

XXXV. *Letter from the Hon. Daines Barrington, F. R. S. to William Heberden, M. D. F. R. S. giving an Account of some Experiments made in North Wales, to ascertain the different Quantities of Rain, which fell in the same Time, at different Heights.*

S I R,

December 24, 1770.

Read June 6,  
1771.

AS I happened to be at the meeting of the Royal Society, when your experiments were read, relative to the different quantities of rain, which fell within receivers of the same dimensions at different heights from the ground; it occurred to me, that the same trials might be made at more disproportionate heights, though at the same distance from the surface of the earth.

I accordingly directed two rain-gages of exactly the same dimensions to be made by your instrument-maker, which you was so obliging as to take the trouble of examining.

As I proposed to keep them at the top and bottom of a Welch mountain, and am not stationary a sufficient time in the Principality to attend to a long course of such observations; I sent the rain-gages to Mr.

Mr. Meredith Hughes, of Bala, in Merionethshire, who is a very ingenious land-surveyor, and, from his philosophical turn, would be pleased with executing the commission, though a very troublesome one.

I directed him to place one of the rain-gages at the top of Rennig, which is about four miles West of Bala, and is commonly considered as the fifth mountain of North Wales, in point of height\*.

I directed the other rain-gage to be fixed near a house, called Bochyrrhaidr, at about half a mile's distance from Rennig; and so as that the rain might not be impeded when the wind blew over the mountain towards the point where the lower rain-gage was placed. Proper precautions were also taken, that neither cattle, nor any other accident, should interfere with the experiment.

Being desirous to know with some degree of precision the height of this mountain, I directed Mr. Hughes to ascertain it in the common method, by examining the fall of the mercury in the barometer, at the top, when compared with its state at the bottom. Having made this experiment, he informed me, that the difference was one inch and sixteen ths, which according to Dr. Halley's method of computation, would give about 450 yards in height, from the adjacent plain.

By the following table it will appear, that the quantities of rain, which had fallen in the two rain-

\* I rather suppose it, however, to be only the sixth, and should range them thus, according to their comparative heights: Carnedd Llewelin, Snowdon, Cader Idrys, Arran Mowddy, Glider, and Rennig. I place Carnedd Llewelin before Snowdon, because I carried a water level to the top of the latter, and conceived Carnedd Llewelin to be higher; perhaps the difference may be only a few yards.

gages were weighed six several times ; in three of which the contents of the upper receiver exceeded those of the lower ; and in the three others, the quantity in the lower exceeded that of the upper. On the whole, however, the contents of the lower rain-gage exceeded that of the upper above half an inch. This trifling difference therefore seems to arise from a shower's lasting perhaps a little longer on the bottom of the mountain, and not from any permanent cause, as in your observations.

I am persuaded; that these experiments have been made with the greatest attention and accuracy, as I was at Bala in August last, and found that all my directions had been most punctually followed.

The inference to be drawn however from them (such as they are) seems to be, that the increase of the quantity of rain depends upon its nearer approximation to the earth, and scarcely at all upon the comparative height of places, provided the rain-gages are fixed at about the same distance from the ground.

Possibly also a much controverted point between the inhabitants of mountains and plains may receive a solution from these experiments ; as in an *adjacent valley, at least*, very nearly the same quantity of rain appears to fall within the same period of time as upon the neighbouring mountains. I am, Sir,

Your most faithful

humble servant,

Daines Barrington.

1770.	Bochyraidr.	The top of Rennig.
	Grains      Inches.	Grains.      Inches.
From July 6th to 16th	5080 = 0,709	4643 = 0,648
July 16th to 29th	15654 = 2,185	15217 = 2,124
July 29th to Aug. 10th	4370 = 0,610	4698 = 0,656
Sept. 9th both bottles had run over.		
Sept. 9th to 30th	23167 = 3,234	17648 = 2,464
Oct. 17th both bottles had run over.		
Oct. 17th to 22d	5353 = 0,747	6336 = 0,885
Oct. 22d to 29th	9179 = 1,281	9944 = 1,388
Nov. 20, both bottles were broken by the frost.	<hr/> 8,766	<hr/> 8,165

# N O T E.

It may not be improper to subjoin to the foregoing account, that, in the places where it was first observed, that a different quantity of rain would be collected; according, as the rain-gages were placed above or below the tops of the neighbouring buildings, the rain-gage below the top of the house, into which the greater quantity of rain had for several years been found to fall, was above fifteen feet above the level of the other rain-gage, which in another part of London was placed above the top of the house, and into which the lesser quantity always fell. This difference therefore does not, as Mr. Barrington justly remarks, depend upon the greater quantity of atmosphere, through which the rain descends: though this has been supposed by some, who have thence concluded, that this appearance might readily be solved by the accumulation of more drops, in a descent through a greater depth of atmosphere. W. H.