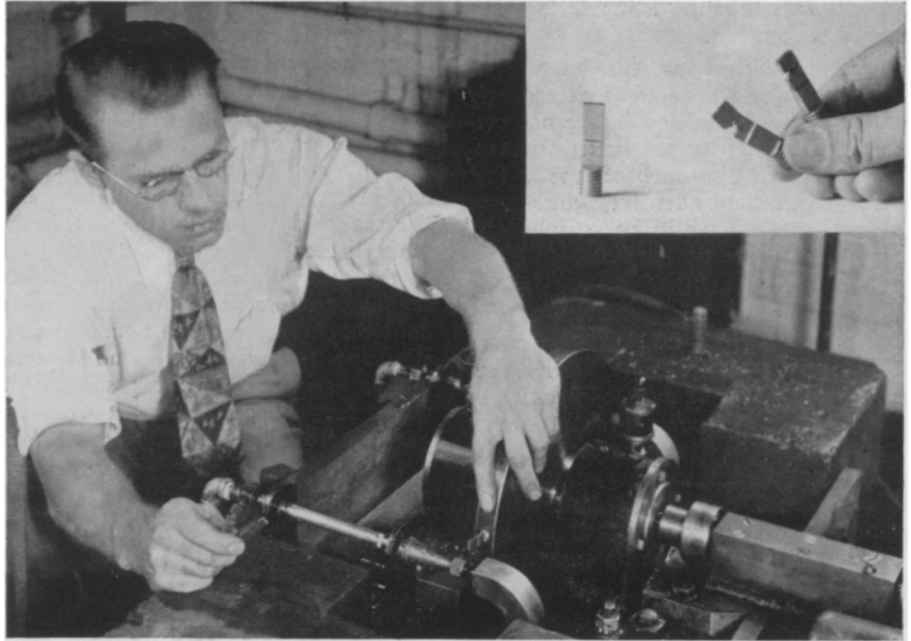


things with it, that I presume may be of good use in an enquiry into the nature of this light, and perhaps also of light in general. And because I fear by what I have observed, that, though the vessel had not cracked, yet the matter distilled would have afforded but a small proportion of lucid substance, I am the more unwilling to fall upon this troublesome work again, till, besides other requisites, I be provided of a competent quantity of a matter which I fear contains but very little of the desired substance. However, I have endeavoured to make that use of our experiment, such it was, that though the noctiluca it produced, be not perhaps so lucid as that of Mr. Kraft's yet it may prove as luciferous as his hath hitherto been, since (as you will see hereafter) I have found a substance, that needs the air, and nothing but the air to kindle it, and that in a moment.

In this narrative I have been the more particular, that it may shew you, (what I hope may make you amend for the length of it) that an inquisitive man should not always be deterred by the difficulties, or even disappointments he may meet with, in prosecuting a noble experiment, as long as he judges himself to proceed upon good and rational grounds. . . .

#### The Process

There was taken a considerable quantity of human urine, (because the liquor yields but a small proportion of luciferous matter,) that had been, (a good part of it at least) for a competent while, digested and putrified, before it was used. This liquor was distilled with a moderate heat, till the spirituous parts were drawn off; after which, the superfluous moisture also was abstracted, (or evaporated away) till the remaining substance was brought to the consistence of a somewhat thick syrup, or a thin extract. This was well incorporated with about thrice its weight of fine white sand, and the mixture was put into a strong retort; to which was joined a large receiver, in good part filled with water. Then, the two vessels being carefully luted together, a naked fire was gradually administered for five or six hours, that all, that was either phlegmatic, or otherwise volatile, might come over first. When this was done, the fire was increased, and at length, for five or six hours made, (N.B. which it should be in this operation) as strong and intense, as the furnace (which was not bad) was capable of giving. By this means, there came over good store of white fumes, almost like those, that



#### HE CUTS STEEL WITH WATER

*At a speed greater than the velocity of sound and to the accompaniment of a piercing shriek, water cuts steel in research at Westinghouse laboratories; which may result in better airplane propellers and turbine blades. T. F. Hengstenberg, engineer in charge, is pointing to the apparatus that turns 20,000 revolutions per minute, and the insert shows a plug of test metal before and after. Quarter inch plugs of stainless iron and of nickel steel are eroded half way through in two or three minutes. Stellite, famous for its hardness, and iron nitride, almost diamond-hard, hold out 15 to 20 minutes.*

appear in the distillation of oil of vitriol; and when those fumes were past, and the receiver grew clear, they were after a while succeeded by another sort, that seemed in the receiver to give a faint bluish light, almost like that of little burning matches dipt in sulphur. And last of all, the fire being very vehement, there passed over another substance, that was judged more ponderous than the former, because (N.B.) much of it fell through the water to the bottom of the receiver: whence being taken out, (and partly even whilst it staid there) it appeared by several effects, and other phenomena, to be (as we expected) of a luciferous nature.

The ways I employed to make a self-shining substance, out of other matters than that expressed in this process, I must, for certain reasons, forbear to acquaint you with, at this time.

#### Nitrogen

*EXPERIMENTS AND OBSERVATIONS ON DIFFERENT KINDS OF AIR, and other branches of Natural Philosophy, connected with the subject. In three volumes; Being the former Six Volumes abridged and methodized, with many Additions. By Joseph Priestley, Birmingham, Printed by Thomas Pearson; MDCCXC (1790).*

Reading in Dr. Hale's account of his experiments, that there was a great diminution of the quantity of air in which had been exposed, a mixture of powdered sulphur and filings of iron, made into a paste with water, I repeated the experiment, and found the diminution greater than I had expected. This diminution of air is made as effectually, and as expeditiously, in quicksilver as in water; and it may be measured with the greatest accuracy, because there is neither any previous expansion, or increase, of the quantity of air, and because it is some time before this process begins to have any sensible effect. This diminution of air is various; but I have generally found it to be between one fifth and one fourth of the whole.

Air thus diminished is not heavier, but rather lighter than common air.

I conclude that the diminution of air by this process is of the same kind with the diminution of it in the other cases, because when this mixture is put into air which has been previously diminished, either by the burning of candles, by respiration, or putrefaction, though it never fails to diminish it something more, it is, however, no farther than this process alone would have done it. If a fresh mixture be introduced into a quantity of air which had been reduced