

long winters might have been perfect for the growth of the handicraft industry, except that British mercantilist legislation discouraged it. As a result, those who couldn't make it from their farming alone either moved on (mostly to upstate New York, which had more and better land), or went into commerce, shipping, and shipbuilding, which were permitted. After the revolution, the connections made in those trades and the skills learned in the shipyards served early factory-builders well, and the lack of handicraft development meant they faced no low-wage competition. With plenty of waterpower and stolen designs to complete the picture, New England was soon up and running as the first factory center in the Americas.

7.1 Sweet Industry: The First Factories

When we think of the first factories, we usually think of Europe, particularly England. After all, factories were the definition of the “modern” and Europe was the leader in modernization. We assume that they were first built in Europe, where capital, machines, and labor combined to create ever-more efficient and productive methods. European ingenuity and entrepreneurship together with previously accumulated capital and budding markets led to the industrialization that was the secret of Europe's centuries-long domination of the world economy. According to this story, the globe was divided between industrial Europe, and later the United States, and the agrarian export-rest of the world. With this international specialization of labor, the agricultural countries only belatedly industrialized. In fact, there is good reason to turn this version on its head: the first factories arose in the colonial, export-oriented world.

To be sure, the importance of the New World colonies for the rise of industry was long recognized. Karl Marx observed a century and a half ago: “Direct slavery is as much the pivot of our industrialism today as machinery, credit etc. Without slavery, no cotton; without cotton, no modern industry. Slavery has given the value to the colonies, the colonies have created world trade; world trade is the necessary condition of large-scale machine industry.” The Cuban historian Manuel Moreno Fraginals echoed this sentiment much more recently: “Sugar received and gave a strong thrust in the development of capital: it was essentially a big motor that accelerated English industrial growth.” In these versions, however, the colonies lead to industry in *England* because of the capital and markets they provided.

In fact, a good argument can be made that the first industrial factories were the sugar mills of the Americas. It is not surprising that one of *Websier's* definitions of “factory” refers directly to the colonies: “a place where factors reside to transact business for their employers, as, the British mer-

chants have factories in the colonies.” But the colonies also had factories in the more standard definition: “an establishment for the manufacture of goods, including the necessary buildings and machinery.” Usually we think of the manufacture of goods as involving the production of a finished product from raw materials through the use of machinery on a large scale and a division of labor.

The last part is crucial. Although sizable workshops had existed since ancient times, bringing together scores of cobblers, tailors, or weapons makers who used tools to transform raw materials into finished products, they did not have specialized labor. Each cobbler made the entire shoe; there was no integration of effort. One worker's product was not dependent upon the work of his neighbor.

The emergence of factories is usually credited to the presence of wage laborers who were able to master the more sophisticated techniques demanded by industrialization. For Karl Marx, industrialization and capitalism came hand in hand. But the fact is that arguably the first factories were the sugar mills of the Atlantic islands such as São Tomé and then the Caribbean. They not only did *not* issue from a natural process of domestic capital accumulation with their product intended for the domestic market, but they also did not use much wage labor, nor did they make great demands of expert laborers. On the contrary, sugar was refined by large slave forces for export to Europe.

Already in the seventeenth century, sugar plantations involved perhaps two hundred slaves and freemen, with a mill, boiling house, curing house, distillery for rum, and storehouse. This involved not only some of the most sophisticated technology of the era, and a large workforce, but also investment of several thousand pounds.

True, nine-tenths of the workforce were field hands engaged in brute labor. But the 10 percent in the crushing, boiling, and distilling plants were very much specialized labor. More importantly, the scale, complexity, and social organization of the sugar mills made them the first factories. Time was a ruthless master in the sugar production process. Once harvested, cane had to be rushed to the mill to prevent loss of sugar content. In the mills, especially the larger ones, close care of temperature was necessary. The boilers' fires had to be constantly stoked; the liquid sugar had to be moved from kettle to kettle without permitting unwanted crystallization, while running off the sediment at the right time. Then the sugar had to be quickly brought to the curing house where the molasses was run off. Sugarcane produced various qualities of sugar, as well as molasses and rum. The closer the attention to production, the better the final product and the greater the returns.

We think of labor-saving machinery when we think of factories. Indeed, technological advances from the sixteenth century on meant that the sugar

mill was able to process much more sugar with far less mill labor. But the great cost of the mill and its voracious appetite meant that large armies of slaves were put to work twenty hours a day feeding the sweet monster. Technological improvement created the demand for greater and more disciplined labor. This was no leisurely tropical enterprise. A Barbadian colonist reported in 1700 on the sugar mill: "In short, 'tis to live in a perpetual Noise and Hurry . . . the Servants [read: slaves] night and day stand in great Boyling Houses, where there are Six or Seven large Coppers or Furnaces kept perpetually Boyling . . . one part is constantly at the mill, night and day, during the whole Season of making Sugar."

This led to sugar mills becoming the first factories ruled by the discipline of industrial time. The specialized work gangs had to coordinate their efforts: cane had to be quickly cut when mature; carters had to carry it to the mill; the hungry crushers were constantly fed cane; the leftover cane, the bagasse, was carried to the boiling room to stoke the fire. The time exigencies of the production process meant that slaves had to work together as so many parts of a well-oiled machine. Efficiency and slavery, labor saving and labor intensification were combined.

The vast amount of sugar that this method produced caused the price of sugar to drop vertiginously, turning the one-time luxury spice and medicine into a mass food and eventually into a food additive. In the early stages of England's industrialization, from 1650 to 1750, per capita sugar consumption rose, while that of bread, meat, and dairy products stagnated. Sugar fueled not just the industrial revolution, but the European industrial workforce.

Sugar, which we think of as a leisure and pleasure product, an import from the balmy Caribbean lands of *mañana*, was actually the first industrial product and a cruel master to the hundreds of thousands of slaves who labored to turn out sweet delights. Marx observed that "the veiled slavery of the wage-workers of Europe needed, for its pedestal, slavery pure and simple in the New World." He could have added that the factories of the Caribbean were holding a mirror in which Europe could see its industrial future.

7.2 Fiber of Fortune: How Cotton Became the Fabric of the Industrial Age

"He who says the Industrial Revolution says cotton," according to one standard text, and cotton textiles were among the first products produced in recognizably modern factories. But as the story proceeds, we usually focus on the machinery, not the fiber; it seems coincidental that the birth of the factory coincided with a switch in Europe's principal fiber crop. In fact, it was any-