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## THE WISCONSIN LEAD AND ZINC DISTRICT

By C. M. SANFORD

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THE area known as the Wisconsin lead and zinc region is sixty-five miles long by fifty-five miles wide, and embraces about twenty-six hundred square miles. Five-sixths of the field is in Wisconsin and one-sixth covers the contiguous corners of Illinois and Iowa.

The existence of lead in this district was doubtless known from the time of the earliest discoveries in the upper Mississippi, and was actually reported as early as 1658. Hennepin's map, published in 1687, shows the location of mines. By 1700 there were several trading posts on the Mississippi river where lead ore was purchased from the Indians. This ore was mined from the residual clays near the surface by the Indian women and old men and carried in baskets to the banks of the river.

The first striking figure to be identified with the development of the region was Julien Dubuque, a man of marked energy and singular tact in dealing with the Indians. Through his efforts pits were dug, furnaces erected, and roads constructed to connect mines with furnaces.

From the time of Dubuque (1787) the influx of whites was so constant that by 1827 Wisconsin was the leading producer of lead in the United States, which distinction it continued to hold until 1871.

At first the ore was shipped down the river to St. Louis and New Orleans in flat boats, later in keel boats, and finally in steamboats. The fact that the ore was near a great natural artery affording water transportation cannot be overestimated in a consideration of the development of the district. For years the Wisconsin region was in close business relations with the South since it not only shipped all its ore south but also purchased its food-stuffs in southern markets. The closeness of these business relations gave the region a southern character and tone. As one might expect, the forging of close commercial ties brought about close intellectual and social bonds. So real was the southern influence that for some time pro-slavery sentiment took deep root in Wisconsin.

Dissatisfaction with the conditions of freighting on the Mississippi gradually developed until about 1836 when strenuous but unsuccessful efforts were made to develop the Fox-Wisconsin or Green Bay route; i. e. up the Wisconsin river to the portage at Fort Winnebago, and thence down the Fox river to Green Bay. So difficult and expensive did navigation on the Mississippi finally become in 1839-40 that the ore began to be carried by wagon to Milwaukee.

"Lead schooners" drawn by eight or more yoke of oxen might be seen daily to arrive at Milwaukee after a journey of ten days over the prairie. The fact that the oxen could be fed upon the abundant prairie grass lessened the cost of such transportation. The further fact that food-stuffs

could be purchased more cheaply in the Milwaukee markets helped to develop this route.

By 1841 the annual output of lead for the district had risen to 13,425 tons, and of this amount about one-half was carried overland to Milwaukee. With the construction of the first railroad in 1841-50 came the practical discontinuance of both the overland and river routes.

No sooner had the problem of transportation by the construction of railroads been solved than the problem of mining the ore took on serious proportions. The exhaustion of the easily-worked portions of the veins near the surface forced the miners to work at a greater depth. This was not only expensive but practically impossible since they soon came to the level of ground-water and no methods were then in vogue for mining below the water table.

To appreciate the problems connected with mining the ore, it is necessary to consider briefly the nature of the deposits themselves. The primary minerals are lead sulphide or galena, zinc sulphide or blende, and iron sulphide or marcasite. The ores occur as disseminations, as honeycomb masses in the limestone, or as vein deposits along joint planes which as a rule have been enlarged by solution. The lead and zinc ores are usually associated.

There is no evidence that the ores have been brought up from deeper seated areas, but rather that they have been derived entirely from the country rock. The ore substances originally existing in the crystalline rocks to the north were brought in solution and precipitated throughout the Galena and Maquoketa beds in the Ordovician ocean that at that time covered this region. Ages afterward meteoric waters in circulating through these beds dissolved the minute, disseminated, metallic substances and redeposited them in their present form. The fact that just beneath the Galena limestone we find the oil rock, a bituminous, shaley, impervious bed is significant since it serves as a floor to the mineral basin below which the meteoric waters cannot percolate.

For a long time mining was confined to the residual clays near the surface. It was not until the miners reached water level that real difficulties were encountered. These difficulties gave the district a serious and what proved to be a permanent setback. From 1851 the decline in lead mining in Wisconsin was rapid and was followed by a period of stagnation that continued until 1901. Even the extremely high price of lead in the time of the Civil War utterly failed to stimulate the industry. Almost coincident with the failure of the resources of the lead district came the alluring prospects of the gold fields of California. The great attractions of the latter field caused miners to leave in throngs. "No part of our state," says a local historian, "ever lost so large a proportion of its people as did the lead region at this time."

It is worthy of note that up to this time nothing had been done with

the zinc ore though it was known to exist in abundance. Its utilization had been greatly retarded for the reason that marcasite or iron sulphide was everywhere associated with the zinc ore. While the gigs which operate on the principle of the sorting power of running water could easily separate the heavier lead from the zinc, it could not separate the zinc from the iron sulphide since both were of about equal specific gravity. The separation of the two minerals remained an unsolved problem until 1904. Now by placing the ore in rotary roasters the marcasite is oxidized. The whole is then passed under magnets which pick up the marcasite thus leaving a very high grade of zinc ore.

Though it is not likely that Wisconsin will again become an important producer of lead, yet with the problem of transportation solved, with the introduction of hoisting engines and pumps, and with the present successful methods of separating the ore from its impurities, it seems likely that Wisconsin for some time will become increasingly important as a producer of zinc.

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#### AN INTERESTING ARTICLE ON CHINA

The September number of the National Geographic Magazine has a good paper by Kenneth F. Junor on *Curious and Characteristic Customs of China*. The author explains that his paper records the conditions in parts of China which are not under foreign influence. The following notes are from the article:

China is a land whose cities have no lights, no plan, no sewers and no sidewalks. Her people have no public spirit, no patriotism, no idlers, no national feeling and no secrets.

Her canals surpass those of any nation in history in their extent, and here is found the longest canal in the world (800 miles).

There are hundreds of cities which are circled by mighty walls, some of them from 40 to 50 feet in both height and thickness.

The Chinese locate intelligence in the stomach. They pay their doctors to keep them well, and punish them, if they can, if they get worse or die.

The woman, in sewing, pushes the needle from her, while the carpenter draws his plane and saw toward him in working.

Men only have the honor of a funeral granted them. Their mourning color is white. Mourners at a funeral are all hired.

The boy in school turns his back upon his teacher when reciting, to show his humility and respect in the presence of the scholar.

The guest of honor is placed on the left at table because his host can more gracefully serve him. To be polite the guest must fairly gorge himself, leaving nothing on his plate. Men and women do not eat together.