# XLII. *Account of the Tranſit of* Mercury, *obſerved at* Norriton, *in* Pennſylvania, Nov. 9. 1769 *agreeable to an Appointment of the* American *Philoſophical Society, held at* Philadelphia, *for promoting uſeful Knowledge. By* William Smith, *D. D. Provoſt of the College of* Philadelphia; John Lukens *Eſq*; *Surveyor General of* Pennſylvania; David Rittenhouſe, *M. A. and Mr.* Owen Biddle. *Communicated by* Benjamin Franklin, *LL. D. F. R. S. and Preſident of the Philoſophical Society at* Philadelphia.

Read Dec. 13, 1770.

AS tranſits of Mercury are more frequent than thoſe of Venus, we need not be ſo particular in this account, as we were in that of Venus.

We had the ſame teleſcopes now as before, *viz.*

1. The college reflector, with Dollond's micrometer; uſed by myſelf, with a magnifying power of 200, to obſerve the *contacts*.
2. A refractor of 42 feet, magnifying 140 times, uſed by Mr. Lukens.

3. Mr.

3. Mr. Rittenhouſe's refractor, with about the ſame power, uſed by himſelf.

Mr. Biddle had no teleſcope; but was very ſerviceable in the other parts of the obſervation.

Although there were many flying clouds, which frequently obſcured the Sun in the forenoon of the day; yet from about one o'clock till half an hour paſt three, the Sun ſhone perfectly clear, and undiſturbed by clouds; which gave us an opportunity, as favorable as we could wiſh, for obſerving the contacts, and making ſome micrometer meaſures.

The firſt external contact was obſerved to the ſame inſtant by all the three obſervers, who had no communication with each other, the two refractors being out of doors, and the reflector within the obſervatory; and the contacts noted (as at the tranſit of Venus) by ſignals given to perſons ſet at the windows of the obſervatory, to count the clock.

The contacts were as follows:

1769, Nov. 9, apparent time,

| | h | ′ | ″ | |
|---|---|---|---|---|
| At | 2 | 35 | 17 | firſt external contact, by all the three obſervers. |
| | 2 | 36 | 35 | firſt internal contact, by Dr. Smith and Mr. Rittenhouſe. |
| | 2 | 36 | 33 | firſt internal contact, by Mr. Lukens. |

| | In. | 20ths | 500ths | ′ | ″ |
|---|---|---|---|---|---|
| ☉'s diam. per microm. | 3 | 13 | 7 | 32 | 20,24 |
| Mercury's diam. taken backwards and forwards ſeveral times, and the ſum halved, gave only | | | | ☉ | 8,22 |

| Nov. 9, 1769. apparent time. | | | Micrometer measures of leaſt diſtance of the neareſt limbs of ⊙ and ☿. | | | | Reduced to Minutes and Seconds of ⊙'s Diameter. | |
|---|---|---|---|---|---|---|---|---|
| h | ′ | ″ | In. | 20ths | 500ths | | ′ | ″ |
| 3 | 1 | 44 | 0 | 5 | 14 | doubtful | 2 | 26,2 |
| 3 | 10 | 9 | 0 | 6 | 12 | | 2 | 50,5 |
| 3 | 19 | 7 | 0 | 8 | 1 | | 3 | 31,84 |
| 3 | 31 | 11 | 0 | 10 | 0 | | 4 | 23,78 |

From 31 minutes paſt three, the ſun was conſtantly obſcured in a cloud, that deſcended with him, till at 32′ paſt 4 he broke out into a ſhort glimpſe of three minutes; during which the diameter of ☿ was again meaſured, and came out as before. One micrometer meaſure more was alſo now attempted of the neareſt diſtance of the limbs, but the ⊙ got under a cloud before it was completed, to our great regret, as we wiſhed to have at leaſt one more meaſure at an hour's diſtance from the reſt. More might have been taken during the firſt half hour, after three; but thoſe that were taken are ſufficiently near each other, and any between them would have been uſeleſs for a projection, as thoſe we have may be depended on.

The following obſervations of another kind were all that Mr. Rittenhouſe could obtain, *viz.*

| Apparent time. h | ′ | ″ | |
|---|---|---|---|
| 3 | 3 | 30 | ⊙'s lower limb at horizontal wire. |
| 3 | 3 | 42 | ⊙'s preceding limb at vertical wire. |
| 3 | 5 | 58 | ☿'s center at vertical wire. |
| 3 | 6 | 31 | ⊙'s ſubſequent limb at vertical wire. |

3 6 32

| h | ′ | ″ | |
|---|---|---|---|
| 3 | 6 | 32 | ☿'s center at horizontal wire. |
| 3 | 7 | 18 | ☉'s upper limb at horizontal wire. |
| 4 | 30 | 34 | ☉'s lower limb at horizontal wire. |
| 4 | 31 | 4 | ☉'s preceding limb at vertical. |
| 4 | 32 | 39 | ☿'s center at vertical. |
| 4 | 33 | 41 | ☉'s upper limb at horizontal. |

The two remaining obſervations of this ſett could not be got, the ſun being again obſcured by a cloud, and appearing no more that day. They had ſomething more of the ſun at Philadelphia, and got ſome micrometer meaſures after four o'clock. By the contacts of mercury at Philadelphia and Norriton, we get the latter 55″ of time weſt of the ſtate-houſe obſervatory; the ſame we made by the eclipſes of Jupiter's ſatellites.

Philadelphia,
Dec. 19, 1769.

W. Smith.