

VII. *An Account of an Experiment made before the Royal Society, touching the Proportion of the Weight of Air, to the Weight of a like Bulk of Water, without knowing the Quantity of either.* By Mr Fra. Hauksbee, F. R. S.

I Took a Bottle somewhat of an Oval form, ( which I had purposely caus'd to be made so, that it might with more ease Librate in Water. ) It held more than three Gallons, ( but how much we have no occasion to know. ) Into this Bottle I put as much Lead as would sink it under the surface of the Water, and was, when weigh'd in that Element, Ballanc'd by a small Weight in the scale on the other end of the Beam. I chose to include my Weight, to prevent the Inconveniency of Bubbles of Air, which I knew would plentifully adhere to and lurk in the Irregular Body of the Weight, had it been fixt on the outside; and must ( I think ) of necessity make an Error in an Experiment which requires so great a Nicety as this. Thus provided, the Bottle being clos'd with Common Air, was by a Wire suspended at one end of a very good Ballance, and being in the Water, was Counterpois'd by a Weight of 385 Grains and a half in the Scale hanging on the other end. Then being taken out and screw'd to the Pump, it was in 5 minutes of Time pretty well exhausted, the Mercury in the Gage being Elevated to near 29 inches and a half. It was then taken off the Pump, but first, by Turning a Cock that screw'd both to it and the Pump, the Air was prevented from Returning into it. In

this manner it was again put into the Water, and suspended as before on the Ballance, and it then weigh'd but 175 Grains and a half, which Subtracted from the first Weight, gave 183 Grains the Difference; and was the weight of the Quantity of the Air drawn from the Bottle by the Pump. Then opening a Cock under Water, the Water was at first violently Impell'd in the Bottle, ( but Abating Gradually of its force, ) till such a quantity was enter'd as was equal to the bulk of Air withdrawn. ( So that by Making the Experiment after this manner, a person need not be very solicitous in the nice Exhaustion of the Receiver, for it must of necessity Answer Reciprocally to the Respective Quantities taken out, the Remaining Air being weigh'd at last as well as at first; and no greater quantity of Water can Enter the Receiver, than what will supply the space deserted by so much Air. ) The Bottle now being again weigh'd, it was found to be 162132 Grains. From which 175 Grains and a half being subtracted, ( which is the weight of the Bottle more than its like bulk of Water ) there remain'd 161956 Grains and a half, which being divided by 183 Grains, the weight of the Air taken out of the Receiver, gave the Proportion as 885 to 1. The *Averdupoize* Weights being brought to Ounces, I reduc'd to Grains, by multiplying them by 438, the just number of Grains contain'd in an Ounce of that Weight. The Column of *Mercury* in the Barometer at the same time Measuring 29.7 Inches. The Season of the Year is to be consider'd, ( which was *May* ) and I doubt not but if the Experiment be Repeated in *December* or *January*, a sensible difference will ensue.