Leonards and the Refining of Iron

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In Colonial America, James and Henry Leonard were among the first to refine bog iron into bar iron. The Leonards had already been iron workers for centuries. James and Henry mastered a particular technology and process for smelting iron that originated in the 1300s in Belgium in French-speaking Wallonia and by the 1500's had been spread to England via France. Their father, Thomas Leonard, a fyner, worked at various forges in the west of England. James and Henry brought their traditional family know-how to Lynn, Massachusetts and practiced it in Braintree and Taunton, Massachusetts. Many of their descendants in Taunton and surrounding communities have practiced the art and science of iron refining. This piece describes the iron making process, fills in the historical context of the Leonards as they passed on and adapted their knowledge to technological improvements and new product demands, and outlines the generations of ironworkers that descend from these two Leonard brothers.

The Process:

"Around the middle of the fourteenth century, an indirect process began to evolve utilizing blast furnace techniques. Essentially, in the foundry, a tower of some fifteen or twenty feel in height was carefully built, and iron ore was layered in with charcoal. A fire was lit, and, with the aid of powerful bellows blowing air into the mass through "tuyeres," a hot fire was maintained to actually melt the ore, which collected in a pan at the bottom. Slag rose to the surface of the melt and was scraped off. The liquid iron was tapped off into "sows" and "pigs," which were further refined and purified at the hearths in the bloomaries or "fineries" and "chaferies," where the now malleable iron was reheated for welding and forming into finished bars. The finery and chafery, together, are often referred to as the forge stage. Later, rolling and slitting mills were invented to produce shapes making the production of small pieces such as nails easier. The English words foundry, finery, chafery, tuyere were all derived the French counterparts."[i]

A fair amount of skill on the part of the ironmaster, founder, or fyner, as the person in charge of a hearth or bloomery, finery, or chafery. Without thermometers to measure temperatures, the ironmaster had to judge by the color of the flame and the feel of the heat whether the temperature was correct. He had to know how to structure the contents of the blast furnace to obtain the iron, judging carefully the quality of the ore, the quality of the charcoal, and impurities that would affect the finished product.[ii]

The founder removed the slag with an iron hook known as a "chorchett" and guided the molten iron into sand molds where it hardened into "sows" and "pigs," hence the name "pig iron" given to the product of the foundry.

The fyner worked at the finery hearth converting the pig iron from the foundry furnace into malleable iron. With furgons, long iron bars used for clearing the bottom and sides of the furnace and the tuyere hole, the fyner moved the melted-down pig iron to the top of the fire, so as to expose it to the decarburizing blast of the tuyere and with a "ranggarde" kept the molten matter in motion by stirring. Toward the end of the refining process, the ball of iron was taken out of the fire by tongs and an iron hook and moved to the hammer and anvil to be consolidated into the desired size and shape.[iii]

Richard Lenard, son of Lawrence Lenard, left us a fireback, dated 1636, which shows not only himself as an ironworker and his dog, but hammer, baskets, wheelbarrow, hook, tools, weights, and ladle. Richard worked at the Brede Furnace in Sussex.

Important in the process was removing the impurities. Sulphur would make the iron brittle and not maleable, for example.

Organizing one of these early ironworks was no easy task. One had to obtain sources of ore and charcoal, plus the stone, wood, and iron to construct the furnaces, finery, chafery, hammer, and bellows. "It required several hundred bushels of charcoal and two weeks' time to heat the furnace hot enough to smelt the ore. When started, the furnace could not be stopped conveniently until the blast of five or six months was completed. The workmen, in leather breeches, knew no regular week days or Sundays, but spent their time alternately at the furnaces and in the cook-shed, where tables were set day and night and the cook, with a big kettle full ofmeat and vegetables simmering upon the fire, was constantly at hand."[iv] Skilled workmen and tools were also required. Since an ironworks could consume an acre of woodland's worth of charcoal each day it was "in heat," rather substantial amounts of woodland were required, plus the labor to cut the wood, make the charcoal, and transport it to the ironworks. The enterprise could easily employ 100 to 250 men in all these tasks.

It is little wonder that literacy became essential in the overall operation of ironworks. Written records became necessary to account for payroll, to track loans, to track ownership of property and supplies, to measure and account for production, and to keep investors informed. Such would explain why a Richard Leader was required to manage Lynn, rather than a master iron founder, and why Henry Leonard, who was an iron founder but illiterate, had so much difficulty in managing the Rowley works.

To this basic process were added technological refinements over the centuries. A flux material was added to the mix to collect impurities. Water power was applied to drive the bellows and the giant hammers used to remove impurities. Coal as a source of heat was perfected in the 1700's and widely applied in the 1800's.

"The first continuous and completely successful use of mineral fuel in the blast furnace was by Abraham Darby, of Shropshire, at his furnace at Coalbrookdale, in 1735, or possibly a year or two earlier."[v] Actually, Dud Dudley successfully used coal to reduce iron ore in the early 1600's, but his iron contained too many impurities to be acceptable.

Steel was made in England as early as 1609,[vi] but " the invention of crucible cast steel originated with Benjamin Huntsman, an English clockmaker, at Sheffield, in 1740."[vii]

Use of anthracite coal in the smelting of iron ore, which took place about 1840, rendered the further production of charcoal pig iron unprofitable...[viii] As the large smelters in Pittsburgh, Sparrows Point, and on the shores of Lake Michigan began producing iron and steel in large quantities at lower costs, the small furnaces in New England were gradually driven out of business in the 1800's or forced to specialize in a particular product line.

The History:

"During the fifteenth and sixteenth centuries the manufacture of iron in England was greatly extended. The encouragement, which Edward III and his immediate successors had given to the immigration of foreign workmen into England had resulted in the settlement in the country of many Flemish and French ironworkers, whose skill was eagerly sought by many landed proprietors who entered with zeal into the manufacture of iron. Sussex became the principal seat of this industry; it possessed iron ores and forest of timber, the later supplying the necessary charcoal for fuel, and small streams furnished the requisite power to drive the 'iron mills."[ix]
The domination of Kent, Sussex, and Surrey in England, where the first applications of the Belgian-French process occurred in England, lasted but a few centuries. The first foundry to cast cannons was at the King's ironworks at Newbridge, Sussex, in 1496; and soon there were a large number of hearths in operation throughout the County.

"The forests of England in the ironmaking districts had largely been consumed by the 'voragious' iron works, and there were loud complaints that the whole community would be unable to obtain fuel for

domestic purposes if this denudation were persisted in. In response to these complaints an act was passed in 1558, the first year of the reign of Elizabeth, which prohibited the cutting of timber in certain parts of the country for conversion into coal or fuel 'for the making of iron,' special exception being made for the weald of Kent, the county of Sussex, and certain parishes 'high in the weald of the county of Surrey.'"[x] "A more sweeping act was passed in 1584, which prohibited the erection of any new iron works in Surrey, Kent, and Sussex."[xi]

"In the sixteenth century, owing to the scarcity of timber in England, some of the ironmasters of Sussex emigrated to Glamorganshire, in South Wales, where they founded the iron works of Aberdare and other iron works. Remains of the works in the Aberdare valley still exist. At Pontypool, on the Welsh border, a blast furnace was built by Capel Hanbury in 1565, to smelt the Roman cinder which was found there, and about 1620 'the Hanburys are said to have built iron works at Llanelly."[xii]

"About the middle of the seventeenth century the British iron industry experienced a serious check through the civil commotion known as the Cromwellian Rebellion which then prevailed. Many of the forges and furnaces in Sussex and in the south of Wales were destroyed, and they were not again rebuilt."[xiii] Birmingham, even then a center of iron manufacturing drawing on iron refined in nearby Shropshire and Staffordshire, suffered as the Royalists and the Parliamentarians fought for domination of the country ultimately won by Oliver Cromwell. For example, the smiths of Birmingham manufactured over 15,000 sword blades for the Parliamentarians in 1642.[xiv] Many skirmishes and battles occurred in the area between 1642 and 1649. One can surmise that perhaps travelling to a relatively tranquil Massachusetts during this period would have appealed to some ironworkers.

"In 1740, however, only 59 furnaces were left in all England and Wales."[xv] "Ten of the furnaces existing in 1740 were in Sussex, but in 1788 only two of these were left, and in 1796 only one is mentioned."[xvi] By the 1800's, the iron industry had moved to the west of England completely, and the technology employed had been superceded by puddling and rolling with the use of coal for heat. The Leonards' technology had played out by the late 1800's, and fyners were no longer employed.

The History, the Process, and the Leonards

We first encounter an ironworking Leonard by name just south of the Beauvaisis at Le Vaumain in France, where Robert Lienart was ironfounder in 1503.[xvii]

"The Ironworker Leonards are clearly shown in the Westminister Denization Rolls of 1544 to have come from France in the persons of:[xviii]

> Lenarde, James, born in Picardie, aged 26 years. In England 19 years. Unmarried. 1 July 1544 (Weston, Denization[xix] Roll 36 Henry 8).
> Lenard, James, born in Picardy, in the King's forge at Newbridge 1 July 1544 (Weston, Denization Roll 36 Henry 8)
> Lyonarde, John, French born, "a finer." In England 30 years. 1 July 1544."

There are records of various Leonards in the Weald of Sussex in the 1500's and on into the 1600's. Martin Quinton alias Leonard was a fyner in Frant and Burwash, mentioned in forge accounts at Etchingham and Robertsbridge. His sons John, Henry, and Jordan are also mentioned in forge records. Lawrence Leonard, a grandson, was an iron founder at Hawkhurst and Brede; and Lawrence's son Richard was the creator of the famous fireback picturing himself as an iron founder among his tools.

Martin's son Henry had a son born at Fletching in 1591 who possibly could have been Thomas, but the records do not include the son's name. Henry was baptized at Etchingham on 1 January 1562.

By the late 1500's and early 1600's, the Leonard ironworkers moved to the west of England, per Elizabeth I's encouragement. Thomas Leonard's children were born in Somerset and Shropshire, and possibly in Staffordshire and Monmouthshire. Church records begin at Trevethin in 1654, well after James and Henry were documented to be in America.

Records do indicate that there were Leonards in Monmouthshire after 1654, as well as in various towns with forges in Staffordshire and Shropshire such as Kinver and Cleobury Mortimer.[xx] There were Leonard ironworkers in Bilston, Staffordshire, in the early 1700's. Correspondence between a James Leonard in Bilston and the Taunton Leonards in the early 1800's indicated the Leonard family had a proprietary interest in an ironworks in Bilston heavily mortgaged by an earlier generation. The expense of a lawsuit to recover it discouraged pursuit of reclaiming ownership. As late as 1838, a Thomas Leonard, finer, married Ellen Jones at Lower Mitton, with John Leonard, fyner, presumably his father, witnessing the marriage.

America

The first iron works in America was established in the Jamestown Colony on Falling Creek in 1621 by John Berkley, his son Maurice, and 20 skilled workmen imported from England, but on 22 March 1622, John Berkley and all his workmen were slain and the iron works destroyed in an Indian massacre. No further efforts to refine iron in the Virginia Colony were made in the 1600's. (check date of next one)

The first successful ironworks in America occurred in Massachusetts. John Winthrop, Jr., son of the Governor of Massachusetts Bay Colony, saw the need for a domestic source of refined iron in the new colony and set about to actualize it. Bog iron deposits had been found and noted as early as 1628 in the Boston area.[xxi] Winthrop and his men did a reconnaissance of every major bog between Marshfield, MA, and Cape Elizabeth in ME.[xxii]

In 1641, Winthrop set sail for England, where he rounded up a group of investors (undertakers) to finance the undertaking in Massachusetts, acquired the necessary skilled workmen and materials, and chartered a ship, the An Cleve, to transport the workmen and materials back to Massachusetts in 1643.[xxiii] By December 1644, they had established a single furnace bloomery in Braintree and began operations.[xxiv] In 1645 Richard Leader replaced John Winthrop as the Undertakers' choice of a managing director to oversee operations.

The Braintree operation soon ran into trouble. The bloomery was badly situated. It was short of water, and the dam overflowed on other people's land. A forge needed to be constructed, which was done nearby in Braintree proper. But overall, Leader needed to construct a bloomery furnace and forge ten miles north of Boston in a section of what was then Lynn, now Saugus. Although begun in 1646, the ironworks at Lynn, including a blast furnace, two fineries, a chafery, a big hammer, and a smith's forge, was complete by 1650. It was named Hammersmith by the workers there, after a forge in England.

Henry Leonard is first mentioned at the Saugus Ironworks in 1649, fined for being a common swearer.[xxv] A deposition made by Henry in 1655 implies he was in Lynn 9 years previously, or 1646.[xxvi] James Leonard was paid at Lynn in 1651, including reimbursement for moving his goods from Providence, RI. In 1645, a James Leonard was granted 25 acres in Providence, but the names of James was crossed out in the document.[xxvii] James' daughter Abigail was born about 1645 in Braintree, so we can assume he was there by that time. But we don't know for sure whether James came earlier to America and settled in Providence or not.

"Henry and James Leonard were also skilled workmen at Lynn. They and their descendants were afterwards identified with many colonial iron enterprises. The family name is the most noted in the

annals of the New England iron industry. Rev. Dr. Fobes, in referring to the Leonard family in his Topographical Description of Raynham, with its History, written in 1793, says that 'the circumstance of a family attachment to the iron manufacture is so well known as to render it a common observation in this part of the country, 'Where you can find iron works there you will find a Leonard.'" Henry and James Leonard are said to have learned their trade at Pontypool, in Monmouthshire. They were forgemen."[xxviii]

The Lynn forge became known as Hammersmith, named by the workmen there after a forge some of them had worked at in England. This naming tradition of forges continued with the Leonards, when they named a forge "Whittenton" after Whittington forge in Staffordshire, England, Chartley after another forge in Staffordshire, and Brummagen, a local term for Birmingham in Warwickshire.

The ironworker families recruited from France in the 1500's have been traced to England in the 1600's.[xxix] Amazingly, some of the same surnames appear on the roles of Hammersmith and Braintree -- Vinton, Leonard, Pray, Pinion, Tyler, and Russell.[xxx] This is further evidence that ironworkers passed on their skills within their families, frequently worked at some of the same forges, and knew each other.

"Where you can find iron works, there you will find a Leonard." Dr. Perez Fobes, 1797.

Many Leonards followed James in ironworks. At least five of James' six sons were ironworkers, and the sixth may have been one also (he died in his 20's). Their sons followed in the family tradition, as did many in the fourth and fifth generations after James. It's been difficult to identify all of the Leonard ironworkers, in that early records pinpoint the owners and shareholders (investors) in ironworks, but not usually the men who were working there.

As Ralph Davol noted in "Two Men of Taunton," The Leonards became powerful by iron -- "Vulcans among their fellows. Wherever they found bog ore, -- in "Scadding's Moire," Stony Brook Meadows, Chartley, Middleboro, or Littleworth Brook, -- the ever-increasing family dammed the streams, made their charcoal, set up their bloomeries, and dug over the soil impregnated to this day with iron."[xxxi] "The iron was absorbed in their blood. They were a sturdy, strong-fibred, and gristly clan. There are probably today more of their descendants in the Old Colony than of any other family. They and their posterity were of sound, efficient stock, well suited to bear the climate and endure all other hardships; marrying early in life..."[xxxii] This characterization is probably more grandiose than any of us would use today, but it certainly sounds better than "truculent and profane."

Teaching one's sons a trade by which they could earn a decent living is certainly an old tradition in human affairs. This was all the more important in the days before regular schooling and books where technologies and processes were documented for all to see. Direct repetitive experience was essential to the learning process of the times. So it is little wonder that so many fathers passed on the art of the iron refining trade to their sons and sons-in-law.

Ironworks in the 1600's and 1700's were the forerunners of the mills found along many New England streams in the 1800's. In early times, mills were buildings devoted to a single purpose, such as milling grain or sawing wood. Ironworks usually combined several processes in the production of iron. With the advent of interchangeable parts and mass production, the model presented by ironworks became more widespread as mills housed a chain of processes and became ever larger. Some Leonards became millwrights and engineers, designing early factories and their waterpower-driven machinery, while others drifted into specialties involving knowledge of working iron, such as moulding, stoves, farm implements, and gunsmithing. Some drifted into manufacturing, such as the Leonard refrigerator company. In short, early iron-making grew into a range of occupations, specialties, and products as iron and its alloys was found useful in more and more manufactured goods.

Government attitudes changed as well. The attitude of the British Government toward the burgeoning colonial iron production changed as competition became significant. "The English Parliament, when they heard that the Americans were engaging in the manufactures, prohibited in the 1750's, on penalty of 200 pounds, the erection of any mill for slitting or rolling iron, or any plating forge to work with a tilt hammer, or any furnaces for making of steel, in any of the colonies."[xxxiii] As you'll see below, that didn't stop the Leonards from doing all of these things.

Below is a list, by no means complete, of early American forges that Leonards developed or where Leonards worked. A more thorough examination of the iron works records at the Old Colony Historical Society and other sources would turn up many more. James Leonard descendants are identified by their Modified Register descendant numbers.

Braintree Forge. 1643.

Braintree Forge started before the Saugus Iron Works, but was poorly situated and was a failure as a blast furnace to refine iron from ore. The initial foundry and forge at Braintree, first set up in 1644, was not financially successful and became a satellite of Hammersmith, refining pig iron to wrought iron. James was evidently there, in that his first four children were born in Braintree. In 1659, James offered to lease the Braintree forge (note that this was after he had in ironworks in Taunton up and running in 1656, so he may have commuted back and forth). Apparently, the proposed lease was never put into effect. 3 James may have worked there until 1671 (ECL).

Lynn (Saugus) Iron Works. 1645.

"About the year 1646, two very capable foremen left the Hanbury ironworks at Pontypool, and migrated to the New England Colonies; these were James and Henry Leonard, descendants of John Leonard (Lyonarde), a Frenchman who arrived in England in 1514 and had constructed some of the early water-driven blast furnaces in the Wealden district of South-east England. The Leonard brothers found employment at the Lynn ironworks in Massachusetts Bay, the first of its kind to be established in New England, but being expert forge builders and iron makers, they were later engaged to erect the second New England ironworks at Braintree (Mass.). The brothers were most successful. Henry Leonard and his sons went on to New Jersey to establish another ironworks, whilst James Leonard build the third New England ironworks at Taunton (Mass.) in 1656: this became known as *Leonard's celebrated ironworks* and it continued working in the possession of descendants of the same family for two hundred years; some of the equipment for the original Taunton forge was imported by James Leonard from Pontypool and other workmen left Monmouthshire for Massachusetts at the same period."[xxxivxxxv]

Actually, Henry and James were first employed at Hammersmith in what was then Lynn, now Saugus, Massachusetts.

Hartley writes: "A this stage, of course, we are far from Hammersmith and Braintree, although still short of the complete story of the Leonard ironmaking ventures. This is not the place to handle what is in many respects the very epitome of the American success story. The Leonards rose in the world. They took on offices in government, militia, and church. In many, indeed in most cases, they acquired more and more property and became "first families" of the towns to which their work carried them. The constancy with which the men of the family stuck to the ironmaker's trade borders on the incredible. Perhaps this much, at least, may be in some measure chalked up as part of the Hammersmith legacy."[xxxvi]

In the following paragraphs the various iron works in which Leonards were involved are identified, along with some of the Leonards who owned and/or worked there, identified with their descendant numbers so that they can easily be identified in the genealogical chapter. There were undoubtedly other forges in which Leonards were involved, many additional Leonards were ironworkers. It would

take a substantial amount of research and a whole book to do justice to the topic of Leonards and ironworking. What you see here is just an initial sample.

Ancient Iron Works at Taunton. This was the original James Leonard forge - bloomery work on the Two Mile River in a part of Taunton that later became Raynham. "Raynham Forge was a two-heart bloomery. The two hearths, normally designated as "East" and "West," seem also to have been referred to as "finery" and "chafery." This suggests a division between roughing out and finishing operations, with the two heating units working in sequence rather than in tandem. Both were used, in the early years at least, in conjunction with one big hammer powered with water from a pond created by damming the Two Mile River. Whether the hammer and other heavy iron equipment came from Hammersmith or from England is not clear. The forge building was presumably crude. There was also a charcoal-storage house and at least one house for the accommodation of the workers."[xxxvii] The forge was in operation in 1656. George Hall was the first clerk and manager until 1669, then his son John Hall, then #**2** Capt. Thomas Leonard. The forge made about 20 to 30 tons a year of bar iron made directly from ore. In 1777, Josiah Dean took possession of the old iron works and converted it to a rolling mill and nail works. His son, Eliab, converted it to an anchor works in 1825. The forge continued to make anchors under ownership of his son, Theodore Dean, a Leonard descendant. The forge was abandoned about 1865. It was demolished about 1890.[xxxviii]

#1 James was the original master workman there.
#2 Thomas - was foreman, manager, later, treasurer of Taunton Iron Works 1683-1713 (ECL)
#1 James put #**2** Thomas in charge of East Hearth in 1675 (ECL).
#1 James put #**3** James in charge of West Hearth in 1675 (ECL).
#3 James helped son #**26** James purchase #**10** Uriah's share of forge in 1699 (ECL)
#3 James placed #**23** Stephen as master workman at West Hearth (ECL)
#13 John was an ironmonger and worked at Raynham (ECL).
#15 Samuel became master workman on the East Hearth when his father died (ECL) and also clerk and manager of the works (ECL).
#28 Stephen took over the West Hearth at Raynham when his brother, #**26** James, bought the Whittington iron works, installing his son #**183** Zephaniah in charge when #**28** Stephen moved to New Jersey (ECL).
#183 Zephaniah had control of the West Hearth for a number of years, but had a falling-out with #110 Samuel, resulting in a long law suit.(ECL) **#110** Samuel owned half of Raynham Forge (ECL).
After **#110** Samuel died, his brother, #**119** Elijah, took over, got the forge heavily in debt, causing it finally to be sold to the Deans (ECL).
Josiah Dean (Josiah4, Mary Kingsley3, Abigail Leonard2, James Leonard1) became sole owner of Ancient Iron Works in 1777 and continued as such until his death in 1818 (ECL).

Whittenton (changed to Whittenton) iron works, on Mill River, Taunton (later Raynham) was built by #**1** James Leonard in 1670. It was a "bloomerie with one hearth." Second and third hearths were added in 1694 and 1737.[xxxix] This was the location of James Leonard's personal iron works, as opposed to the stockholder-owned Ancient Iron Works . Three sons worked there: #**5** Joseph, #**6** Benjamin, and #**10** Uriah It continued in family for over 100 years. It used bog iron mined in vicinity of Scaddings Pond ("Moire") and along the Mill River up to Winneconnet Pond.[xl] . Starting in 1737, higher grade New Jersey ores were used.[xli] It was in the possession of the Leonards until 1807.[xlii] Then, Crocker, Bush, and Richmond, who had been Samuel's assistants in the iron business, built a story on the mill and converted to making cotton yarn.

#5 Joseph Leonard was a master workman at Whittington forge (ECL), inherited a one-third interest, later came to own a half interest (ECL)
#6 Benjamin worked at Whittington until his father died (ECL). He owned a share at the new hearth at Whittington (ECL). His son, #**56** Benjamin, also worked there (ECL).
#12 Thomas was paid for work here.

#26 James bought out #**10** Uriah's share, giving him half the Old Hearth and a third of the New Hearth at which **6** Benjamin worked.
#160 James received one half of his homestead at Whittington from his father in 1749 (ECL).
#524 Samuel was iron master at Whittenton (ECL)(Emery).
#461 Abiathar, #**444** Zadock, #**522** Apollos, and finally #**524** Samuel[xliii]

Forge on the Two Mile River, half a mile above the Old Forge. #**31** Seth Leonard sold to Israel Washburn the privilege of erecting and building a furnace there for crafting hollow ware in 1757. He later sold his son **206 Edmund** one-sixth share in the ironworks there.

Chartley iron works built on **Stony Brook (Cowesitt River? - ECL) in Taunton North Purchase** (Norton, later called Chartley Village, West Norton) where Tremont Street crosses Mine Brook.[xliv] Works were built by **#3** James Leonard Jr. and #**2** Capt.Thomas Leonard. Initially, the foundry was only a bloomery producing bar iron. Construction started 1696, in operation by 1698. **#14** George Leonard bought **#3** James' share of Chartley on 28 Oct 1707 (ECL). In 1713 #**14** George Leonard became the sole owner of these works and greatly enlarged them. **#56** Joseph was master workman at Norton Forge, which his father had started (ECL). These were the noted Leonard iron works of Norton. It used bog iron ore.[xlv] It burned down in 1741 (ECL).

Bloomery at the Taunton line, on Three Mile River, near present site of North Dighton furnace, built by Richard Stephens in 1695. I'm not sure if any Leonards were involved in its building or operation. It continued in operation until about 1800.[xlvi]

Baylies Iron Works, Westville, Three Mile River, 1739. It was located above the Stephens' bloomery. The forge was set up by Boston merchants Bollan and Laughton, but run by Thomas Baylies and later his brother Nicholas and thereafter by Hodijah Baylies. The anchor for "Old Ironsides" made here. Ironworks were sold to John West in 1809. It is not known if any Leonards worked here.

King's furnace, built on Littleworth Brook, on the eastern part of Taunton in 1724 and 1725. It produced hollow ware. It was rebuilt in 1816, where it employed about 30 men and continued in operation until the 1840's. It is not known if any Leonards worked here.[xlvii] #**16** Elkanah Leonard had a small interest in it.[xlviii] Raynham Forge had to purchase ore there when the law suit between #**183** Zephaniah and #**110** Samuel tied up Raynham's supply from elsewhere.

Hopewell iron works. Bloomery only. It was built on Mill River near the Danforth Street bridge in Taunton in 1739 and 1740 by #**183** Capt. Zephaniah Leonard. **#266** Uriah Leonard worked here in 1764 (ECL). It made bar iron from bog ore. It was succeeded by a rolling and slitting mill erected by John Adam in 1776 and 1777. In 1782 the property passed into the hands of Samuel Leonard and others of Taunton. It produced nails from imported Swedish and Russian iron. #2037 Deacon Lemuel Leonard managed the operation for a while. It was finally unprofitable.[xlix]

Small Foundry below Whittenton Mills, Taunton. Built in 1845 by **#2037** Deacon Lemuel L. Leonard for casting stoves and small ware. Later, **#2037** Deacon Lemuel and his son, #**3529** Lemuel Mason Leonard, built a large foundry on Wales Street in Taunton and removed from Whittenton in 1865. The Leonard Co-operative Foundry Company was organized in 1877 and reorganized in 1891 under the name of the New England Stove Company. (ECL)

Old Colony Iron Works, Taunton. It was built in 1824 by **#1086** Horatio Leonard & Co. (Emery) In 1827 they commenced making iron with bituminous coal rather than charcoal. It manufactured iron for nails and shovels.

Trout Brook forge in Middleborough. It was started by **2**Thomas and Philip King. Thomas purchased King's share in 1700 and put **#16** Elkanah Leonard was in charge (ECL). **#52** Benjamin

Leonard worked at #16 Elkanah Leonard's forge (ECL). #244 Philip Leonard ran lawyer **#123** Elkanah's iron works, while **#298** Elkanah and **#299** Zebulon ran the store. The forge was known as the tack factory on the railroad between Middleboro and Taunton (ECL). **#614** George became the operator in the late1700's (ECL). **#1315** Nehemiah (followed his father George) as operator, later selling it to his brothers (Nehemiah was Elisha Clark Leonard's father) (ECL).

Bloomery forge built at Bridgewater in 1722. It was converted to gun factory by Hugh Orr in 1738. It is not known if any Leonards worked here.[l]

An iron works was erected at Plympton, now **Carver**, in 1730, with a blast furnace and in operation until after the 1760's. There was mention that Leonards worked there, but no specific names have been found.

Ironworks at Danforth Dam, Attleboro. A rolling and slitting mill was operated by Thomas Cobb and two of his sons in the 1760's and following decades. Thomas married a daughter of Capt. James Leonard, **#167** Lydia Leonard, and learned the iron business at Chartley. Thomas Cobb's sons, **#494** Thomas Cobb and **#495** Jonathan Cobb, operated the mill in the later 1700's.

A slitting mill for slitting nail rods was erected at **Milton** about 1710 (?).

Judge Peter Oliver's Slitting mill and forge was erected by Oliver in 1751 on the Nemasket River near Muttock, Middleborough, and abandoned in 1830. It was said to be modelled on slitting mill in Canton. It later became a shovel factory. Leonards worked here: **#243** Joseph, as did his son, **#602** Archippus, **#246** Benjamin, **#432** Joseph, and probably others.

"New Forge" built on the Nemasket River, Middleborough, in 1762, burned in 1785, and bought by #613 Capt. Benjamin in 1796 (ECL). Partnership with **#614** Lt. George Leonard (Benjamin's brother), Abiel Washburn, and Abner Bourne. It later became Abiel Washburn's shovel works.

Forge at the foot of Stones Pond on Trought Hole Brook in Easton. Originally known as Brummagem,[li] more commonly referred to as **#161** Capt. Eliphalet Leonard's forge. **#161** Capt. Eliphalet Leonard gave it to his son, **#472** Jacob, in 1782, then son, **#1018** Isaac, who sold it in 1802 to Timothy Mitchell and Giles Leach.[lii] This eventually became the Ames works in 1800.

#26 Capt. James Leonard bought the forge in 1720 or 1721 and installed his son **#161** Eliphalet as master workman there (ECL).

"Shovel Shop Pond Dam" Forge, Easton. It was built about 1792/3 **#1014** Eliphalet III. It was not very successful. It went bankrupt in 1801 and was sold to Oliver Ames in 1803.

Forge at Marshall Place, Easton, on road east from Washington Street Methodist Church. It was built was among first to make steel. The mill was erected by #467 Eliphalet Leonard, Jr. about 1775 or 1776 on land he bought in 1765.[liii] He erected it due to the extreme scarcity of steel during the Revolutionary War, which he needed for the manufacture of firearms. It was later operated by **#467** Eliphalet's son, **#1012** Jonathan. The furnace was capable of making 3 tons at a batch. It was enlarged in 1808 to make 10 tons a batch.

Tremont, Wareham, "The Old Washington Works." Dam and works built by **#605** Benajah and his brothers **#603** Rowland and **#604** Ichabod.

Canton. A foundry was erected by **#1016** Jonathan Leonard in 1813. It made 100 tons of steel a year.

Canton. Steel was made by Leonard & Kinsley by the German method. Later by Dunbar & Leonard. (Was this Jonathan's works from 1813?)

Canton. **#2089** Charles Sargeant Leonard opened a forge in 1823 that burned down in 1826.

Stoughton, now Canton, Forge on Massapoag Brook. **#75** Uriah Leonard started this forge after moving from Norton (ECL). His son **#268** Walley worked here, and it's likely sons **#267** Nathaniel and **#266** Uriah also worked here. Also, it appears **#663** Walley, son of **#268** Walley, and **#664** Uriah, son of **#268** Walley, also worked at this forge.

Mansfield Forge - #104 Ephraim Leonard had a forge here.[liv]

Russell's Mills, Dartmouth, Massachusetts. Ralph Russell was to have joined Henry and James Leonard in the Taunton venture, but declined and set up an iron works in Dartmouth. No Leonards are known to have worked there.

Rowley Iron Works, at Rowley Village, now Boxford, near the Topsfield line. Henry Leonard had a sixteenth share of the works. Construction was begun in 1671. The forge had 3 hearths with water-power driven bellows. It was called "Bromingum Forge." In 1673 Henry took off for New Jersey, leaving a bundle of suits and debts and giving up his lease. Henry's sons Samuel, Thomas, and Nathaniel took over working the forge. During this period the forge burned down, suspicion being that Nathaniel was responsible. The sons left temporarily, but by 1679 had returned.[lv]

New Haven, Connecticut, Iron Works. It was the brainchild of John Winthrop, Jr., and started in 1657. They hired a number of Hammersmith employees, but no Leonards known to be involved. It was abandoned in 1680.[lvi]

Upper Mill Brook, Laysville/Lyme, Connecticut. Capt. Samuel Southworth from Bristol and George Hall from Taunton partnered in the erection of a bloomery here in 1737. It operated from 1741 until about 1793. Seth Leonard and Deborah Hall, sister of George, moved to Lyme about 1741, perhaps in connection with the ironworks. (research by WCL).

Salisbury, Litchfield Co., Connecticut. A number of furnaces and forges were in operation in Northwestern CT, apparently started by #**1017** John Adam and his partner, Samuel Forbes. Adam was a son of John Adam and Abigail Leonard. Abigail was the daughter of Zephaniah Leonard of Easton, leading one to suspect that the Adams father and son learned the iron refining business from Zephaniah.

Whippany, Hanover twp., New Jersey. **#28** Stephen Leonard moved here in 1722. He had all his forge tools (will). There was a forge there. #**187** Joshua, his son, succeeded him as the master workman there.

Tinton Falls Iron Works, near Shrewsbury, Monmouth Co., NJ. It was begun by James Grover in the early 1670's, later sold to Col. Lewis Morris, who in 1675 employed Henry Leonard and his sons Samuel, Nathaniel, and Thomas to operate the iron works.

Later Ironworks:

#1953 Elijah Leonard ran away from home before completing his apprenticeship in iron refining. He worked for several iron works in the Lake George area before migrating west to **Taberg**, north of Syracuse, where he built a small iron works. He later purchased an iron works in **Constantia, NY**. In 1829 he became superintendent of the **Normandale Forge** in Ontario, Canada, which employed over 400 men. In 1834 he established an iron works at St. Thomas, Ontario, in 1838 moving it to London, Ontario. #**3435** Elijah, Jr. and his brother, **#3434** Lewis, ran the iron works at **London,**

Ontario (Elijah Leonard & Sons Iron Co. The firm later became E. Leonard and Sons and continued in operation under the Leonards until 1945.

Job Mason Leonard (Job4, Samuel3, James2, William1?) organized the East Bridgewater Iron Company in 1850, sold his interest in it five years later, and organized the **Mt. Hope Iron Works** in Somerset, MA, in 1855. He later combined these with the **Old Colony Iron Works**. The ironworks at its height employed over 500 people. After his son decided to pursue another calling in 1904, Job said, "If a Leonard cannot run these iron works, no one else shall" and shut down the plant, which employed about 500 people.[lvii]

Other Leonards employed in the iron business:

#124 Joseph is said to have been an ironworker, but we don't know where.

#432 Joseph was a bloomer (ECL), but we don't know where he worked. Judge Oliver's forge?

#659 Nathaniel was a blacksmith and tool maker. He lived in Chester, VT.

#1958 Simeon Lewis Leonard was a blacksmith in Osterville, MA.

#2046 Nathaniel Leonard was a nail manufacturer in Dighton, MA.

#2066 Elbridge Gerry Leonard was an iron founder in Providence, RI.

#2074 Joseph Warren Leonard was foreman at an iron works in Phoenixville, PA, and at Troy, OH.

#2205 John B. H. Leonard was a metal smith in RI and CT.

#2520 Andrew Leonard was a forgeman in Dorchester, MA

#2679 Ellis Leonard was a blacksmith in Foxboro, MA.

#2764 Oliver Leonard was an iron dealer in Taunton, MA.

#3346 John H. Leonard was a blacksmith in Providence, RI.

#3431 Frederick N. Leonard was an iron moulder in Westmoreland, NY.

A Sidelight: The Leonards as Bankers: Why hold silver or gold when you could hold something valuable, like iron?

There was a shortage of specie -- money in circulation that could be used as cash -- in early New England. A mint for coining silver money, pine tree shillings, was established in Boston in 1652, but the amounts of coinage issued were small. In 1690 paper money was first issued in Massachusetts in 1690, but again, in very small amounts. There were no banks. Iron, given its relative price stability, availability, and desirability, was used from the late 1600's through the 1700's as a store of value and a medium of exchange, principally for business transactions, but also to pay wages and salaries, settle estates, and erase debts. The record books of various Leonards starting with **2** Thomas in the archives of the Old Colony Historical Society show the various accounts of bar iron held by members of the Taunton, Raynham, and Middleborough communities, with transfers between and among accounts as payments were made, credits established, loans were made, and debts were settled. **2** Thomas and **15** Samuel kept ledgers of balances, credits, and debts. Among the papers were various notes that, in effect, were checks. When the debt settled or the transfer was made, the signature was cut out.

Here are some examples:[lviii]

"Ensigne Thos. Leonard, pleas to pay Bar: Tipping nine shillings &three pence in iron as money. Taunton 16: 1st, 1685-86. from yr. friend, Richard Williams" This is an order from one of the promoters of the iron works, who draws on his account to pay his grocery bill.

"Ensign Thomas Leonard. Please pay ye bearer hereof one hundred of iron yt is due on Mr. Shoves act. to my wife your friend. Taunton ye 16 of ye 1st Mo. 1685-86. your friend, Walter Deane."

"Thomas Leonard, clarke of the Iron Works of Taunton: Sr paray pay to Joseph Crosman, one hundred of iron as money, & this shall be your discharg: this ye 13th Janura 1683. Tanton-'84 Hezekiah Hoare."

"Loving ffriend, John Cary. these may inform you that if you please to Credit Richard Burt as much as comes to a hundred of Iron, I will be Responsible to you & Rest your Lo'g ffriend. Tanton Dec. 30, 1683-4. Thomas Leonard."

"Ensine Lenard, I pray you let Mr Greene have four shillings more in iron, as money, and place itto my account. June 20, 1684. James Walker." This was payment to the local schoolmaster.

"Captain Leonard: Sir, I would intreate you to pay James Tisdale yesum of 2-7-6 in iron at 22s. per hund. and make me Deptr for it on ye acount of ye Credit Mr. Danford gave mie on yourbook. Your ffr'd. Tanton ye 23 March 1688-9. Increase Robinson."

Rev. Samuel Danforth, the fourth minister of Taunton paid his "servant mayd:"

"To Captain Thomas Leonard, Sr I would pray you to pay Elizabeth Gilbert (my late servant mayd) the sum of thirty shillings in iron at 18 sh. pr Cent: to her or her order-& place it to my account... pr yr friend and servant. Dated Tanton, Mar 11, 1703-4. Samll Danforth."

A filial business letter transfer "money" from the Chartley Iron Works to the Old Iron Works from George3 Leonard, clerk at Chartley, to his father, Thomas2, clerk at the Old Iron Works and the accounts to whom they should be paid:

"Loving ffather, my humble duty and my wives to you remembered, and our due Respects to all the Rest of our Relations, hoping you are all in good health as blessed be God we all are. I have now sent a tun of Iron by obadiah Edy, and would intreat you or brother Elkanah to take a little care of it: there is 29 bars ffor Mr. Pool of Boston, being ffifteen hundred & half; and ten bars for Mr. Henry Kimball, ffour hundred & a half: yours to serve. George Leonard"

The account books and "checks" are archived at the Old Colony Historical Society in Taunton.

Other Notable Leonards

Of course, not all Leonards were iron workers. Many were lawyers, clergymen, or farmers. When later President John Adams in his younger years visited Taunton as a circuit-riding lawyer, he found five Leonards among the justices before whom he would appear.[lix] He was not pleased. From his diary: "June 8, 1762. Went to Taunton Court, the land of the Leonards; three Judges of the Common Pleas. Of that name each of them has a son who was or at (Harvard) college. The Hon George, the 1st Justice, seems to be arbitrary. He committed two old gentlemen who were nearly 80 years old to the custody of an officer for only speaking loud. A check, a reproof, an admonition would have been enough. He was unwilling that the Sessions should adjourn for an hour to take the verdict of the jury upon a presentment for riot but would have the jury kept together all night till the Court should sit again the next morning. No other Court in the Province superior or inferior would have thought of

keeping the jury up. He broke in abruptly on Bob Paine.[lx] He did not think it right to run out against the King's witnesses. For his part he did not like to hear it 3 or 4 times over. Thus the haughty tyrant rules the country." (ECL) The three Judges referred to above were George, his brother Ephraim, and cousin Zephaniah. George's father was also a Judge. The King's Attorney in the County was Daniel Leonard, son of Ephraim. Daniel was a prominent Loyalist at the time of the Revolutionary War and later became Chief Justice of the Bermuda Supreme Court.

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[i] Robert E. Bowman, "Glimpses into the English and Continental Origins of Certain Braintree and Saugus Ironworkers of about 1650: Vinton, Leonard, Pray, Pinion, Tyler, and Russell," The Essex Genealogist, May 2000, p. 2.
[ii] E.N. Hartley, Ironworks on the Saugus: The Lynn and Braintree Ventures of the Company of Undertakers of the Ironworks in New England, Norman, OK: 1957, pp. 165-184, explains the process used in New England in the late 1600's.
[iii] Dr. H. R. Schubert, "The First English Blast-Furnace," Historical Note 37, the Journal of the Iron and Steel Institute, February 1952.
[iv] Davol, "Two Men of Taunton," p. 56.
[v] James Moore Swank, "History of the Manufacture of Iron in All Ages and Particularly in the United States from Colonial Times to 1891," Philadelphia: The American Iron and Steel Association, 1892, p. 52.
[vi] Swank, p. 54
[vii] Swank, p. 54.
[viii] Swank, p. 162.
[ix] Swank, p. 45.
[x] Swank, p. 50
[xi] Swank, pp. 50-51.
[xii] James Moore Swank, "History of the Manufacture of Iron in All Ages and Particularly in the United States from Colonial Times to 1891," Philadelphia: The American Iron and Steel Association, 1892, p. 56.
[xiii] Swank, p. 51
[xiv] Samuel Smiles, "Industrial Biography, Iron Workers and Tool Makers," 12 December 1995 (Project Gutenberg reproduction).
[xv] Swank, p. 51.
[xvi] Swank, p. 52.
[xvii] Leblond and Tremblot, eds. *Documents notartes*, 357, quoted by Brian Awty in an undated manuscript.
[xviii] *Denizations and Acts of Naturalization*, Huguenot Society of London Pubs. 8:152. Quoted by Bowman, p. 8.
[xix] Denization - English law. The act by which a foreigner becomes a subject of England, but he has not the rights either of a natural born subject nor one who has been naturalized.
[xx] "The earliest and longest lived forges were at Cleobury. These must have been built at the same time as the first blast furnaces, around 1570." http://www.discovershropshire.org.uk/html. Two of Thomas Leonard's children were baptized in Cleobury Mortimer,.per Barton, "Pre-American Ancestry of our Leonard Ironworkers."
[xxi] Bill Barton, "The Establishment of the Iron Industry in America,"
http://freepages.genealogy.rootsweb.com/~bart/LEONARD1.htm. 4/8/2007, p. 1.
[xxii] Bill Barton, "The Establishment of the Iron Industry in America," p. 2. Quoted from the Winthrop Papers, Vol. IV, pp. 425-6.
[xxiii] One of the undertakers was Thomas Foley 1617-1677, one of a set of brothers who were entrepreneurs owing iron and mine works from Staffordshire to Monmouthshire. Barton speculates that the Foleys were perhaps responsible for recruiting James and Henry to the Massachusetts Bay Colony venture.
[xxiv] Whether the ironworks at Braintree was the first to produce iron in 1644 or whether the Saugus/Lynn ironworks had that honor in 1643 is not clear. Barton quotes sources for both dates.
[xxv] The Leonards were often in trouble with local authorities. See Tod Shacklet, "The Leonards of Lynn: A Case Study of the Integration of Outsiders Into a Puritan Community, manuscript, 9 June 1997. Shacklet quotes Stephen Innes as describing the ironworkers who came to New England as having "a long, and apparently well-earned, reputation for stout-hearted truculence and profane living." See Stephen Innes, "Creating the Commonwealth: The Economic Culture of Puritan New England," New York: W. W. Norton & Co., 1995, p. 252.
[xxvi] Bill Barton, "Pre-American Ancestry of Our Leonard Ironworkers,"
http://freepages.genealogy.rootsweb.com/~bart/LEONARD2.htm, downloaded 4/8/2007, p. 1.
[xxvii] Barton, Pre-American Ancestry, p. 2.
[xxviii] Swank, p. 112.
[xxix] Letter from Brian K. Awty dated 23 March 2007 enclosing a draft of the section on the Leonards.
[xxx] Robert E. Bowman, "Glimpses into the English and Continental Origins of Certain Braintree and Saugus Ironworkers of about 1650," The Essex Genealogist, May 2000, pp. 1-16.
[xxxi] Ralph Davol, "Two Men of Taunton, in the Course of Human Events, 1731-1829," Taunton: Davol Publishing Co., 1912, p. 58.
[xxxii] Davol, p. 59.
[xxxiii] Sanborn, Genealogy of the Families of Kings, p. 16.

[xxxv] "The Early Pontypool Ironworks," p. 9. Chapter on the Hanburys of Panteg. Philip Hanbury b. 1582 came to Monmouthsire about 1608, settled at Panteg, only one mile from the Pontypool ironworks.
[xxxvi] E. N. Hartley, "Ironworks on the Saugus," Norman: University of Oklahoma Press, 1957, p. 276
[xxxvii] Hartley, p. 274.
[xxxviii] Swank, p. 114. See also J.W.D. Hall, "Ancient Iron Works in Taunton," NEHGS Register 38:265-275.
[xxxix] Hartley, p. 275
[xl] Swank, p. 116
[xli] Hartley, p. 275
[xlii] Hartley, p. 275
[xliii] Hall, "Ancient Iron Works in Taunton," p. 19. This is a typescript transcribed from the Collections of the Old Colony Historical Society, Taunton MA, Vol. I, no. 3, pp. 131-162 by Herbert B. Willis in May 1940. A much shorter version appeared in the NEHGS articled previously cited.
[xliv] Chartley was the name of a forge in Staffordshire, England, owned by the Foleys. Source: http://www.herefordshire.gov.uk/htt/584.aspx.
[xlv] Swank, p. 116
[xlvi] Swank, p. 117
[xlvii] Swank, p. 117
[xlviii] Hartley, p. 275
[xlix] Swank, p. 117
[l] Swank, p. 121
[li] Birmingham UK Archives, www.birminghamuk.com/brummagen.html: "Brummagem (originally Bromichan or Bremicham) is a name in Brummie dialect for the city of Birmingham in England. The origins of the word date back to the time of Middle English, and it is known to have been in widespread use by the time of the Civil War" (164 0-60). This would seem to indicate a Leonard connection to the area. Also, Leonards whose y-dna indicates a common ancestry with James have lived in the area for several centuries or more and flourished as gun barrel makers.
[lii] Hartley, p. 275
[liii] William L. Chaffin, "History of the Town of Easton," Cambridge: John Wilson and Son, 1886, pp. 278-9.
[liv] Davol, "Two Men of Taunton," p.
[lv] Hartley, pp. 294-296.
[lvi] Harley, pp. 286-288.
[lvii] Hurd, p. 654.
[lviii] These are quoted from Capt. J. W. D. Hall of Taunton, MA, "Ancient Iron Works in Taunton," read before the Old Colony Historical Society, July 1884, pp. 9-17. The original pieces of paper are in the archives of the Old Colony Historical Society in Taunton.
[lix] Davol, Two Men of Taunton, p. 65.
[lx] Robert Treat Paine, another Leonard descendant described at length in Davol's "Two Men of Taunton." He was later a representative to the Continental Congress with John Adams and a signer of the Declaration of Independence.