

from a Greek word signifying flame. Thus lead, which when heated in air changes to an earthy dross, or, as it was then termed, "calx," may be restored to the state of metal by heating it with charcoal powder, or with flour, or with any substance rich in "phlogiston;" that is, with any substance which is itself capable of burning. He supposed that the lead was rich in "phlogiston;" that when it changed to lead-dross, the "phlogiston" escaped; but that on heating with charcoal, the latter parted with *its* phlogiston to the lead-dross, changing it back again into lead. It is evident that this idea accounts for some of the facts observed; and it gained ground rapidly. But it had been shown by the French physician Jean Rey, by the English philosopher Robert Boyle, and others, that metals, when they changed into earthy powders on heating, gained weight; and it is at least curious that the lead, on *losing* one of its constituents, namely "phlogiston," should *gain* weight: one would have expected that weight would be lost, not gained. The way out of this difficulty was ingenious. We know, it was said, that weight is due to the attraction of the earth; now, it is not impossible that the earth may repel phlogiston, instead of attracting it; and in that case a body would grow heavier, instead of lighter, if it parts with phlogiston. Another objection to the theory was that a candle, for example, which is rich in phlogiston, goes out when made to burn under a glass shade; that is, when air is excluded. True, said the phlogistonists; that is because the phlogiston cannot escape. And because this theory gave a plausible explanation of the common phenomenon of combustion, it was widely accepted, and survived until the end of the eighteenth century.

The idea had been steadily gaining ground that knowledge was to be acquired only by trial and failure. **Francis Bacon, Lord Verulam**, at the end of the sixteenth century wrote: "The true kind of experience is not the mere groping of a man in the dark, who feels at random to find his way, instead of waiting for the dawn or striking