CHAPTER I The Colonial Setting

> It is a fact not generally realized that the American Philosophical Society at Philadelphia, the Royal Society of Great Britain and the Royal Institution of London, are all of them in a measure indebted for their birth and first foundation to natives or inhabitants of New England.
>
> — JACOB BIGELOW, 1816

I

IN THE YEAR of the Lord 1620 Francis Bacon, Lord Chancellor to King James of England, published his *Novum Organum*. The object of true knowledge, he claimed, was the relief of man's estate, the furtherance of man's power over nature, to alleviate human misery and to add to the comforts of life. Let man experiment, and study the ebb and flow of the sea, the motion of the planets, weight, gravity and the many forms of heat. Then true induction will give him understanding, and understanding will make him master of his fate.

Bacon drew the conclusions from a social process which was rapidly developing in the world around him. The Elizabethan period of relative peace had stimulated the growth of mercantile and industrial enterprise. Navigation had opened new seaways and new continents. The older crafts were flourishing, and new ones were established. Weavers, spinners, fullers, carders, printers, brewers, wheelwrights, blacksmiths and silversmiths increased the national income. Across the seas from Holland, France and Italy came word of new achievements in agriculture, of canal building and of mill construction, of new developments in textiles and in the art of war making. And from across the seas came also the books of Copernicus and Stevin, of Kepler and Galileo, with their new and wondrous discoveries. King James was interested, especially in the great engineering works of his period, the draining of the Lincolnshire Fens and the new water supply of London. It was a period of new and hardy enterprise, stimulating invention and science, as well as a new philosophy of life.

2

In that same year 1620, on a bleak December day, the Pilgrim Fathers landed on the inhospitable shores of Plymouth and laid the foundation of the New England settlements. Several of them, their leaders, had been in Holland and seen the many crafts, the canals and windmills of that rapidly developing country. Others had stayed in England, many of them in Yorkshire, Lincolnshire and neighboring districts with their advanced workmanship and their new engineering projects. Many of them were able craftsmen. William Bradford, their leader, knew the silk business and was a fustian maker, others were wool combers, and among them were a tailor, a brewer and a smith. These Pilgrims were followed, some years later, by men and women of similar social and religious background, who spread along the rocky coast of the Atlantic Ocean and penetrated into the virginal forest. Salem was settled in 1626, Boston in 1630. There were men of many crafts among the colonists, weavers, shipbuilders, blacksmiths, printers, carpenters and tanners. Several of their leaders were men of learning. John Winthrop was "browghte up amonge boockes and learned men," as were the ministers John Cotton and John Eliot. They knew their Bible but read other books as well, and remained as much as possible in contact with their brethren overseas. In culture and crafts the new colonies of Massachusetts Bay, of New Haven, of Connecticut and other plantations were a fair reflection of the more advanced parts of England.

These men were Puritans, nonconformists escaping from Royalist and Anglican suppression to build their own institutions. With the theocratic and orthodox Calvinists came representatives of other Protestant sects with similar social background. Providence, in 1636, was settled by Roger Williams, who believed in the separation of church and state. Hartford, in 1636, was settled by Thomas Hooker, who opposed Winthrop's magisterial autocracy. Every year brought new colonists, many of them men and women of ability, craftsmen willing to try their skill at farming in the new country. Some of them were scholars, bringing their books. It is estimated that in the twenty years following the landing of the Pilgrims twenty thousand persons crossed the ocean and settled in New England.

Then, with the English Revolution, the downfall of Charles I and his execution in 1649, the emigration ceased almost entirely. Under

Cromwell the Puritans and the dissenters in England enjoyed sufficient freedom of worship, and no longer felt the necessity of hazarding the perilous journey to the new colonies. Even under the Restoration there was never enough pressure to send more than a small number of individuals across the ocean. The result was that the immigrants of 1620–1640 had the country almost exclusively to themselves and their descendants. There were a few minor waves, one after 1685, when some hundreds of Huguenots came over from France after the Revocation of the Edict of Nantes by Louis XIV. In the early eighteenth century a number of Scotch-Irish settlers immigrated on grants from English land speculators. A few Negro slaves were imported from the South or on Northern slave ships. All this did not deeply affect the composition of the population. The Yankees of the American Revolution were almost without exception descendants of the early Protestant settlers, the inheritors of their tradition. Immigration on any large scale into New England was not resumed until deep into the nineteenth century, when industrialization brought new representatives of new nations.

3

For six or more generations, during more than one century and a half, the original settlers and their descendants lived on their own soil in considerable seclusion from the outside world, isolated even from other British colonies. The main means of communication with other parts of the world was by sea navigation, which tended to break the provincialism of the coastal towns. Poor roads made long land travel adventurous and even dangerous, and no rivers connected New England with other parts of the colonies.

In that long period New Englanders had full opportunity to develop their own local traits and even what may be called their national character. They were, to begin with, descendants of a racially and culturally homogeneous group of immigrants, all hailing from the more economically advanced regions of Elizabethan England. Their small towns and widely scattered farms centered around their Calvinist churches. The training of the early immigrants had served them well in building their homes and providing for the other necessities of life. This training had been passed from father and mother to children and grandchildren, who applied it to the cultivation of the new country. They showed considerable ingenuity in crafts and in trading, in naviga-

tion and shipbuilding, with early touches of originality. They numbered about a million just after the Revolution.

The majority was engaged in agriculture on self-contained homesteads, often far away from the centers of population. An active minority was busy in navigation, fisheries, lumbering and the mechanical arts. The strong family ties, the predominance of self-contained farms, the small size of the towns all led to the maintenance of strong traditions in church and state. In most places the official religion was the old Puritan creed, brought from England and differing little from the original Calvinism with its predestination and its strict adherence to the Bible as the revealed word of God. The Calvinist ministers had decisive influence in matters of public policy as well as of creed. Eventually other sects, especially the Episcopalians and the Quakers, were tolerated, and sometimes became quite influential, but Calvinism set its stamp on colonial New England, as it set its stamp on the Dutch Republic and on Scotland. It was a creed of hardy and individualist workers and traders, which blessed the self-reliant man in the pursuit of his business. Calvinist church organization was democratic, with the emphasis on the community of believers; it harmonized well with the homespun democracy of the New England town government. In the eighteenth century the countryside was covered with small towns scattered along the bays and coves of the seacoast and the rivers and brooks of the hilly countryside.

These towns were all of a remarkable similarity, and some of them can still be admired in secluded spots removed from modern traffic and modern industry. They have a village green with Wren-style churches, still called meetinghouses in true Puritan fashion, and white clapboard homesteads with brick chimneys and small-paned windows looking out over old-fashioned gardens. The old houses vary in appearance; some are in saltbox style, others are gabled, the later and more prosperous ones are square mansions with flat roofs and ornamented doorways. Along the broad village streets, around the homesteads and in the pastures, stand majestic elms, the typical trees of New England, with their slanting branches as different from the English elm as the American robin is from his namesake in England. Maples and oaks abound, and color the landscape in fall in brilliant and fantastic colors. Some relics of the past, a hitching post, a wayside inn, a gristmill or a manse, are carefully preserved. Near the church is the old cemetery, with stern and pious stones guarding the remains of the old settlers. Almost every town has lists of ancient local inventors,

scholars, authors and pioneers, who have set their stamp not only on the locality, but on other parts of the Union as well. Nothing reveals better the homogeneity of old New England than the character of its towns, despite their subtle local differences.

4

The very geography of the country influenced the building of the national character. New England stretches from the Hudson River and Lake Champlain on the west to the Atlantic Ocean on the east, and northward well into the approaches of the St. Lawrence River. It is a rocky land, broken by hills and mountains that rise to more than four or five thousand feet, crowned by Mount Washington with its summit above the 6000 foot level. The country is studded with lakes and crossed by broad and impressive rivers, which drain regions by a wealth of fast-flowing brooks. Its mountains, which to the north break up into the Green Mountain chain and the White Mountains, are part of the Appalachian system which stretches from Georgia to Maine along the eastern part of the North American continent. The rock of these mountains is extremely old and dates back to the Paleozoic period. Most of it was worn down by erosion in Mesozoic times; later it was tilted again to form new valleys. These valleys were gradually eroded by rivers, such as the Connecticut, where fertile ground was accumulated. In more recent times an ice sheet spread over New England, thick enough to cover large hills, and in the successive advances and retreats of the glaciers the ice left the country filled with glacial remnants, with debris, lakes, streams, boulders, terminal moraines, eskers, drumlins and scraped rocks. New England thus became a typical example of a glaciated region, widely covered with a thin soil filled with rocks and stones.

The rivers which break this rocky region flow in the main north–south, starting as wild mountain streams and ending in broad estuaries. The most majestic are the Penobscot, the Androscoggin and the Kennebec in Maine, the Merrimack in Massachusetts, and the Thames, the Connecticut River and the Housatonic in Connecticut. Longest of all is the Connecticut River, 400 miles long from its source in the Canadian border wilderness to its mouth in Long Island Sound. Most of its course it winds through long, narrow stretches of meadowland dotted with elm trees. These rivers are navigable only to a limited distance away from the mouth, where rapids make further passage of larger boats

impassable. The rapids were favorite fishing places for the native Indians, and in the last century provided water power for the new industries. The Indians have left their mark in the names of the larger rivers and in some other geographical names.

5

In this glaciated country agriculture was from the beginning a back-breaking business, and the early settlers needed all their courage, training and Calvinistic faith to hold body and spirit together. Through the hard and continuous labor of several generations they reached a moderate level of prosperity. Despite the skill of the farmer and his desire to improve himself and his family, agriculture never rose far above subsistence level, with some exceptions, notably in the Connecticut Valley. The main reason for this was the lack of capital investment in agriculture which alone could have made it profitable. When large fortunes were made in New England, they were in commerce. The possibility of considerable returns on investments in trade, commerce, and also land speculation, discouraged the interest of wealthy men in the improvement of farming. At a time when agriculture in the mother country advanced technically, Yankee farming remained backward and poorly paying. The men and women of the countryside had to make the best of a difficult occupation by frugal living and a considerable display of ingenuity. Since the seacoast towns, even Boston, remained small throughout the whole colonial period, the backbone of New England remained fixed in its solid yeomanry.

Yankee farming was thus extensive in character and almost entirely self-sufficient. Capital and labor were thinly applied over a large extent of land, and the produce was mainly for home consumption. Poor transportation facilities discouraged production for the market, and made the farm a poor market for city industries. The farms ranged normally from 100 to 200 acres, but were often smaller near the larger centers of population, and increased in size in newly settled regions. There was plenty of work for all members of the family. The woman washed and cooked and sewed, spun yarn and churned butter. The man worked in the field, sowed and harvested his crops, and kept his tools in working condition. Hired labor was scarce, the poorer members of the community often trying their luck in fishing or in shipping. The farmer in coastal districts might also be a sailor or a fisherman during a part of the year or a part of his life.

The homestead produced food, clothing, farm implements, furnishings, all of a simple kind. It was dependent on the outside world only for the products of some local craft, a blacksmith, a miller or perhaps a cobbler or a fuller. The farmer had no occasion to forget whatever skill his ancestors had brought with them from the old country. Over several generations he developed into a many-sided artisan, a veritable jack-of-all-trades. He could, in the words of Chancellor Livingston, with equal address mend his plow, erect his walls, thresh his corn, handle his ax, his hoe, his scythe, his saw, break a colt or drive a team. Forced from early life to rely upon himself, he acquired skill in many different arts, a skill and a versatility uncommon in countries with greater division of labor, a more generous nature or a feudal land tenure.

6

This was an ideal background for the development of manufactures, the display of inventive skill and even the pursuit of the less speculative sciences, the more so since the Puritan religion sanctified the self-reliant man and his right to a profit. Francis Bacon's philosophy and the Puritan's exodus sprang from a common soil, and it might be expected that New England would become a testing ground of Baconian ideas, perhaps a "New Atlantis," Bacon's utopian community across the seas. The speed with which the howling wilderness was transformed into a civilized community showed that the many crafts learned in the Elizabethan homeland were put to excellent use. "Wonder working Providence of Zion's Saviour," exclaimed one of the founders of Woburn in 1654. The settlers were acquainted with the use of water and wind power. Grist, saw and fulling mills were built along the many fast brooks and streams, with an undershot or overshot wheel built to measure by the local carpenter. The rhythmic ticking of the wheel amid the rushing water of the mill creek — a sound still familiar to European ears but alien to modern America — not only was a sign of civilized life and its conveniences, but set many a Yankee lad dreaming of the use to which water power might some day be put.

Occasionally the mill creek had to be dug first. Then the new settlers turned canal diggers, if only on a small scale. At Dedham the Neponset and Charles Rivers were connected by a short canal and at Watertown a ditch was dug at the head of tidewater on the Charles River. Both canals were in existence before 1640. Around the same time a millpond with mill creek and causeway was constructed in Boston's North End,

on which several mills were built, driven by tidewater. Cattle were introduced as early as 1624 and in increasing amount, so that by the time emigration from Europe ceased the stock was well diffused over the country. This promoted leather and shoe making. It is reported that the first settlers of Lynn excelled in stock husbandry and had large numbers of horned cattle, sheep and goats, so that they were the first to think of tanning and cobbling. At any rate, Lynn and the surrounding towns soon became leather centers, but many other towns also acquired tanneries at an early date. And in this way the many crafts of England were spread throughout the country, including the noble art of printing. Daye's press, the first in the colonies, was set up in 1638 at Cambridge near Boston, where in 1639 he printed, significantly, a *Freeman's Oath* and an *Almanack*.

At a very early date discovery was made of the existence of iron ore in numerous peat bogs and ponds in eastern Massachusetts.[1] In 1641 the younger Winthrop formed in London a "Company of Undertakers for the Iron-Works," which established an iron foundry and forge at Saugus, near Lynn, in 1643. Several ironworkers came on from Hammersmith near London, among them Joseph Jencks, metalworker, die cutter and handy man in general. He could work in brass as well as in iron, and provided Boston with iron house utensils, silver specie, and even in 1659 with "an Ingine to carry water in case of fire." This early mechanic, who has been called the Tubal-Cain of New England, was the father of the founder of Pawtucket, and for several generations there were Jenckses who pioneered in Rhode Island industries. This bog iron foundry was never very successful as a financial venture, hammering out, it is said, more contention and lawsuits than bars of iron, but it produced skilled ironworkers who established forges and "bloomeries" in other parts of the country. The site of the forge can still be seen, near cinder banks overgrown with grass. The old iron house, with its steep gables, diamond-paned casements and huge central chimney, is a delightful example of early colonial architecture, which still treasures some kitchen objects made, it is said, at the forge.

The Saugus venture was followed by other foundries in different parts of New England, near places where bogs or rocks contained iron ore. Charcoal could easily be obtained from timber, at that time

[1] This "bog ore," a form of limonite, consists of rusty brown lumps occurring in the surface of certain swamps fed by springs of water carrying iron in solution, and was "mined" by simply scrapping up.

abundant in the colonies even near the Eastern shore. The most important iron mines were those of the so-called Salisbury district, which extended from southern Vermont through the mountainous country of western Massachusetts and western Connecticut along the Housatonic River to the eastern banks of the Hudson. The iron ore in this district was much denser than bog ore. Many ruins of forges and furnaces, subterranean shafts and local names such as Ore Hill, Red Mountain or Mine Mountain remind the traveler today of the importance of this region to the colonial iron industry. The district was named after the town of Salisbury in Connecticut, where, beginning in 1732, some of the most successful mining was done. Workmen were brought from as far as Switzerland and Russia. We know of forty-five important mines in this district, some of which are still being worked at the present day. There Ethan Allen, the later hero of Ticonderoga and deist philosopher, helped to establish in 1762 an iron forge and blast furnace, which – though under other owners – cast a large proportion of the colonists' cannon for the Revolutionary War. Alexander Lyman Holley, one of the leaders of the nineteenth-century iron industry, was the scion of a family which hailed from Salisbury.

Two processes were used, one to produce cast iron, another to produce wrought iron, from which colonial blacksmiths produced nails and other household articles, as well as weathervanes, candlesticks and gates. Some steel was produced in small quantities from wrought iron by a trial-and-error process, the oldest attempt going back to the middle of the seventeenth century. Samuel Higby, a blacksmith of Simsbury, Connecticut, claimed in 1728, however, that he was the very first in America to convert iron into steel, which "curious art" he had found out and obtained "with great pains and cost." The legislature granted him and an associate a ten-year patent on his invention. In 1716 an act was passed giving another firm the right to erect a slitting mill at Stony Brook in Connecticut. Invention was at work in the iron industry and the product improved to such an extent that the British iron manufacturers became worried. Among the experimenters we find the Reverend John Eliot, of Killingworth, also in Connecticut, who had iron smelted from black magnetic sand, a process he described in the *Transactions* of the Royal Society in London of 1762, and for which he received a gold medal from the Society for the Encouragement of Arts, Manufacturers and Commerce in London. Without the many furnaces the American Revolution would have been even more sorely in need of arms than it was.

There were also copper mines in the New England colonies, mainly in Connecticut. The mine at Simsbury, with which Samuel Higby was connected and from which he struck bootleg copper coins of remarkable perfection – now a choice collector's item – had two shafts up to 80 feet and vast caverns in the hills. The imperfect knowledge of mining, especially the difficulty of draining the water out of the shafts, never made it a very profitable enterprise, and on top of this came the prohibition of smelting in the colonies by Parliament. In 1773 the works were converted into a prison for felons, who had to do the mining. This was the horrible Newgate Prison at East Granby, which served during the Revolution as a place of confinement for Tories, and from 1790 to 1827 as the Connecticut State Prison. Mining continued in this place interruptedly until the middle of the nineteenth century, but even the use of modern mining methods could not make it profitable. The place is now preserved as a museum.

7

Yet, with all these possibilities, Yankee industries never advanced beyond this initial stage. The reasons can be found partly in the concentration upon shipbuilding and navigation, from which big fortunes were made, partly in the overwhelming amount of work necessary to clear land and raise harvests in the agricultural districts. However, the mercantilist policy of the British Crown was the main reason of the frustration of Yankee inventiveness. Cromwell, in 1651, prohibited the ships of foreign nations from trading with the colonists. This navigation law was not in every respect unfavorable to the colonists, and actually promoted shipbuilding in New England and elsewhere in America, but it was followed by a whole series of measures created to establish a protective system beneficial to English manufactures and detrimental to the industries of the colonies. The more these industries grew, the more they worried the manufacturers of the home country. Laws were passed by Parliament aimed increasingly at the full suppression of colonial industry and keeping the colonies only as providers of raw material for British factories. The expanding iron industry furnishes one of the best illustrations. Not only New England but also other colonies, especially Pennsylvania, began to threaten English iron manufacturers by the abundance and excellence of their product. Inquiries were made in 1731–1732 by the royal governors, in which it was shown that New England possessed six furnaces, nineteen

forges, one slitting mill and one nail factory. Though they did not supply iron enough for the country's use, British iron interests became increasingly frightened. They realized, however, that America, with its unlimited resources of wood, could supply the British market with cheaper bar and pig iron than the home country, which was fast becoming deforested. The result was the Act of Parliament of 1750 which encouraged the importation from the colonies into the port of London of bar iron, and into any port of Great Britain of pig iron, to be exchanged for woolen and other manufactures of Great Britain, and which prohibited the erection of any "mill or other engine for splitting or rolling of iron, or any plating forge to work with a tilt hammer, or any furnace for making steel," or their continued operation, if already erected. The importation of raw materials into England was thus encouraged, and the export of finished products. Even the establishment of any manufacture for distant sale inside the colonies was discouraged, as the export of hats, wools and woolen goods from one province to another by water, by land or upon horseback. Permitted were household manufactures or manufactures producing only for the immediate neighborhood, but products such as those of steel furnaces and slitting mills had to be purchased from British merchants and manufacturers.

A lucid description of this side of British colonial policy can be found in Adam Smith's *Wealth of Nations*, which was published in 1776. Smith had to agree that the British mercantilist system was more liberal than that of other countries, notably that of Spain or Portugal. Nevertheless, his criticism was severe:

> To prohibit a great people, however, from making all that they can of every part of their own produce, or from employing their stock and industry in the way that they judge most advantageous to themselves, is a manifest violation of the most sacred rights of mankind.

The system was complemented by the restrictive power exercised by the royal governors, who were instructed to veto all legislation tending to assist the development of manufactures. Limitations were imposed upon British capital, if it intended to invest in the colonies. Such investment was allowed only in land or in land speculation – in the South, also in tobacco – and the opportunity for such speculation was widely used. One of the most notorious of these speculators was Governor Wentworth of New Hampshire, whose nephew John was

one of the men who spoiled young Thompson, the later Count Rumford. No such gambles were possible in the colonial manufactures. The result of all this was that in the very period in which England was rapidly converted from an agricultural to an industrial country, and the factory system was spreading over large sections of the homeland, the colonies remained entirely behind in industrial development. Neither did they profit from technical changes in British agriculture, except in a few isolated instances.

It is remarkable that the mercantilist system did not enter more prominently into the demands made to the Crown by the rebellious colonies. The rebellion did not consciously center so much around the question of the repressive economic laws as around the political principle of taxation without representation. One reason is that the navigation laws were never rigorously enforced, notably in overseas commerce. Even in the industrial field there were ways and means to evade them. Bishop reports that copper smelting and refining at Simsbury were quietly conducted by German workmen notwithstanding the prohibition. Another reason was that, as long as the colonists had so many other economic possibilities, the prohibition of industries was not generally felt as a great injustice. The principles of the mercantilist system were taken more for granted than we might think at present. Even William Pitt, the great friend of the colonies in Parliament, while thundering against taxation without representation, maintained the right of Parliament "to bind, to restrain America," and claimed that its legislative power over the colonies was sovereign and supreme. Franklin, in England during the period after the conquest of Canada, maintained that Canada should be kept because it meant cheap land, so that America could remain a nonmanufacturing country. The original form of Jefferson's agrarian democracy was based on a distrust of manufactures. The Declaration of Independence enumerates in detail the grievances of the colonies, but the mercantilist system is never directly attacked. Jefferson became convinced of the value of domestic manufactures only after the painful experiences during the long period of Napoleonic Wars, in which the supply of goods from Europe was curtailed. It is only when we compare the lopsided scientific activity and the restricted inventive productivity of colonial days with the steady growth of science and the outburst of inventive genius after the Revolution that we understand the deadly pressure of the mercantilist system on the colonies. The situation in India under British

[illegible] invites comparison

8

In its restricted field, however, Yankee craftsmanship was certainly in full evidence. The simple and beautiful products of the colonial artisan are now highly valued as Americana — chairs, tables, clocks, glassware, pottery, silver, pewter and hand-woven textiles. Clockmaking, which after the Revolution became such a highly developed industry in Connecticut, had its roots in colonial craftsmanship. The products of Thomas Harland and of Thomas Danforth are still well preserved, as are those of the Willards of Grafton, Massachusetts. The Huguenot Paul Revere, who settled in 1723 in Boston as a silversmith, was the father of a more famous and more versatile namesake, who succeeded his father in his shop and became known as an engraver, a pewter worker, a gunpowder maker, a bell founder and a printer. Longfellow's poem celebrates him as a horseman and a patriot. Among these New England clockmakers were men with a considerable interest in science. Among them we find Joseph Pope of Boston, who made an orrery later purchased by Harvard College, John Fitch, the later steamboat maker, and Walter Folger, the Nantucket astronomer and technical jack-of-all-trades. Several of these craftsmen, despite their humble birth, were men of considerable social status in their community. Many leaders of the Revolution were able craftsmen themselves. The very fact that the mercantilist system frustrated the development of industries may well have had a beneficial effect on the growth of this often exquisite craftsmanship. When the Revolution had removed the mercantilist restrictions the more inventive of these artisans turned their minds to new and more ambitious schemes, and many early republican inventors and shipbuilders sprang from the ranks of these colonial carpenters and metalworkers.

9

Shipping and shipbuilding suffered least from the mercantilist system, and in many ways actually profited by it, either legitimately or by illegitimate means. This led a vast portion of New England's energy into fisheries and into navigation. Along the Atlantic Coast with its sheltered harbors in bays and river estuaries many fishing and trading centers arose, of which several grew into towns of some importance, though not into big cities. Shipyards flourished in or near the trading