

XXI. *Determination of the Longitudes and Latitudes of some remarkable Places near the Severn. In a Letter from Edward Pigott, Esq. to Sir Henry C. Englefield, Bart. F. R. S.*

Read May 20, 1790.

AS perhaps this Paper may be thought of some use, I beg you will do me the favour of presenting it to the Royal Society. Its principal object is to settle the longitude and latitude of several remarkable places near the Severn, the relative distances of which I measured trigonometrically during my stay in Glamorganshire. As they are all deduced from Frampton-house, it is requisite to determine the position of that place with correctness. My father has already given its longitude in the Philosophical Transactions, Vol. LXXI. being the mean of several observations of Jupiter's first and second satellites. From the known ability of the observer, we may undoubtedly depend that all possible exactness was obtained, of which those observations are susceptible; but at that time the superior accuracy of the lunar transits was not known; therefore at present there can be no hesitation in giving the preference to the following results.

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E e e

Difference

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Difference of longitudes in time between Greenwich and Frampton-house, deduced from observed meridian transits of the moon's limbs.

Dates.	Difference of meridians, west.	Stars observed with D.	
		G. Greenwich.	F. Frampton.
1778			
Oct. 3.	14 28''-	β Aquilæ at G. and F.	
15.	14 36	γ Aquilæ at G. and F.	
Nov. 25.	14 25+	{ D observed only at 3 wires at F. { υ ♁ and MAYER'S N° 891. at F. { Fomalhaut at G.	
Dec. 26.	14 28	{ δ ♁ η ✕ at F. { α γ α γ at G.	
1779			
Feb. 22.	14 26-	{ ι γ ζ γ at F. { α γ α Ceti at G.	
27.	14 31	γ ♁ at G. and F.	
Mar. 24.	14 37	{ γ Canis maj. δ π at F. { α γ α Ω at G.	
30.	14 41	{ b ♁ at F. { α γ α Ω at G.	
31.	14 37	{ s. ♁ at F. { α γ at G.	
31.	14 43-	Ditto. ditto.	
Apr. 24.	14 27+	{ D observed only at two wires at F; but { they agree. { β ♁ at G. and at F.	
May 22.	14 26½	α Ω at G. and at F.	
Oct. 22.	14 33½	Fomalhaut at G. and at F.	
Diff. of meridians	14 32+	on a mean.	

These are all the observations I have reduced except three doubtful ones, which were computed merely out of curiosity.

1778	"	
Nov. 1.	14 20—	{ D and Arcturus; 10+ hours interval; going of clock uncertain; F. α γ at G.
30.	14 47	{ D observed only at two wires. D and Arcturus; 12½ hours interval; going of clock uncertain.
1779		
Apr. 26.	14 14½	{ D observed only at three wires, and they do not agree; F.

This method of determining terrestrial longitudes I have fully detailed in the Philosophical Transactions, Vol. LXXVI. and still think it cannot be too strongly recommended. The preceding additional set of results do further corroborate the reliance that may be put on it, though the observations were not made with that intention, and consequently several of them are deficient in many particulars: their agreement, nevertheless, is conclusive, and infinitely more satisfactory than could be expected. Since the above-mentioned publication I have been informed, that M. le Marquis DE CHABERT and others, many years ago, settled differences of meridians on similar principles, and I dare say with as much sagacity as the then imperfect state of the method would permit. At present it is certainly considerably improved, being susceptible of very great exactness and facility, which perhaps may be considered as the sole requisites for rendering it any wise useful.

The latitude of the same place, taken with an 18-inch quadrant made by BIRD, is thus by my observations:

51° 25' 0" by β Geminorum.

51 24 50 by ϵ Bootis; two observations.

51 25 5 by π Sagittarii.

51 25 13 by γ Virginis.

51 24 55 by η Bootis; two observations.

51 24 48 by γ Delphini.

51 24 56 by Fomalhaut.

51 24 58 + on a mean.

51 25 1 { ditto, by my father, with the same instrument.
See Phil. Transf. Vol. LXXI.

51 25 0 - latitude of Frampton-house on a mean.

Having thus settled the position of the Observatory, I may now proceed to give the particulars of the trigonometrical operations.

I measured the same base three times by different methods,

the results were $\left. \begin{array}{l} 2046 \\ 2042 \\ 2042 \end{array} \right\}$ feet. As the view from its extremities

was very confined, another base of 1861 yards was deduced from it, situated on the high lands that edge the Severn, having a very extensive and beautiful prospect. From the extremities of this second base, all the angles were taken with a tolerably good theodolite on which two minutes might be easily read off. The results here given are the distances from the various places to the western extremity of their base, their perpendicular distances to its meridian, and its distance from these perpendiculars.

Distances in yards,			
Direct.	To the meridian.	To the perpendicular.	
3307	1254 E	3059 N	Frampton-house.
45654	42239 E	17324 S	Brin Hill, the center.
36928	21853 E	29768 S	Quantock Hill, the east part.
40446	15586 E	37322 S	Land Mark, a tower.
35543	11542 E	33617 S	Watchet Hill, the center.
21911	1465 E	21862 S	Minehead.
21336	6664 W	20268 S	Porlock, or Huston Point.
30238	23152 W	19450 S	Leemouth.
46264	40308 W	22547 S	Hangman Hill.
2921	2842 W	673 N	St. Donat's Castle.
1564	491 E	1483 N	Llantwit Church.
10140	448 W	10130 N	Llangwynnewar Hill, east part.
25126	2299 E	25020 N	A remarkable hill.
3135	2063 E	2361 N	Llanmace Church.
8864	5906 E	6609 N	St. Hilary's Church.

The direct distances are the most accurate, the others being affected according to the exactness of the meridian of the west extremity of the base; the direction of which was found by the variation needle, its declination having been determined at Frampton-house, and therefore sufficiently correct; for an error in that angle, even of half a degree, would make a difference of a very few seconds in any of the places observed.

The following are the longitudes and latitudes of the same places, deduced by Gen. Roy's most accurate and useful tables, shewing the value of each degree, &c.

Longitudes west of Greenwich,			Latitudes North.			
in time.		in deg. &c.				
12	24—	3 5 58	51	14	56 $\frac{1}{2}$	Brin Hill, the center.
13	28—	3 21 57	51	8	48 $\frac{1}{2}$	Quantock Hill, east part.
13	47 $\frac{1}{2}$	3 26 52	51	5	5	Land mark, a tower.
14	0+	3 30 1	51	6	55	Watchet Hill, the center.
14	17 $\frac{1}{2}$	3 34 23	51	26	44 $\frac{1}{2}$	St. Hilary's Church.
14	29—	3 37 12	51	35	49	A remarkable Hill.
14	29 $\frac{1}{2}$	3 37 24	51	24	39	Llanmace Church.
14	31 $\frac{1}{2}$	3 37 52	51	12	42 $\frac{1}{2}$	Minehead.
14	32+	3 38 2	51	25	0—	Frampton-house.
14	34 $\frac{1}{2}$	3 38 38	51	24	13	Llantwit Church.
14	36+	3 39 1	51	23	29	Station, west extremity of the base.
14	37 $\frac{1}{2}$	3 39 22	51	28	28 $\frac{1}{2}$	Llangwynnewar Hill, east part.
14	45	3 41 15	51	23	49	St. Donat's Castle.
14	57—	3 44 14	51	13	29 $\frac{1}{2}$	Porlock or Hufon Point.
15	48 $\frac{1}{2}$	3 57 7	51	13	54	Leemouth.
16	42 $\frac{1}{2}$	4 10 35	51	12	22	Hangman Hill.

The names of the places here set down were pointed out to me by persons who seemed well acquainted with the surrounding country. The breadth of the Severn at that part where I took the angles is about $12\frac{1}{9}$ miles. However coarse these trigonometrical operations may appear, when compared to those made so scientifically, and with such wonderful exactness, in the southern parts of the kingdom, they nevertheless settle the geographical situations of the given places with more precision than is usually obtained, even from a series of astronomical observations.

Perhaps some gentlemen in the north of Devonshire or Somersetshire may be induced to continue similar operations, when they consider with what little trouble they may be made, as the distances between any of the towns I have determined may suffice for a base.

