

XXXIII. *Meteorological Observations at Caën in Normandy; for 1765, 1766, 1767, 1768, 1769. By Nathanael Pigott, Esq; communicated by the late Dr. Bevis, F. R. S.*

Read May 9, 1771.

1765.

Months	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
January	31 9	Greatest height Leaf ditto	30,20 29,10	29,65			Wind chiefly S. S. W. 15th frost in the morning; the rest of the month was cloudy.
	8 31	Greatest ditto Leaf ditto			46,5 37,5	42	
February	24 28	Greatest ditto Leaf ditto	30,14 28,87	29,505			
	27 19	Greatest ditto Leaf ditto			44,5 33 5	39	
March	8 23 1	Greatest ditto Leaf ditto	30 02 28,97	29,495			
	24 1	Greatest ditto Leaf ditto			51,0 40,0	45,5	
April	12 20	Greatest ditto Leaf ditto	30,38 29,57	29,975			
	27 28 13	Greatest ditto Leaf ditto			67,5 47,5	57,5	
May	12 15 24	Greatest ditto Leaf ditto	30,24 29,56	29,90			
	22 23 5	Greatest ditto Leaf ditto			67,0 53,0	60,0	
June	9 16 17	Greatest ditto Leaf ditto	30,22 29,78	30,00			
	4 5 29 30	Greatest ditto Leaf ditto			70,0 61,0	65,5	

Month

Meteorological Observations, at Caën in Normandy.

1765.

Months	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
July	4	Greatest height	30,28	29 99			Wind most in the northern points; beginning, cloudy sky; middle, sun with clouds; end, windy and sun with flying clouds; 25th at 7h. P.M. therm. 77°.
	7	Least ditto	29,70				
	19 1	Greatest ditto. Least ditto			72,0 62,0	67,0	
August	18	Greatest ditto	30,30	29,66 +			These observations are from the 10th to the 24th only. Wind variable; the beginning showery; 12th stormy; end, sunshine and clouds.
	22	Least ditto	29,03				
	23 12	Greatest ditto Least ditto			76,0 59,0	67,5	
November	21	Greatest ditto	30,27	29,645			Wind variable: beginning rainy; middle foggy; end, white frost in the mornings.
	25	Least ditto	29,02				
	1 23-24	Greatest ditto Least ditto			56,0 42,0	49,0	
December	16	Greatest ditto	30,34	29,73			Wind chiefly in the East points: beginning frosty: 5th hard frost; 8th, 9th, 10th, 11th, rain; remainder, almost constant frost.
	11	Least ditto	29,12				
	8 25	Greatest ditto Least ditto			51,0 37,0	44,0	

1766.

January	29	Greatest ditto	30,72	30,375			Wind chiefly E. S. E. from the beginning till the 20th, foggy and cloudy till the 30th; 31st, frost, 29th, 30th, 72 inches: height of barometer carefully set down.
	2	Least ditto	30,03				
	31 11	Greatest ditto Least ditto			40,0 27,0	33,5	
February	19	Greatest ditto	30 61	30,065			In the beginning wind in the North points; in the middle in the South; at the end to the Northern points; frost till 11th; wind and rainy till the end.
	17	Least ditto	29,52				
	15 8	Greatest ditto Least ditto			45,0 30,0	37,5	

Meteorological Observations at Caën in Normandy.

1766.

Month	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
March	7	Greatest height	30,29	29,565			Wind variable; 1st, 22d, stormy; 26th hurricane; 23d, 24th, 25th, wind and snow in the nights. The whole month mostly cloudy: from 25th to 26th, quicksilver fell in barometer 0,67 inches.
	26	Least ditto	28,84				
	13	Greatest ditto			53,0	46,5	
	1 3	Least ditto			40,0		
April	7	Greatest ditto	30,40	29,875			Wind variable; most part of the month rain and wind.
	24	Least ditto	29,35				
	27	Greatest ditto			57,0	52,5	
	1	Least ditto			48,0		
July	4	Greatest ditto	30,08	29,885			These observations from the 2d to the 16th only. Wind variable; cloudy and rainy.
	9	Least ditto	29,69				
	10	Greatest ditto			70,5	66,75	
	3	Least ditto			63,0		
August	26	Greatest ditto	30,27	30,065			Wind at beginning in the North points; middle variable; end in the South points. Clouds and wind almost the whole month.
	22	Least ditto	29,86				
	9	Greatest ditto			76,0	70,0	
	17	Least ditto			64,0		
September	17	Greatest ditto	30,38	29,99			Wind till towards the end varying; from the 25th S. S. E. Clouds and wind the whole month.
	7	Least ditto	29,60				
	27	Greatest ditto			72,0	66,0	
	16	Least ditto			60,0		
October	2	Greatest ditto	29,84	29,555			Wind mostly E. S. E. the end of the month variable; clouds and wind; 6th stormy: these observations from the 1st to the 10th only.
	8	Least ditto	29,27				
	5	Greatest ditto			70,0	66	
	9	Least ditto			62,0		

Meteorological Observations, at Caën in Normandy.

1767.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
January	21	Greatest height	30,10	29,575			Wind mostly S. S. E. this month frosty; sometimes sharp and high winds.
	13	Least ditto	29,05				
	30	Greatest ditto			52,0	41,25	
	13	Least ditto			30,5		
February	1	Greatest ditto	30,03	29,665			Wind most in the South points. Rainy and windy from the 9th to the 15th. These observations only down to the 15th.
	8	Least ditto	29,30				
	1	Greatest ditto			54,0	52,0	
	10	Least ditto			50,0		
May	24	Greatest ditto	33,30	29,86			Wind varying the whole month, mostly rainy and windy.
	30	Least ditto	29,42				
	16	Greatest ditto			62,0	58,5	
	4	Least ditto			55,0		
June	10	Greatest ditto	30,15	29,77			Wind varying. 3d stormy; the whole month windy and rainy.
	3	Least ditto	29,39				
	29	Greatest ditto			65,5	60,25	
	3	Least ditto			55,0		
July	18	Greatest ditto	30,02	29,825			Wind varying. 21st stormy; from the 11th to the 30th cloudy and rainy. Few flies yet in the apartments, and those cannot fly.
	21	Least ditto	29,63				
	16	Greatest ditto			67,0	65,0	
	12	Least ditto			63,0		
September	13	Greatest ditto	30,16	29,89			These observations only from the 1st to the 15th; wind varying; weather changeable.
	4	Least ditto	29,62				
	4	Greatest ditto			72,0	68,0	
	15	Least ditto			64,0		

Meteorological Observations at Caën in Normandy.

1767

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
October	15	Greatest height	30,16	29,92			These observations from the 7th to the 20th only. Wind most in the North points, chiefly cloudy, some rain.
	8	Least ditto	29,68				
	8	Greatest ditto			62,0	57,5	
	14	Least ditto			53,0		
November	28	Greatest ditto	30,37	29,79			These observations from 14th to 29th only. Wind chiefly in the S. points; 18th, 21st, 22d, sun-shine and small frost. 16th the leaves fall green on the trees.
	15	Least ditto	29,21				
	27	Greatest ditto			54,0	50,5	
	23	Least ditto			47,0		
December	3	Greatest ditto	30,44	29,815			23d began to freeze very hard with N. N. E. wind. See an account of this frost lower down. 1st, most trees have leaves, but yellow and begin to fall. 13th, the trees stripped of their leaves.
	20	Least ditto	29,19				
	8	Greatest ditto			54,0	43,5	
	27	Least ditto			33,0		

1768

January	5	Greatest ditto	30,00	29,55			Wind mostly in the East points. 1st, much snow; high wind; hard frost to the 8th; 8th, thaws. The rest of the month rainy and windy.
	8	Least ditto	29,10				
	30	Greatest ditto			52,5	37,25	
	6	Least ditto			22,0		
February	6	Greatest ditto	30,37	29,965			In the beginning wind in the N. points: at the end in the S. This month mostly windy, cloudy and rainy.
	10	Least ditto	29,56				
	14	Greatest ditto			57,0	50,5	
	4	Least ditto			44,0		

Meteorological Observations at Caën in Normandy.

1768

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
March	4 11	Greatest height	30,39	29,705			Wind chiefly E. towards the N. greatest part of this month frosty.
	15	Least ditto	29,02				
	1	Greatest ditto			57,0	50,5	
	11 12	Least ditto			44,0		
April	11	Greatest ditto	30,16	29,795			Wind changing; 6th, storm of thunder, lightning, and hail, at 5 h. P.M. lightning fell on the church, called Abbaie aux Dames, ran over the choir with quick serpentine motion, and then disappeared without any further mischief; 29th, rain and thunder at 11 h. $\frac{1}{2}$ A. M.
	29	Least ditto	29,43				
	17	Greatest ditto			61,0	56,0	
1	Least ditto			51,0			
May	23	Greatest ditto	30,17	29,76			Wind chiefly in the N. points. This month was windy, and the sun shone with white broken clouds. 5th, at 10 h. P.M. storm of thunder, lightning and rain.
	29	Least ditto	29,35				
	23	Greatest ditto			70,0	63,0	
2 19	Least ditto			56,0			
June	21	Greatest ditto	30,16	29,855			Wind chiefly in the Westerly points. 7th, at 4 h. P.M. storm of hail thunder and lightning; from 9th to 22d, windy and rainy; 24th, stormy, with rain thunder and lightning.
	26	Least ditto	29,55				
	24	Greatest ditto			69,0	65,8-	
20	Least ditto			62,5			
July	21	Greatest ditto	30,14	29,845			Wind chiefly in the Westerly points. This month cloudy and windy, with some rain.
	7	Least ditto	29,55				
	1	Greatest ditto			73,0	69,0	
20	Least ditto			65,0			
August	9	Greatest ditto	30,13	30,015			These observations from the 3d to the 13th only. Wind most in the Western points; sky partly cloudy, partly clear.
	4	Least ditto	29,96				
	12	Greatest ditto			70,0	68,0	
9	Least ditto			66,0			

Meteorological Observations at Caën in Normandy.

1768.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
September	14	Greatest height	30,03	29,74			These observations from the 7th to the 15th only. Wind unfettled. 12th, some thunder in the morning; the other days wind, clouds or rain.
	12	Least ditto	29,45				
	14	Greatest ditto			65,0	62,7+	
	8	Least ditto			60,5		
October							October 30th, betwixt 12 h. and 13 h. at Harcourt, about 5 leagues S. W. of Caën, several gentlemen saw a ball of fire of a whitish colour, apparently of about a foot diameter, which cast a great light in the room, though the curtains were drawn, and there was a great fire and several wax lights in it: its direction from N. to S. It fell with great velocity, and seemingly about 30 or 40 yards from the room, without any explosion. I had just left the apartment, but was immediately informed of it; about 3 hours after, there was a violent hurricane of wind, hail and rain.
November	19	Greatest ditto	30,22	29,41			Barometer at noon the 21st 29,43
	23	Least ditto	28,60		ditto — — 22d 28,46		
	15	Greatest ditto			54,0	49,0	fell in 24 hours 0,97
	23	Least ditto			44,0		22d, continued rain; at 10 $\frac{1}{2}$ P. M. smart flashes of lightning with thunder. Wind varying this month and the weather cloudy, rainy and windy; 15th leaves begin to fall.
December	12	Greatest ditto	30,40	29,77			Wind chiefly in the Southern points. 2d storm of wind and rain; 14th hard frost. The weather this month unfettled.
	2	Least ditto	29,14				
	1	Greatest ditto			52,0	42,0	
	15	Least ditto			32,0		

Meteorological Observations, at Caën in Normandy.

1769.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
January	14 1	Greatest height Least ditto	30,16 29,49	29,825			Wind chiefly in the Southern points, cloudy, wind and rain; 24th white frost; 22d white frost: the weather this month unfetted.
	13 22 24	Greatest ditto Least ditto			50,0 39,5	44,7 +	
February	20 5	Greatest ditto Least ditto	30,19 29,26	29,725			Wind mostly in the Eastern points. 4th at 11 h. P. M. hurricane, morning generally white frost. From the 22d to the end of the month, rainy, cloudy, and high wind.
	28 1	Greatest ditto Least ditto			53,0 39,0	46,0	
March	3 11	Greatest ditto Least ditto	30,47 29,20	29,835			Wind in the Northern and West points. All this month clouds and wind; little rain.
	4 10 31	Greatest ditto Least ditto			55,0 46,0	50,5	
April	24 8	Greatest ditto Least ditto	30,13 29,08	29,605			Wind at beginning in the North points; at the middle in the South points; at the end in the North points; 22d, white frost in the morning; the rest of the month chiefly rainy and windy.
	28 2.3.4.5 6	Greatest ditto Least ditto			62,5 46,0	54,2 +	
May	2 14	Greatest ditto Least ditto	30,39 29,50	29,945			Wind varying; 18th, at 3 h. P. M. thunder; 20th at 4 h. P. M. rain with thunder and lightning; 23d, at 11 h. P. M. thunder and lightning; 23d, at 3 h. $\frac{1}{2}$ P. M. ther. 75°; 27th, at 4 h. P. M. a very heavy rain. This month mostly windy and rainy.
	23 13	Greatest ditto Least ditto			73,0 54,0	63,5	
June	11 15	Greatest ditto Least ditto	30,19 29,65	29,92			These observations from 2d to the 19th only; wind chiefly in the W. points. This month cloudy, windy and rainy.
	9.10.13 15	Greatest ditto Least ditto			65,0 61,0	63,0	



Meteorological Observations at Caën in Normandy.

1769.

Month	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
July	10	Greatest height	30,16	29,60			These observations from 6th to 16th only; wind variable; first days clouds; the last days clear sun.
	8	Least ditto	29,04				
	7	Greatest ditto			76,0	72,5	
	10	Least ditto			69,0		
August	18	Greatest ditto	30,12	29,81			
	22	Least ditto	29,50				
	15	Greatest ditto			70,0	66,7+	
	21	Least ditto			63 5		
September	16	Greatest ditto	30,17	29,785			
	12	Least ditto	29,40				
	6 19	Greatest ditto			71,0	65,5	
	26	Least ditto			60,0		
October	10	Greatest ditto	30,30	29,98			
	22	Least ditto	29,66				
	19 20	Greatest ditto			63,0	55,8	
	7	Least ditto			48,6		
November	28	Greatest ditto	30,52	30,035			
	22 23	Least ditto	29,55				
	27	Greatest ditto			55,0	47,5	
	20	Least ditto			40,0		
December	4	Greatest ditto	30,38	29 59			
	23	Least ditto	28,69				
	23	Greatest ditto			55,0	49,0	
	8	Least ditto			43,0		

Meteorological Observations at Caën in Normandy.

Inches 1765	Mean height of Barometer	Inches	Mean height of Barometer.	Remarks
29,650	January	29,550	January 1768	These observations were made at noon, in a South-West room, with a barometer, whose tube is about $\frac{3}{8}$ of an inch diameter; in which the motion of the quicksilver, in squalls and gusts of wind, is extremely perceptible; yet, for further satisfaction, I ordered another to be made in London, with the greatest care, by Heath and Wing, with a nonius giving the $\frac{1}{100}$ part of an inch. I placed this barometer by the other, in July 1769; and having compared them every day for a year, I find that the ancient one marks $\frac{1}{100}$ of an inch more than the other; therefore, if from the mean height as above — 29,802 be deducted — 0,050 the true mean height is 29,752
29,505	February	29,965	February	
29,495	March	29,705	March	
29,975	April	29,795	April	
29,900	May	29,760	May	
30,000	June	29,855	June	
29,990	July	29,845	July	
29, 66 +	August	30,015	August	
	September	29,710	September	
29,645	November	29,410	November	
29,730	December	29,770	December	
29,655	mean of these means	29,828 +	mean of these means	
30,375	January 1766	29,825	January 1769	The greatest height observed, at noon, was, Jan. 29, 1766, 30,72 The least, Dec. 23, 1769, at 8 h. P. M.
30,065	February	29,725	February	
29,565	March	29,835	March	
29,875	April	29,605	April	
29,885	July	29,945	May	
30,065	August	29,920	June	
29,990	September	29,600	July	
29,555	October	29,810	August	
		29,785	September	
29,992 —	mean of these means	29,98	October	
		30,035	November	
		29,590	December	
29,575	January 1767		mean of these means	Limits of the motion of quicksilver — 2,03
29,665	February			
29,860	May	29,805		
29,770	June			
29,825	July	Mean height	In the years	
29,890	September			
29,920	October	29,665	1756	
29,790	November	29,922.	1766	
29,815	December	29,790	1767	
		29,828 +	1768	
		29,805	1769	
29,790	mean of these means		mean of these means	
		29,802		

Hence it appears, that if the mean height of barometers, on a level with the surface of the sea, be supposed, with Dr. Scheuchzer, Phil. Trans. N<sup>o</sup> 405, 406, 29,993 inches and the mean height at Caën, — — 29,752 ditto

0,241 the diff.

will be the greater mean weight of the atmosphere at the surface of the sea, then at Caën: and if, with the Doctor, we allow, for each tenth of an inch depression of the quicksilver, 90 feet elevation, my room, which is in the highest part of the town, will be about 217 feet above the level of the sea.

Monsieur de Luc, of Geneva, has given a method to measure the different elevation of places by barometers, grounded on his own observations, far more exact than any other before him; his rule is, “the difference of the logarithms of the height of the quicksilver, in the two places, reduced into French lines, and the logarithms carried to five places, including the characteristicks, will give the difference of elevation in toises, if Fahrenheit’s thermometer be nearly at 66°; but about  $\frac{1}{8}$  must be deducted from the elevation so given, if the thermometer be at 55° or temperate.”

29,993 English inch. = 337,824 French lines log. 25286,8  
29,752 ditto = 335,110 ditto log. 25251,9

diff. 34,9 toises

or 209 4 French feet = 223 English feet nearly; from which if  $\frac{1}{8}$  = 12  $\frac{1}{2}$  nearly be deducted, 210  $\frac{1}{2}$  feet remain for the difference of elevation of my room and the surface of the sea, which differs 6  $\frac{1}{2}$  feet from the result given by the first hypothesis.

The greatest height observed, in these five years, with a good Fahrenheit’s thermometer screened from the sun, in a S. W. room, was as follows at noon:

1765 August 23d }  
1766 August 9th } 76°  
1765 June 7th }

the least height of ditto Jan. 6th 1768 — — 14

1765 August 23, exposed the thermometer, at noon, to the sun, suspended on a thread between two sticks, in the middle of my garden at Caën, which may be about two English acres, so that the thermometer received the least reflected heat possible in that place; the quicksilver stood as follows,

at 1<sup>h</sup> P. M. 97°

at 2 ditto 96

1765 August 26, at a village, called *les Iles Bardelles*, 7 leagues from Caen, the same thermometer, in a South room, from which the sun was excluded by the window shutters, rose to 90°.

An Account of a remarkable degree of cold observed at Caën in Normandy.

1767	Ther.	Hours	Barometer
December	°	h /	Inch.
24	+ 12	at 8 0	30,02
	+ 16	at 9 0	30,02
25	+ 18	at 11 0	29,9 { little wind at E. S. E. small fog. cloudy.
	+ 15	at 12 44	
	+ 18	at 21 45	
		at 22 00	
26	+ 15	at 10 00	29,67 wind N. E.
	+ 11	at 19 00	
	+ 12	at 21 00	
		at 22 00	
27	+ 17	at 7 00	29,49 no wind.
	+ 16½	at 8 00	
	+ 12	at 10 00	
	+ 11	at 11 00	
	+ 10	at 18 00	
	+ 10	at 20 00	
28	+ 15	at 8 20	29,46 { little wind S. S. E. flying clouds.
	+ 14	at 11 00	
	+ 13	at 19 00	
	+ 18	at 22 00	
30	+ 23	at 7 00	29,84 little wind S. flying clouds
	+ 20	at 10 00	
	+ 11	at 19 00	
	+ 14	at 21 00	
		at 22 00	

An Account of a remarkable degree of cold, observed at Caën in Normandy.

1768	Ther.	Hours	Barometer.
January	o	h /	
3	+ 10	at 11 00	
	+ 9	at 20 00	
	+ 11	at 5 00	
	+ 10	at 6 00	
	+ 8	at 8 00	
4	+ 6	at 9 15	
	0	at 12	
	- 8	at 19 30	
	0	at 21 0	30,03 clear sky, no wind.
		at 19 0	30,00 wind W. by S.
	- 2½	at 5 30	
	- 2	at 6 30	
	- 2	at 8 00	
	+ 1	at 9	
	0	at 9 30	
	- 3	at 10 00	
5	0	at 10 35	
	0	at 11 00	
	+ 3	at 19 30	
	+ 6	at 20 00	
	+ 7	at 21 00	
	+ 8	at 21 30	
	+ 10	at 22 15	
	+ 14	at noon	
6	+ 12	at 7 15	
	+ 14	at 8 45	
	+ 13	at 10 00	

N. B. The sign + signifies, that the degrees marked by the quick-silver were above 0, or the beginning of the division. The negative sign — signifies, that the degrees were below 0, or the beginning of the divisions. The thermometer was exposed in the open air to the North. The hours are astronomical hours.

Experiments on some Liquids.

1768	H. M.	
Jan. 3	11 30	I placed a wine glass half full of rack, another half full of rum, in a North window, to the open air: the next day, at the same hour, the rack was frozen to a thick jelly, with icy particles; the rum also to a jelly, but less thick.
	4 50	I exposed, as above, a wine glass, half full of cyder: ditto of beer.
	5 13	Ditto of red wine, called Beaujenci.
	6 30	The cyder began to freeze. Ditto consolidated.
4	5 5	The beer began to freeze.
	6 30	Ditto consolidated.
	5 12	The wine began to freeze.
	6 30	Ditto nearly consolidated.
		The icy surface of the cyder being broken, it froze over again, in three or four seconds, the ice forming, with a progressive motion, very perceptible to the eye.
	9 00	I exposed, as above, a wine glass half full of Malaga wine.
		Half ditto of Burgundy, called Migraine.
		Half ditto of Rouffillon wine.
		Half ditto of spring water.
		Half ditto of cyder-brandy
5	9 15	The water began to freeze.
	9 30	Ditto consolidated.
	9 30	The Malaga, Migraine, Rouffillon, began to freeze.
	11 00	Ditto ditto ditto consolidated.

N. B. The brandy did not freeze; but the 6th at noon, the quantity was diminished, and some icy particles stuck to the glass, above the surface of what remained. I found, by weighing the above liquids hydrostatically, in a temperate state of heat, that the migraine, cyder, beaujenci, boer, and the water, were very nearly of the same specific gravity; and that a piece of gold, which

weighed in the water	-	-	224,25 grains,
weighed in the Malaga	-	-	224,00 ditto,
in the Rouffillon	-	-	224,50 ditto,
in the brandy	-	-	225,00 ditto.