AN OLD JERSEY FURNACE

A STUDY BY HARVEY MOORE

FOREWORD

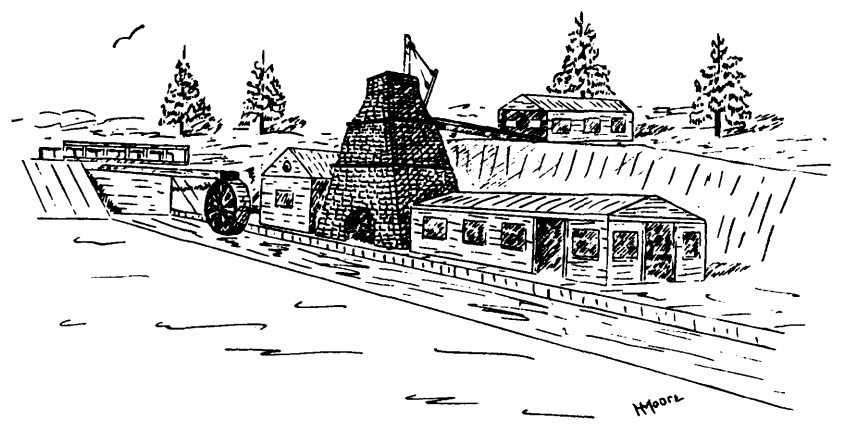
The following paper is the outcome of an interest in bog-ore furnaces that was aroused while botanizing in the neighborhood of the site of one in South Jersey.

Research could disclose nothing in print about the organization and functioning of these old furnaces. An attempt is here made to view one as a going concern, instead of an obsolete curiosity.

The statements made are the result of a long close study of the furnace journal mentioned in the text, a study that was checked currently by many explorations at the site.

Much that was archaic and obscure in the journal was cleared up by the fortuitous discovery of an old unsigned article on iron in volume IX of the "New American Cyclopedia" published in 1860 by D. Appleton & Company at New York.

MARTHA FURNACE AS IT MAY HAVE APPEARED



There is nothing remaining today [1943] except the dam, the spillway, a pile of debris where the furnace stood, some foundation planks of the wheel, and the "bank". The buildings in the sketch are correctly located, however imaginary their appearance.

The Pine Barrens of New Jersey cover the major portion of that part of the state extending from approximately, the latitude of Trenton, south to that of Vineland or Millville. They start about 23 miles east of the Delaware River, and extend across the state without interruption, to the narrow strip of fertile land that borders the maritime marshes. The sandy soil of the Barrens does not lend itself to farming. The first settlers in South Jersey, therefore, occupied the farm-supporting country along the Delaware, or the fertile land beside the coastal marshes. Very early in the state's history the Pine Barrens were as devoid of population as they are today.

While the Pine Barrens, as the name suggests, consist of seemingly endless monotonous stretches of pitch pine growing in white sand, there is really variety in them. Along the courses of the sluggish streams that drain the barrens, are great swamps supporting dense stands of white cedar, which give way here and there to open reaches of bog that, in the early days, were the sources of iron ore for a long since vanished industry.

Many of these bogs today have been taken over by the cranberry growers. But aside from the year around caretakers, the pickers in season, and one week of deer hunters in early winter, about the only human frequenting the Barrens today is the enthusiastic botanist, who, unmindful of either mosquitoes or intense humidity, can occasionally be found sloshing around in the bogs to feast his eyes on the abama, the rose pogonia, the golden crest, or other bits of bog loveliness; or maybe on a cold crisp day in fall, looking for the glory of the gentiana family, the intense blue pine barren gentian. However, it is not the present day naturalist we are interested in, but in a long departed industrialist of the Barrens; - the iron worker, who, over a hundred years ago lived in the small towns then scattered about in the pines, and who worked in a nearby blast furnace.

Lumbermen cutting out the white cedars in the swamps must have been the first men who lived in the barrens. Closely following the lumbermen came the men who developed the iron industry. Valuable deposits of iron ore were discovered in the bogs. Furnaces for extracting this ore from the iron-stone that contained it soon sprang up near the heads of navigation of the streams draining the Barrens. From the small beginnings of using clay-lined hollow tree trunks for the primitive furnaces, the industry grew until large brick furnaces, some complete with forges, were in use, supporting towns of between 300 and 600 population. The situation was ideal for the development. The bogs were full of ore; in the surrounding timber was a plentiful supply of charcoal; the nearby salt bays contained all the necessary lime flux in the shape of oyster and clam shells; while the streams leading to the sea provided a waterway to the markets for the finished product.

The presence of ore in the Jersey Pine Barrens should be explained by a chemist. A chemist has a way of being both mystifying and convincing at one and the same time. As near as a non-chemical mind can comprehend, it comes about something like this: The underlying marls and green sands Of the barrens are full of iron in some chemical form. The springs and streams pick up this chemical iron and carry it in suspension, until it comes in contact with the air, when oxidation takes place. Oxidation gives solidity to the chemical iron. It unites with the mud and decayed vegetation and thereby is precipitated in the coves and bogs, where it collects to form the "iron-stone" ore used by the furnaces. The process of iron-stone formation is continuous. A bog cleared of ore would replenish itself so fast that the "ore-raisers" could go back and extract a second supply of ore in twenty years or less.

A furnace at the peak of the Jersey bog-ore industry was a brick, double-walled chimney, faced outside with stone. It was about 20 feet high and 20 feet square at the base. More than anything else it resembled a squat, truncated pyramidal bottle, with four low arches in the outside masonry at the bottom, through which access was had to the working parts. The inside chamber widened gradually from the top of the chimney downward, to reach its greatest diameter three-quarters way down, where it was called the "bosh". From the bosh it narrowed sharply to end in a relatively small crucible called the hearth. The name "hearth", which suggests entrance to a firing place, was a misnomer. The furnace hearth was about the only place where there was no fire. All the fire was above. The furnace hearth included both the arch in the masonry and the

crucible inside, into which crucible the molten iron and cinder ran, to be drawn off from time to time.

The charging was done through the top of the chimney from a platform where a charging mechanism was located. A furnace was built in a depression so this charging could be done across a bridge, or ramp, that led from the "bridge-house" on "the bank", or higher ground, to the chimney top. The charges were weighed in the bridge-house to see that a proper mixture was obtained.

Close to the furnace ran the spillway from a dammed up stream. In the spillway was built a water wheel that operated two large bellows which gave to the furnace its draft. As soon as ice conditions permitted continuous running of the water wheel, the operation for the season began. To heat and dry out the furnace, it was filled with charcoal and fire put in at the chimney top. When the fire had burned down to the hearth, the furnace was filled again with charcoal and permitted to burn its way back to the top, after which the charging began. A layer of ore was spread over the burning charcoal, and a layer of shell flux placed over the ore, followed by a layer of charcoal. Succeeding layers in this order were put in until the furnace was filled, when the blast was started. This layer system of charging through the chimney top was continuous throughout the life of the blast - about eight months. It was estimated that a charge of ore and flux took about 24 hours to work down to the hearth in a molten state. When it reach the hearth, the molten iron being heavier, dropped to the bottom; while the molten cinder, consisting of the rock residue united with the flux, floated on top of the iron. The molten iron and cinder were drawn off about twice daily through tap holes properly placed for the purpose. The cinder was carted away to the slag pile, while the iron was run into the casting shed, built in front of the tap holes. In the casting shed the molten iron was poured into moulds, or run into a series of gutters prepared in the floor, and converted into pig iron. Pig iron was not an end in itself, but merely a convenient method of handling iron that was later sent to a forge to be worked into some merchantable form of malleable iron or steel. The operation of a furnace was continuous; - 24 hours a day, divided into two 12 hour shifts, seven days a week, with holidays unknown.

Prior to its advent into the furnace, some of the iron stone, to reduce its size, was put through a crusher called the "stamping mill". From time to time the cinder was gathered up and run through the stamping mill to recover such ore as might remain in it. The recovered ore, known as "the stamped stuff" was mixed with fresh ore, and put through the furnace again. Ore from the hill country to the north, called "mountain ore", was sometimes brought in and mixed with the bog ore to improve the product.

Not all the iron went into pigs. At the Martha Furnace, according to existing records, much of it was cast into stoves, fire-backs, sash weights, and "hollowware", as kettles, skillets, and such utensils were called. Cannon wheels were also cast at this furnace; and something known as "cambosses", whatever they were. The Martha Furnace had no big forge connected with it. The only forge at Martha was the small one in the blacksmith shop, where axes, hammers, horse shoes, gear for the wagons, and other forgings necessary for carrying on the business were made. About a mile and a half below this furnace was the Wading River Forge that took some of the pig. Here it was converted into wrought iron, rolled into sheets, and run through the "slitting mill", as a mill equipped with roller shears was called, and "slit" into merchantable sizes for making nails, wagon wheel tires, and similar forgings.

The Martha Furnace was built in 1793 by Isaac Potts, and named after his wife. It was in Burlington County, located on the East Branch of the Wading River (also known as the Oswego River) about two miles above the forks, up to which point scows could be navigated, or about four miles above the head of navigation at Leeks Landing, where the coasting schooners from Philadelphia and New York tied up.

The lay-out at Martha included the casting shed, the blacksmith shop, the carpenter or pattern shop, and the warehouse, all clustered about the furnace. Beyond the furnace was the dam that backed up the river water to make a pond about two miles long, down which much of the ore was boated. The dam, in addition to running the wheel for the bellows, furnished the power that operated the saw mill, the nearby grist mill, and the stamping mill. The powerful hammers of the stamping mill could be heard a great distance, as they crushed out the ore and cinder. The records show that the grist mill and saw mill both antedated the furnace by about 40 years, which indicates that some settlement existed there before it was called Martha, evidently supported by a lumber operation. The area was then known on the tax books as the Oswego Lumber Tract.

While the Martha Furnace was no different from any other South Jersey furnace, and while the site today is almost entirely devoid of any remains, it was unique in one particular:—It left a journal of its operations between the years 1809 and 1815, through the pages of which can be seen some of the vanished activities of the furance [sic] towns. Internal evidence supports the conclusion that this journal was written by the ironmaster's clerk, one Caleb Earl, a self-effacing humorist who leavens the monotony of a day by day record of furnace happenings with pungent comment on the very human frailties of his associates.

The town of Martha contained about 400 people. It supported a schoolhouse and a hospital. Apparently no doctors were connected with the hospital. They seem to have been brought in from the outside; usually "Doc Sawyer", and sometimes one known as "The Dutch Doctor". The company operated a general store at which employees had "accounts". At the furnace the men worked as hearthmen, banksmen, fillers, guttermen, moulders, pattern makers, blacksmiths, and warehousemen. There were laborers who "put up the ore" and flux, and carted away the slag. In addition to those employed directly at the furnace, there was the saw mill and the stamping mill to run. Beyond the Martha activity was the woods operation that supported the ore-raisers, the lumbermen, the charcoal burners, together with the teamsters and boatmen who brought in the raw material to the furnace. The teamsters also carted the oyster and clam shells up from the landings and took the finished product back to Leeks Landing for shipment to the markets at Philadelphia and New York in the deep sea schooners that docked there.

The schooners did a thriving business, taking out the finished product and bringing back meat, provisions and supplies for the town; for as has been said, these Pine Barren furnace towns were not self supporting. The soil did not lend itself to any extensive farming or grazing. Virtually all food-stuffs had to be brought in from the outside.

The ore raisers worked in the bogs. They brought up the iron stone with the aid of some oyster-tongue like device, also known as an "ore-raiser". Holes eight feet square were dug, through which the ore was raised to the surface. A wall of muck and earth was left between these holes to keep the ore raisers from being washed out. Occasional records, however, are made in the journal of high water "flooding them out", and making them stop work. The ore was brought to Martha from the bogs within a radius of seven or eight miles. It was constantly coming in from bogs along the streams within that

radius: - Papoose, Tranquility, Hospitality, Beaver Run, "Waden Runs" and Hauken; and also from Half Moon Swamp, Sassafras and "Long Slow".

The journal makes many references to several nearby taverns at which the teamsters frequently stopped, sometimes with disasterous [sic] results: Bodine's Tavern at "The Landing" where the Tuckerton Road crossed the Wading River, and where the Philadelphia-Tuckerton stage stopped; Sooy's Tavern at Washington; and one that cannot be located with accuracy, called "The Bucks". The Bucks was probably close to the Slitting Mill (now deserted Harrisville.) Near the Bucks was a church, at which, so the journal says, Jacob Emans once stopped after liquoring up at the Bucks, (called "frolicking" those days) "to get his sins forgiven him."

Not much recreation aside from what the taverns afforded was available to the inhabitants of furnace towns. From Martha they frequently went "over to the beach", presumably in sailing vessels. They organized excursions to The Plains to gather "wortleberries", that today we call huckleberries. The men attended Town Meeting at Sooy's. They go to Bodines for some sort of military training. The War of 1812 touches them lightly, and gets the single mention that "this day we had rumors of the peace confirmed". And on July 4, 1811 there is an entry that should be quoted in full: - "Independence Day. May the name of Washington be immortal; and the Federal Constitution, may it never fail."

They are reported from time to time as going "to the country", which in the light of today's complete desolation, seems somewhat strange and implies a well built up area. There was considerable travel between furnace towns: - Batsto, Weymouth, Hanover, Speedwell, and to Westicunk (West Creek) Forge. Occasionally they formed hunting parties and went after deer; or down the river for ducks; or, when the snow was on the ground, they took sleigh rides. But in spite of the absence of recreative opportunities, the journal is quite happy in tone, and reveals the existence of much rough, boisterous humor among the inhabitants.

While the furnace was owned and operated by the Quakers, the Irish dominate the pages of the journal. Michael Mick is everywhere; bossing the labor, hiring, firing, cursing and working hard, or drinking with his boon companions - James Nash, James McGilligan, Neal McCag, and Patrick Scully - middle-aged men all, with grown sons. The Micks are around that neck of the woods yet. One of them runs a filling station not so very far from the site of Martha.

Other men appear constantly throughout the record; - Solomon Reeve who ran the stamping mill, the saw mill, and who fought and cursed everybody between times. His descendants today are running cranberry bogs in the neighborhood. Then there was Jacob Ventling, a sturdy dependable mechanic who was perpetually going "over to the beach", or "down the river for ducks", or making something special in the blacksmith shop. James McEntire also figures prominently. It seems his inability to hold much rum was notorious, and he was often home sick from the effects of "having drunk a tablespoon more than his allowance".

There was a colony of free negroes at Martha. At one place "James McGilligan makes a violent attempt on the chastity of Miss Druky Trusty, ye African" In addition, the journal tells of a society known as "The Sons and Daughters of Thunder" that attend camp meetings, usually held at Lower Bank on the Mullica River.

There are records of snows, rains, winds and high water. Occasionally the mosquitoes are bad. Sometimes it is "very sultry". Sometimes the days are "fine" with dry, cool northwest winds blowing. There are births - called "musterings" - and deaths, with burials mostly at Batsto. They have quilting parties, house ”raisings", and weddings, at all of which much rum seems to be present. Men get drunk, beat up their wives; fall in the creek; break various and sundry bones; have "grand" fights with each other; lose their cows in the woods; and have their teams run away, which usually take a couple of days to recover.

Stray dogs roam through the town. "Michael Mick kills a rattlesnake". James Craig returns to work "after enjoying the pleasures of matrimony and goes to chopping wood". Jacob Ventling takes pot shots at a loon for two days, and then don't get it. Jane Hamilton is tried by the synod of her church for drinking the "spiritual" liquor, and is acquitted. James McEntire brings his daughter back from Half Moon "for fear her morals will be corrupted". The floor boards of the bridge slip up and "Old Leather Jack falls in the creek casouse." Walter Anderson "dreams ecstatically of kissing two handsome girls". Sol Reeve gets drunk, breaks his nose, "throws Pink out of doors and breaks his leg", and then goes about all the next day "grunting like a man 100 years old". Jesse Evans, the ironmaster, makes surveys, lays out "crossways" (corduroy roads), builds bridges, hunts for ore, checks cargo, makes out bills of ladings, goes to court, visits Philadelphia, and once a year starts out with his wife, Lucy Evans, for "Schuley's Mountain Spring".

The moulders all quit one hot August day and go "over to the beach" to cool off. "Old Sore Toes departs this life" - he was a horse. Ed Ruffer gets "$3.00 per month for wheeling cinders". Men dig for buried treasure. A "conflagration" destroys the furnace, casting shed and warehouse, which are all rebuilt in record time. Bogs are cleaned out and fresh ones opened up. The saw mill is rebuilt and so is the stamping mill. A new hearth is put in the furnace each spring. The bridge house gets a new floor. The "coaling" (charcoal) comes in good, bad, and indifferent, and occasionally catches fire and damages the wagons. The ore boat runs aground in the pond coming down from Sassafras. Fires occur in the pines. A gale of wind blows the roof off the carpenter shop. Teams fall off the bridges; wagons collapse; the "pacer" breaks down; the bellows get wrecked; the dam gives way; and all hands get hilariously drunk when the furnace goes out of blast for the winter.

Throughout it all, the product of the furnace is shipped out, and the supplies for the town come in. Life goes on in a happy prosperous manner. They had enough money to buy what they needed, and they seem to have had abundant health. At all events they had lots of laughter. And when the journal comes to an abrupt end in May, 1815 the Martha Furnace was at the very peak of its career.

The entire Pine Barrens region on the Wading River and Mullica River watersheds, and around the headwaters of the Rancocas, was filled with prosperous furnace towns. In areas completely deserted today, there was much activity in colonial, revolutionary and early 19th century times. Stage coaches ran through these areas connecting them with Philadelphia. There was much travel between furnace towns, and to county seats for court. Burlington, Mt. Holly and Philadelphia were visited almost daily on the stage lines that connected them. Hotels and taverns sprung up along these stage routes, around which grew trading settlements. Farmers on the fertile coastal land supplied these hotels and taverns with food-stuffs and did a thriving business. Itinerant traders went from town to town selling their wares. The schooners maintained a contact with the big cities, and kept everybody in touch with the outside world. The people who lived in the

furnace towns and around the hotels were well informed, and alive to current happenings. But everything depended on the iron industry. Iron was king.

And iron remained king until anthracite was discovered in Pennsylvania, beside valuable deposits of iron ore, which ore was better than the Jersey bog ores. Methods of reducing this ore with anthracite-fired furnaces were perfected about 1840. Immediately an iron industry started up in Pennsylvania with which the bog ore business could not compete. The collapse of the South Jersey industry was catastrophic. In ten years the South Jersey furnaces went out of blast for all time. And as the land in the Pine Barrens was unable to support the population that was in them, the towns were deserted. The schooner traffic fell into disuse The whole area reverted to its primitive state. All vestages [sic] of the towns have long since disappeared. Recurring forest fires and frame construction have seen to that.

The paper and glass industries which grew up with the iron business hung on for a while, but now they too, have gone. Nothing remains of any of them except the names of their locations, which still persist on present day maps: Hanover, Stafford, Dover, Mary Ann, Harrisia, Speedwell, White Horse, Etna, Hampton Furnace. There isn't an inhabitant left in any one of them, and most are inaccessible on deserted sand roads. At Martha, the only sign of life visible today is in the presence of a mature Bald Eagle, who seems to have taken possession of the place, and who frequently can be seen, with white head and tail gleaming in the winter sunshine, as he wheels his way over the old furnace pond.