

**ON THE STATISTICS AND GEOGRAPHY  
OF THE PRODUCTION OF IRON: A PAPER  
READ BEFORE  
THE AMERICAN GEOGRAPHICAL AND  
STATISTICAL SOCIETY, ON THE 21ST  
FEBRUARY, A.D., 1856**

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On the statistics and geography of the production of iron: a paper read before the American geographical and statistical society, on the 21st February, A.D., 1856 by Abram S. Hewitt

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**ABRAM S. HEWITT**

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**American Geographical and Statistical Society,**

UNIVERSITY BUILDING,

NEW YORK, 21st February, 1856.

At a meeting of the Society, held at their rooms this evening—

HENRY GRINNELL, Esq., V. P., in the Chair,

The Society proceeded to the paper of the evening; upon the conclusion of the reading of which, by Mr. HEWITT, the Hon. HORATIO BERMOUR offered the following resolution, which was unanimously adopted:—

*Resolved*—That the thanks of the Society be tendered to Mr. HEWITT for his very able paper read before the Society this evening, and that a copy be requested for publication, for the uses of the Society.

WM. COVENTRY H. WADDELL,

*Recording Secretary.*

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ON THE STATISTICS AND GEOGRAPHY OF THE  
PRODUCTION OF IRON.

A PAPER READ BEFORE THE AMERICAN GEOGRAPHICAL AND  
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Mr. PRESIDENT AND GENTLEMEN OF THE SOCIETY :

One of our poets has told us that Basil, the blacksmith, was

"A mighty man in the village, and honored of all men;  
"For, since the birth of time, throughout all ages and nations,  
"Has the craft of the smith been held in repute by the people."

How far this feeling of respect for my calling has weighed with you in honoring me with a request to prepare a paper on iron, I know not; but it is quite certain that from the earliest days there has been a peculiar charm about the business, which has left its traces in the myths of the ancients, and in those mystical legends of the middle ages, that have survived the decay of empires and feudal institutions, and even to this day delight the young at the Christmas fireside.

In one of the earliest treatises on alchemy, we are told how the "Sons of God," who first fell from their high estate through love for "the daughters of men," imparted to their giant offspring the secrets of extracting the metals from the earthy calx; and who of us have forgotten with what intense interest our childhood was absorbed in those wonderful stories of King Solomon, in which this race of genii are represented as toiling, imprisoned in the bowels of great mountains, to produce the metals which enriched the wise king, and enabled him to build

the Temple of God, "so that there was neither hammer, nor axe, nor any tool of iron heard *in* the house while it was in building."

Nor is it strange that to the young or the ignorant, the idea of magical power should attach to those who, penetrating into the depths of the earth, shatter the mighty rocks with explosive power, rivaling the thunderbolts of Jove, and by the combined action of earth and air, and fire and water, reduce from the dull ore the glowing vivid metal, till then

" In stony fetters fixed and motionless."

It is a perpetual struggle against resisting nature, and the victory is only won by turning her own gigantic powers against herself, so that the ancients called in the aid of Gods to account for the triumph; and for the gift which, as Æschylus has it, "has shown itself a teacher of every art to mortals, and a great resource," made the unhappy Prometheus expiate the offence in fetters on the rude Caucasian rock.

But in our day the interest which attaches to the production of iron rests upon a better appreciation of the difficulties to be surmounted; and upon a full knowledge that iron is the main-spring of modern civilization, Locke has told us that "he who first made known the uses of iron may be truly styled the Father of Arts, and the Author of Plenty;" and in our own day, Hood thus wittily sums up its multifarious applications:—

"The universality of the employment of iron is so manifest, especially in this country, that if any period has deserved the title of the Iron Age, to none can it be so characteristically applied as to the present. The seas are traversed by iron ships; the land travelled over by iron carriages upon iron roads. We have iron engines employed for nearly every mechanical purpose. Water is brought along our streets by iron pipes, and all our thoroughfares illumined by means of gas conveyed to us through a similar channel. Many of our houses have iron floors and iron roofs, whilst the windows are closed with iron shutters. In short, from the gigantic steamer which crosses the Atlantic, to the smallest of ornamental shirt buttons, this metal has become so prevalent, that the country ought to be ticketed, like a

laundress' window, with 'Ironing done here.' But the wealth and comfort arising from this state make it equivalent to the much more lauded advantages of the Golden Age."

The hand that penned these characteristic words was scarce cold in the grave before that great temple of industry, reared like a creation of magic, had been opened in the metropolis of the world, to receive the products of every clime, and exhibit the fruits of human ingenuity to admiring thousands. Fond enthusiasts dreamed that the reign of universal and perpetual peace had been inaugurated, and that the material which had been used for dealing out death and destruction was now for evermore consecrated to human progress, and a higher civilization. But scarce had the last notes of the national anthem died in the ears of the heterogeneous mass of hearers who were assembled from all nations and tongues of the earth to witness the magnificent closing of the most magnificent spectacle which mankind has ever seen, when the rude alarm of war burst upon astonished Europe; and all the energy, skill, and genius of the world were called into play to devise new methods of applying iron to the work of destruction. Steamers hurried masses of men and supplies with a speed which throws the achievements of Napoleon into the shade. A railway is constructed from the sea to the beleaguered city; the steam-whistle shrieks its wild requiem over the dead and dying as it conveys them by the car load to hospitals, sanctified by the holy and heroic presence of woman. The telegraph carries the swift messages of death, from the entrenched camps to the cabinets of ministers, a thousand miles away. The tidings of victory or defeat are heard by a listening world before the great cannons have ceased to roar. For days and weeks together, the mouths of these gigantic monsters vomit forth iron hail, until walls are battered down by the resistless shock of twenty thousand tons of cannon balls; and the stern old Russian, who had stood unmoved while he lost his thousand men a day, is compelled to retire before what he graphically describes as "the fire of hell." It is the terrible energy with which iron has been employed in this contest, rather than any skill in strategy or diplomacy, which now enables the world to felicitate itself with the prospect of peace after the lapse of two short years, instead of having to endure



all the miseries of a struggle protracted for thirty years, as in all former European contests. But my limits on this occasion do not permit to trench on the domain of the moralist, nor even of the man of science. My investigation will have reference solely to the statistics and geography of the production of iron; and if, as I fear, the results be found dry, and lacking in originality, my apology must be found in the name and objects of this Society, and in the consideration, so well stated by another, "that statistics are far from being the barren array of figures ingeniously and laboriously combined into columns and tables, which many persons are apt to suppose them. They constitute rather the ledger of a nation, in which, like the merchant in his books, the citizen can read, at one view, all the results of a year, or a period of years, as compared with other periods, and deduce the profit and loss which has been made in morals, education, wealth or power."

And first, I shall attempt to give you a succinct account of the growth of the business. Iron was known to the ancients; but being the most difficult of the metals to reduce, it came into use after the other metals were well known. Tubal-Cain is admitted to have been the first manufacturer; but on so small a scale was his business established, that even in the days of Homer, a piece of iron which a single man could throw was offered as the most precious prize at the games in honor of the death of Patroclus.

"Let him whose might can hurl this bowl, arise:  
Who farthest hurls it, take it as his prize."

When Porus came from the land of gold and pearls and diamonds to propitiate the conqueror of the world, it is recorded that his most precious gift to Alexander was a piece of Indian iron weighing forty pounds. In the days of Pliny it had come into more general use; and he is equally eloquent in describing its application in the arts of peace, as he is indignant at its perversion to the purposes of war. But it was not until long after the Christian era that its production was aided by any mechanical appliances worthy of the name. It is exceedingly doubtful whether cast-iron, (carburet of iron,) was known until the 18th

century after Christ. Previous to this time, iron was made by simply placing the ore and charcoal in layers in a rude oven, and smelting it by a blast forced in by a common bellows, worked by the hand of man.

We are accustomed to regard the crusades purely as an outburst of religious enthusiasm at a time when the civilization of the world afforded no outlet for the pent-up energies of men, and to attribute to them no other practical result than the impoverishment of the nobles, and the consequent liberation of the serfs. But it is probable that the returning crusaders brought back with them the knowledge of the manufacture of cast-iron, thus identifying the birth of modern civilization with the birthplace of that divine religion which has accomplished for the moral elements of our nature what the use of iron has for the practical progress of the race.

The knowledge thus acquired was soon put to use throughout Europe; but it surprises the inquirer to find that in the year 1740, only 118 years ago, the total production of iron in England amounted to not more than 17,350 tons, made by fifty-nine furnaces, giving an annual production of 294 tons to each furnace. At that time I am satisfied that the total production of Europe did not exceed 100,000 tons, of which 60,000 tons were made in Sweden and Russia, and one-half of this was imported into England. The annual consumption of iron in England was, therefore, 15 pounds per head of population, and in Europe did not exceed 2 pounds per head. The destruction of wood, caused by this insignificant product, was so rapid, that the business of making iron was likely to be extinguished, when, as is the universal rule, the evil which was dreaded gave birth to a remedy which imparted new life to the production, and has enabled it to reach its present gigantic proportions. This remedy was the substitution of pit, or *mineral* coal, for charcoal. To Dud Dudley, an Englishman, is due the merit of this discovery, or at least of its practical application; and to him, more than any other man, belongs the title of the "Father of the Iron Trade." But his discovery made little progress for the period of 100 years. In 1750 it came into general use; and in 1760 the first blowing cylinders were erected by Smeaton, at the Carron Iron Works. A single furnace was there made to yield 1000 tons per annum, or

three times as much as the average of charcoal furnaces. This wonderful result agitated the whole industrial world, so that even the poet Burns came to see the grand spectacle; and being refused admission, gave vent to his indignation in these rather indiscriminate lines:—

We cam na here to view your works,  
 In hopes to be mair wise;  
 But only last we gang to hell,  
 It may be nae surpris.  
 But when we tirl'd at your door,  
 Your porter dought na bear us;  
 So may, should we to hell's yetts come  
 Your billy, Satan, sair na.

[A. D., 1797.]

The total production of Great Britain, in 1788, had reached 68,300 tons, making an increase of 50,950 tons in 48 years, *i. e.*, 300 per cent. At this time Watts' great invention of the steam-engine was introduced; and emancipating the iron works from dependence on sites where there was water power, produced so great an increase in the business, that in 1796 the production had reached 125,079 tons, and in 1806, only 10 years later, it had increased to 258,206 tons, each furnace making an average of 1546 tons per annum; but the average of the best constructed was 2615 tons per annum, or nine times as great as the charcoal furnaces only 60 years before. At this date, only 50 years ago, I am satisfied that the annual make of the whole world did not exceed 500,000 tons, one-half of the present annual production of the United States. The annual consumption of iron per head in Great Britain had reached 40 pounds, showing conclusively a wonderful progress in the arts of civilization—the consumption having nearly trebled in less than 60 years.

These were the results of the inventions of Dud Dudley and of Watts. But in 1783 and 1784, Henry Cort, also an Englishman, inaugurated a new era in the iron business, by his invention of the process of puddling (*i. e.*, of converting cast-iron into wrought iron in reverberatory furnaces), and of reducing the rough masses thus obtained into finished bars, by grooved rollers. The history of this great benefactor of his race is an instructive one. Born to a competence, well educated in the science of his day, attracted to the iron business by an enthu-