

fal of those who may be inclin'd to inquire farther into this Part of Nature ; and perhaps by the Continuance of this Method, in Proceſs of Time, a Diſcovery may be made of ſome regular Courſe in theſe Things, which may be of Uſe.

VII. *A Collection of the Observations of the Solar Eclipse, Feb. 18. 1736-7. ſent to the Royal Society.*

I. *The Sun's Eclipse on February 18. 1737. obſerved in Fleetſtreet, London, by Mr. Geo. Graham, F. R. S.*

		Apparent Time.			
		Ho.	Min.	Sec.	
At	2	25	9		P. M. a ſmall Impreſſion appear'd on the Sun's Limb; I judge the Beginning to have been about five or ſix Seconds ſooner.
	3	21	28		The Middle of the firſt and larger Spot was cover'd.
		29	30		The Middle of the ſmaller Spot.
		40	4		The Cuſps perpendicular.
	4	3	34		The Cuſps horizontal.
		35	32		The Middle of the larger Spot emerged.
		38	21		The ſmaller emerged, or a little before.

Z

4 52 57

Ho.	Min.	Sec.	
4	52	57	The Chord between the Cusps 1057
	55	00	The Chord 954
	56	32	The Chord 851
	59	34	The Chord 632

Then a Cloud cover'd the upper Limb, and prevented a Sight of the ending, which was soon after.

Between twelve and one o'Clock, I measur'd the Diameter of the Sun with a Micrometer. At the time of the greatest Obscuration, the lucid Part of the Sun's Diameter was equal to 392 such Parts as his whole Diameter contain'd 2188.

I had a Transit of the Sun at Noon, and of *Sirius* at Night, which, compar'd with preceding ones, I found my Clock went too fast for mean Solar Time, about one Second in a Day.

2. *The same Eclipse observed at the Royal Observatory at Greenwich, in Company with Dr. Edm. Halley, by Dr. J. Bevis.*

Apparent Time.			
Ho.	Min.	Sec.	
At 2	25	39	P. M. The Beginning.
	5	03	The End.

At the End, the Sun's Limb appear'd somewhat tremulous, and a small thin Cloud came over it. Dr. *Bevis* judg'd the Time might be relied on to two or three Seconds.

3. *An Observation of the Eclipse of the Sun, on Feb. 18. 1737. made at Edinburgh, by Colin Mac Laurin, Professor of Mathematics in that University, and F. R. S. in a Letter to Martin Folkes, Esq; V. P. R. S.*

S I R.

I Hope the following Account of the late Eclipse of the Sun, as it was observed here, and in other Parts of this Country, will not be unacceptable to you. In the History of Eclipses collected by *Ricciolus*, there are very few said to be Annular; and of these some have been controverted, as that seen by *Clavius* at *Rome, April 9. 1567*, and that seen by *Jessenius* at *Torgaw in Misnia, Feb. 25. 1598*, which are both disputed by *Kepler*. Some Astronomers, Antient and Modern, have been of Opinion, that no Eclipse can be Annular; and since such seem to have been rarely observed, and I have not met with a particular Description of any of them, I shall give you as full an Account of this Eclipse as I can collect from the Observations that were made here, and those that have been communicated to me from the Country.

The Sky was generally favourable in the Southern Parts of *Scotland* during the Eclipse; and though there were great Showers of Snow in the North, they had sometimes a View of it. There was something very entertaining in the annular Appearance, a *Phenomenon* that was equally new to all who saw it, that gave great Delight to the Curious, without striking Terror into the Vulgar. It extended Southward almost to *Morpeth* in *Northumberland*, and beyond *In-*

verness Northward; so that a Part of *England*, and almost all *Scotland*, were within its Limits. I have not as yet learned how far the North Limit was from us: In Expectation of some Letters from the remote Parts concerning this Limit, I have so long delayed sending you this Account; but I am informed, that the Weather was very unfavourable there.

Ten Days before the Eclipse, I wrote to many of my Acquaintance in the Country, desiring that they would determine the Duration of the annular Appearance as exactly as possible; in Hopes, by comparing their Observations, to have traced the Path of the Centre and the Limits of this *Phænomenon* after the Example given in 1715, by Dr. *Halley*, to whom we owe the best Description of an Eclipse that Astronomical History affords. I shall give you an Abstract of the Accounts I received in Answer to these Letters, after I have described our Observations at *Edinburgh*.

The Times of the Appearances here were determined by a Pendulum Clock, which Mr. *Graham* gave me some Years ago, from whom I also had the meridian Instrument by which it is examined. The meridian Line was often adjusted in the usual Manner, and an exact Account of the Sun's Transits in the Meridian, and of the Transits of *Procyon* in a fix'd Telescope, was kept by Mr. *Short* for a long time before and after the Eclipse; and, by comparing his Observations, I cannot doubt but that the Times were determined with sufficient Exactness. I was often with him when he examined the Meridian, and observed those Transits; particularly the Day of the Eclipse, when by the Sun's Passage in the Meridian, we found that the Clock was before the apparent Time 13 Minutes 27 Seconds;

Seconds; and so much I have subducted from the Times that were marked during the Observation. The Latitude of this Place is commonly said to be 55 Degrees 55 Minutes; and by some Trials we have made lately, this must be near the Truth, though in some Maps and Tables it be represented greater. By comparing an Observation we had here of the End of the Eclipse of the Moon, *Nov. 20. 1732.* with an Observation of the End of the same Eclipse by Mr. *Graham* at his House in *Fleetstreet*, the Longitude of this Place is a little more than 12 Minutes of Time further West: But I may be able to give a more exact Account afterwards of the Longitude and Latitude of this City.

Some Days before the Eclipse, the Right Honourable the Lord *Aberdour* set up a Clock in the Castle, and adjusted it with mine by a Watch that shewed the Seconds. The Clocks were compared together the Day of the Eclipse at Noon, by a Cannon fired from the Castle, some Persons being appointed to attend each Clock, and mark the Seconds when they heard the Sound: An Allowance of two Seconds and a half being made for the Progress of the Sound, (which was determined by several Trials at Night) the Clock in the Castle was found to be before the apparent Time. 12 Minutes 19 Seconds, and so much is subducted from the Times that were marked in the Castle during the Observation. It was agreed that we should give Signals to one another mutually at the Beginning and End of the Eclipse, and at the Beginning and End of the annular Appearance. His Lordship's Signal from the Castle was a Cannon, ours from the College a Musquet, Persons being appointed to mark our Signal from
from

from a proper Place of the Castle : There is no Regard however had to those Signals in marking the Times of the Appearances. Lord *Aberdour* made use of a reflecting Telescope of 15 Inches and a half focal Distance, that magnified 90 times; only he observed the annular Appearance with one of 5 Inches and a half, that he might have a View of the whole Disk of the Sun at once. Mr. *Short* observed the Beginning of the Eclipse with a Telescope of 15 Inches and a half focal Distance, that magnified 104 times, but the annular Appearance with one of the same Length, that also took in the whole Disk of the Sun, and magnified 50 times. The reflecting Telescope with which I observed the Eclipse from the Beginning to the End, took in the whole Disk of the Sun, (having been made by Mr. *Short* for this Purpose) though the focal Distance of the big Speculum be 9 Inches and a half; and though it bears a higher Charge, I made use of an Eye-glass on this Occasion, that magnifies only 50 times.

By a Computation that had been made here from Sir *Isaac Newton's* Theory, I expected that the Eclipse would begin at 2 Hours 6 Minutes, apparent Time; we therefore looked attentively towards the South-west Part of the Sun's Limb from Two o'Clock. At 2 Ho. 5 Min. 36 Sec. we perceived a Depression that was just discernible on the Sun's Limb near that Place; our Signal was then made, but by an Accident Lord *Aberdour* had been hindered from observing the Sun at that Time: However, when he looked for it, he saw it was begun, and his Signal gave general Intimation of this to the Town, about 40 Sec. after we had first perceived it; and, as far as I have learned, it was not discerned

discerned by the Eye, though assisted with a smoked Glass, till about this Time.

I observed the Progress of the Eclipse by a Helioscope; but after 10 Digits were eclipsed, I returned to the Telescope, to attend the Beginning of the annular Appearance. A little before the *Annulus* was complete, a remarkable Point or Speck of pale Light appeared near the Middle of the Part of the Moon's Circumference, that was not yet come upon the Disk of the Sun; and a Gleam of Light, more faint than this Point, seemed to be extended from it to each Horn: I did not mark the precise Time when I first perceived this Light, but am satisfied that it could hardly be less than one fourth of a Minute before the annular Appearance began. Mr. *Short* (who was in another Chamber at some Distance, and made use of a larger Telescope) assures me that he saw it 20 Seconds before the *Annulus* was completed; and this is confirmed by a Call that was then heard from the Chamber where he was, of which I did not understand the Meaning till we met afterwards, and upon which the Person who made our Signals was about to fire, if I had not forbid him. I was surprized with this Light at first, and did not immediately recollect that it proceeded probably from the same Crown that was seen about the Moon in a total Eclipse of the Sun at *Naples* in 1605; and was observed by many in different Parts of *Europe* in the three late total Eclipses of 1706, 1715 and 1724. I did not expect to have seen this Light, when so much of the Sun's Disk was uncovered; but as I kept only so much of the Disk in the Telescope as was necessary for ascertaining the Time of the Formation of the *Annulus*, this must have contributed to my

my discovering it; for this Light was very faint, compared with that which appeared upon the Sun's Arch near the same Place the Moment it was uncovered, and the Annulus completed.

Most of those who observed the Eclipse with Telescopes, mention in their Letters, that as the *Annulus* was forming, they perceived the Light to break in several irregular Spots near the Point of Contact, and that the Limb of the Moon seemed to be indented there. Some express themselves as if those irregular Parts had appeared to them in a kind of Motion. It is thus described by Mr. *Bayne* (Professor of the Municipal Law, a worthy Gentleman, whom we have since lost) in a Letter to Lord *Aberdour*: "What appeared
 " to me most entertaining, says he, considered as an
 " Object of Sight, was, when the Extremities of the
 " Horns formed upon the Face of the Sun seemed as
 " if they had been in the Action of uniting their
 " Points, the Inequalities on the Extremity of the
 " Moon's Disk gave the Appearance, as it were, of
 " small Bodies in particular Motion." There was not any Undulation at this Time on the Circumference of the Sun. I find that such Appearances of a tremulous Motion in certain Periods of solar Eclipses are mentioned by *Hewelius* and others. Lord *Aberdour* observed the Beginning of the annular Appearance with a smaller Telescope, and perceived only a narrow Streak of a dusky red Light colour the dark Edge of the Moon, immediately before the Ring was completed, and after it was dissolved.

At 3 Ho. 25 Min. 55 Sec. the Circumference of the Sun appeared complete, and perfectly circular. We called at the same Instant to the Person who was appointed

pointed to make our Signal, and in a Second or two the Cannon from the Castle was heard. The *Annulus* appeared to the Eye to be central for some time, but in the Telescope it was always broader toward the South-east than toward the North-west Part of the Sun's Disk. The Breadth appeared much greater to the naked Eye, than could have been expected from the Difference of the Semidiameters of the Sun and Moon. This was so remarkable, that such a *Phænomenon* must have confirmed those Astronomers in their Opinion, who imagined that the Diameter of the Moon is contracted in her Conjunctions with the Sun. This Appearance proceeded chiefly, I suppose, from the Light's inroaching on the Shade, as is usual; but whatever was the Cause, every body seemed surprized that the Moon appeared so small upon the Disk of the Sun.

It was observed, that the Motion of the Moon appeared more quick in the Formation and Dissolution of the *Annulus*, than during its Continuance. This is particularly described by Mr. *Fullarton*, of *Fullarton*, in a very exact Account of the Eclipse, as it appeared at his Seat at *Crosby*, near *Air*, on the West Coast of *Scotland*, that has been communicated to me by a Friend. He writes that "the *Annulus* appeared to be nearly of an uniform Breadth during the greater Part of the Time of its Continuance, but seemed to go off very suddenly; so that when the Disk of the Moon approached to the concave Line of the Sun's Disk, they seemed to run together like two contiguous Drops of Water on a Table when they touch one another;" and he adds, that it came on in the same way. This Appearance seems to be

accountable from the same optical Deception as the former.

During the Appearance of the Annulus, the direct Light of the Sun was still very considerable; but the Places that were shaded from his Light appeared gloomy. There was a Dusk in the Atmosphere, especially towards the North and East. In those Chambers that had not their Lights Westwards, the Obscurity was considerable. *Venus* appeared plainly, and continued visible long after the Annulus was dissolved, and I am told that other Stars were seen by some: One Gentleman is positive, that, being shaded from the Sun, he discerned some Stars Northwards, which he thinks by their Position were in *Ursa Major*.

It was very cold at this Time; a little thin Snow fell; and some little Pools of Water in the College Area, where there was no Ice at two o'Clock, were frozen at Four. A reflecting Telescope of a large Size, and of a much greater Aperture than ordinary, that took in the whole Sun, and burned Cloth very suddenly through the tinged Glass at the Beginning of the Eclipse, and on that account could not then be used with Safety, was that by which Mr. *Short* observed the annular Appearance. Some curious Gentlemen found, that a common Burning-glass, which kindled Tinder at 3 Ho. 59 Min. and burned Cloth at 4 Ho. 8 Min. had no Effect during the annular Appearance, and for some time before and after it.

I have mentioned those things mostly upon the Report of others; for during the greater Part of this Appearance I was observing the Progress of the Moon upon the Disk of the Sun through the Telescope. The first internal Contact of the Disks, at the Formation

tion of the Annulus, was considerably below the West Point of the Sun's Disk; and the second Contact, at the Dissolution of the Annulus, seemed to be about 10 Degrees Eastwards from the North Point or Zenith of the Disk: But I did not find that the Position of those Points of Contact could be estimated with Exactness on several Accounts. The Breadth of the Annulus towards the South-east Part of the Sun's Disk, was at least double of its Breadth towards the opposite Part, about the Middle of this Appearance. An Apparatus, by which I was in Hopes of being able to determine those things more accurately, was not ready. I proposed to have made some Estimation of the *Ratio* of the Continuance of the annular Appearance, where it was central to its Continuance at *Edinburgh*, from that of the Arithmetical Mean betwixt the Numbers that should express the Proportion of the greatest and least Breadth of the Annulus to the Geometrical Mean betwixt the same Numbers; or from the *Ratio* of the *Radius* to the Sine of half the Arch intercepted between the two Points of internal Contact; but I did not obtain these *Ratio's* with sufficient Exactness.

At 3 Ho. 31 Min: 43 Sec. the *Annulus* was dissolved, after having continued 5 Min. 48 Sec. And here again our Signals were heard immediately after one another: The Middle of the Eclipse was therefore at 3 Ho. 28 Min. 49 Sec. In this the Time by Observation did not agree so well with the Time by Computation as in the Beginning of the Eclipse, the Difference being here about four Minutes. The Irregularities of the Moon's Surface occasioned the same Appearances, in some measure, as at the Formation of the *Annulus*. When I returned to the Helioscope,

there was some Time lost in directing it towards the Sun; and when I got the Image in a due Position, there was less than 11 Digits eclipsed; and I suspect that it never amounted to full 11 Digits. I had no Micro-meter.

After taking some more Digits, I went with Sir *John Clerk* to a neighbouring House, to observe the End of the Eclipse, being afraid we should not be able to see it from the College. By a Signal that was made to the Person who attended the Clock, (two Seconds being subducted, that were lost in making the Signal) the End was at 4 Ho. 44 Min. 51 Sec. The Wind blew hard at this time, so that the Telescope could not be kept very steady, and there was some Undulation on the Circumference of the Sun; but I cannot think that the Error of this Observation can exceed three or four Seconds, the Circumference of the Sun appearing to me complete at that Instant.

I shall now subjoin the Observations that were made in the Castle and College in one View, by which you will see that they agree precisely as to the Continuance of the annular Appearance, a Coincidence that could not have been expected; but so it is, according to the Numbers that were given me immediately after the Eclipse by those who attended the Clocks.

	In the College.			In the Castle.		
	H.	M.	S.	H.	M.	S.
The Beginning of the Eclipse at	2	5	36			
The Beginning of the annular Appearance	3	25	55	3	25	53
The End of the annular Appearance	3	31	43	3	31	41
The End of the Eclipse	4	44	51	4	44	48

By Lord *Aberdour's* Observations, the lowermost and biggest of the two Spots that appeared upon the Disk of the Sun in the upper Part, was touched by the Moon at 3 Ho. 4 Min. 40 Sec. and this Spot was wholly covered at 3 Ho. 5 Min. 19 Sec. Mr. *Short* observed another Spot at the Circumference of the Moon, at 2 Ho. 24 Min. 51 Sec. Though the Observations of the Digits could not be made with so much Exactness as the preceding, on several Accounts, I shall subjoin some of them.

		H.	M.	S.
The Sun was eclipsed	2 Digits at	2	21	14
	6 Dig.	2	50	54
After the annular Appearance	9 Dig.	3	45	57
	8 Dig.	3	52	55
	7 Dig.	3	59	53
	6 Dig.	4	6	51

At *Hopeton-House*, nine Miles West, and a little Northwards from *Edinburgh*, the Right Honourable Lord *Hope* observed the annular Appearance begin at
3 Ho.

3 Ho. 25 Min. the End of this Appearance at 3 Ho. 31 Min. and the End of the Eclipse at 4 Ho. 44 Min. and a half. His Lordship was obliged to observe the Eclipse at a Distance from the Clock, and to determine the Times by a Pocket Watch, that had been adjusted by a very good Dial that Day at 12 o'Clock; but assures me, that the Duration of the annular Appearance was six Minutes, as near as could be judged by a Watch that did not shew the Seconds. The Moon appeared to touch the larger Spot above-mentioned at 3 Ho. 4 Min. and covered it in about half a Minute. The Emerision of the same Spot was at 4 Ho. 13 Min. A lesser Spot, higher on the Sun's Disk, was not covered till 11 Minutes after the greater Spot, but appeared rather sooner than it.

At *Crosby*, on the West Coast of *Scotland*; about four Miles North from *Air*, Mr. *Fallarton* observed the Eclipse to begin at two o'Clock. A distinct Annulus was formed about 20 Minutes after Three, which continued exactly seven Minutes, measured by a Pendulum vibrating Seconds. It appeared rather broader on the lower Verge of the Sun; but the Difference must have been very small, for it was but barely discernible in a Species of the Eclipse six Inches over, cast on a Piece of Paper behind the Eye-piece of a Telescope six Feet long. He adds, that the Day-light was not greatly obscured, appearing only so much dimmer than usual, as that of the Sun is, when seen through a very gentle Mist in a fine Morning in *April* or *May*. Sir *Thomas Wallace* found that the annular Appearance continued at his House near *Lockryan* in *Galloway* five Minutes.

From the Observation at *Crosby*, the Centre of the annular Penumbra seems to have entered *Scotland* not far from *Irwine*. It proceeded afterwards towards the East, with a considerable Inclination Northwards; and probably left *Scotland* not far from *Montrose* on the East Coast: For the Reverend Mr. *Auchterlony* found, that the annular Appearance continued there seven Minutes, as near as he could judge by an ordinary Watch. The *Annulus* also appeared to him of an uniform Breadth, through a common Telescope. This Observation, though not so exact as that at *Crosby*, is however confirmed by that at *St. Andrew's*, to be mentioned afterwards. These two Observations at *Crosby* and *Montrose*, were made nearer the Path of the Centre, than any others that have been communicated to me.

As for the Southern Limit of this Appearance, the Eclipse was not Annular at *Newcastle*, and there wanted about 40 Degrees of the Limb of the Sun to appear in order to form an *Annulus*, according to the Observation of Mr. *Isaac Thomson*, communicated to me by Mr. *Blake*, a Gentleman of the County of *Durham*, who was present with us at *Edinburgh* during our Observation. The whole Duration of the Eclipse was 50 Seconds less by his than by our Observation; and the bigger Spot was hid 1 Ho. 9 Min. 35 Sec. by his Observation, the Digits eclipsed at its Immersion 7, 7; at its Emerfion 4, 1. Nor was the Eclipse Annular at *Morpeth*, whence Mr. *John Willson* writes, that the Body of the Moon appeared almost intirely on that of the Sun; and that, to the naked Eye, the Disk of the Sun seemed to be almost round.

But:

But of all the Observations that have been communicated to me, that of Mr. *Long* at *Longframlington**, determines the Southern Limit with the greatest Exactness. The *Annulus*, he says, was very small there upon the upper Part, and the Duration 40 or 41 half Seconds, measured by a Pendulum 9, 81 Inches long; from which we may conclude, that the Limit was very near this Place. This curious Observation, with several others, was communicated by Mr. *Mark* at *Dunbar*. I have received no Accounts concerning this Appearance from any Places on the West Coast of *England*. At *Alnwick* in *Northumberland* the Eclipse was Annular, but I have not heard that the Time of its Continuance was measured.

At *Berwick*, the annular Appearance continued betwixt four and five Minutes: The End of the Eclipse at *Dunbar*, by Mr. *Mark's* Observation, was at 4 Ho. 48 Min. 16 Sec. but there was some Mistake committed in reckoning the Vibrations of the Pendulum in measuring the Continuance of the Annulus.

At *St. Andrew's*, this Appearance was observed to continue precisely six Minutes, by a Pendulum Clock, by Mr. *Charles Gregory* and Mr. *David Young*, Professors in the University. By a Figure of the *Annulus* taken from its Image, projected through a Telescope upon a Paper Screen, the Breadth towards the South-east Part of the Sun's Disk is rather more than double of its Breadth towards the opposite Part.

* *Longframlington* is seven computed Miles on this Side of *Morpeth*.

I have already mentioned the Observation at *Montrose*. At *Aberdeen* the *Annulus* was observed by Mr. *John Stewart*, Math. Prof. for 3 Min. 2 Sec. It was almost central, when the Clouds deprived him of any further View of it; he thinks it probable, that it continued there about six Minutes. Several Gentlemen, who live on the Coast Northwards from *Aberdeen*, were desired to observe the Continuance of the *Annulus*; but I do not find that any of them saw this Phenomenon from the Beginning to its End.

At *Elgin*, the Eclipse was observed Annular at 3 Ho. 29 Min. the larger Part of the Ring being uppermost, by the Reverend Mr. *Irwin*, who had a View of it for about 30 Seconds; but by reason of intervening Clouds could not determine the Beginning or End of this Appearance. At *Castle Gordon*, Mr. *Gregory* had one View of the Eclipse while it was annular, but could make no further Observation for the same Reason.

At *Inverness*, the Eclipse was annular for some Minutes, as I am informed by several Gentlemen; but they did not measure the precise Time how long it continued. By the Accounts I have had from *Fort Augustus* and *Fort William*, it is doubtful whether the Eclipse was annular in those Places or not. *Fort Augustus* is at the West End of *Lochness*, and probably was not far from the Northern Limit of this Phenomenon. I have as yet received no Accounts of this Appearance from any Place further Northwards, or from any Place in the West, but those I have mentioned. Some Gentlemen in *Argyleshire*, who observed this Eclipse, were deprived of a View of the *Annulus* by the Clouds.

Mr. *Walker*, an ingenious Gentleman at *Frazerburgh* on the North Coast, (*Feb. 18. 1737.*) found that from the Time of the Ring's beginning to appear upon the lower and Western Part of the Sun's Disk, till it began to break on the East and upper Part, there were 300 Vibrations of a Pendulum, or five Minutes. The Ring seemed somewhat narrower even at the Middle of the Eclipse on the lower Part.

This is the Sum of what I have been able to learn concerning the Observations of this Eclipse, that were made in this Country, and in the neighbouring Parts of *England*. I have made some Computations relating to the Extent of the annular *Penumbra*, and the Direction and Velocity of its Motion; but since I have not a sufficient Number of exact Observations, by which I might examine them, it would be of little Use to describe them. Had the Weather been more favourable in the North, and my Request of having the Duration of the annular Appearance measured, been made more public before the Eclipse, after Dr. *Halley's* Example in 1715. I doubt not but I should have been able to have given a more exact Account of the Progress of the Centre of this Phenomenon, and of its Limits; but I had been discouraged from publishing any thing concerning it, by our bad Fortune in several late Eclipses, of which the Clouds had not allowed us the least View.

I am informed, that there was very little Notice taken of this Eclipse by the Populace in the Country; and I cannot but add, that several Gentlemen of very good Credit, who are not in the least short-sighted, assure me, that about the Middle of the annular Appearance they were not able to discern the Moon upon

on the Sun, when they looked without a smoked Glass, or something equivalent.

I have taken Notice of this, because it may contribute to account for what at first Sight appears surprizing, that there are so few annular Eclipses in the Lists collected by Authors. *Kepler*, in his *Astron. Optic.* does not seem to acknowledge, that any Eclipse, truly annular, had ever been observed. There are none mentioned by *Ricciolus*, from the Year 334 till 1567. though there are 13 or 14 total Eclipses recorded within that Period; yet it is allowed, that the Extent and Duration of the annular Appearance may be considerably greater in the former, than of the Darkness in the latter. It may have contributed to this, that annular Eclipses must have been rather incident in the Winter Season in the Northern Hemisphere, and that Eclipses have been more readily total in the Summer, when their Chance of being visible was greater, and the Season more favourable for observing them. But perhaps the chief Reason why few annular Eclipses appear upon Record, is, that they have not been distinguished in most Cases from ordinary partial ones. The Darkness distinguished total Eclipses, or such as were very nearly total; and it is these chiefly, Historians mention. There are two central Eclipses of the Sun still famous amongst the Populace in this Country: That of *March 29. 1652.* was total here, and that Day is known amongst them by the Appellation of *Mirk Monday*. The Memory of the Eclipse of *Feb. 25. 1598.* is also preserved amongst them, and that Day they term, in their way, *Black Saturday*. There is a Tradition, that some Persons in the North lost their

Way in the Time of this Eclipse, and perished in the Snow.

There was a remarkable total Eclipse of the Sun in this Country, *June 17. 1433.* the Memory of which is now lost among the Populace; but it appears from a Passage in a Manuscript in our Library, that it was formerly called by them the *Black Hour*, after their usual Manner. It is described thus: “ Hoc anno
 “ fuit mirabilis Eclipsis Solis, 17^{mo} die mensis *Junii*,
 “ hora quasi tertia post meridiem; & per dimidium
 “ horæ tenebræ tanquam in nocte supergressæ sunt
 “ superficiem terræ, ita ut nihil obtutibus humanis per-
 “ vium fuit; unde abhinc vulgariter dicta fuit Hora
 “ Nigra.” This Eclipse is not in *Ricciolus’s* Catalogue, but is mentioned by him in another Place, *Schol. Cap. 2. L. 5.* By a Computation of this Eclipse, the Sun was within two Degrees of his *Apogæum*, and the Moon within 13 Degrees of her *Perigeum*; so that this must have been a remarkable Eclipse. The Progress of the Shadow was towards the South-east; and *Sethus Calvisius* cites the *Turkish Annals* for its being total in some Part of their Dominions.

You will perceive by this Account, that we have no Observatory in this Place; but we are in Hopes that some time or other we shall obtain one from the Patrons of the University. I doubt this last Eclipse will not be distinguished by any particular Appellation amongst the Populace, as the former that were central in this Country. The Remembrance of it however will be preserved by the Curious, who observed it with great Pleasure, and agree that it was the most entertaining Spectacle of this kind they ever saw. I shall

shall be glad if this Account of it give you any Satisfaction, and am with the greatest Respect,

S I R,

Edinburgh,
May 12, 1737.

Your most obedient,
most humble Servant,
Colin Mac Laurin.

P. S. We looked for the Occultation of *Aldebaran* by the Moon on *Feb. 25.* in the Evening; but the Star passed by the upper Horn, without being hid, at a Distance from it, that was by Estimation nearly equal to the Distance betwixt the nearest Part of the Spots *Eudoxus* and *Aristotle.*

4. *An Account of the Observations of the late Solar Eclipse made at Edinburgh, on Feb. 18, 1736-7. by the Honourable Sir John Clerk, Bart. one of the Barons of his Majesty's Exchequer there, and F. R. S. Communicated by Roger Gale, Esq; F. R. S.*

ON the 18th of *February* last, we had a very fine bright Day for observing the Eclipse; and never was any thing of that kind, I believe, observed with more Exactness. In several Places for 10 Miles round this City, as well as in it, were some skilful Persons stationed for that Purpose: I myself happened to be in the Castle here, which is an Eminence at least of 500 or 600 Feet in Height, besides a great Ascent from the Level of the Sea to the Foot of the Rock upon which it is situated.

Our Professor of Mathematics, Mr. *Mac Laurin*, a Person of great Knowledge in this Science, had placed himself at a Window in our College; others
were

were sent where the Eclipse, we supposed, would be perfectly central, about 12 or 14 Miles farther North.

A Gun from the Castle was fired at 22 Seconds after Twelve, mean Time, (or 12 Minutes 22 Seconds before Twelve, apparent Time) upon which, by Agreement, the Clocks and Watches of the Observers were adjusted. A second Cannon was discharged precisely when the Eclipse began, which was at 5 Minutes 36 Seconds after Two. A third was discharged when the annular Appearance began, which was at 25 Minutes 55 Seconds after Three; its Continuation was 5 Minutes 48 Seconds. A fourth Cannon was fired at the End of the Eclipse, which was at 44 Minutes 50 Seconds after Four; all reckoned by apparent Time. We had half a score good reflecting Telescopes to make these Observations, and our Calculations perfectly agreed, so that you may depend upon them as most exact.

This was not done by us as a Matter of mere Curiosity, but to assist in ascertaining the Motions of the Moon, on Sir *Isaac Newton's* Theory, upon which a good deal of the Doctrine of the Longitude will depend. Sir *Isaac's* Calculation, as to the Beginning of this Eclipse, was pretty right; but not so well as to its central Appearance. Two Spots in the Sun made a very distinct Appearance to us, as they entered under the Moon's Body; one was a little above the central or horizontal Line of the Sun, of this Shape

; the other was near the Edge, on the East Quarter.

The first, by Comparison with the Sun's Diameter, was larger than the Disk of our Earth; it was dark in the Middle, and certainly emitted no Fire or Light. The Edge of the Moon appeared a little ragged

ged or rough, but not mountainous, because of the Sun's Light. There was no considerable Darknes, but the Ground was covered with a kind of a dark greenish Colour. Two Stars appeared, the Planet *Venus*, and another farther Eastward. This Account is what you may depend on.

5. *Observations of the Solar Eclipse, on Feb. 18, 1736-7. made at Trinity-College, Cambridge, and at Kettering; communicated in a Letter from Mr. Charles Mason to Mr. John Senex, F. R. S.*

H. M. S.

The Beginning by the Clock at 2 36 40

The End at 5 14 12 Exact.

Digs.	The Eclipse Observed.					
	Increasing.			Decreasing.		
	H.	M.	S.	H.	M.	S.
0 $\frac{1}{2}$	2	39	30	5	11	50
1	2	43	00	5	9	00
1 $\frac{1}{2}$	2	46	40			
2	2	50	25			
2 $\frac{1}{2}$	2	54	15	4	59	30
3	2	58	05			
3 $\frac{1}{2}$	3	1	55			
4	3	5	50			
4 $\frac{1}{2}$	3	9	40			
5	3	14	00	4	42	55
5 $\frac{1}{2}$	3	18	10	3	39	10

Digs.	The Eclipse Observed.					
	Increasing.			Decreasing.		
	H.	M.	S.	H.	M.	S.
6	3	22	20	4	35	20
6 $\frac{1}{2}$	3	26	30			
7	3	30	40	4	27	40
7 $\frac{1}{2}$	3	34	50	4	23	55
8	3	39	30	4	20	10
8 $\frac{1}{2}$				4	16	30
9	Clouds.			4	13	00
9 $\frac{1}{2}$				4	10	10
10				4	7	50

H. M. S.

The lesser Spot immersed at 2 58 50

The greater Spot begun to immerge at 3 33 05

The Middle at 3 33 20

The End at at 3 33 37

Times

Times observed at *Kettering*, as follow :

	Ho.	Min.
Beginning	2	21
2 Digits	2	36
Centre	{ 3	07
	} 4	22
End	4	59
Great Spot immers'd	3	18

N. B. The Observatory Clock was 1 Minute 50 Seconds too slow, which being added all the way, will give true Time.

I should be obliged to you, if I could have any Observations that correspond with these, to compare them: these are most of them tolerably exact; but the Wind, and other Difficulties, make some of them a little precarious. The Time is nearly true, if the Error be corrected depending upon the Truth of a Meridian Telescope, which I can yet correct, if any nicety of Longitude require it. I hope you will excuse my freedom in troubling you with this from

Your humble Servant,

Cha. Mason.

6. Defectus Solis *observatus e Specula Bononiensis Scientiarum Instituti, die prima Martii 1737. N. S.*

INitium hujusce deliquii calculos nostros minutis horariis plus septem antevertit. Hora enim 3 min. 33 sec. 36 jam aliquid Solaris marginis a Luna delibari apparuit, directo intuitu per vitrum fuligine infectum, ac telescopio pedum undecim aptatum (cum paullo ante, hoc est in ipso scrupulo 33, eodem telescopio Sol plane rotundus visus esset) : calculi autem initium in horam 3. 41 conjiciebant.

Deinceps digitos eclipticos notavimus trajecto Solis radio per tubum opticum pedum sex, eoque excepto in tabella candida, cui tabellæ circulus inscriptus erat ad imaginem Solis commensus, atque in digitos ac semidigitos dispersit. Verum observationi haud parum obstitit ventus machinam exagitans. Certiores phases hæ fuisse videntur.

Hor.	Min.	
3.	40	Deficiebat digitus præterpropter
3.	48	Duo digiti
3.	57	Digiti tres
4.	6	Digiti quatuor
4.	15½	Quinque digiti
<hr/>		
4.	35	Digiti septem
4.	45	Septem cum semisse, quæ nobis obscuratio maxima visa est
4.	55	Iterum digiti ipsi septem, Eclipsi jam decrescente.

Postmodum cum species Solis in occasum vergentis nimis fluctuans ac trepida videretur, necnon ex rotunda in ovalem sat manifeste deformata, a digitorum dimensione, quippe haud satis certa, cessavimus.

Nonnullæ apparebant in Sole maculæ, tres præsertim, quarum positiones ipso meridie ejus diei ab observationibus descriptas exhibet subjectum schema. [*vide* TAB. II. FIG. I.] Duarum ex his occultationes ita definivimus eodem tubo pedum undecim.

Hor. Min. Sec.

4.	23.	18	Limbus Lunæ coronam maculæ A contingit
	23.	49	Nucleum ipsum maculæ A tegere incipit
	24.	25	Totum nucleum abscondit
	26.	14	Maculam B distringit
	26.	31	Totam involvit.

7. Defectus Solis ex Monte Aventino Romæ observatus, die prima Martii, A. 1737. N. S. a Didaco de Revillas, Abbate Hieronym. R. S. Lond. S.

TRajecta per telescopium Campani Ped. 6. Solis specie, hanc tabella alba excipiebat, cum circulus speciei æqualis in digitos XII divisus, inscriptus erat. Phases hocce organo observatæ, sunt hujusmodi.

H. p. m. M. S.

3.	43	4	Limbus Solis jam limbo Lunæ aliquantulum obscuratus deprehenditur.
	51	50	Digit. I.
4.	0	40	Digit. II.
	9	30	Digit. III.
	18	20	Digit. IV.
	27	10	Digit. V.
	36	0	Digit. VI Dum limbus Lunæ centrum Solis attingit, densæ nubes utriusque luminaris & sequentium eclipsis phasium conspectum eripiunt.

8. Eclipsis

8. Eclipsis Solis *partialis*, quæ die XIII. Feb. St. Vet. five D. I. Martii St. Nov. A. 1737. contigit, Phases *decrescentes* Vittembergæ Saxonum *observatæ*, a J. Frederico Weidlero, *Math. Prof. & R. S. Lond. S.*

Digiti Eclipsæos decrescētis.				<i>Vide Schema in</i>
	H.	M.	S.	TAB. II. FIG. II.
VIII	4	50	31	p. m.
VII $\frac{3}{4}$		58	16	
VII $\frac{1}{2}$	5	1	56	
VII $\frac{1}{4}$		5	26	
VII		8	16	
VI $\frac{1}{2}$		10	16	Postea Sol ad occasum ver- gens nubes subiit.

Initium propter nubes cœlo obductas videri non potuit.

VIII. *A Letter from the Rev^d Ebenezer Latham, M. D. and V. D. M. to C. Mortimer, M. D. Sec. R. S. containing a Proposal to make the Poles of a Globe of the Heavens move in a Circle round the Poles of the Ecliptic; read at a Meeting of the Royal Society, April 17. 1738.*

S I R, *Findern, April 14, 38.*

I Take the Liberty through your Hands to communicate the inclosed to the *Royal Society*, and at the same time to submit to that learned Body a Pro-





