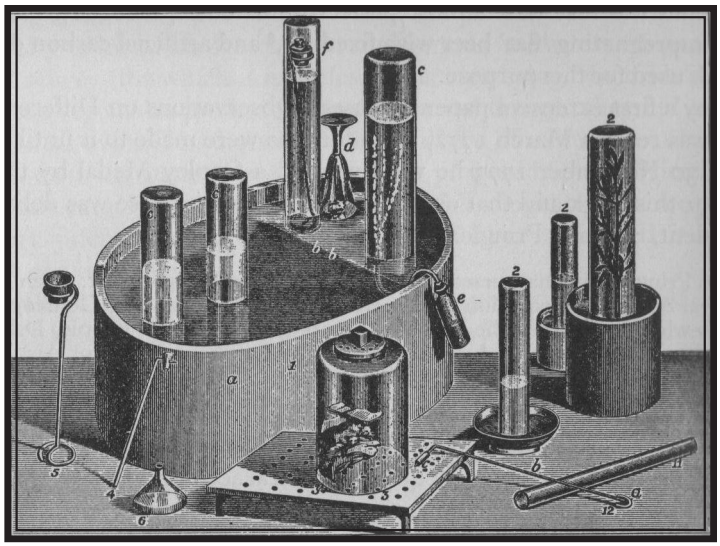
Who Discovered the "Photo" in Photosynthesis? Joseph Priestley and Jan Ingen-Housz Bicker for Two Decades

By Jane F. Hill

In the late 1770s, Joseph Priestley came very close to the crucial discovery of the requirement for light in photosynthesis, but his contemporary, Dutch physician Jan Ingen-Housz (1730-1799), beat him to it. Priestley never fully acknowledged Ingen-Housz's priority, and, for two decades, the men sniped at each other over the matter.

Priestley had had early success in plant experiments. In 1771, he had discovered that plants and animals exist in an inter-relationship mediated by gases: Plants "restore" air that has been made "impure" by the burning of candles or the breathing of animals, and animals in turn thrive in the revitalized air. Then, in 1774, Priestley discovered "dephlogisticated air" (oxygen). These twin discoveries by Priestley were very important for the unfolding understanding of photosynthesis, the process by which plants take carbon dioxide from the atmosphere and water from the soil and, using energy from sunlight, form carbohydrates, with the liberation of oxygen gas.



Priestley ran into trouble in plant research, however, in the late 1770s, when he was unable to reproduce his earlier results on the interdependence of plants and animals mediated through gas exchange, mainly because he was unaware that plants require light in order to produce dephlogisticated air. In the spring of 1779, he reported his disappointing findings in Experiments and Observations relating to various Branches of Natural philosophy, with a Continuation of the Observations on Air, Vol. I. He also reported that a "green matter" that developed in containers of standing water produced dephlogisticated air in the sunlight. Sadly for Priestley, although he at first identified this material as a plant, he later changed his mind. (The green matter was later identified as a microscopic green alga.) He also concluded, erroneously, that the water itself was producing dephlogisticated air.

In September of that year, Priestley finally concluded that the green matter was a plant. He found that other plants, when placed in water, also yielded dephlogisticated air in the light (although he did not fully recognize how important light was). He reported his results only in letters to friends, however, never in a published book or paper, the accepted medium of scientific communication.

Meanwhile, beginning in June of 1779, Ingen-Housz had undertaken an intensive summer of research on plants, during which he clinched the discovery of the light requirement. In October he published his results in a book.

Upon reading the book, Priestley wrote a friend, "The things of most value that he hit upon and I missed are that leaves without the rest of the plants will produce pure air and that the difference between day and night is so considerable." Despite this admission, Priestley persistently maintained that communication of his findings in letters to friends constituted "publication." Never, in any of his subsequent volumes, did he acknowledge Ingen-Housz's priority. Confusingly, though, in a letter to Ingen-Housz in 1787, eight years after Ingen-Housz's book, Priestley admitted, "The same summer, and the same sun, operated for us both, and you certainly published before me."

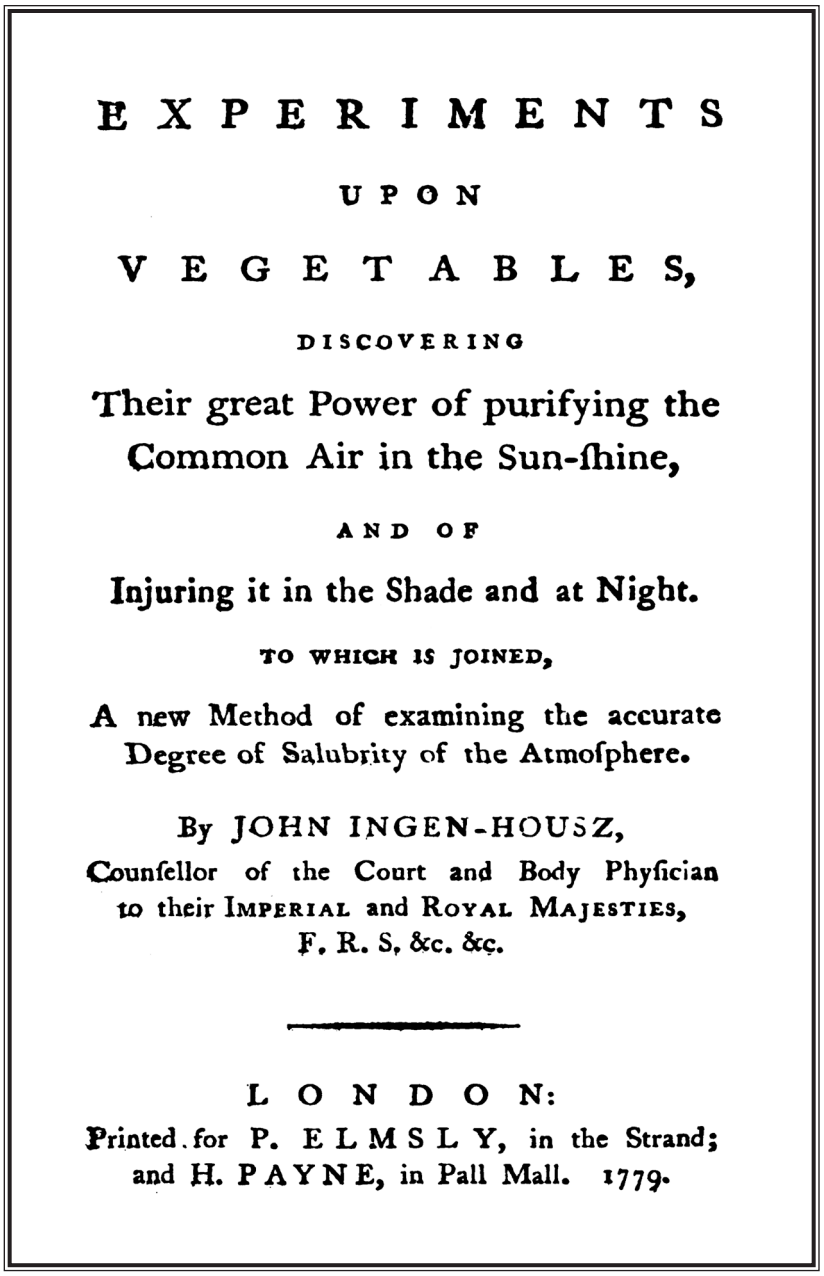
As late as 1790, in a letter to Priestley, Ingen-Housz complained about Priestley's failure to acknowledge Ingen-Housz's priority. Then, in a paper published in 1800 (a year after Ingen-Housz's death), Priestley indicated how little credit he thought Ingen-Housz deserved and accused Ingen-Housz of, in effect, treading on his turf by experimenting with plants and light at a time when Ingen-Housz knew Priestley was pursuing the matter. It is a sad episode, not uncommon among scientists even today.

Interestingly, in 1798, near the end of his life, an ailing Ingen-Housz lived with Lord Shelburne (who was by then Marques of Lansdowne) at Bowood House, in Calne, England, where Priestley had resided from 1773 to 1780. Ingen-Housz resumed his plant research there, in the same laboratory where Priestley had discovered oxygen, even using some of Priestley's equipment. Ingen-Housz died at Bowood and is buried nearby.

For more information:

Gest, Howard. 2000. Bicentenary homage to Dr Jan Ingen-Housz, MD (1730-1799), pioneer of photosynthesis research. Photosynthesis Research 63: 183-190.

Jane F. Hill is a botanist who has written on the history of science, including the early pioneers of research on photosynthesis. She is just completing an English translation of an 1804 French book by one of the pioneering investigators, Théodore de Saussure. It will be published by Springer.



EXPERIMENTS

UPON

VEGETABLES,

DISCOVERING

Their great Power of purifying the Common Air in the Sun-ſhine,

AND OF

Injuring it in the Shade and at Night.

TO WHICH IS JOINED,

A new Method of examining the accurate Degree of Salubrity of the Atmoſphere.

By JOHN INGEN-HOUSZ,

Counſellor of the Court and Body Phyſician to their IMPERIAL and ROYAL MAJESTIES, F. R. S. &c. &c.

LONDON:

Printed for P. ELMSLY, in the Strand; and H. PAYNE, in Pall Mall. 1779.