

trate in considerable quantity ; this Mr. Faraday conjectures to have been saltpetre, which had been added to the water by the priests.

The reading of a paper was commenced, entitled, " Observations on the Theory of Respiration." By William Stevens, M.D., D.C.L., Fellow of the Royal College of Physicians of Copenhagen, and of Surgeons of London. Communicated by W. T. Brande, Esq., V.P.R.S.

May 21, 1835.

WILLIAM THOMAS BRANDE, Esq., Vice-President, in the Chair.

The reading of the paper, entitled, " Observations on the Theory of Respiration." By William Stevens, M.D. D.C.L., Fellow of the Royal College of Physicians of Copenhagen, and of Surgeons of London. Communicated by W. T. Brande, Esq., V.P.R.S., was resumed and concluded.

From the fact that no carbonic acid gas is given out by venous blood when that fluid is subjected to the action of the air-pump, former experimentalists had inferred that this blood contains no carbonic acid. The author of the present paper contends that this is an erroneous inference ; first, by showing that serum, which had been made to absorb a considerable quantity of this gas, does not yield it upon the removal of the atmospheric pressure ; and next, by adducing several experiments in proof of the strong attraction exerted on carbonic acid both by hydrogen and by oxygen gases, which were found to absorb it readily through the medium of moistened membrane. By means of a peculiar apparatus, consisting of a double-necked bottle, to which a set of bent tubes were adapted, he ascertained that venous blood, agitated with pure hydrogen gas, and allowed to remain for an hour in contact with it, imparts to that gas a considerable quantity of carbonic acid. The same result had, indeed, been obtained, in a former experiment, by the simple application of heat to venous blood confined under hydrogen gas ; but on account of the possible chemical agency of heat, the inference drawn from that experiment is less conclusive than from experiments in which the air-pump alone is employed. The author found that, in like manner, atmospheric air, by remaining, for a sufficient time, in contact with venous blood, on the application of the air-pump, acquires carbonic acid. The hypothesis that the carbon of the blood attracts the oxygen of the air into the fluid, and there combines with it, and that the carbonic acid thus formed is afterwards exhaled, appears to be inconsistent with the fact that all acids, and carbonic acid more especially, impart to the blood a black colour ; whereas the immediate effect of exposing venous blood to atmospheric air, or to oxygen gas, is a change of colour from a dark to a bright scarlet, implying its conversion from the venous to the arterial character : hence the author infers that the acid is not formed during the experiment in question, but already exists in the venous blood, and is extracted from it by the atmospheric air. Similar experiments made

with oxygen gas, in place of atmospheric air, were attended with the like results, but in a more striking degree ; and tend therefore to corroborate the views entertained by the author of the theory of respiration. According to these views, it is neither in the lungs, nor generally in the course of the circulation, but only during its passage through the capillary system of vessels, that the blood undergoes the change from arterial to venous ; a change consisting in the formation of carbonic acid, by the addition of particles of carbon derived from the solid textures of the body, and which had combined with the oxygen supplied by the arterial blood : and it is by this combination that heat is evolved, as well as a dark colour imparted to the blood. The author ascribes, however, the bright red colour of arterial blood, not to the action of oxygen, which is of itself completely inert as a colouring agent, but to that of the saline ingredients naturally contained in healthy blood. On arriving at the lungs, the first change induced on the blood is effected by the oxygen of the atmospheric air, and consists in the removal of the carbonic acid, which had been the source of the dark colour of the venous blood ; and the second consists in the attraction by the blood of a portion of oxygen, which it absorbs from the air, and which takes the place of the carbonic acid. The peculiar texture of the lungs, and the elevation of temperature in warm-blooded animals, concur in promoting the rapid production of these changes.

May 28, 1835.

Sir BENJAMIN COLLINS BRODIE, Bart., Vice-President, in
the Chair.

A paper was in part read, entitled, " On the Influence of the Tricuspid Valve of the Heart on the Circulation of the Blood." By Thomas Wilkinson King, Esq., M.R.C.S. Communicated by Thomas Bell, Esq., F.R.S.