THE PRIESTLEY AIR PUMP.

PRESENTED BY

COLEMAN SELLERS, JR., and HORACE W. SELLERS.

IN presenting to the Institute, at its Stated Meeting held Wednesday evening, October 20th, the air pump, once the property of Dr. Joseph Priestley, shown on the opposite page, Mr. Coleman Sellers, Jr., made the following remarks:

Mr. President, members of The Franklin Institute, ladies and gentlemen: Before considering this ancient piece of philosophical apparatus, it may add to its interest, if we recall to memory some facts about the remarkable man to whom it formerly belonged.

Dr. Joseph Priestley is recollected chiefly as the discoverer of oxygen; but this accomplishment by no means comprises all of his contributions to science, for he also discovered and experimented with many other gases; but the curious part of the matter is that his scientific work was his avocation, or pastime. By profession, he was a controversial non-conformist clergyman, and a prolific writer and lecturer on theological and other topics. He was an ardent political reformer, and it was to his political activity in an unpopular cause that we owe his exile to America, which has finally brought this historic air pump to a permanent home in the collection of this Society.

Doctor Priestley was born in Yorkshire, near Leeds, March 13, 1733, his father being Jonas Priestley, weaver and dresser of cloth. From 1742 to 1764 he made his home with an aunt who sent him to school, where he learned Latin and Greek. He studied Hebrew in his holidays, so that when he was about sixteen years old, he claimed to have a pretty good knowledge of the ancient languages. He came of a strongly religious family, and it was his intention to enter the ministry; but lung trouble for a time deterred him from this course and he took up the study of modern languages, learning French, Italian and German.

He also studied mathematics, logic and natural philosophy. He learned Hebrew, Chaldee, Syriac, and began to read Arabic. In 1755 he became assistant to a superannuated minister for a compensation of 30 £ sterling per year; and in 1758 he assumed the pastorate of a church near old Chester. His congregation was

small and his duties not burdensome, so he opened a school for about thirty boys and six girls and taught daily from 7 A.M. to 4 P.M. with one hour for dinner and no holidays. After school hours, he had private pupils.

He was now able to buy a few books and even an air pump and an electric machine, and it was through this apparatus that his interest in experimental science began. Incidentally he wrote and lectured on many subjects covering various phases of political economy, government, civil law, logic, anatomy and Hebrew.

During a visit to London, he met and formed a strong friendship with Benjamin Franklin, who, undoubtedly exercised a powerful influence in shaping Priestley's future life. He offered to write a history of electricity, if Doctor Franklin would furnish him the necessary books. This he gladly did, and the work was published in 1767, under the title of "The History and Present State of Electricity, with Original Experiments Illustrated with Copper-plates." Much of this work was original matter, the result of his own experiments, and although the laboratory work and composition were done in the leisure time of a busy clergyman, he was able within a year to send to Doctor Franklin a printed copy of the book. It is worthy of mention that during this year, he spent five hours a day lecturing and took a two months' vacation. This book resulted in his election as a Fellow of the Royal Society.

He was ordained a minister in 1762 and in 1767 became pastor of a congregation in Leeds, at a salary of 100 guineas and a house. His wavering heterodoxy built on a Calvinism, which he did not find convincing, finally settled into Unitarianism and he became one of the chief upholders of heterodoxy in religion and of advanced ideas in politics.

It was at Leeds that he began his work on gases. He started with a study of "fixed air," or carbon-dioxide, and invented soda water, which he suggested might be useful in medicine. He made his first publication on gases in 1772, for which he was awarded the "Copley Medal," and in succession he discovered nitrous oxide, hydrochloric acid gas, nitric oxide, oxygen (in 1774), ammonia gas, sulphur dioxide, silicon fluoride and nitrosulphuric acid.

It is not to be understood that he recognized these substances by the names we now call them. Oxygen, he knew as "dephlogisticated air." In fact, his philosophy was usually vague and his

reasoning defective, largely perhaps because he was influenced by the prevalent theories of the time, and also it has been suggested, by defects of memory. He often forgot his own notes, and his own publications. In his cheerful way he suggested that this defect was in a measure compensated for by facility in "invention or new and original combinations of ideas." He was much more interested in trying experiments than he was in philosophic deductions from the facts observed.

Priestley was a real discoverer, a brilliant experimenter, an indefatigable investigator. He proved by experiment "that plants are perfectly capable of restoring air injured by respiration"; and he made some measurements of the oxygen absorbed and the carbon-dioxide evolved during respiration.

His busy and useful life was disturbed in 1791 by the Birmingham Riots, which were precipitated by a demand for the repeal of the Test Act. Priestley was active in this movement and also sympathized with the French Revolution. When an attempt was made to celebrate the fall of the Bastille on July 14, 1791, by a public banquet, the hotel was attacked by a mob, which broke the windows and then proceeded to Priestley's church, the "New Meeting," which was sacked and burned, as was also the "Old Meeting." Burning of non-conformists' churches and ministers' houses continued, and Priestley was hurried to London, where he was taken charge of by his friends.

He was offered a pulpit, but felt that his usefulness in England was ended, and he concluded to join his sons in America. He sailed for New York, April 8, 1794, proceeded to Philadelphia and then to Northumberland, Pa. Soon after his arrival in Philadelphia, he was offered the professorship in chemistry at the University, which he declined, and in 1803, it was proposed to make him Provost of the University. This he also declined on account of his advanced age. In America he resumed his scientific work; but made no new discovery of importance, although he published a number of papers. He died February 6, 1804.

When he came to America, he brought with him such of his apparatus as he could, and among other things was the air pump which we have before us.

As to the history of the pump since Doctor Priestley's death: My father's correspondence¹ shows that it was procured by his

¹ Coleman Sellers, E.D., D.Sc. (1827-1907), President of The Franklin Institute, 1870-1874.

brother Charles,² who was a friend of the Priestleys, for use in some lectures which he was delivering in Cincinnati. When he left that city about 1849, he turned his philosophical apparatus over to his younger brother Escol,³ who subsequently removed to southern Illinois.

In 1897, at my father's request, Escol Sellers sent him the air pump, which apparently had never been used while in his possession. Escol wrote that when his brother Charles got the pump, the valves and pump chamber were in bad shape, and he worked a long time to put them in order. He said that on the frame, there was a portion of a bone or ivory name plate, on which they made out the words "Adams" and "London," which they inferred to have been the name of the maker and his address.

We all value this relic highly and my brother⁴ and I have felt anxious to transfer our responsibility as its custodians to that association which would most appreciate it, and would give it the best care.

We have concluded that the most appropriate custodian is The Franklin Institute of the State of Pennsylvania, and we feel sure that we are putting the old pump in safe and appreciative hands.

I take pleasure, Mr. President, in delivering to the Institute, over which you so ably preside, this ancient relic and memento of a remarkable man, with the full assurance that it will be guarded and preserved with the respect it deserves.

The Dye-works Chemist.—According to B. LEECH (*Jour. Soc. Chem. Ind.*, 1920, xxxix, Review, 300-302), the chemist in a British dye-works should have a broad scientific training in a university, supplemented by special training in a technical school. Among the problems which he may have to solve are: plan of buildings and proper materials for their construction; ventilation of the plant; weaving goods "in the gray" and dyeing the woven piece; special treatments, such as weighting of silk and mercerization of cotton; production of artificial fibres; treatment of fabrics to render them fireproof, waterproof, or non-permeable to gases, and many procedures which involve organic colloidal, and biological chemistry, mycology, physics, and engineering.

J. S. H.

² Charles Sellers (1806-1898).

³ George Escol Sellers (1808-1899).

⁴ Horace Wells Sellers, F.A.I.A.