

In Sweden, a few years later (1746), SWEN RINMAN published some details on the examination of ferruginous tin-ore, and other minerals, by the blowpipe; and, in 1748, ANTON VON SWAB—usually, but erroneously, cited as the first person by whom the blowpipe was used in its scientific applications—referred to the use of the instrument in a paper on the occurrence of native antimony. BERGMAN states that VON SWAB employed the blowpipe in 1738, but the date of his first publication in which reference is made to its use is ten years later, as pointed out by Dr. HERMANN KOPP in his valuable *Geschichte der Chemie*: 1844.

Up to this time, however, no general or systematic use of the blowpipe appears to have been attempted; but in 1758, AXEL FREDERIC CRONSTEDT, who had previously employed the blowpipe in his researches on nickel (1751), published anonymously at Stockholm his celebrated treatise on Mineralogy, in which a chemical classification of minerals was first definitely essayed. In this work, the pyrognostic characters of minerals, as determined by the blowpipe, are brought prominently into notice; and in addition to borax, the two general reagents still in use, bicarbonate of soda ("*sal sodæ*") and microcosmic salt or phosphor-salt ("*sal fusibile microcosmicum*") are employed as blowpipe fluxes. To the English translation of Cronstedt's work published in 1770, GUSTAV VON ENGESTROM appended a short but complete sketch of the use of the Blowpipe, as then known; and JOHN HYACINTH DE MAGELLAN added somewhat to this sketch in the second (English) edition of the work, published in London in 1788. The plate which accompanies VON ENGESTROM's essay, exhibits a portable case of blowpipe apparatus, comprising, in addition to the blowpipe as devised by Cronstedt, a hammer, anvil, magnet, silver spoon and other articles (but none, of course, of platinum), with candle, charcoal, and three small bottles for fluxes. This essay of VON ENGESTROM, attached to his translation of Cronstedt's work, was translated into Swedish by RETZIUS in 1773; and in the same year the Swedish chemist TORBERN BERGMAN published a memoir on the blowpipe reactions of lime, magnesia, alumina, and silica; whilst, in 1774, SCHEEL described the action of the blowpipe on manganese ores, molybdenite, and other minerals. A few years later (1777) a complete treatise in Latin on the use of the Blowpipe was drawn up by Bergman, and published, soon after, under the editorship of Baron VON BORN, the metallurgist, at Vienna (*Commentatio de tubo ferruminatorio, etc.: Vindobonæ, 1779*). A Swedish translation, by HJELM, was issued at Stockholm in 1781.

In the preparation of this work, BERGMAN was very materially assisted by JOHANN GOTTLIEB GAHN. The latter chemist subsequently carried out an extended series of experiments with the blowpipe, and discovered various new methods of research. BERZELIUS, to whom at an after period he communicated personally his mode of operating, states that GAHN always carried his blowpipe with him, even on his shortest journeys, and submitted to its action every new or unknown substance that came in his way. In this manner he acquired great skill in the use of the instrument. He published nothing, however, on the subject; but, finally, drew up at the instigation of BERZELIUS the short sketch of the blowpipe and its applications contained in the latter's *Lärbok i Kemi* first issued in 1812. GAHN then undertook, in conjunction with