

## MISCELLANEOUS.

## Geology of the Lead Mines—No. 4.

It is hardly necessary for us to advert to the manner in which mining is prosecuted in this section; yet we will do so for the information of those who "are not to the manor born." With us, it is almost universally the united effort of from two to four individuals; their capital, a set of mining tools, worth some five dollars, and stout hearts and willing hands to labor. After having made a verbal agreement with the owner of mineral lands, for permission to dig, and agreed upon the amount of rent, (generally one-fourth or one-fifth of all the mineral raised) they proceed to work. If successful they continue their operations; if not, they either sink a new shaft, or abandon the ground altogether. No capital is employed; so far from it, that in many, very many, cases with us, the hardy miner is dependent upon his daily success for his daily bread. No companies formed—no systematic united effort of capital and labor to develop our mineral resources. It is merely individual efforts to acquire the wealth that lies near the surface.

In England a lease is taken for ground for a definite period, and with a view to extensive operations. A company formed—shares sold—a capital provided, and rules and regulations adopted for their government in all their operations—experienced men to supervise in all departments, and mining commences. Should, at any time, any shareholder be disposed to withdraw from the concern, he can do so, and dispose of his shares in any way that he wishes. Statements, similar to the following, are made every two months to the stockholders:

"At the ordinary two monthly meeting of shareholders in Bomin Wheal Mary Consols, on Wednesday, the accounts showed:—Balance from last account, £89 13s. 10d.; call of £2 per share on 824 shares, £1,648; ores sold (less dues), £133 15s. 10d.—£1,871 9s. 8d. Cash due to pursuer from last account, £163 15s. 9d.; March and April cost, including £300 paid on account of engine, £1,035 15s. 10d.; leaving balance in favor of adventurers, £672 18s. 1d. A call of £1 per share was made to pay the balance (£697) owing on account of the 50-inch cylinder engine. A report from Capt. Kernick was read, which stated that an important discovery had been made on No. 1 lode. An ancient level, supposed to have been driven 100 years ago, has been cut into, and upon examination it is found that the old miners had driven on the side of the lode, and the water having crushed and broken down, the level in many places is full of valuable ore; there is a vast quantity altogether in sight."

Upon a comparison of the two systems, should we be surprised at a decline of production in our mines? Or can any estimate be made of the increase of lead, if we were thus operating? The only matter of surprise is, that we have continued to produce the quantities we have, under all our disadvantage; and had not our lodes been rich, and our whole section abounding, as it is, in mineral wealth, we would have abandoned mining long since.

The method of mining in Cornwall, is thus:—With the exception of a small number of individuals, employed as superintendents, clerks, &c., who are paid stated salaries, the labor is performed by contract, made at regular short intervals—generally every eight weeks. These contracts are made publicly, and very similar to auction; work being the article bid for—men the purchasers or "takers," and the price is regulated by their own bids. There is, however, this peculiarity, that the work is always started by the "Captain," at a price much higher than it is really worth, and this price is gradually reduced to a fair one by competition among the men. This system has been pursued in Cornwall for ages, and so well is it adapted to the interests of both employers and employed, that strikes, so prevalent in mining and other branches of industry, are unknown. Work in these mines is principally of three kinds, tutwork, tribute, and dressing. The first is excavations, which have for their ultimate object, the discovery of ore, and are not made, as with us, for the sole object of obtaining it. Shafts, levels,

cross cuts, &c., are of this kind, and are paid for by the lineal or cubic fathom, as the case may be. When substances extracted become of any value, the miner then receives, in addition to his bid, a certain proportion of the value of the mineral so taken out by him. It is thus made his interest to save everything that will pay. The price of this kind of work varies from 10 to 200 dollars per fathom. Tribute includes all excavations from which ore is obtained, and which are made solely for the purpose of procuring it. As the quantity and quality of ore is extremely variable, this kind of labor is paid for by a certain proportion of the actual value of the ore, when brought to the surface and reduced to a state fit for the operation of the smelter to whom it is generally sold. In executing this labor, from two to four men generally work together; but, as it goes on night and day, without interruption, it is requisite that the party that takes it, should consist of three times as many as are actually employed at a time, as they relieve each other in succession—a part working but 8 hours in the 24. Such a set of men, although varying in number from two to twelve, are always called a pair. In making the contract, there is only one person, who, having agreed with his pair as to the terms on which they will work, closes it; he is called the taker. Dressing consists of processes which the ore undergoes when brought to the surface, separating it from all impurities, which they are compelled to do, before it is offered for sale. It is generally performed under the same contract with the tribute, but sometimes, by other persons. The poorer part of ores, called halvans, which would not pay for dressing under the original contracts, are again let to other persons at a higher price.

A few days previous to the survey, as the auction is termed, the captains or superintendents of the mine, examine every part of it and determine what works shall be carried on for the next two months. All of this work is accurately specified, and registered in a book kept expressly for this object, and opposite each kind of labor, is marked the rate which, in their opinion, is a fair remuneration for performing it. The captains are selected from the most intelligent working miners, and are well qualified to form correct opinions; as the labor upon which they set a value, is of a kind which they are practically acquainted with. The survey is always held in the open air before the office, where the business of the miner is transacted. In front of the building there is a porch, corresponding in height to the first story. About noon the captains of the mine take their station on this platform, and commence the business of the day. By this time, the miners employed in the mine, as well as others who may be desirous of obtaining employment, are assembled. One of the captains commences by reading aloud a printed form of rules, and prescribes the conditions on which work is to be taken, fines for neglect and idleness, and all other regulations of the mine. The name and descriptions of the first piece of work is then read, and this is immediately bid for by any person who, with his pair, may be desirous of obtaining it. The price is, however, generally much higher than there is any hope of obtaining, and some other party will immediately make a lower bid. While the price continues high, the competition goes on briskly; but when it approaches what is known to be a fair rate, the bidders become more cautious, the competition slackens, and at last, ceases altogether. The captain then throws a pebble into the air and declares the last bidder to be the taker of the work at the last price named. The miner then comes forward, and gives his name, with that of his pair, or party, who engage to perform the work, and their names and terms are publicly registered in the Letting Book, upon the spot. In this manner business proceeds, until all the different pieces of work, or bargains, have been taken by the men. Thus, in a couple of hours, work is disposed of which amounts to several thousand pounds sterling, and insures certain employment to hundreds of persons for the next two months. All waste of time and dispute are thus avoided; and what is of far more consequence to both the workmen and proprietors, the price of labor is, by this system, continually adjusting itself to a fair standard, and which no com-

bination, of either shareholders or miners, can change. It requires but little examination to premise that by the plan we have been describing, the interests of both men and employers are effectually combined. Tutwork differs but little if any from piece work, so generally adopted as a system in large manufactories. And by the tribute, the wages of the men and the profits of their employers are so regulated, as necessarily to keep pace with each other; for it is evidently the direct interest of the miner to send to the surface and render saleable, as large a quantity of ore as possible, at the least cost, for production; and this is precisely the interest of their employers. Mining, in almost all cases where thus systemized has proved a profitable investment, or at least paid a fair interest upon the capital employed. To some such system, with modifications to suit our position, will we be compelled to resort, if we ever expect fully to develop our mineral wealth.

In compiling these sketches, it has been no part of our design to refer to all the resources of this section. When speaking of a mineral region, one is apt to associate with it, a rocky, sterile soil. Not so ours. These mines are in a fertile country; the surface produces as abundantly, and in as great variety, as any other in the same latitude. Our's is as rich in mineral resources. It is no uncommon thing for us to see diggings on lands under cultivation. In many locations, one may stand in a field, bearing upon its surface as good a crop of wheat, corn, or potatoes, as can be produced upon an equal area, in any part of our valley, and hear the miner tearing the rock asunder far beneath him. The farmer's plough, and the miner's pick, both developing wealth from the same spot of earth. These facts, although they may seem strange, are no less true. We have good agricultural and mineral land combined, and farming and mining are often carried on with us by one person on the same piece of land.

E. H. B.

Galena, Ill.

[This concludes the series of articles on the lead ores of the West. They will be of great use for reference to many of our readers, and when bound up with the volume, will take their place as standard articles of a scientific character.]

## Telegraphing.

Telegraphing, with us, has reached that point, by its great stretch of wires and great facilities for transmission of communications to almost rival the mail in the quantity of matter sent over it. It has become indispensable to many business transactions, and an interruption of the communication between cities is severely felt by the business community. Nearly seven hundred messages, exclusive of those for the press, were sent on Thursday last, over the Morse Albany Line. The Bain Line at Boston, on Friday, sent and received five hundred communications, exclusive of reports for the press. These facts show how important an agent the magnetic telegraph has become in the transmission of communications. It is every day coming more and more into use, and every day adding to its power to be useful.—[Philadelphia Ledger.]

## Potash in Soot.

At a recent meeting of the Glasgow (Scotland) Philosophical Society, Dr. Penny communicated the important discovery, made by himself, of the presence of a considerable quantity of potash salts in the soot from blast iron furnaces. The soot experimented upon was obtained from the Coltness Iron Works, where it leads into the flues that lead the heated gases and other products of combustion, from the top of the furnaces to the air-heaters and steam boilers. Dr. Penny gave the particulars of a careful analysis of the soot, and exhibited specimens of the potash salt, which had been extracted in large quantities by Dr. Quilan, of Hurler. The salt has been pronounced by competent judges to be a good marketable article, consisting chiefly of carbonate and sulphate of potash, with a small admixture of soda salts. According to the results of experiments described by Dr. Penny, it appears that soot will yield 50 per cent. of this marketable salt, containing 43 per cent. of pure potash. It has been found that the amount of potash in soot procured from other iron works is subject to variation, arising, no

doubt, from the use of different coals in the blast-furnace. From the well-known value of potash salts, there is every reason to expect that this discovery will prove of considerable importance to those who are interested in these commercial products, and also to iron-masters, who will now be enabled to turn to account a substance which has not hitherto been applied to any practical use.

Here, in this discovery, we have the cause explained of the well-known value of soot for agricultural purposes.

## The New Jersey Zinc.

In many parts of the world there are large strata of zinc ore; that is, zinc in the form of an oxide mixed with other metallic ores. The ore of the sulphuret of zinc is quite abundant in various parts of the world, and this is generally combined with arsenic, cadmium, iron, and some other mixtures. The sulphuret of zinc is very fractious, and expensive to manufacture, especially to bring it to the white oxide for the purpose of paint. In Sussex Co., N. J., and one or two other counties, we believe, large veins of zinc ore have been known to exist for a great length of time. These zinc ores are mixed with frankinite (an ore of iron) and manganese. It is not a sulphuret, nor is it mixed with arsenic or other volatile metals. For many years, we know, the economical reduction of this ore was a problem. Many eminent chemists—such as Dr. Ure and others,—were consulted, but they afforded no satisfactory information to work it profitably. Some years ago an association, named "The New Jersey Zinc Company," was formed for the purpose of manufacturing the zinc ore into paint. But as white lead is the head, front, and basis of almost all our paints, it was discovered that unless the zinc ore could be reduced to the white oxide, the company would fail in one grand object of its organization. Why? Because white lead is an unhealthy and dangerous paint, to use, both for painters and those who have to dwell in newly painted houses, while white zinc is a more beautiful paint, more enduring than white lead, and is quite healthy to use. The Company, about two years ago, erected works on the Passaic river, near to Newark, N. J., for the manufacture of the ore into white zinc paint, and various shades, from a light cinnamon to a cinnabar color. The Company has learned much since it first commenced operations; many difficulties have been overcome, and new inventions (elicited by that profitable teacher, necessity) have at last crowned all the efforts of this Company with well-deserved success, and now it is on the high road to become one of the most prosperous associations in the world.

The ore is taken from a distance of about thirty miles to the works, which are built on the Passaic for the convenience of getting cheap fuel, &c. The ore is slightly roasted, then stamped in a stamping mill, and placed in reducing furnaces, submitted to a certain degree of heat, and then the zinc, being volatile, passes away through pipes into bags of twilled cloth, which retain the white zinc, while the air, being more subtle, passes through the pores of the cloth. To perform this operation, exhausting machinery is placed in the reversed position to that which it is employed in forcing air into furnaces. The iron and manganese are retained in scoria in the furnaces, but the iron ore is very good, and makes a far stronger metal than the best Swedish iron. We have described the process of making the white oxide—it is a beautiful and ingenious one. Of course it would not answer for some other kinds of zinc ores. A patent was granted for it to S. T. Jones, and the claim was published in our list a few weeks ago.

The white oxide of zinc is mixed with oil, like white lead, by grinding, and then packed in casks for market. We can speak from knowledge, and say that it is far more beautiful than white lead. It is our opinion that a minute quantity of chlorine gas, which passes off with the air, helps to give the beautiful white color to the zinc. The sales of the Company amount to seven tons of paint per day, and in a few years it will amount to twenty tons. We believe that the ore from which the New Jersey zinc is made, is the only kind yet discovered which is free from arsenic or sulphur.