PROCEEDINGS

OF

THE ROYAL SOCIETY.

1839. No. 37.

February 14, 1839.

JOHN W. LUBBOCK, Esq., V.P. and Treas., in the Chair.

The Right Honourable Lord Carrington, was balloted for, and duly elected into the Society.

A paper was read, entitled, "Researches on the Chemical Equivalents of certain Bodies." By Richard Phillips, Esq., F.R.S.

The author examines, by a new series of experiments, the truth of the theory of Dr. Prout and Dr. Thomson, namely, that "all atomic weights are simple multiples of that of hydrogen," a theory which the late Dr. Turner had maintained is at variance with the most exact analytic researches, and consequently untenable. Although the experiments of Dr. Turner, and the inferences which he drew from them, agree very nearly with those of Berzelius, it still appeared to the author desirable to investigate this subject; and it occurred to him that the inquiry might be conducted in a mode not liable to some of the objections which might be urged against the processes usually employed.

Dr. Turner having adopted a whole number, namely 108, as the equivalent of silver, this substance was selected by the author as the basis of his inquiry into the equivalent numbers of chlorine, and some other elementary gases. It appeared to him that the chance of error arising from the fusing of the chloride of silver might be entirely removed, and other advantages gained, by experimenting on silver on a large scale, with such proportions of the substances employed as were deemed to be equivalents; and instead of calculating from the whole product of the fused chloride, to do it merely from the weight of such small portion only, as might arise from the difference between theoretical views and experimental results.

The author concludes, from the train of reasoning he applies to the series of experiments so undertaken, that no material, and even scarcely any appreciable error can arise from considering the equivalent numbers of hydrogen, oxygen, azote, and chlorine, as being 1, 8, 14, and 36 respectively.

A paper was also read, entitled, "Some Account of the Hurricane of the 7th of January, 1839, as it was experienced in the neighbourhood of Dumfries," in a letter addressed to P. M. Roget, M.D. Secretary to the Royal Society. By P. Garden, Esq. Communicated by Dr. Roget.

After describing the position of his house, and the nature of the instruments employed for observation, the writer gives his observations of the barometer and thermometer on the 6th and 7th of January last, and proceeds to state, that on the 6th, at about ten minutes past ten o'clock p.m. violent squalls commenced, at first with intermissions of perfect calms, but gradually becoming more frequent, and being accompanied by the sound of strong and increasing whirlwinds. By eleven o'clock the wind was observed to proceed from the East, and its velocity was estimated at forty miles an hour. Its violence then increased, and threatened to blow down the chimneys. At midnight it abated, at the same time shifting to the south or west. At two o'clock in the morning nearly two tons of lead were torn away by the wind from the west end platform on the house-top, and thrown down behind the house in a westerly direction. Some of the lower windows having been left a little open, the wind thus admitted into the house forced up and blew off the very heavy hatch-door of the roof, which was covered with lead. The whole house rocked terribly, and even the stone floor of the half-sunk kitchen story heaved as if shaken by an earthquake: the slates from the roof were blown in every direction, some being carried to a prodigious distance. During the greater part of the night the rain fell in tremendous torrents. In the interval from two to half-past three in the morning, the barometer sunk very nearly an inch and a half, and reached its greatest depression. But the tempest continued till about four o'clock, when it began gradually to subside. Extensive devastation occurred among the trees; some that were blown down raising two or three tons of clay soil with the roots. Several trees thus thrown down fell with their tops to the W.N.W.

The writer concludes from these and other observations, that the first and squally part of the storm began from the E.S.E., and blew from S. by W. at about midnight; and that most injury was done to the slating and roof when the wind was not far from the south. It then gradually veered to the west, till noon, and reached the N.W. point by eight o'clock in the evening of the same day.

February 21, 1839.

JOHN GEORGE CHILDREN, Esq., V.P., in the Chair.

Captain Arthur Conolly and Lieut.-Colonel William Reid, C.B., R.E., were balloted for, and duly elected into the Society.

A paper was read, entitled, "An Account of the Processes employed in Photogenic Drawing," in a letter to S. Hunter Christie, Esq., Sec. R.S. By H. Fox Talbot, Esq., F.R.S.

The subject, Mr. Talbot observes, naturally divides itself into two heads,—the preparation of the paper, and the means of fixing the design.

In order to make what may be called ordinary Photogenic paper, the author selects, in the first place, paper of a good firm quality and smooth surface; and thinks that none answers better than superfine writing paper. He dips it into a *weak* solution of common salt, and wipes it dry, by which the salt is uniformly distributed throughout its substance. He then spreads a solution of nitrate of silver on one surface only, and dries it at the fire. The solution should not be saturated, but six or eight times diluted with water. When dry, the paper is fit for use. He has found by experiment that there is a certain proportion between the quantity of salt and that of the solution of silver which answers best, and gives the maximum effect. If the strength of the salt is augmented beyond this point, the effect diminishes, and in certain cases becomes exceedingly small. This paper, if properly made, is very useful for all ordinary photogenic purposes. For example, nothing can be more perfect than the images it gives of leaves and flowers, especially with a summer sun. The light passing through the leaves delineates every ramification of their nerves. If a sheet of paper thus prepared, be taken and washed with a *saturated* solution of salt, and then dried, it will be found (especially if the paper has been kept some weeks before the trial is made) that its sensibility is greatly diminished, and in some cases seems quite extinct. But if it be again washed with a liberal quantity of the solution of silver, it becomes again sensible to light, and even more so than it was at first. In this way, by alternately washing the paper with salt and silver, and drying it between times, Mr. Talbot has succeeded in increasing its sensibility to the degree that is requisite for receiving the images of the camera obscura. In conducting this operation it will be found that the results are sometimes more and sometimes less satisfactory in consequence of small and accidental variations in the proportions employed. It happens sometimes that the chloride of silver is disposed to darken of itself without any exposure to the light: this shows that the attempt to give it sensibility has been carried too far. The object is, to *approach* to this condition as near as possible, without *reaching* it, so that the substance may be in a state ready to yield to the slightest extraneous force, such as the feeble impact of the violet rays when much attenuated. Having therefore prepared a number of sheets of paper slightly different from one another in the composition, let a piece be cut from each, and having been duly marked or numbered, let them be placed side by side in a very weak diffused light for about a quarter of an hour. Then, if any one of them, as frequently happens, exhibits a marked advantage over its competitors, Mr. Talbot selects the paper which bears the corresponding number, to be placed in the camera obscura.

With regard to the second object, that of fixing the images, Mr. Talbot observed that after having tried *ammonia* and several other reagents, with very imperfect success, the first which gave him a successful result was the iodide of potassium much diluted with water. If a photogenic picture is washed over with this liquid, an *iodide of silver* is formed, which is absolutely unalterable by sunshine. This process requires precaution; for, if the solution is too strong, it attacks the dark parts of the picture. It is requisite therefore to find by trial the proper proportions. The fixation of the pictures in this way, with proper management, is very beautiful and lasting. The specimen of *lace* which Mr. Talbot exhibited to the Society, and which was made five years ago, was preserved in this manner. But his usual method of fixing is different from this, and somewhat simpler, or at least, requiring less nicety. It consists in immersing the picture in a strong solution of *common salt*, and then wiping off the superfluous moisture and drying it. It is sufficiently singular that the same substance which is so useful in *giving* sensibility to the paper, should also be capable, under other circumstances, of *destroying* it, but such is nevertheless the fact. Now, if the picture which has been thus washed and dried, is placed in the sun, the white parts colour themselves of a pale lilac tint; after which they become insensible. Numerous experiments have shown the author, that the depth of this lilac tint varies according to the quantity of salt used relatively to the quantity of silver. But by properly adjusting these, the images may, if desired, be retained of an absolute whiteness. He mentions also, that those preserved by *iodine* are always of a very pale primrose yellow, which has the extraordinary and very remarkable property of turning to a full gaudy yellow whenever it is exposed to the heat of a fire, and recovering its former colour again when it is cold.

A paper was also read, entitled, "A Description of a Hydro-pneumatic Baroscope." By J. T. Cooper, Esq., Lecturer on Chemistry.

The liability of the ordinary mercurial barometer to derangement and to fracture, led the author to the construction of an instrument for measuring atmospheric pressure that should be exempt from these objections. It consists of a float, formed by a brass tube, having the shape of the frustum of an inverted cone, nine inches long, two inches in diameter above, and one inch below, and its content being about fourteen cubic inches. From the centre of the upper and wider end, which is closed, a brass wire proceeds, surmounted by a cup, for the purpose of holding such weights as are necessary for bringing the float, when immersed in water, to the same constant level. The lower and smaller end of the tube is closed by a brass plug, sufficiently heavy to sink the instrument to the proper depth, and maintain its position, and having a small perforation in its centre. This float is inclosed in a case, containing the water in which it is to be immersed, and which is to be raised to a constant given temperature by a spirit lamp burning beneath it. The float being first filled with water, a given portion of this water is poured out into a measure of known capacity, and is consequently replaced by an equal volume of air, the dilatations or contractions of which will, when the temperature is constant, be dependent only on the external pressure of the atmosphere; and the latter will, therefore, be indicated by the weights requisite to be placed in the cup of the float, in order to maintain it at the same level in the fluid, on the principle of the hydrometer. The author gives a minute description of all the parts of the apparatus, of the method of using it, and of the adjustments and calculations required for determining by its means the difference of level of two stations.