Professor Graham, in a note to Dr. Hall, says, "If an animal were to breathe atmospheric air to which carbonic acid were added, in proportion to this addition, the evolution of carbonic acid from the blood would, in my opinion, be impeded; the passage of the carbonic acid outward, at all from the blood, depending upon the comparative absence of that gas from the air taken into the lungs."

In treating of "asphyxia," Dr. Hall says, "The absorption of oxygen, or the evolution of carbonic acid, or both, are impeded or interrupted in every case of asphyxia. From the want of oxygen the blood is deficient in stimulus; by the presence of carbonic acid it is positively poisonous."

It appeared from the researches of physiologists, that the presence of a certain proportion of carbonic acid was necessary to stimulate the action of the heart, and regulate the circulation of the blood; that nature kept up the proper supply for this purpose, but that any excess was prejudicial.

Acting upon this principle, Dr. Payerne had brought forward a proposition for purifying the air in a diving-bell, so that without using the air-pump the diver might remain under water for four hours, or even longer. This was, the professor believed, accomplished by decomposing the carbonic acid, absorbing the carbon, and eliminating the oxygen, and not by generating oxygen, as had been generally imagined.

No. 626. "On the Formation of Embankments for Reservoirs to retain Water." By Robert Thom, M. Inst. C. E.

After describing a model, designed to show that the proper slope for reservoir embankments, should not be less than three to one on the water-face, and remarking that waves act more severely on the pitching or paving of the inner face, in proportion to the steepness of the slope, the author proceeds to describe in detail the mode of forming embankments. The foundation is excavated to such a depth as is found firm and capable of preventing the passage of water, then spreading alternate layers of puddled peat, or alluvial earth and gravel, and beating them together with wooden dumpers, until they are completely mixed; the slopes are covered with a puddle made with small stones or furnace-cinders mixed with clay, so as to prevent the possibility of moles or other vermin penetrating into the embankment. He condemns the practice of forming embankments with puddle-trenches, and refers to many reservoirs made by him at Greenock, Paisley, and elsewhere, the banks of which have stood the test of time without having any puddle-trenches in them, and parti-

Formation
of Em-
bankments

cularly mentions one at Greenock which remained firm and sound, after a rush of water passing over it at a height of ten feet, caused by the breaking down of the embankment of a reservoir situated about 150 yards above it. He recommends, instead of the puddle-trenches, that the whole of the inner part of the embankment should be made water-tight during the formation of it, by which means it will more effectually resist either any casual injury, or any effect of the swelling of the puddle-trench. The paper is entirely of a practical nature, and is intended to illustrate the author's peculiar views founded on his long experience. It is accompanied by a diagram of the model used in his experiments.

June 20, 1843.

The PRESIDENT in the Chair.

Among the presents announced was a third contribution of books, selected by Mr. Robert Young from the library of his brother the late Dr. Young.

No. 645. A Pressure-Gauge was presented for the Museum of the Institution by Alfred King, M. Inst. C. E.

Pressure
Gauge.

This gauge, which has been used at the Liverpool gas-works for more than ten years, for indicating small amounts of pressure, consists of a close cistern containing water, in which is a cylinder having in it a hollow float, connected with a balance-weight, by a fine silken cord, passing over a pulley, on the axis of which is fastened a pointer, one end of which marks the amount of pressure upon a dial divided in such a manner, that as each division is equal to a column of water of $\frac{1}{160}$ th of an inch, a difference equal to $\frac{1}{360}$ th, or even $\frac{1}{160}$ th of an inch, may be estimated.

The action is very simple, the float being elevated by the rising of the water within the cylinder, when the surface is depressed in the cistern by the pressure of the current of gas from the inlet pipe.

The description was illustrated by a diagram showing the internal construction of the gauge.