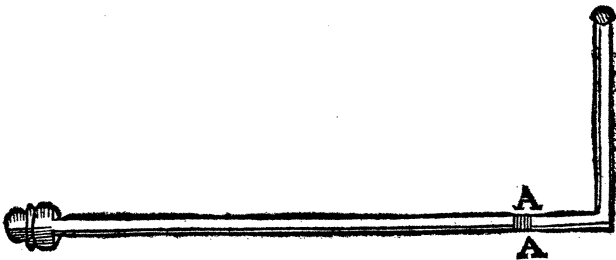


III. *An Account of an Experiment touching the different Densities of the Air, from the greatest Natural Heat, to the greatest Natural Cold in this Climate.*  
By Mr. Fr. Hauksbee, F. R. S.

I Took a Glas Tube about 2 Feet in length, and near two tenths Diameter; which at about 6 Inches from one end, I bent in form of a Syphon, as represented by the Figure: at whose end, which was farthest distant



from the Angle, I cemented on a Brass Screw with a small Perforation in it; by which means, when I put a little Quicksilver into the shorter Leg, I could by declining the Tube, or longest Leg, bring it to rest any where; as suppose at A A. the superfluous Air within passing the premention'd Perforation. Then screwing a Cap on it, the Mercury was detain'd in the same Place, and possess'd in length about half an Inch. In this manner it was convey'd into a Wooden Trough, with a Thermometer: Then putting in as much warm Water as would cover its Ball, the Syphon lying at Bottom in an Horizontal  
O Position,

Position, its shorter Leg appearing above the Water, (which was purposely so contriv'd to prevent any Inconvenience that might arise by the Waters getting into it, and to give a free liberty for the pressure of the outward Air to exercise its full power.) When the Spirit of Wine had ascended by the heat of the Water into its small Ball on top, which I thought was necessary, that I might make my Observations with the more exactness upon its Descent; supposing by that time it should fall to the Degree design'd to begin at, that the Spirit in the Ball, would have receiv'd an equal Degree of heat in all its Parts. Accordingly I began my Observations, when it had descended to 130 Degrees above the Freezing Point; at which time, I found the length of the Column of Air, from the closed end of the Syphon, to the nearest Surface of the Quicksilver, to be just 144 tenths of an Inch. After the Spirit had descended 10 Degrees lower, the Air, which before possess'd 144 Parts, lack'd one of them now; and so on successively at every 10 Degrees descent of the Spirit, the Column of the contain'd Air was lessen'd in its length one exact tenth. When it had descended to 30 Degrees above the Freezing Point, the Air was found to possess but 134 of the prementioned Parts: So that from hence it will be easie to conclude, that at the Freezing Point, the Air in the Syphon would be reduc'd to 3 tenths less than the last Observation. And consequently at 50 Degrees below the Freezing Point, (which I am inform'd is the greatest degree of Cold that has happen'd in our Climate,) it would be reduc'd to 126 Parts of the whole, and in that state would be one eighth more dense than when at the greatest Degree of our Natural Heat: and the Reason why I could not prove this latter part by Experiment was, that when I came to expose the Thermometer and Syphon in the open Air, or Freezing Mixture, the Syphon would instantly

stantly receive the Impression of the Cold, and the Air contain'd in it be considerably contracted, before the Thermometer gave any sign of such Alteration. But seeing the former part of the Experiment succeeded so exactly regular, I think there can be no doubt of the truth of the whole Calculation, which yet I do not see how better to be perform'd. I shall add a Table of the different Degrees of the Airs density at every 10 Degrees, from 130 above the Freezing Point, to 50 Degrees below it.

This Experiment was made *February* the 11th, 1708; the Mercury in the Barometer at the same time standing at 30 Inches

	Degrees.	Parts.	
	130	144	$\frac{1}{144}$
	120	143	$\frac{1}{143}$
	110	142	$\frac{1}{142}$
	100	141	$\frac{1}{141}$
	90	140	$\frac{1}{140}$
	80	139	$\frac{1}{139}$
Above.	70	138	$\frac{1}{138}$
	60	137	$\frac{1}{137}$
	50	136	$\frac{1}{136}$
	40	135	$\frac{1}{135}$
	30	134	$\frac{1}{134}$
	20	133	$\frac{1}{133}$
	10	132	$\frac{1}{132}$
Freezing Point. }	0	131	$\frac{1}{131}$
	10	130	$\frac{1}{130}$
Below.	20	129	$\frac{1}{129}$
	30	128	$\frac{1}{128}$
	40	127	$\frac{1}{127}$
	50	126	$\frac{1}{126}$

This Table shews the Difference of the Airs Density at every 10 Degrees, from 130 above the Freezing Point, to 50 below it. As supposing the Spirit in the Thermometer should stand at 40 Degrees above the Freezing Point; I find right against it in the third Column  $\frac{1}{127}$ : Its State being then so much more dense than when the Spirit is elevated to 130 Degrees. And so of all the rest.

The 2d Column shews the extent of the Air at the several Stations, from the Greatest Heat, to the Greatest Cold.