulus around the planet as appeared in 1761. The part of this annulus next to the limb of Venus appeared a little duſky, but much more clear than in 1761 (when it appeared more confuſed, and as a penumbra); but that part of the annulus fartheſt off from the circumference of Venus appeared to me a little tinged with blue. The breadth of the annulus about five or ſix ſeconds.

Upon hearing a gentleman in the lower apartment call out to be ſhewed the atmoſphere of Venus, I now left my teleſcope, went down ſtairs to Mr. Nairne and Mr. Dollond, and deſired them to be attentive at their teleſcopes, and they would ſee this ſhining annulus, which they attended to, and after a little while ſaw it plainly, although for ſome time they could not perceive any ſuch thing. Then the other gentlemen preſent ſaw it, but not before me nor them.

Theſe obſervations being made, I ſtate the firſt external contact at 7^h 10′ 37″ apparent time for Greenwich. Circular contact internally at 7^h 29′ 25″. Completion of the thread of light at 7^h 29′ 48″ under the circumſtances above deſcribed.

Although I would not willingly form any hypotheſis from the aforementioned phænomena, there is one of them, namely, the appearance of the well-defined ſtreaks of light between the fiſſures, which ſeems accountable for thus. The partial light which preceded it, I take to be rays ſcattered by refraction and reflection through that part of the planet's atmoſphere where the contact was to happen; and the well-defined ſtreaks of light following it, I take to have been the ſun beams paſſing between mountains on the ſurface of Venus's globe.

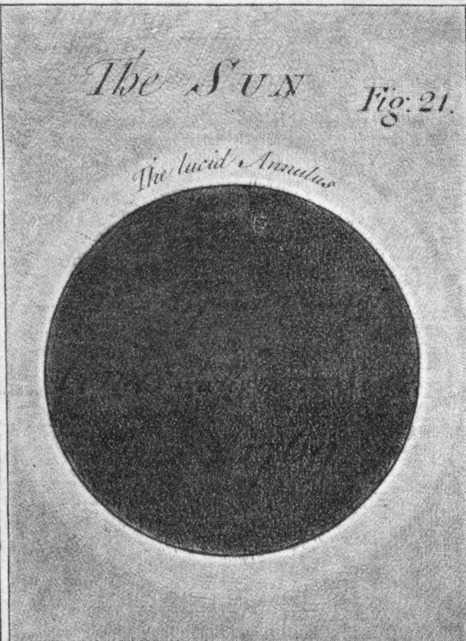
To this account I have added ſeveral drawings of the appearances in the tranſit of 1761, and of the like appearances in the tranſit of 1769; and muſt here beg leave to explain the meaning of an expreſſion made uſe of by me in the account of the former tranſit of 1761, in Phil. Tranſ. In that account,

count, by the expreſſion, *no loſs of light*, I mean, that at thoſe times the thread of light was not broken, but only obſcured by the brown or dark penumbra which interpoſed between Venus and the limb of the ſun.

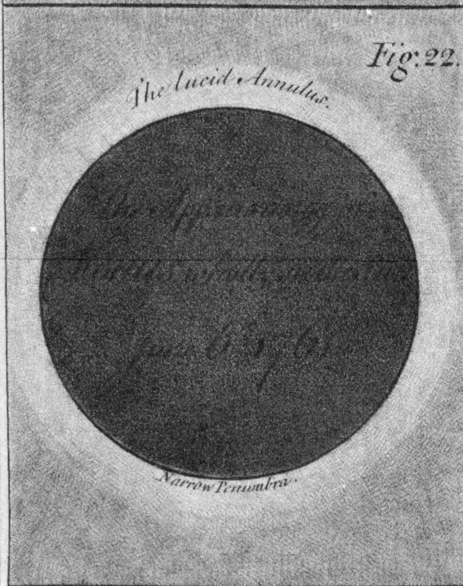
In the drawings, TAB. III. Fig. 1. 2. 3. 4. 5. 6. ſhew the penumbra which interpoſed in 1761, with the coreſpondent times. Fig. 11. 12. 13. 14. 15. 16. are the ſimilar appearances in 1769. Oppoſite to which are the times of thoſe appearances by different teleſcopes, which table of different teleſcopes was formed from experiments. Fig. 7. 8. and 9. 17. 18. and 19. ſhew how much the planet's figure differed from a circle in both tranſits. Fig. 10. ſhews the external contact for 1761, and Fig. 20. the external contact for 1769, and Fig. 21. 22. 23. 24. 25. 26. 27. 28. are more exact repreſentations of the phænomena at the times there mentioned.

Samuel Dunn.

Venus on the Sun June 3.^d 1769.

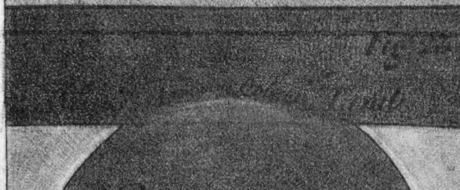


Venus on the Sun June 6.^th 1761.



Sky

1769.

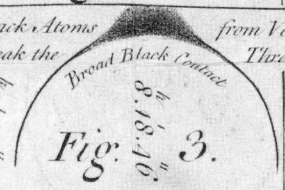


Observations of the T…
In the Years 1761 & 1769…
Referred to the Royal…

Phænomena in the Year 1761. | Phæn…

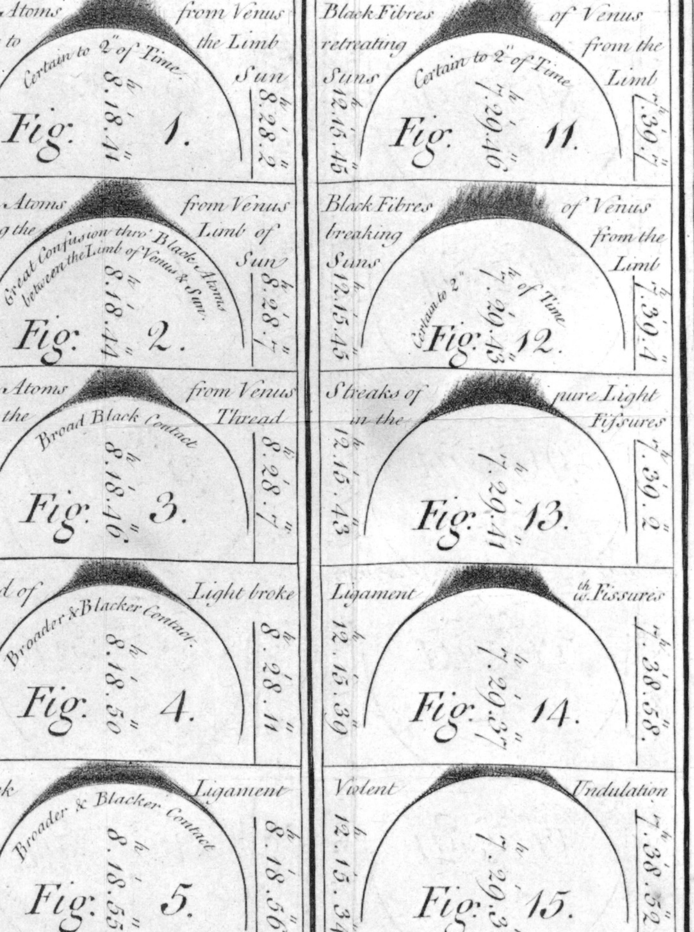
The Times per Clock for 1761 are the Original Numbers & other Times per Clock for 1769 are the Original Numbers & Observation was made in the Royal Observatory at Greenwich, …

Phænomena	Per Clock	For Greenwich (Sun's Limb)	For Paris	Fig.	Phæn…	Per Clock
Black Atoms flowing to of the Sun — from Venus the Limb (Certain to 2" of Time)	8.16.46	8.18.41	8.28.2	Fig. 1.	Black … retreat… Suns	12.15.45
Black Atoms touching the the Sun — from Venus Limb of (Great Confusion thro' Black Atoms between the Limb of Venus & Sun)	8.16.49	8.18.44	8.28.7	Fig. 2.	Black … breakin… Suns	12.15.45
Black Atoms break the — from Venus Thread (Broad Black Contact)	8.16.51	8.18.46	8.28.7	Fig. 3.	Streak… in t…	12.15.43
Thread of — Light broke (Broader & Blacker Contact)	8.16.55	8.18.50	8.28.11	Fig. 4.	Ligam…	12.15.39
Black — Ligament (Broader & Blacker Contact)	8.17.0	8.18.55	8.18.56	Fig. 5.	Violen…	12.15.3…



...vations of the Transit of Venus over the Limb of the S... Years 1761 & 1769. with the Circumstances & Correspondent Apparent T... ...ed to the Royal Observatory of Greenwich, Paris, &c

By Samuel Dunn.



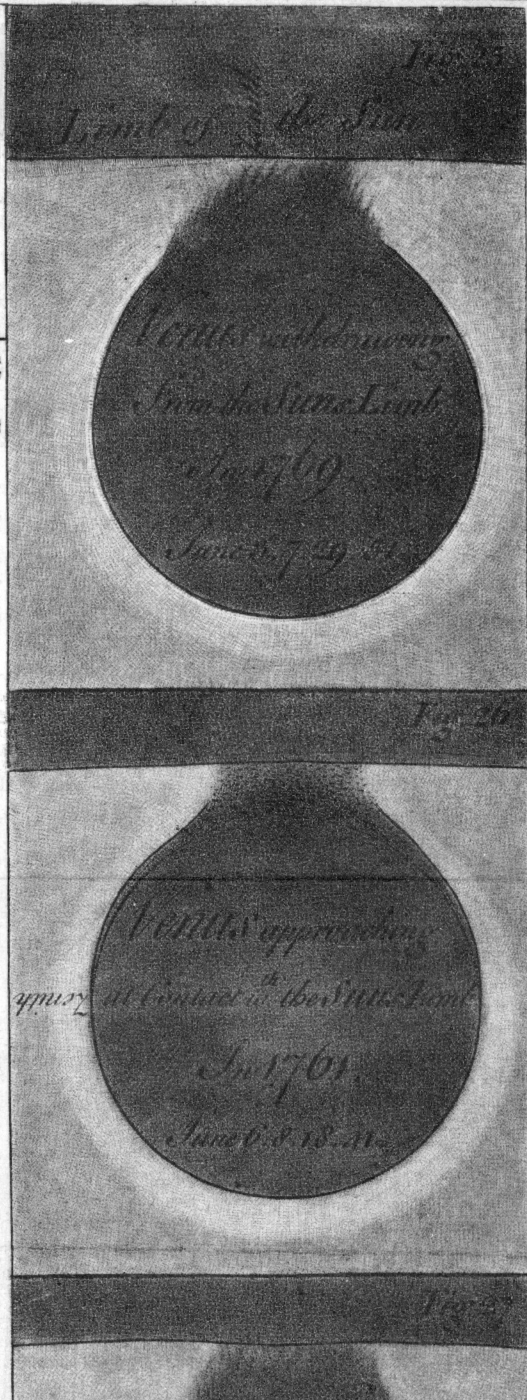
The Time of External & Internal Contact at both Tr... by Telescopes of different Powers, referred to Greenwi...

Internal Contact June 6th 1761. for Greenwich by different Telescopes.	External Contact June 6th 1761. for Greenwich by different Telescopes.	External Contact June 3rd 1769 for Greenwich by different Telescopes.	Internal Contact June 3rd 1769 for Greenwich by different Telescopes.
8.18.41	8.37.3	7.10.37	7.29.
8.18.39	8.37.1	7.10.39	7.29.
8.18.37	8.36.59	7.10.41	7.29.
8.18.35	8.36.57	7.10.43	7.29.
8.18.33	8.36.55	7.10.45	7.29.
8.18.44	8.37.3	7.10.37	7.29.
8.18.42	8.37.1	7.10.39	7.29.
8.18.40	8.36.59	7.10.41	7.29.
8.18.38	8.36.57	7.10.43	7.29.
8.18.36	8.36.55	7.10.45	7.29.
8.18.46	8.37.3	7.10.37	7.29.
8.18.44	8.37.1	7.10.39	7.29.
8.18.42	8.36.59	7.10.41	7.29.
8.18.40	8.36.57	7.10.43	7.29.
8.18.38	8.36.55	7.10.45	7.29.
8.18.50	8.37.3	7.10.37	7.29.
8.18.44	8.37.1	7.10.39	7.29.
8.18.46	8.36.59	7.10.41	7.29
8.18.44	8.36.57	7.10.43	7.29
8.18.42	8.36.55	7.10.45	7.29.
8.18.55	8.37.3	7.10.37	7.29
8.18.53	8.37.1	7.10.39	7.29.
8.18.51	8.36.59	7.10.41	7.29.
8.18.49	8.36.57	7.10.43	7.29.

…he Limb of the Sun
…espondent Apparent Times
…CH, Paris, &c.
…y Samuel Dunn.

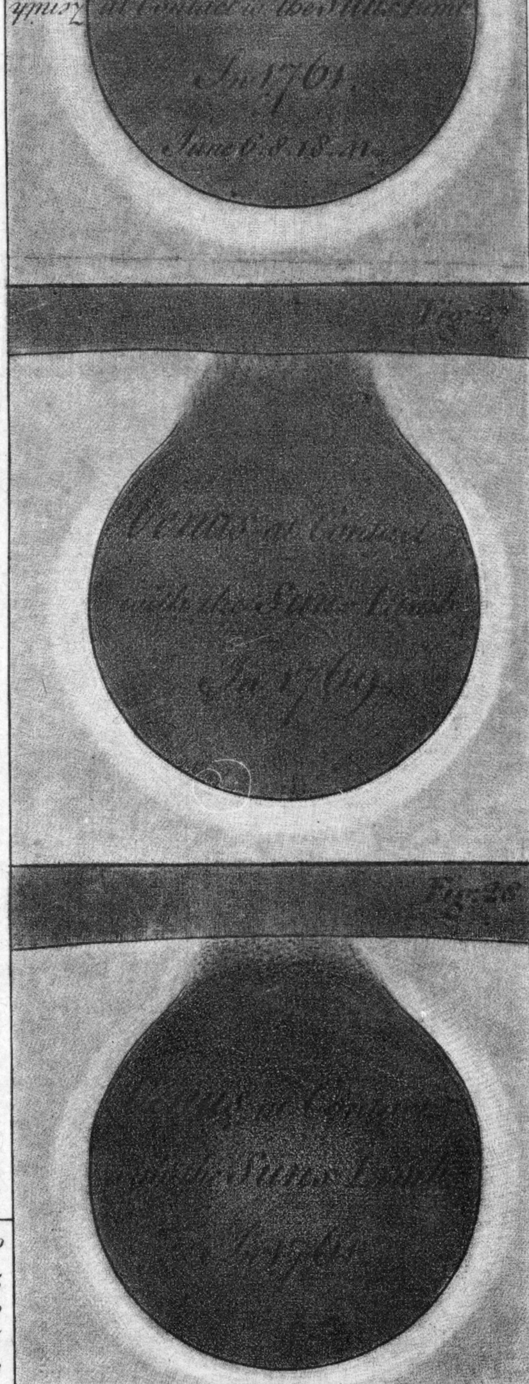
…& Internal Contact at both Transits …of Powers, referred to Greenwich.

	External Contact June 3d 1769 for Greenwich by different Telescopes.	Internal Contact June 3d 1769 for Greenwich by different Telescopes.	Mag. Power
.3	7.10.37	7.29.46	150
.1	7.10.39	7.29.44	125
.59	7.10.41	7.29.41	100
.57	7.10.43	7.29.39	75
.55	7.10.45	7.29.37	50
.3	7.10.37	7.29.43	150
.1	7.10.39	7.29.41	125
.59	7.10.41	7.29.39	100
.57	7.10.43	7.29.37	75
.55	7.10.45	7.29.35	50
.3	7.10.37	7.29.41	150
.1	7.10.39	7.29.39	125
.59	7.10.41	7.29.37	100
57	7.10.43	7.29.35	75
55	7.10.45	7.29.33	50
3	7.10.37	7.29.37	150
.1	7.10.39	7.29.35	125
59	7.10.41	7.29.33	100
57	7.10.43	7.29.31	75
55	7.10.45	7.29.29	50
3	7.10.37	7.29.32	150
1	7.10.39	7.29.30	125
59	7.10.41	7.29.28	100
.57	7.10.43	7.29.26	75



Sky
Thread of Light broken 1769.
Sky
Thread of Light breaking 1761.
Sky
Th…

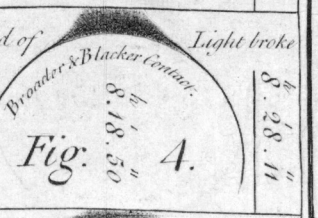
55	ich by different Telescopes.	7.10.45	by different Telescopes.	7.29.33	75
				7.29.33	50
3		7.10.37		7.29.37	150
1		7.10.39		7.29.35	125
59		7.10.41		7.29.33	100
57		7.10.43		7.29.31	75
55		7.10.45		7.29.29	50
3		7.10.37		7.29.32	150
1		7.10.39		7.29.30	125
59		7.10.41		7.29.28	100
57		7.10.43		7.29.26	75
55		7.10.45		7.29.24	50
3		7.10.37		7.29.26	150
1		7.10.39		7.29.24	125
59		7.10.41		7.29.22	100
57		7.10.43		7.29.20	75
55		7.10.45		7.29.18	50
.3		7.10.37		7.28.42	150
.1		7.10.39		7.28.40	125
6.59		7.10.41		7.28.38	100
.57		7.10.43		7.28.36	75
.55		7.10.45		7.28.34	50
7.3		7.10.37		7.27.57	150
7.1		7.10.39		7.27.55	125
6.59		7.10.41		7.27.53	100
6.57		7.10.43		7.27.51	75
.55		7.10.45		7.27.49	50
7.3		7.10.37		7.25.58	150
7.1		7.10.39		7.25.56	125
6.59		7.10.41		7.25.54	100
.57		7.10.43		7.25.52	75
.55		7.10.45		7.25.50	50
.3	as Fig: 20.			7.10.37	150
.1				7.10.39	125
.59				7.10.41	100
.57				7.10.43	75
.55				7.10.45	50

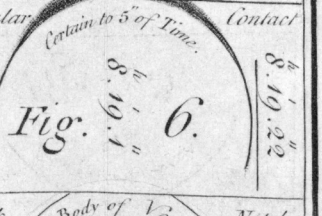


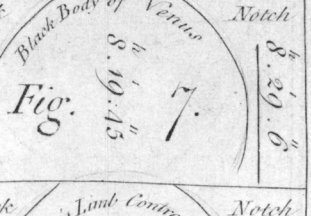
...ght breaking 1761.
Sky
Thread of Light breaking 1769.
Sky
Thread of Light broken 1761.

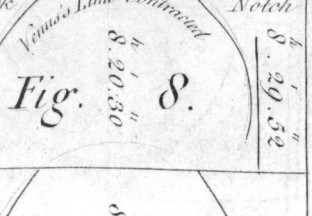
Basire Sc.

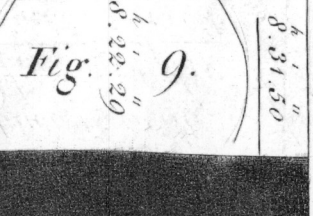
two Minutes of Time. In 1761. nearly the same time in protuberating. S.Dunn.

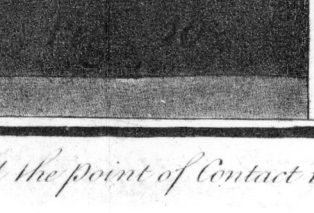


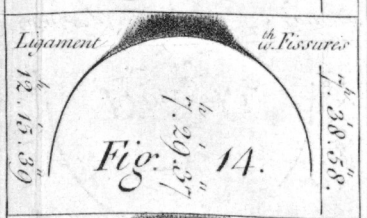


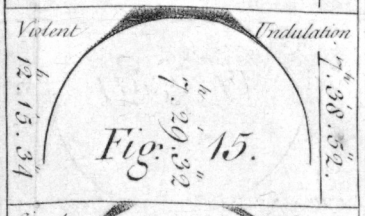


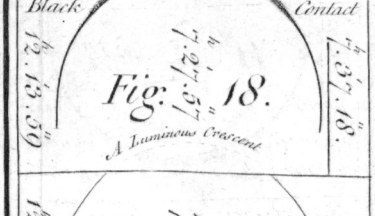


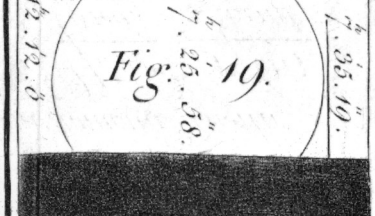


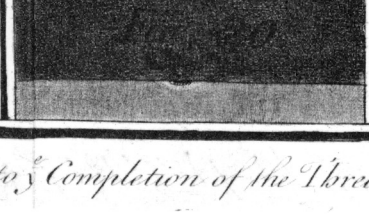












8. 18. 38	8. 36. 55	7. 10. 45	7. 29.
8. 18. 50	8. 37. 3	7. 10. 37	7. 29.
8. 18. 48	8. 37. 1	7. 10. 39	7. 29.
8. 18. 46	8. 36. 59	7. 10. 41	7. 29.
8. 18. 44	8. 36. 57	7. 10. 43	7. 29.
8. 18. 42	8. 36. 55	7. 10. 45	7. 29.
8. 18. 55	8. 37. 3	7. 10. 37	7. 29.
8. 18. 53	8. 37. 1	7. 10. 39	7. 29.
8. 18. 51	8. 36. 59	7. 10. 41	7. 29.
8. 18. 49	8. 36. 57	7. 10. 43	7. 29.
8. 18. 47	8. 36. 55	7. 10. 45	7. 29.
8. 19. 1	8. 37. 3	7. 10. 37	7. 29.
8. 18. 59	8. 37. 1	7. 10. 39	7. 29.
8. 18. 57	8. 36. 59	7. 10. 41	7. 29.
8. 18. 55	8. 36. 57	7. 10. 43	7. 29.
8. 18. 53	8. 36. 55	7. 10. 45	7. 29.
8. 19. 45	8. 37. 3	7. 10. 37	7. 28.
8. 19. 43	8. 37. 1	7. 10. 39	7. 28.
8. 19. 41	8. 36. 59	7. 10. 41	7. 28.
8. 19. 39	8. 36. 57	7. 10. 43	7. 28.
8. 19. 37	8. 36. 55	7. 10. 45	7. 28.
8. 20. 30	8. 37. 3	7. 10. 37	7. 27.
8. 20. 28	8. 37. 1	7. 10. 39	7. 27.
8. 20. 26	8. 36. 59	7. 10. 41	7. 27.
8. 20. 24	8. 36. 57	7. 10. 43	7. 27.
8. 20. 22	8. 36. 55	7. 10. 45	7. 27.
8. 22. 29	8. 37. 3	7. 10. 37	7. 25
8. 22. 27	8. 37. 1	7. 10. 39	7. 25
8. 22. 25	8. 36. 59	7. 10. 41	7. 25
8. 22. 23	8. 36. 57	7. 10. 43	7. 25
8. 22. 21	8. 36. 55	7. 10. 45	7. 25
as Fig. 10.	8. 37. 3	as Fig. 20.	7. 10
	8. 37. 1		7. 10
	8. 36. 59		7. 10
	8. 36. 57		7. 10
	8. 36. 55		7. 10

by different Telescopes.

by different Telescopes.

by different Telescopes.

by different Telescopes.

the point of Contact to y^e Completion of the Thread of Light was near two Minutes of Time. In

Venus on the

Sky

Circular Contact & Crescent 1769.

Sky

Circular Contact 1761.

Narrow Penumbra

Fig. 2d

Venus's Circular Contact

In 1769

June 3d 8h. 28' 8" apparent

Fig. 3d

Venus's Circular Contact

In 1761.

June 6d 8h. 1' apparent

the Original Numbers given for Shelfia see Phil. Trans. 1761. But those the Original Numbers shewn by the Clock in the Great Room where the Observations at Greenwich, And from which the Apparent Time was had.

Sky

Sun

Thread of Light broke

Broader & Blacker Contact.

h. ' "
8. 10. 55

h. ' "
8. 18. 50

Fig. 4.

h. ' "
8. 28. 11

Black Ligament

Broader & Blacker Contact

h. ' "
8. 17. 0

h. ' "
8. 18. 55

Fig. 5.

h. ' "
8. 18. 56

Circular Contact

Certain to 5 of Time.

h. ' "
8. 17. 6

h. ' "
8. 19. 1

Fig. 6.

h. ' "
8. 19. 22

Black Notch

Black Body of Venus

h. ' "
8. 17. 50

h. ' "
8. 19. 45

Fig. 7.

h. ' "
8. 20. 6

Black Notch

Venus's Limb Contracted

h. ' "
8. 18. 35

h. ' "
8. 20. 30

Fig. 8.

h. ' "
8. 20. 52

h. ' "
8. 20. 34

h. ' "
8. 22. 20

Fig. 9.

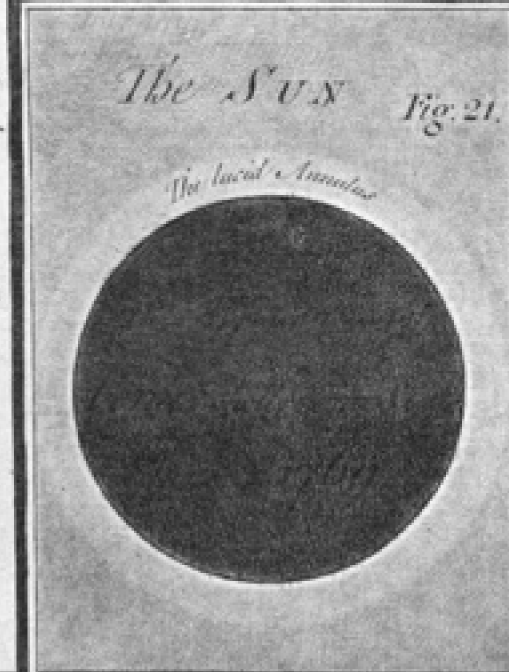
h. ' "
8. 31. 50

Fig. 10.

In 1769 from the first additional ferment around the point of Contact to y

Observations of the Transit of Venus over the Limb of the Sun In the Years 1761 & 1769. with the Circumstances & correspondent Apparent Times Referred to the Royal Observatory of Greenwich, Paris, &c.

By Samuel Dunn.



Venus on the Sun, June 3d 1769.

Venus on the Sun June 6th 1761.

Sky

Circular Contact 3d June 1769.

Sky

Circular Contact 1761.

Phænomena in the Year 1761. Suns Limb

Fig.	Phænomenon	Per Clock (Chelsea)	For Greenwich	For Paris
1	Black Atoms flowing to the Sun from Venus the Limb of the — Certain to 2" of Time	8.16.40	8.18.41	8.28.2
2	Black Atoms from Venus touching the Limb of the Sun — Great Comparison thro' Black Atoms between the Limb of Venus & Sun	8.16.40	8.18.44	8.28.7
3	Black Atoms from Venus break the Thread — Broad Black Contact	8.16.51	8.18.46	8.28.7
4	Thread of Light broke — Broader & Blacker Contact	8.16.55	8.18.50	8.28.11
5	Black Ligament — Broader & Blacker Contact	8.17.0	8.18.55	8.18.56
6	Circular Contact — Certain to 5" of Time	8.17.6	8.19.1	8.19.22
7	Black Notch — Black Body of Venus	8.17.50	8.19.45	8.29.6
8	Black Notch — Venus's Limb Continued	8.18.35	8.20.30	8.29.52
9		8.20.34	8.22.29	8.31.50
10	Sky / Sun			

Phænomena in the Year 1769. Suns Limb

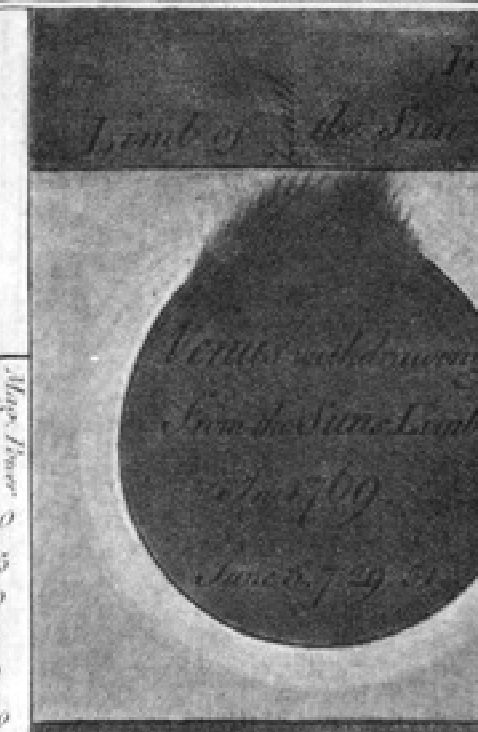
Fig.	Phænomenon	Per Clock	For Greenwich	For Paris
11	Black Fibres of Venus retreating from the Suns Limb — Certain to 2" of Time	12.15.45	7.29.46	7.30.7
12	Black Fibres of Venus breaking from the Suns Limb — Certain to 2" of Time	12.15.43	7.29.43	7.30.4
13	Streaks of pure Light in the Fissures	12.15.43	7.29.41	7.30.2
14	Ligament & Fissures	12.15.39	7.29.37	7.38.58
15	Violent Undulation	12.15.34	7.29.32	7.38.52
16	Circular Contact — Certain to 5" of Time	12.15.28	7.29.26	7.38.46
17	Slight Undulat.	12.14.44	7.28.42	7.38.3
18	Black Contact — A Luminous Crescent	12.13.59	7.27.57	7.37.18
19		12.12.0	7.25.58	7.35.10
20				

The Times per Clock for 1761, are the Original Numbers given for Chelsea, see Phil. Trans. 1761; But those other Times per Clock for 1769 are the Original Numbers shown by the Clock in the Great Room where the Observation was made in the Royal Observatory at Greenwich. And from which the Apparent Time was had.

The Time of External & Internal Contact at both Transits by Telescopes of different Powers, referred to Greenwich.

Fig.	Internal Contact June 6th 1761 for Greenwich by different Telescopes	External Contact June 6th 1761 for Greenwich by different Telescopes	Fig.	External Contact June 3d 1769 for Greenwich by different Telescopes	Internal Contact June 3d 1769 for Greenwich by different Telescopes	Mag. Power
1	8.18.41	8.37.3	11	7.10.37	7.29.46	150
	8.18.39	8.37.1		7.10.39	7.29.44	125
	8.18.37	8.36.59		7.10.41	7.29.41	100
	8.18.35	8.36.57		7.10.43	7.29.39	75
	8.18.33	8.36.55		7.10.45	7.29.37	50
2	8.18.44	8.37.3	12	7.10.37	7.29.43	150
	8.18.42	8.37.1		7.10.39	7.29.41	125
	8.18.40	8.36.59		7.10.41	7.29.39	100
	8.18.38	8.36.57		7.10.43	7.29.37	75
	8.18.36	8.36.55		7.10.45	7.29.35	50
3	8.18.46	8.37.3	13	7.10.37	7.29.41	150
	8.18.44	8.37.1		7.10.39	7.29.39	125
	8.18.42	8.36.59		7.10.41	7.29.37	100
	8.18.40	8.36.57		7.10.43	7.29.35	75
	8.18.38	8.36.55		7.10.45	7.29.33	50
4	8.18.50	8.37.3	14	7.10.37	7.29.37	150
	8.18.44	8.37.1		7.10.39	7.29.35	125
	8.18.46	8.36.59		7.10.41	7.29.33	100
	8.18.44	8.36.57		7.10.43	7.29.31	75
	8.18.42	8.36.55		7.10.45	7.29.29	50
5	8.18.55	8.37.3	15	7.10.37	7.29.32	150
	8.18.53	8.37.1		7.10.39	7.29.30	125
	8.18.51	8.36.59		7.10.41	7.29.28	100
	8.18.49	8.36.57		7.10.43	7.29.26	75
	8.18.47	8.36.55		7.10.45	7.29.24	50
6	8.19.1	8.37.3	16	7.10.37	7.29.26	150
	8.18.59	8.37.1		7.10.39	7.29.24	125
	8.18.57	8.36.59		7.10.41	7.29.22	100
	8.18.55	8.36.57		7.10.43	7.29.20	75
	8.18.53	8.36.55		7.10.45	7.29.18	50
7	8.19.45	8.37.3	17	7.10.37	7.28.42	150
	8.19.43	8.37.1		7.10.39	7.28.40	125
	8.19.41	8.36.59		7.10.41	7.28.38	100
	8.19.39	8.36.57		7.10.43	7.28.36	75
	8.19.37	8.36.55		7.10.45	7.28.34	50
8	8.20.30	8.37.3	18	7.10.37	7.27.57	150
	8.20.28	8.37.1		7.10.39	7.27.55	125
	8.20.26	8.36.59		7.10.41	7.27.53	100
	8.20.24	8.36.57		7.10.43	7.27.51	75
	8.20.22	8.36.55		7.10.45	7.27.49	50
9	8.22.29	8.37.3	19	7.10.37	7.25.58	150
	8.22.27	8.37.1		7.10.39	7.25.56	125
	8.22.25	8.36.59		7.10.41	7.25.54	100
	8.22.23	8.36.57		7.10.43	7.25.52	75
	8.22.21	8.36.55		7.10.45	7.25.50	50
Fig. 10.	do	8.37.3	Fig. 20.	do	7.10.37	150
		8.37.1			7.10.39	125
		8.36.59			7.10.41	100
		8.36.57			7.10.43	75
		8.36.55			7.10.45	50

Sky

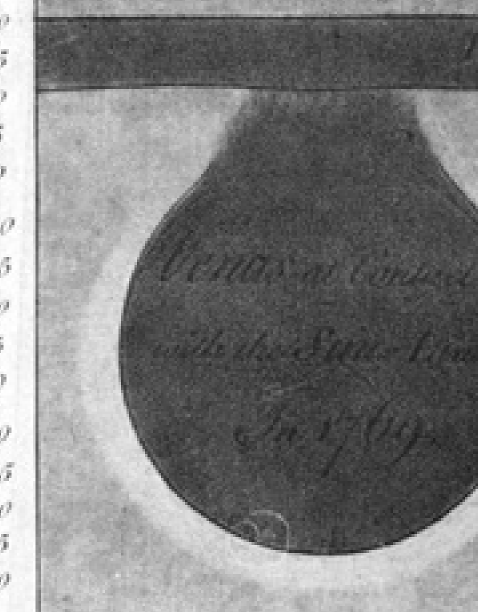


Thread of Light broken 1769.

Sky

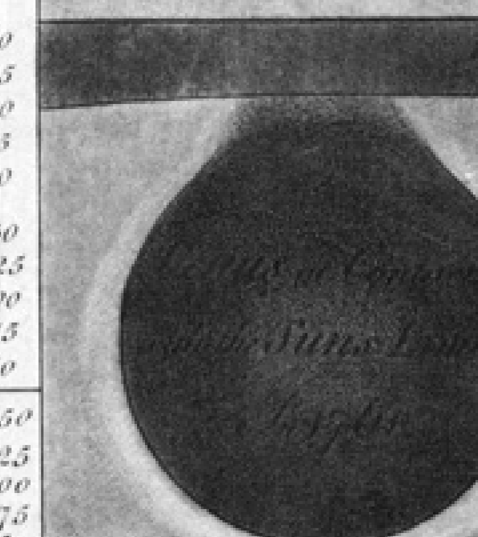
Thread of Light breaking 1761.

Sky



Thread of Light breaking 1769.

Sky



Thread of Light broken 1761.

In 1769 from the first additional ferment around the point of Contact to ye Completion of the Thread of Light was near two Minutes of Time. In 1761, nearly the same time in protuberating: S. Dunn.

Basire Sc.