do not attract our attention so long as the sensory organs are in vigorous operation, and occupied with bringing new impressions in. But when these organs become weary and dull, or when we experience hours of great anxiety, or are in twilight reveries, or asleep, the latent apparitions have their vividness increased by the contrast, and obtrude themselves on the mind. For the same reason they occupy us in the delirium of fevers, and doubtless also in the solemn moments of death. During a third part of our lives we are withdrawn from external influences-hearing, and sight, and the other senses are inactive; but the never sleeping mind -that pensive, that veiled enchantress, in her mysterious retirement, looks over the ambrotypes she has collected-ambrotypes, for they are unfading impressions-and combining them together as they chance to occur, weaves from them a web of dreams. Nature has thus introduced into our very organization a means of imparting to us suggestions on some of the most profound topics with which we can be concerned. It operates equally on the savage and on the civilized man, furnishing to both conceptions of a world in which all is unsubstantial. It marvelously extracts from the yestiges of the impressions of the past overwhelming proofs of the reality of the future, and gathering its power from what might seem a most unlikely source, it insensibly leads us-no matter who or where we may be-to a profound belief in the immortal and imperishable, from phantoms that have scarcely made their appearance before they are ready to vanish away !"

## ON BOILING WATER.

## BY W. GROVE, ESQ., Q.C., F.R.S., M.R.I.

A paper by M. Donny ("Mémoires de l'Académie Royale de Bruxelles," 1843) makes known the fact that in proportion as water is deprived of air, the character of its ebullition changes, becoming more and more abrupt, and boiling like sulphuric acid with soubresauts, and that between each burst of vapour the water reaches a temperature above its boiling point. To effect this, it is necessary that the water be boiled in a tube with a narrow orifice, through which the vapour issues; if it be boiled in an open vessel it continually reabsorbs air and boils in the ordinary way.

In my experiments on the decomposition of water by heat, I found that with the oxy-hydrogen gas given off from ignited platinum plunged into water, there was always a greater or less quantity of nitrogen mixed; this I could never entirely get rid of, and I was thus led into a more careful examination of the phenomenon of boiling water, and set before myself this problem—what will be the effect of heat on\_water perfectly deprived of air or gas.

Two copper wires were placed parallel to each other through the neck of a Florence flask, so as nearly to touch the bottom; joining the lower ends of these was a fine platinum wire, about an inch and a half long, and bent horizontally into a curve. Distilled water, which had been well boiled and cooled under the receiver of an air-pump, was poured into this flask, so as to fill about one-fourth of its capacity. It was then placed under the receiver of an air-pump, and one of the copper

wires brought in contact with a metallic plate covering the receiver, the other bent backwards over the neck of the flask, and its end made to rest on the pump plate. By this means, when the terminal wires from a voltaic battery were made to touch, the one the upper and the other the lower plate, the platinum wire would be heated, and the boiling continued indefinitely in the vacuum of a very excellent air-pump. The effect was very curious; the water did not boil in the ordinary manner, but at intervals a burst of vapour took place, dashing the water against the sides of the flask, some escaping into the receiver. (There was a projection at the central orifice of the pump-plate to prevent this overflow getting into the exhausting tube.)

After each sudden burst of vapour, the water became perfectly tranquil, without a symptom of ebullition until the next burst took place. These sudden bursts occurred at measured intervals; so nearly equal in time that, had it not been for the escape from the flask, at each burst, of a certain portion of water, the apparatus might have served as a timepiece.

This experiment, though instructive, did not definitely answer the question I had proposed, as I could not of course ascertain whether there was some minute residuum of gas which would form the nucleus of each ebullition; and I proceeded with others. A tube of glass, 5 feet long and <sup>4</sup>/<sub>10</sub>ths inch internal diameter, was bent into a V-shape; into one end a loop of platinum wire was hermetically sealed with great care, and the portion of it in the interior of the tube was platinised. When the tube had been well washed, distilled water, which had been purged of air as before, was poured into it to the depth of 8 inches, and the rest of the tube filled with olive oil; when the was inverted the open end of the tube was placed in a vessel of olive oil, so that there would be 8 inches of water resting on the platinum wire, separated from the external air by a column of 4 feet 4 inches of oil. The projecting extremities of the platinum wire were now connected with the terminals of a voltaic battery, and the water heated; some air was freed and ascended to the level of the tube-this was made to escape by carefully inverting the tube so as not to let the oil mix with the water-and the experiment continued. After a certain time the boiling assumed a uniform character, not by such sudden bursts as in the Florence flask experiment, but with larger and more distinct bursts of ebullition than in its first boiling.

The object of platinising the wire was to prevent more points for the ebullition, and to present soubresants as much as possible.

The experiment was continued for many hours, and in some repetitions of it for days. After the boiling had assumed a uniform character, the progress of the vapour was carefully watched, and as each burst of vapour condensed in the oil, which was kept cool, it left a minute bead of gas, which ascended through the oil to the bend of the tube: a bubble was formed here which did not seem at all absorbed by the oil. This was analyzed by a eudiometer, which I will presently describe, and proved to be nitrogen: The beads of gas, when viewed through a lens and micrometer scale at the same height in the tube, appeared as nearly as

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