Boyle this sentiment was not laid aside. He relates, that a friend of his, by distilling a quantity of water an hundred times, found at length that he had got six-tenths of the first quantity in earth : whence he concludes, that the whole water, by further prosecuting the operation, might be con­verted into earth. Others have made experiments to the same purpoſe, and seemingly with the same ſucceſs ; but the deception is now found out. Water has the power of corroding the hardest bodies, even glaſs itſelf, by long digestion, eſpecially when assisted by heat ; and hence thoſe who have made the experiments just mentioned have been themſelves deceived, by ſupposing the earth which really came from the containing vessel to come from the water.

Margraaf made ſeveral experiments to determine whether water be tranſmutable into earth, and found that after every distillation a ſediment was left. Lavoisier repeated Margraaf’s experiments, and gave the explanation which we alluded to, that the ſediment consisted of portions of the glass ſeparated by the water. Dr Black, in the valuable courſe of lectures which he has for many years delivered, with ſo much honour to himself, and ſo much to the ad­vancement of the ſcience of chemistry, goes still farther : he ingeniouſly ſupposes, that the alkali, which is an essential ingredient in the composition of glaſs, unites with the water, and makes the glaſs ſwell, and thus occaſions ſmall portions of it to be detached.

*Historical Account of the Diſcovery of the Composition of Water.*

That water is not a simple but a compound ſubstance, consisting of a mixture of vital and inflammable air, is one of the most astonishing and important diſcoveries which has been made since the origin of chemistry, or indeed since the origin of ſcience. The history of this curious and interesting discovery we shall trace back with as much precision and impartiality as poſſible to the first hints which were thrown out upon the ſubject, and endeavour at the same time to assign to all who have contributed to the discovery the merit to which they are respectively intitled.

The first thing that led chemists to make experiments concerning the composition of water, was a letter which Mr John Warltire, lecturer in natural philoſophy, wrote to Dr Priestley, dated Birmingham 18th April 1781, and published in the Appendix to the 5th volume of Dr Priestley’s *Experiments and Obfervations.* This gentleman had long entertained an opinion that the question “ whether heat be a heavy body,” might be determined by burning inflam­mable air mixed with atmospherical air. For some time he was deterred from trying the experiment, from an apprehension that the contequences of passing the electrical spark through ſo combustible a mixture might be attended with danger ; but at length, being encouraged by Dr Priestley, he prepared an apparatus for the purpoſe. He got a cop­per ball weighing 140z. and ſufficient to contain three wine pints, with a screw stopper adapted to it, ſo that no air could eſcape. When he filled this ball with inflammable and common air, and made the electric fpark to paſs thro’ it, a loſs of weight was obſerved, upon an average, about two grains. When the same experiment was made in close glaſs vessels, the inside of the glaſs, though clean and dry before the operation, became immediately wet with dew, and was Fried with a sooty ſubstance. When Mr Warltire ſaw the moisture, he said to Dr Priestley, that it confirmed an opi­nion which he had long entertained, that common air deposits its moisture when it is phlogisticated. After this experiment had been repeated by Dr Priestley and Mr Warltire in company, they next fired a mixture of vital and inflammable air ; but the only effects which they obſerved were, that the light was much more intente, and the heat much greater.

During the same year, and after the publication of the volume of Dr Priestley’s works, referred to above, Mr Cavendiſh repeated the experiments of Mr Warltire ; but though the vessel which he used held 24,000 grains of wa­ter, and though the experiment was repeated ſeveral times with common and inflammable air, he could never perceive a loſs of weight of more than one-fifth of a grain, and common­ly none at all. In all these experiments Mr Cavendiſh did not perceive the least footy matter ; but the inside of the glaſs globe became dewy, as Mr Warltire had obſerved. The inflammable air was procured from zinc.

That he might examine the nature of the dew, he burned 500,000 grain measures of inflammable air with two and a half times that quantity of common air, and the burned air was made to paſs through a glaſs cylinder eight feet long, and three quarters of an inch diameter, in order to deposit the dew. Theſe two kinds of air were mixed and ſet on fire by a lighted candle. In a short time 135 grains of water were condensed in the cylinder, which had no taste nor ſmell, and which left no sensible ſediment when evaporated to dryneſs ; neither did it yield any pungent ſmell during the evaporation : in ſhort, it seemed pure wa­ter. From this experiment Mr Cavendish concluded, that when inflammable and common air are exploded in a pro­per proportion, almost all the inflammable air, and near one-fifth of the common air, lose their elasticity, and are condensed into dew ; which, when examined, is found to be pure water.

He wished next to examine the effect produced by firing a mixture of vital and inflammable air. He took a glaſs globe holding 8800 grain measures, furnished with a brass cock, and an apparatus for firing air by electricity. The globe was exhausted of its air by an air-pump, and then a mixture of 19,500 grain measures of dephlogisticated air, and 37,000 of inflammable air, was conveyed ſuccessively from a glaſs jar, inverted in water, into the globe, and there fired by electricity. At the end of the experiment, when the whole air was conſumed, a condented liquor was found in the globe, weighing about 30 grains, which was sensibly acid to the taste ; and, by ſaturation with fixed alkali and evaporation, yielded near two grains of nitre. This product of nitre must have been occasioned by a mixture of azotic gas, which had combined with part of the oxygene, or dephlogisticated air ; which are now well known to be the component parts of the nitric acid. Theſe experi­ments, Mr Cavendiſh informs us, were made in 1781.

Mr Cavendiſh having mentioned these experiments to Dr Priestley, that gentleman made a course of experiments in order to investigate the same ſubject ; an account of which is published in the Philosophical Transactions for 1783; and in the last volume of his Experiments. Having formerly obſerved ſeveral remarkable changes in fluid ſubstances, in consequence of long expoſure to heat in glaſs vessels her­metically sealed, Dr Priestley formed a design of expoſing all kinds of ſolid ſubstances to great heats in close vessels. As many ſubstances consist of parts ſo volatile as to fly off before attaining any considerable degree of heat in the ufual pressure of the atmosphere, he imagined that if the same ſubstances were compelled to bear great heats under a greater pressure, they might assume new forms, and under­go remarkable changes. Happening to mention these ideas to Mr Watt, the ingenious improver of the steam- engine, Mr Watt mentioned a similar idea of his, that, it might be poſſible to convert water or steam into perma­nent air.