

AN ARSENIC MINE.

WHERE POISON IS OBTAINED BY THE TON.

Description of the Famous English Arsenic Works—How They Are Operated—The Work Not Necessarily Unhealthy.

THE celebrated arsenic works on the Tamar, in England, are the remains of a once famous copper mine. For twenty-eight years it proved the richest mine in the country, says a writer in the London Graphic.

The lode then gave out and the mine would have been abandoned as worthless had it not been accidentally discovered that it was exceedingly rich in arsenic. Copper is still produced in the mines, but in comparatively small amounts, and is despatched to South Wales, there to be smelted.

The material brought up from underground is crushed in a machine called the stonebreaker that resembles a huge pair of jaws, which literally chews up the stone until it has reduced its proportions sufficiently to pass into another machine, the crusher, wherein it is pounded into pieces about the size of a walnut. The material is now conveyed in barrows to the dressing floors, and each barrow load is turned out and washed in a running stream that carries off the small particles. The nuts are then thrown up with a fork upon a table, behind which recline on a sloping board, the mine girls who assort them.

As soon as the arsenical pyrites is completely separated from the common ore and from the earthy matter, then it is conveyed to the first calciner, where it is burned with low class coal, and produces "arsenic soot," that is to say, arsenic so mixed with smoke soot from the coal as to be of a gray color. The arsenic and soot are deposited combined in the chimney or condenser. This is scraped out and taken to the second calciners to be purified.

The method consists of a rotary iron like a mill-stone, convex in the middle, under a surface studded with iron flukes in three ranges, five in each. The arsenic to be refined is admitted from above. A fire is kept up in a furnace at one side, and the flames are swept in between the rotating mill-stone and its fluke studded cover. All are brought to a glowing red heat. The arsenic on falling in blazes as stars, and, dropping on the burning mill-stone, is turned over by the flukes and gradually slips away over the fiery bed to the edge, when, reaching that there is naught but earthy matter left, the vaporized arsenic being carried off in the flue.

The calcining of arsenic is let out to the workmen. Three men in four weeks will make 100 tons of arsenic; if they make more they receive extra premium; if they burn the arsenic badly, so that it is wasted, they are fined, and the fine has been known to amount to thirty shillings. Some years ago arsenic soot fetched from half a crown to fifteen shillings a ton; it is now worth from £7 to £7 10s. The arsenic is refined till it is, to use the local term, "as white as a hound's tooth."

It is deposited in the condensers. These are neither more nor less than a mile of chimney carried on an incline up the hill, with doors of iron in the side. As the hot blast passes up the chimney it deposits a crust of arsenic crystals on the brickwork all around to the depth of from two to three inches, and it deposits minute dust of crystals on the floor. Before the smoke passes into the upright chimney, the height of which is 125 feet, it has to traverse a rain of water which catches what remains of the arsenic, after which what passes forth is nothing but sulphurous acid.

The crystals of arsenic are scraped off the flue or condenser while still warm and are ground in a mill to flower of arsenic, after which it is packed in small barrels containing a little over three hundredweight.

The men who work the arsenic, either raking up the arsenic soot or scraping out the condensers or grinding it in the mill, are obliged to wear muffers over their mouths and noses to prevent inhaling the particles. The arsenic workers are obliged to wash themselves thoroughly every day on returning from the works, as the arsenic is liable to produce sores wherever it lodges in wrinkles and folds of the flesh, especially about the mouth and nostrils, the wrists and ankles and under the arms; in fact, wherever perspiration lodges. As a rule it only does this when the worker is careless about his personal cleanliness. Otherwise the work is healthy.

An Artificial Foot for a Peacock.

We have heard of a cat with false teeth, a horse with spectacles, a cow with a wooden leg and now here is a gentleman writing to the Field to ask where he can obtain an artificial foot for his peacock. This speaks well for humane people who love to be called foolish in a good cause. It will be real kind of the Field to publish the results of the naive inquiry and how the peacock liked his foot when he got it.—Boston Herald.

The Latest in Advertisements.

"Wanted, with a view to matrimony, a young lady to match a bonnet trimmed with green, which I won the other day in a raffle for charitable purposes. Must have means of her own. Please address under the heading: Lebensgluck (life's happiness) to the office of this paper. Lady cyclist preferred."—Pall Mall Gazette.

The breath of suspicion is generally scented with cloves.—Puck.

Future of Aluminum.

Aluminum, which itself possesses a high degree of specific heat, does not really absorb heat itself, and thus is not liable to the chief objection to iron buildings in hot weather. But apart from light decorative purposes, such as balconies, cupolas, finials and verandas, it is as a roofing material that aluminum should be most welcome to the builder. In plates or scales, two-thirds lighter than copper, uncorroded by air and undimmed even by the sulphur of London smoke, it should make a roof fit for a palace of romance.

The humble elements of health and comfort in the house, hardly less important than its external defenses against the weather—pipes, cisterns, taps and gutters, now made of iron, which rust, or lead, which poisons—would be more enduring and far more healthy if made of this light and healthy metal, which might also take the place of all water-holding vessels now made of heavy, brittle earthenware or painted tin. An aluminum bath is among the probable luxuries of the next century. But it is not as a mere accessory to comfort and convenience that real development of the new metal should lie. It is for use at sea that its most marked quality of lightness obviously fits it.

The marine engineer and the naval architect, who are already looking in this direction for a reduction in the weight which is inseparable from loss of efficiency, whether in speed or cargo, cannot neglect the possibilities of a metal which, when mixed in the proportion of one to fifty, gives to aluminum-bronze a hardness and toughness which makes it almost as reliable as steel, and which, if the proportions could be reversed and the strength preserved, would reduce the weights of ships and machinery alike by two-thirds. That is a problem which awaits the metallurgists for solution. The reduction in cost, judging by analogy, can only be a question of time and research.

The best steel now costs little more than a halfpenny per pound, while aluminum is fifty times that price. But aluminum exists in far greater quantities than iron, is more widely distributed, and neither the limits of time nor the history of metallurgy forbid us to conjecture that as the world has seen its age of stone, its age of bronze and its age of iron, so it may before long have embarked on a new and even more prosperous age of aluminum.—St. Louis Post-Dispatch.

Changing Quicksands.

One of the most ingenious expedients for overcoming the difficulties of sinking shafts for mining or other purposes in wet "measures" is the "freezing process." Supposing that the bottom of the shaft is so continuously flooded that the miners are unable to use their picks or in any way proceed with their excavation, pipes are run down from the surface to the flooded locality, and through these pipes is forced a powerful freezing mixture.

The consequence is that the impending water becomes solidified, and the workman can quarry his way through the ice, which now becomes a protection from the body of water beyond, and the sinking of the shaft can be continued. A process somewhat akin to this is the new method of grouting up quicksands, etc., of Neukirch.

Where quicksands or damp and unstable strata are encountered, powdered cement is forced in by air pressure through a pipe lowered in the sand. The pipe is about 1½ inches in diameter, but is drawn to a point at its lower end, where there are three openings, each three-eighths of an inch in diameter. The upper end of the pipe is connected to an air pressure supply by a rubber hose.

An injector is provided, to which the cement is fed, and meeting with the air blast is driven with considerable pressure into the sand. The cement is retained by the wet sand, forming a kind of concrete with it. The introduction of the tube is facilitated by the use of the air jet, which clears the sand away from the point of the tube. When the pipe has reached a firm stratum the cement is turned on and the pipe slowly raised to the surface.—Pittsburg Dispatch.

Bird Reasoning.

A little known and striking instance of foresight and industry exhibited by a bird is that of the California woodpecker. Like others of its kind, this bird is an insect-eater. Yet in view of the approach of winter it prepares a store of food of a wholly different character, and arranges this with as much care as an epicure might devote to the storage of his wine in a cellar. In the summer the woodpecker lives on ants. For the winter it stores up acorns. To hold each acorn it hollows a small hole in a tree, into which the acorn is exactly fitted, and is ready to be split by the strong beak of the climbing woodpecker, though too tightly held to be stolen either by squirrels or other birds.

A relation of this woodpecker inhabits the driest parts of Mexico, where during the droughts it must die of starvation unless it made a store. To prevent this it selects the hollow stem of a species of alce, the bore of which is just large enough to hold a nut. The woodpecker drills holes at intervals in the stem, and fills it from bottom to top with the nuts, the separate holes being apparently made for convenience of access to the column of nuts within.

The intelligence which not only constructs a special storehouse, but teaches the woodpecker to lay by only the nuts which will keep, and not the insects which would decay, is perhaps the highest form of bird reasoning which has yet been observed.—The Spectator

GOOD ROADS.

DISCUSSING THE PROBLEM OF BETTER HIGHWAYS.

Economy of Good Roads Shown by Europe—Should the National Government Undertake the Work—Cost Per Mile.

It has been estimated that, in addition to the good roads already possessed by this country, in order that a system equal to the best in Europe may be had, it would be necessary to build or rebuild about one million miles, a reasonable estimate of the cost of which is \$400,000 a mile, or \$400,000,000 for the whole country. Enormous as must be the cost of constructing a system of first-class highways, it would appear that, in their present deplorable condition, the roads are expensive almost beyond comparison. According to the census bureau, there were in the country June 1, 1890, 14,976,017 horses, 2,246,936 mules and 49,109 asses. A prominent authority gives twenty-five cents a day as his estimate of the cost of feed for each animal. Taking this as a basis the expense of feeding this vast number for a single day aggregates over \$4,318,000 or more than \$1,576,000,000 in one year.

It is said that on the smooth stone roads of certain European countries a dog can move a heavier load than is drawn on an average in this country by a horse, and that a horse there pulls easily three times as heavy loads as equally good American animals move with difficulty. A conclusion which many, no doubt, will draw from this is that about one-third of the present number of horses would give better service with first-class wagon roads than is now enjoyed. However, in view of the fact that a considerable share of these animals is owned in the cities, where there are more or less of good pavements, the number could be reduced only one-half instead of two-thirds. This would mean a lessening of the feed expense of \$788,000,000 a year.

The average earnings of capital in the United States are about three per cent. On this basis the unnecessary expense of \$788,000,000 in maintaining what would, with good roads, be surplus stock, represents the interest on an average investment of more than \$26,000,000,000. This is more than six times the investment required for the building of 1,000,000 miles of good stone roads at a cost of \$4000 a mile.

It is inconceivable to many how the idea can be entertained for a moment that the construction and maintenance of highways can be safely intrusted to individuals or private corporations for gain. Only a little in advance of this, it is declared, however, is the so-called subdistrict road supervisor system. County control, as a rule, shows still a marked improvement over the two plans named, and wherever the States have entered into the field of road building with effective legislation an even greater improvement is noted. But of all roads ever constructed in the United States those which the National Government has built unquestionably are or have been the best.

A striking illustration of the comparative merits of National and local management of public roads is to be found in Germany. The best roads of that country were built by the States which now constitute the Empire while they were yet independent kingdoms, and they were thus the creations of National Governments. Absorbed into the Empire, the States were no longer distinct Nations. What had been National before to them now sunk to the rank of the provincial. The roads had been constantly improved previous to the formation of the Empire. Now narrower and cheaper roads are built, and the highways of the Fatherland, excellent as they are, do not compare favorably with those of France, over which National authority is exercised.

Until recently the inhabitants of cities in this country have generally regarded the building of country roads as an undertaking which belonged to the farmer alone, the expense of which he should bear. Of late, through natural causes and the general agitation of the question, a better understanding has been reached. The mud blockades in the various sections of the country in the last few years have served to bring merchants of towns and smaller cities to a realizing sense of what bad roads mean. Three years ago the merchants of an Ohio city of 30,000 inhabitants lost on account of muddy roads, in two weeks of the holiday season over \$100,000 of trade. Smaller cities and towns, of course, suffered still more in proportion, being more directly dependent upon the trade which the farmers supplied.

The quickest and most satisfactory, and in fact the only sure way to secure good public highways throughout the country, in the opinion of many, is for the National Government to step in and exercise its rightful authority. There exists in the country a strong sentiment adverse to the issuing of additional National bonds. Can the roads be built without running the Government into debt? By building a reasonable portion of the roads each year until all shall have been constructed, and by apportioning the expenses among the Nation, the States and Territories, the counties, and possibly the townships, it is believed it will be found possible to secure the coveted good roads without issuing bonds. Twenty years would be a reasonably short period for the building of 1,000,000 miles of suitable highways. This would require the construction of 50,000 miles per year. Two hundred millions of dollars would be the annual expense. On the

convenient supposition that the Nation at large should bear one-half and that the States and Territories, together with the counties and towns, should bear the balance, the General Government would be compelled to appropriate annually \$100,000,000. This would not represent a very considerable additional burden, for now three-fourths of that amount is expended by the Postal Department on highways. Of the remaining \$25,000,000 a large share, say \$10,000,000, could be wiped out by employing regular army forces on the roads in those sections where their presence is required. As a rule, it may be said, no less than 20,000 men, who now find army life irksome because of its idle monotony, could be employed to good account on the highways.

The majority of the State Governments, as well as the counties and townships, it is believed, could also provide for the expense which they would be expected to bear that the tax burden would not be greatly increased during the period of construction. Moreover, the expense could be made even less onerous by the employment of the thousands of criminals in each commonwealth, and at the same time remove from free labor an objectionable class of competitors.—New York World.

Peculiarities of Animals.

The reason of the shortness of the elephant's neck is that the head of the animal is so heavy that were it placed at the end of a neck of a length proportionate to the dimensions of that organ in other animals, an almost incalculable amount of muscular force would be necessary to elevate and sustain it. The almost total absence of a neck obviates the difficulty and the trunk serves as a substitute. The uses and advantages of a long neck, peculiarly exemplified in the giraffe, which contains only the same number of vertebral articulations as in the elephant, are in the latter supplied by the trunk or proboscis, by which he is enabled to carry food to his mouth and to drink by suction. This curious organ contains a vast number of muscles variously interlaced, is extremely flexible, endowed with the most exquisite sensibility and the utmost diversity of motion, and compensates amply for the absence of a long neck.—St. Louis Post-Dispatch.

There is so much variety in the hands of monkeys that a comparison of them with those of man cannot very easily be made, but this comparison may be made with the higher apes, such as the gorilla and chimpanzee, which approach nearest in their structure to ourselves. In the gorilla the thumb is short and does not reach much beyond the bottom of the first joint of the forefinger. It is very restricted in its movements, and the animal can neither twiddle its thumbs nor turn them around till the tips describe a circle. The web between the fingers reaches to the beginning of the second joint, the fingers taper to the tips, and there is a callosity, or pad, on the knuckles on which the animal rests when walking on all fours. In man the thumb reaches to the top of the first joint of the forefinger. Man can "twiddle" his thumb, so that the tip will describe a circle; and he can touch the tips of all his fingers with it; the web between the fingers does not extend beyond the base of the first joint, and there are no pads on the knuckles. The bones in the hand of man and in that of the gorilla are the same in number and in general form. But the thumbs of the monkey have no separate flexor or bending muscle, as those of men have. This is why a monkey always bends his thumb with his fingers and never puts his thumb round an object which he grasps, but always keeps it on the same side as his fingers.

The whiskers of cats and of the cat tribe are exceedingly sensitive, enabling them, when seizing their prey in the dark, to feel its position more acutely. These hairs are supplied through their roots with branches of the same nerves that give sensibility to the lips and that in insects supply their "feelers."—St. Louis Post-Dispatch.

Riding Down a Wolf.

It has often been noticed in India how fast a wolf travels by means of a loping trot that is by no means suggestive of speed. While one gallops after it as hard as a good horse can go, the wolf pursued, never apparently hurrying, lollaps along at a pace that equals that of the following horse. I have heard it said that no horseman ever rode a wolf down; but to this statement I must demur, inasmuch as I have done this thing. Perhaps my wolf was sick.

Be that as it may, I did, when out pigeon-sticking in the Ganges country over against Colong, follow a wolf, and that wolf turned sharply when I closed with it, and the horse I rode (a rare good one) kicked it over with his fore feet, and made the matter of spearing my wolf simplicity itself. One of my companions of that day found explanation of this performance in the fact that I had ridden another man's horse with my own spurs.—Blackwood's Magazine.

A Woman's Capacity.

The power of love, and the possibility of a woman's intellect, are both exemplified in the case of a naval officer who has devoted several years to an important and complex invention. His girl-wife, through sheer determination to be his chief confidante, has acquired as thorough a knowledge of the invention as he possesses himself, and has him come to her with every trial and attempt, able to be sympathetic and intelligent throughout. Men who sneer at feminine minds should see this wise man lean on that little wife of his.

WORDS OF WISDOM.

He that preaches the gospel of good hard sense has an important mission to fill.

There is no possible process of legislative enactment by which a lazy man may be made energetic.

Some men are more careless about the company their children keep than they are of the breed of their dogs.

"Love adds no dollars to the till," grants the miserly husband. Fewer dollars and more love would add immensely to the value of his life.

To be happy at home is the ultimate result of all ambition; the end to which every enterprise and labor tends, and of which every desire prompts the prosecution.

If a man should register all his opinions upon love, politics, religion, literature, etc., beginning from his youth, and so go on to old age, what a bundle of inconsistencies and contradictions would appear at last.

The importance of this powerful agent—public opinion—for the prevention of injurious acts, is to obvious to need to be illustrated. If sufficiently at command it would almost supersede the use of other means.

Look at Nature with science as a lens. The rock swarms, the cloud dances; the mineral is but the vegetable stepping down, and the animal an ascending plant; the man, a beast extended; and the angel a devoted human soul.

The Wedding Journey.

A newly married couple who have just come from the far Southwest to reside in West Philadelphia, had an experience on their wedding tour, which, though an exciting one at the time, has caused both of them and their friends a great deal of merriment since. They had just been married and were ushered on their journey an hour later.

The train was running along swiftly and they were recovering from the excitement of the ordeal through which they had just passed; when the train stopped suddenly and the brakeman came rushing through the train pulling down the blinds in a most unceremonious manner. The groom began to get a little apprehensive, so he told his bride he was going to find out what was the matter. He came back with the news that the train was held up by robbers.

The bride's face blanched. Involuntarily she looked at the wedding ring that had been placed on her hand only an hour or so before. She wondered if she begged real hard to the train robbers whether they would leave her at least that. She thought exactly what she was going to say to the bandit when he came for her valuables. Then the conductor came in and warned the passengers, and people hid watches and pocketbooks and jewels in every conceivable place. Suddenly the report of a revolver, followed by others in quick succession, made all shiver.

"Get down between the seats," hastily said the young husband to his bride. I won't run even the shadow of a risk."

So, obedient to her new master, she crept down on the floor in security. "There's no danger at all," said the man in the next seat, reassuringly. Just then several more shots were heard, and the speaker flopped down between the seats. All the other people in the car followed suit, and as they were on all fours in breathless anxiety, there came in a sweet-tuned voice, full of suppressed anxiety: "Edgar, have you got a good safe place?"

There was a smile, even in the terrors of the moment, on the faces of many of the passengers. The train robbers left without going through the passenger coaches.—Philadelphia Press.

A Wonderful Echo.

At Madame Arabelle's the conversation turned upon echoes, and a lady in the company declared that she knew of one that repeated a sound nine or ten times.

"Pooh! that is nothing," said the marquis; "I have an echo in my park that can beat yours into its."

"Impossible!" said everybody in chorus.

"You can easily put it to the test if you like."

"Very good, we will step across tomorrow to hear for ourselves."

"Yes, come without fail," and so saying, the marquis took his departure, meditating a little scheme of his own. On reaching his mansion he sent for his old lackey, Sancho by name.

"You are up to all sorts of tricks, old chap. Do you think you could manage to play the part of an echo?"

"Certainly, my lord; you have only to shout ho, ho! and I repeat the same."

"Very well; to-morrow afternoon you shall go and stand in that clump of trees behind the lake and repeat thirty times any call that you may hear, gradually lowering your voice; but mind—mum's the word."

Next day his lordship's friends came trooping into the park. Sancho was at his post pricking up his ears.

"Now, ladies and gentlemen, your doubts will soon be dissipated," said the marquis; "will you be the first to try the experiment, madame?"

"No, thanks, marquis; your voice is louder and more effective for the purpose than mine."

Whereupon the marquis inflated his lungs and called out at the top of his voice:

"Are you there?"

To which the echo made answer: "Yes, my lord, I been here a couple of hours!"—La Famille.

Travel in Frontier Mexico.

The hacienda San Jose de Bavi-cora lies northwest from Chihuahua 225 of the longest miles on the map. The miles run up long hills and dive into rocky cañons; they stretch over never-ending burnt plains, and across the beds of tortuous rivers thick with scorching sand. And there are three ways to make this travel. Some go on foot—which is best, if one has time—like the Tahrnamars; others take it ponyback, after the Mexican manner; and persons with no time and a great deal of money go in a coach. As first thought this would seem to be the best, but the Guerrero stage has never yet failed to tip over, and the company make you sign away your natural rights, and almost your immortal soul, before they will allow you to embark. So it is not the best way at all if I may judge from my own experience. We had a coach which seemed to choose the steepest hill on the route, where it then struck a stone, which heaved the coach, pulled out the king-pin, and what I remember of the occurrence is full of sprains and aches and general gloom. Guerrero, too, is only three-fourths of the way to Bavi-cora, and you can only go there if Don Gilberto, the patron of the hacienda, or, if you know him well enough, "Jack"—will take you in the ranch coach.

After bumping over the stones all day for five days, through a blinding dust, we were glad enough when we suddenly came out of the tall timber in the mountain pass and espied the great yellow plain of Bavi-cora stretching to the blue hills of the Sierra. In an hour's ride more, through a chill wind, we were at the ranch. We pulled up at the entrance, which was guarded by a bunch of cow-punchers, who regarded us curiously as we pulled our aching bodies and bandaged limbs from the Concord and limped into the patio.

To us was assigned the room of honor, and after shaking ourselves down on a good bed, with mattress and sheeting, we recovered our cheerfulness. A hot toddy, a roaring fireplace, completed the effect. The floor was strewn with bear and wolf-skin rugs; it had pictures and draperies on the walls, and in a corner a wash-basin and pitcher—so rare in these parts—was set on a stand, grandly suggestive of the refinements of luxury we had attained to. I do not wish to convey the impression that Mexicans do not wash, because there are brooks enough in Mexico, if they want to use them; but wash-basins are the advance guards of progress, and we had been on the outskirts since leaving Chihuahua.—Harper's Weekly.

Hospitals.

Hospitals, as we now understand the term, are of modern growth. True it is, as Mr. Burdett tells us in the historical section of "Hospitals and Asylums of the World," that in the records of Egypt and ancient India we find allusions to institutions that foreshadow the hospitals of later times, and even our asylums for sick animals are borrowed from the East.

An inscription engraved on a rock near the City of Surat tells how Asoka, a King, who reigned in Gujerat in the third century B. C. commanded the establishment of hospitals in all his dominions, and placed one at each of the four gates of the royal city at Patna. Six hundred years after this, Fa-Hian, an intelligent Chinese traveler who visited India in 299 A. D., records that Asoka's hospitals still existed and flourished, but the successive floods of conquest swept all away, and by the beginning of this century only a hospital for animals remained of all the pious King's foundations.

Ancient Egyptian records are more vague in their allusions to the treatment of the sick; but it seems likely from a legend which is given in the Papyrus Ebers, that a clinic existed in connection with the temple of Heliopolis. It is equally probable that, if the history of the temples of Aesculapius could be unveiled, we should find that in them also a hospital supplemented the shrine, and that the sick who offered sacrifices there found something more than "faith healing" within their walls. But from none of these are our hospitals derived; they were destroyed or forgotten in the barbarian conquests, and so utter is the oblivion into which they fell that it is now an article of the popular creed that it is to Christianity we owe the first idea of care for the sick and afflicted.—The Quarterly Review.

Seventy-two Races of Mankind.

M. de Quatrefages, the noted French ethnologist, has read a paper before the Paris Academy of Sciences on his favorite study. In it he gives an interesting summary of his general conclusions with regard to the origin and distribution of the human species. Omitting minor differences, he estimates that there are no fewer than seventy-two distinct races of men now inhabiting the earth. All of these, he says, descend or branch off from three fundamental types—the white, the yellow and the black—which had their origin in North Central Asia, which is, without doubt, the primitive Eden or "cradle of the human race." M. de Quatrefages states that representatives of these three primitive types may yet be found scattered over his Asian Eden—the whites to the west of the central point of organization, the yellow to the east and the blacks to the south. The yellow race spread to the northeast and crossed to America, where they "mixed with a local quaternary race," producing what we know as the American Indian.

The largest scholarship given by any American college is the Stinneys scholarship at Princeton. It is awarded for excellence in Greek and Latin, and amounts to \$1500 annually.