

The Romans were not workers in iron, though they encouraged the industry among the peoples whom they conquered. The mines of Elba, which had successively been worked by the Phœnicians, the Greeks and the Etrurians, continued their operations under Roman rule; but we do not learn that any improvements in processes of manufacture were introduced. The bellows were substantially the same as the blacksmith's bellows in use in our day, and the first reduction of the ore produced a small loop or bloom of spongy malleable iron, which was beaten on an anvil into the shape most suitable for the transportation to market or for the blacksmith's use. That iron weapons were in use at an early day is proved by the fact that king Porsenna, 500 years before our era, imposed upon the Romans as a condition of peace that they should use iron only for agricultural implements. The best iron brought to Rome at the beginning of our era came from Noricum, corresponding to parts of Styria and Carinthia, and it is believed that the mines now worked at Erzberg and Huttenberg are the same that were worked twenty centuries ago. The Quadi who lived north of Noricum in what is now Moravia, were then spoken of as a nation of iron workers; and it was from Moravia, that fifteen centuries later one of the most valuable discoveries in connection with iron—that of coating it with tin—was derived.

The Spanish iron industry flourished during the Carthaginian occupation, and probably before. The Romans attributed Hannibal's success at Cannæ in part to the fact that his troops were armed with Spanish swords of superior quality. Diodorus Siculus speaks of Spanish two-edged swords "exactly tempered with steel," made from iron which had been buried in the ground "to eat out all the weaker particles of the metal, and leave only the strongest and purest." The notion is not yet quite extinct that rust first attacks and destroys the poorer and baser parts of the iron, leaving the finest and the best. The manufacture of Toledo blades, begun in prehistoric times, has continued till our day, attaining its greatest proportions, as the weapons attained their greatest celebrity, in the fifteenth and sixteenth centuries.

When Cæsar invaded Britain, 55 years before our era, he found iron in use there. Most accounts represent that the natives who met the Romans employed chariots armed with iron scythes. I have looked carefully through Cæsar for confirmation of that statement; but, though I find many references to the chariots, I find no account of the iron scythes. It is certain, however, that the

Britons had iron. Some writers think they did not make it, but obtained what they had from the Belgæ, with whom they had considerable intercourse, and who certainly manufactured iron. Others maintain that the Britons themselves made iron. Cæsar says of them: "They use either brass or iron rings, determined at a certain weight, as their money. Tin is produced in the midland regions; in the maritime iron; but the quantity of it is small: they employ brass, which is imported." Cæsar's stay on the island was brief, and his knowledge of it far from extensive or accurate. My own belief is that at the time of Cæsar's visits iron had been made in Britain for centuries, and in considerable quantities. At various places in England, but chiefly in the weald of Kent, the weald of Sussex, and in the Forest of Dean in Gloucestershire, have been found vast beds of cinder or slag, the remains of iron works which existed there in very early times. That these operations were carried on during the Roman occupation or later is evidenced by the fact that Roman coins and pottery have been found in the cinder. But I believe they were also carried on before the arrival of the Romans. The smelting operations were to a large extent conducted in wind bloomeries, without any artificial blast. These bloomeries were built on the tops of hills, with openings in the direction of the prevailing winds. The ore, mined with infinite patience and toil, was carried up to these furnaces on men's backs, and the operation was wasteful of metal as of labor; for so little of it was extracted from the ore that in late years the slag has been remelted in modern furnaces, and the operation found remunerative. Now, the Romans had for centuries been accustomed to the use of the bellows in smelting iron; and if they had introduced the industry into Britain they certainly would have adopted the methods known to them and not have reverted to a ruder, more wasteful and more laborious one. I am therefore compelled to believe that when the Romans invaded Britain they found the wind bloomy in use. The hearths of more modern bloomeries have been found, with Roman coins and remains among the ashes; and these are pretty good evidences that during the Roman occupation, improvements, based upon Roman knowledge, were introduced. Andrew Yarranton says that "within a hundred yards of the walls of the city of Worcester there was dug up one of the hearths of the Roman foot blast, it being then firm and in order, and was seven foot deep in the earth; and by the side of the work there was found a pot of Roman coin to the quantity of a peck." Strabo says that in his day