

Before the last few centuries the quantity of metals available for man's use was almost insignificant in comparison with the supply now employed. In very early times small quantities of copper were jealously guarded in the treasuries of kings, and for many centuries the metal appears to have been possessed chiefly by kings, nobles, and persons of considerable wealth. Mining operations were generally confined to relatively rich ores and to those near the surface; other factors as well tended to prevent large production. But by the end of the eighteenth century greatly increased ability to produce copper had resulted from the invention of gunpowder, used in blasting rock; the mine pump that freed many abandoned workings of water, thus permitting a resumption of mining operations; and, finally, the steam engine, used for hoisting. Better understanding of smelting had made reduction of ores more efficient and less costly, and laws that had formerly given the bulk of metal production to the sovereign or the landowner had been amended liberally.

It is therefore probable that the annual world production of 18,000 tons of copper at the beginning of the nineteenth century was in itself the culmination of a great increase in production that had been in progress for several centuries.

In 1800 there was as yet no established production from North America, Africa, or Australasia, but Europe produced an average of about 12,400 tons a year, including about 7,300 tons from Great Britain, 3,300 tons from Russia, and 1,700 tons from Sweden, Norway, and Germany. Japan produced about 3,100 tons a year and South America about 2,600 tons a year—1,700 tons from Chile and 900 tons from Venezuela. All other production appears to have been casual in character and slight in quantity.

Table 25 reveals the remarkable expansion in copper production since 1800, but a brief statement as to world distribution of production should follow.

From the middle of the last century it gradually became apparent that the United States possessed extensive resources of copper. Michigan, Montana, Arizona, Utah, Nevada, New Mexico, California, Colorado, Tennessee, and finally Alaska, became producers of large tonnages. The annual production of the United States rose to nearly a million tons during the war period, 1916-1918 (964,000 tons in 1916) and is now normal at about 850,000 tons. United States production averaged 60 per cent of world production during 1916-1920 but has since decreased to 50 per cent as a result of increased production elsewhere.

It is safe to say that the United States production will continue to be the chief item of world production for many years, although its proportion in the world total may be expected to decrease slowly for a time, while the South American, African, and Canadian propor-