

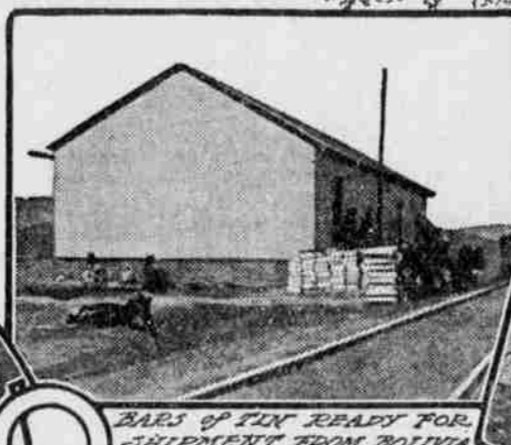
TIN MINING *in the* AMERICAS

WHETHER tin, as such, was known to the ancient world is a mooted question. Most probably it was not, although the alloy of copper and tin called bronze was used ages before that time whereof the earliest legends run and loosely called the dawn of history. It is common to say that the age of bronze followed the age of stone and that both are prehistoric. Unscientific as is such a marshaling of "ages," and untrue if applied to man the world over, it yet presents a picture something near the known facts about that part of the ancient world which lies around the Mediterranean sea. Bronze was no doubt the first metal here used by man, just emerging from the lowest state of savagery. Its superiority for the forming of weapons and tools over flints, bones, and fire-hardened sticks was manifest. Whence the European savage derived it, by what process the metals were separated from the ore, whether the alloy of the two metals was made by man or fortuitously occurred in nature, are interesting subjects, but not within the scope of this article. The fact is, however, that had pure tin been the first metal known it would have received but scanty consideration from primitive man; for, except for its weight, which would have rendered it suitable for a mace or club head, its want of strength and softness is such that for his uses it would have been inferior to flint, bone or even fire-hardened wood.

The remarkable property which certain metals have, and among these tin is one of the most conspicuous, that when alloyed with another metal the compound possesses a quality of strength, hardness, malleability, or resiliency superior to that of either of the metals entering into the compound is what in its first use gave value to the union of copper and tin called bronze. At a later period in the world's history the property which tin has of not tarnishing, or rather of being in a high degree resistant to the decomposing action of air, water and the common acids and alkalis, was taken advantage of in the use of the metal as a coating for harder and stronger but more easily affected metals, like iron or steel. Tin alone has even now but few industrial uses, principally in the making of certain pharmaceutical instruments and tin foil. For almost every other purpose for which tin is suitable an alloy of tin and copper, or tin and zinc, or tin and lead, or



A BOLIVIAN ORE-CARRIER



BAR OF TIN READY FOR SHIPMENT FROM BOLIVIA



A TIN MINE IN THE OROURO DISTRICT OF BOLIVIA

an exceptionally high grade of ore. In colonial days Berenguela was a rich silver mine. The two ores are in distinct veins.

The tin mines of the northern field of Bolivia are in two groups—Huayna-Potosi and Milluni, north of the Great Plateau. Included in the Inquisivi fields are the mines of Quimsa Cruces, Araca and Santa Vela Cruz.

The first area is at the southeast end of Lake Titicaca, in the mountains some 13,000 feet above sea level. During colonial days these ruins were silver mines, but silver now in this locality is but little more than a tradition, for the only mining now carried on is tin mining. There are a great number of small mining properties in this locality, but the principal output comes from the French company, which owns the Carmen mine of the Huayna-Potosi and the Milluni mine.

The Quimsa Cruz or Tres Cruces district of Inquisivi is one of the most promising of the Bolivian fields. It is in the heart of the Cordillera Real, which here rises over 17,000 feet above sea level. These fields are about equidistant from La Paz and Oruro, but much more accessible to the latter. The principal tin property in the district is the group of Monte Blanco mines, owned by a Chilean company. These mines are on the western slope



BEGINNING OF A NEW TUNNEL IN A TIN MINE

of the Cerro Atarani. The quarters and mine office of the company are at an elevation of 14,800 feet and some of the lodes mined are 1,500 feet higher up the mountain slope. Among these lodes in the Santa Fe, which outcrops for about 1,000 feet, with an average width of from six to nine feet. The ore runs about 12 per cent. pure cassiterite. In pockets the mineral is found nearly pure. In the neighborhood of the Monte Blanco mines are the mines of Barroso Cota, Santa Rosa, La Florencia, Copacabana and others.

About twenty miles south of Monte Blanco is the Santa Vela Cruz field. The most important property in this field is that of the Concordia Tin company, an English corporation. The location is not quite so high as Monte Blanco. Here the best mining methods are being adopted and the property will be without doubt a large producer, although not yet fully developed.

South of Santa Vela Cruz are the fields of Sayacuri, a new field in which some prospecting has been done which promises large results, and Colquiri, formerly a silver field, but now developing into a tin-producing district.

The northern tin fields of Bolivia have in the past suffered much for lack of good transportation. This condition is being greatly improved with the recent railroad development in the country.

Another Change of the Times

Nurses and parents do not frighten children so much nowadays with foolish stories as they did a generation or two ago. Children are not terrified into "being good." But in the remoter country places this objectionable and dangerous form of tyranny still lingers. In parts of Scotland the bodach still has his terrors for youngsters. The chief of these specters is "The Son of Platter-pool from gray spike, stiken spike, great caterpillar." There is almost a Shakespearean suggestion about the name. "His terrific bugbear peers in at windows, flattens his wicked face against the pane, sharpens his teeth with murderous distinctness, and carries away crying or noisy children in a twinkling. But he never enters a house without being called. The threat to summon him is enough, and the unhappy child goes to bed quietly, to brood over nameless terrors in the dark.—London Chronicle.

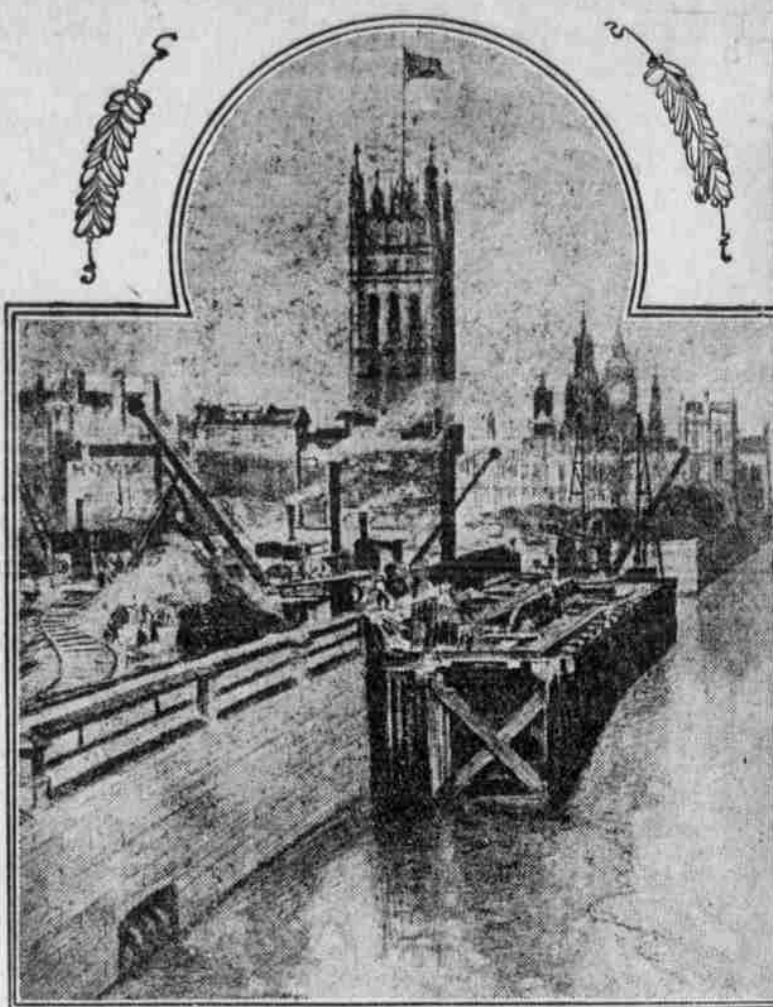
Use for the Crickets

The cricket has had other uses besides that of affording an excuse for argument. In China crickets were frequently trained for fighting purposes and brisk betting went on over cricket matches. In Florence, too, crickets in cages were hawked about the streets on Ascension day to be bought and let loose about the houses in order to insure a year of good luck. Theophile Gautier mentions how the people of Madrid kept pet crickets in small cages decorated with glass ornaments. Also, presumably, to bring good luck.

Where He Drew the Line

"Ethel," said Mr. Brown, "I want you to give that young man of yours a little message from me."
"Yea, father," said Ethel, blushing.
"Tell him that your mother and father don't object to big gas bills, but they object to his carrying the morning paper away with him when he leaves."—Tit-Bits.

LONDON'S NEW EMBANKMENT



CONSTRUCTING THE EMBANKMENT

IT is but little over a year ago, at the time when King Edward lay in state in Westminster hall, that thousands of Londoners made their first acquaintance with the riverside district which lies between Vauxhall and Lambeth bridges. No one who witnessed the wonderful spectacle presented by the vast crowds that thronged Grosvenor road, Millbank street and Abingdon street in their patient pilgrimage can ever forget it. Joining the multitude at or even beyond Vauxhall bridge, those who walked, step by step, felt that when at last they reached Lambeth bridge the goal was almost in sight, for just beyond the great Victoria tower was the royal death chamber. Few paused to notice the rather squalid appearance of the approach by Millbank street to the houses of parliament and old palace yard as compared with the splendor of the opposite approach along the spacious ways of Whitehall and the embankment, and few knew much of the proposed scheme destined to transform this part of London and make it worthy of the Imperial center of the metropolis.

In the old days the river banks here on both sides were lonely marshland; where Lambeth bridge now spans the stream there was an ancient horse-ferry. (Horseferry road preserves its name), the revenues of which belonged to the archbishops of Canterbury, whose palace of Lambeth lies opposite, on the Surrey side. Just outside the southern wall of the abbey precincts there arose in later times a little suburb much favored by the gentry of the days of Anne and the Georges. College street, Cowley street and Barton street still show the quaint, dignified facades of these charming specimens of eighteenth century domestic architecture. Here in 1716, in Smith square, was built the singular church of St. John, with its four belfry towers, which was admired and abused more, perhaps, than any church in London; some likened it to "a parlor-table upset with its legs in the air, a chef d'oeuvre of the absurdity of its architect, Thomas Archer"; others spoke of it as an ornament to the city of Westminster, and regretted that a vista had not been opened up from old palace yard to show its beauty. Nowadays, perhaps, we are better able to appreciate its merits, the originality of its design and its massive construction. St. John's church is the central feature of the Millbank improvement scheme now being carried out at immense cost by the London county council.

This great scheme, known as the "Thames Embankment Extension and Westminster Improvements at Millbank," was proposed thirteen years ago in a resolution of the council that a plan should be prepared for the embankment of the Thames from the Victoria tower garden to Lambeth bridge, including the widening of Millbank street. In 1901 provision was made for the scheme by a capital vote of £7,575,000, of which the sum of \$5,915,000 was the estimated cost of acquiring the properties east and west of Millbank street and for widening the west side of the street itself; while \$250,000 was reserved for the rehousing of the laboring classes displaced by so extensive a sweeping away of the unsightly dwellings occupying the site. The most important part of the scheme is the construction of the new gardens between the existing Victoria tower gardens and Lambeth bridge, the extension of the embankment between the houses of parliament and the bridge, and the widening of Millbank street, which will thus form a broad and spacious approach from the south. The new gardens and embankment will take the place of old rows of wharves and breweries. Few, however, will regret that staidness and

One Use of Adversity.

"The late Senator Frye," said a certain Republican of Lewiston, "was exactly an orator, but he had a tendency of driving home a point.

"I remember how during his maturity, he once rebuked a somewhat charitable committee of reform. 'These men wanted to press certain transgressors too hard—wanted to crush them, in fact—but Frye said, "You, gentlemen, have had an ample time of it through life. I think if you had met with more adversity you'd be more lenient toward these poor fellows."

"Then he smiled and nodded in direction of a wholesale butcher the committee."
"Man," he said, "is like one of those prime steaks, Mr. Brown. He has a lot of pounding before he's tender to others."

On the Wrong Train.

She—Did you ever get on a train when it was moving?
He—Yes—once.
She—What was the sensation?
He—Ripping—for the woman's Womani's Home Companion.

steel, iron, or brass coated with tin, is more suitable, and it is these uses of tin, as an alloy or as a coating, which give it its real value and its place in the arts and industries. Just as primitive man would have found but little use for pure iron, so civilized man might easily dispense with it were it not for its use as an alloy or as a preservative coating. As such it is of enormous use to the world and easily ranks among the four or five most valuable metals. Of the so-called common metals tin is the least widely distributed and the most costly.

The value of the imports of tin into the United States as given by the bureau of statistics is now about \$30,000,000 a year. In 1907 it amounted to nearly \$43,000,000. This includes ore, bar and block tin, and some of the manufactures thereof, and also tin plate, but does not include the ordinary alloys of tin, such as bronze, pewter, gun metal, and bell metal, nor does it include a very large importation of manufactured articles in which tin is a considerable and sometimes the major element of value.

For 1909 the figures were as follows:

Article.	Quantity (pounds.)	Value.
Tin plates	18,115,771	\$ 3,239,659
Cassiterite	26,661	3,134
Bars, blocks, pigs, etc.	91,133,413	26,907,216
Foil		43,612
Manufactures		60,251
Total		\$39,344,872

This exceeds largely the imports of any other metals except iron and steel—gold and silver not being considered true imports. If the total value of tin imported into the United States could be given, including all manufactured articles and alloys at the proportionate value of the tin therein contained, the amount would probably be over \$40,000,000 for the year 1909.

About one-fourth of the tin imported is used for the making of tin plates, sheet steel dipped in tin, and the bulk of the remainder goes into the alloys of which there are scores of varieties containing different proportions of tin with copper, zinc, lead, nickel, silver and antimony.

Metallic tin is rarely found in nature and then never in commercial quantities. Fine grains of the metal sometimes occur in the gold ores of several localities, principally in Bolivia and in Siberia. There are a number of tin compounds, oxides, chlorides and sulphides, but there is but one ore of any considerable importance in tin mining, and that is the binoxide of tin or stannic acid called tinstone or cassiterite. Tinstone is of various colors—brown, gray, yellow, red or black—ordinarily due to the presence of peroxide of iron or manganese. In its pure state the ore is nearly colorless. It is a remarkably hard and heavy mineral, so hard that it will often strike fire from flint, and of specific gravity 6.7, about equal in weight to antimony, and not much less than cast iron.

Tin mining bears many resemblances to gold mining. Like gold tin is found either in veins, running through older rock formations, or in allu-

via deposits which represent the remains of the same veins washed down from the hills after the disintegration of the surrounding rock through the action of air and water and cold and heat. Unlike gold tin occurs in a compound, cassiterite, while gold is generally more or less pure. The tin mines of Cornwall in England and of Bolivia are mostly vein deposits, while those of the Malay Peninsula, the Dutch Islands and elsewhere are alluvial.

The following figures give approximately the world's production of tin in 1908. Quantities are given in short tons (2,000 pounds), and the reduction from ore in tin ingots is made:

	Short Tons.
Straits Settlements	67,760
Bolivia	19,040
Island of Banka	12,880
Australia	6,552
Cornwall	6,048
Island of Billiton	2,464
South Africa	1,904
Total	116,848

The Socavon de la Virgen, San Jose, Huanuni, Negro Pabellon, Morococcala and Antiquera mines, now rich tin mines, were in the old Spanish colonial days rich silver mines, tin being held of such little value that it was rarely extracted. The San Jose mine is about two miles from Oruro. It is both a silver and a tin mine, but the tin is of the greater importance. The Antiquera mines are near Poopo, on the Antofagasta and Oruro railway. Huanuni is said to contain the richest tin mines in the department of Oruro. These are located about fifteen miles from the station of Machacamaca of the Antofagasta railway. The Cerro de Pozocani, in which these mines are situated, arises to the height of about 10,000 feet—a rough cone in shape. It is laced by innumerable lodes and veins, some of which are worked on a large scale. The Catacagua vein produced in 1905 ore equivalent to 1,192 metric tons. The vein runs from two to eight feet in width and is from 20 to 50 per cent. cassiterite.

The Bolivian ores are ground and concentrated for the pure cassiterite. In this form is sand called tin barilla; it is exported. A very considerable part of the valuable oxide is lost in treatment.

The mines of Negro Pabellon, Morococcala and Vilacollo are about ten miles south of Huanuni, near Paria. The principal lode of the Negro Pabellon is about three feet in width and is crossed by several smaller veins, with here and there rich pockets of cassiterite. The barilla obtained from this ore is exceptionally rich, containing more than 70 per cent. metallic tin. Concentrated Bolivian ores as a rule run about 60 per cent., or a little less, metallic tin. In the Morococcala mine the vein is from twelve to fifteen feet thick, of a good grade of ore.

Berenguela, in the province of Cochabamba, has