

# Popular Science Monthly/Volume 37/June 1890/Tin and its Native Land

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## TIN AND ITS NATIVE LAND.

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TIN, which, every one knows, but which few, except men of science and metallurgists, are acquainted with, is one of the most precious and most interesting metals. After gold and silver, it is intrinsically the most precious of those in use. It is nearly of the same color and almost as bright as silver, but has less resistance and is less valuable. When warmed by friction, it has a pronounced odor and taste. When it is bent, the derangement of the crystals of which its mass is formed causes it, without any fracture taking place, to emit a peculiar sound which metallurgists call its cry, and by means of which an expert can nearly determine its degree of purity. The places where tin is produced are few, scattered sparsely over the surface of the globe; and it disguises itself under the form of a blackish mineral which, to the profane eye, gives no sign of the treasure that is within it.

One of the richest as well as most ancient tin mining districts is in the Malay Peninsula, the Golden Chersonesus of the ancients. The name of the province, Pérak, signifies silver; but it is peculiarly the province of tin. A few years ago we visited the mines there, ascending the Larout River in a Chinese junk to Telok-Kartang, where a warm reception awaited us from the English colonial authorities. Thence we went, in a country wagon, and afoot after it had broken down, through a country where tigers are not rare, to Thaïping, the principal town in the district. We found lodging in the house of the assistant resident on the top of the Boukit Bandéra, which appeared to our eyes at the moment a veritable castle of the fairy tales. Opening the window in the morning, we could look from our elevated position upon the country of tin, which lay in nearly its full extent before us. Large mounds of white earth and water-holes of strange form, breaking up the surface at different points around the *kampang*, marked where mines had been worked or were still in working. Chinese coolies were climbing up and down the notched tree-trunks which served as ladders to the open pits, bearing on their shoulders bamboos, at each end of which hung the baskets in which the mineral was carried. Hydraulic wheels, which were nothing but primitive wooden Archimedes' screws, or *norias* with inclined buckets, were turning with harsh creakings, lifting the water out of the bottom of the excavations. Animation prevailed over the whole plain, in which were to be seen by turns arid spots of mineral refuse, or exuberant tropical vegetation. Farther on the country grew hilly, and the view was at last shut off by a semicircle of high mountains, in which are found the true mines, in quartz veins charged with tin, intersecting the granitic masses. The washings of these veins, mingled with alluvial sands, have been carried down by the rivers and spread by them through the floods of the ages over the bottom-lands of the country. Taking advantage of this work of Nature, man, instead of quarrying in the mountain for the vein and having to blast the incasing rock, has only to look in the flats for the mineral.

The mines were worked by the Chinese, no European operator having been as yet established in the country. It did not take long to witness the extremely simple process by which the ore is

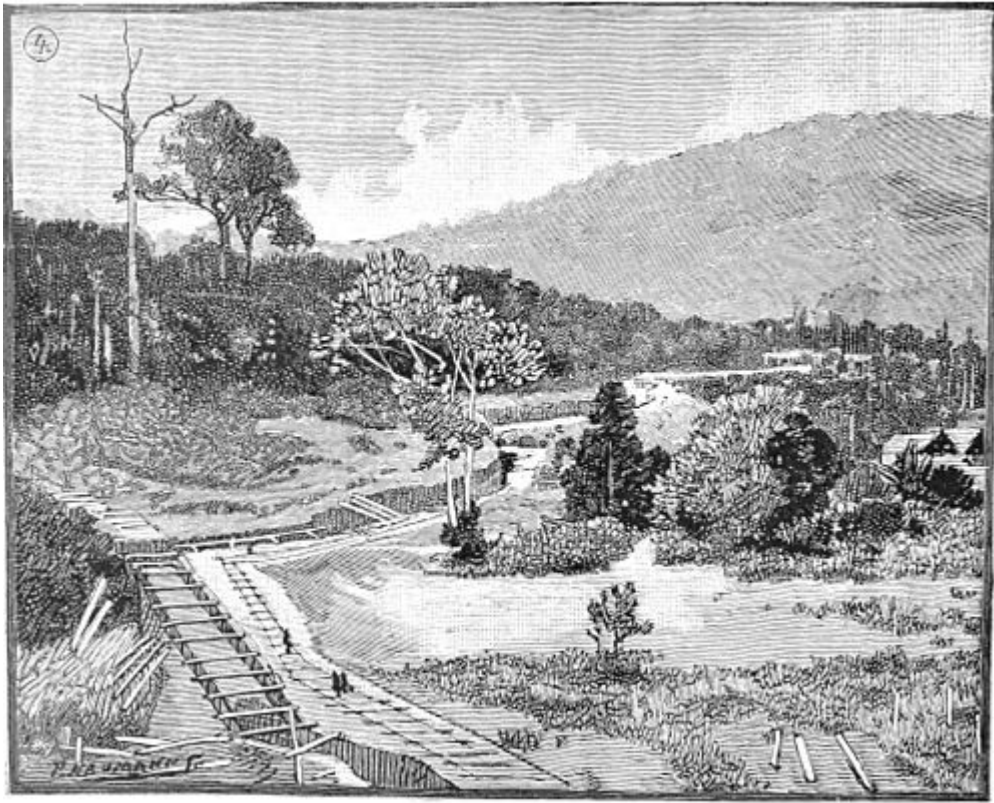


FIG. 1.—SUNGEI LEMBING TIN-MINING DISTRICT, PENINSULA OR MALACCA.<sup>[1]</sup>

extracted. After clearing off the ground, the surface and subsoil are removed for one, two, or three metres, till the mineral, tin-bearing bed is exposed; this is sometimes several metres thick. The mineral is carried in baskets, as we have seen, up the cocoa-trunk ladders, to a wooden flume which is washed by a current of water. As the mine grows deeper this labor, with the rudimentary means at the disposition of the Chinese, is made extremely difficult by the inflow of water. The washing of the tin-bearing earth is done by coolies, who with a rake remove the stones and work up the material in such a way as to eliminate the light sands that are mixed with oxide of tin, till only twenty-five or thirty-five per cent of foreign matter is left. The mineral thus enriched is melted in little brick furnaces, with the aid of a bellows of bamboo, which is worked by a coolie as if it were a syringe. The white metal as it runs out is cast into the well-known cubic ingots with one side flaring over the edges, so as to give them a pair of ears by which they can be more easily handled. A great deal of metal is certainly wasted in this process; and a second washing of the refuse would probably be very remunerative. The Chinese and Malays call this lost metal young, tin, which is re-turned to the earth to ripen, because it is not yet old enough to stay in their primitive machines. It is only now, after no one can tell how many centuries since tin has been known and worked in the peninsula, that a rational system of operating the mines is about to be adopted.

The use of tin dates from extreme antiquity. Homer mentions it as *kassiteros*, in the descriptions of the arms of his heroes. Herodotus speaks of the British Islands as the *kassiterides*. The Phœnicians obtained the tin which they furnished to the ancient world chiefly from those islands, but partly also from Gaul and the Iberian Peninsula. Before the Phœnicians and the Greeks, however, the Chaldeans knew this metal under the name of *kastira*. The most ancient document in which a mention of it has been found is probably a hymn to the fire, which M. Oppert has translated from the Accadian language, a tongue the knowledge of which has been recently revived from cuneiform documents. Tin was designated in them, five thousand years ago, as *anaku*. The biblical text in the Book of Numbers, in which Moses names tin in the enumeration of the metals, is therefore comparatively modern, for it is of fifteen hundred years later date than the hymn to the fire. Even more definite than these texts is an Egyptian statuette in bronze (an alloy of tin) of the age of the pyramids, or 3600 years B. C.

Let us return to our own age, and see what is the present annual production of tin. In a recent book on the Industries of the Netherlands, M. de Ramaix gives as the production of the Dutch East Indies, ten thousand tons; of Cornwall, eight thousand tons; and of Australia, seven thousand tons; in all, twenty-five thousand tons. These figures show that the English mines have fallen off since the days of the Phœnicians, when Cornwall was the principal center of production. They have been left behind by the Dutch East Indies, and will soon be overtaken by Australia, if the number, seven thousand tons, given as the present production of its mines, is not exaggerated. Saxony and Bohemia, which still figure in the cyclopaedias as sources of tin, are not mentioned in M. de Ramaix's estimate. A graver omission is that of the Malaccan mines, which I have mentioned as the most ancient, and also perhaps the most productive. According to Mr. Patrick Doyle's *Tin-Mining in Larut* (London, 1879) the Malay states of the Malaccan Peninsula exported to Penang in 1877, in round numbers, 2,500 tons of tin, and the Siamese states of the same country, 7,000 tons, making 9,500 tons in all. From personal information, I estimate the exportation from the single Malay state of Pérak, in 1881, at 6,139 tons. The production of the peninsula having grown steadily since 1876, I believe I can assert that it now takes the lead among tin-producing countries, and that the world's total present annual production of this metal is not less than 45,000 tons.<sup>[2]</sup>



FIG. 2.—NATIVE CHINESE TIN-STAMPING MILL ON THE KUANTAN, MALACCA.

Yet this production is hardly sufficient to supply the needs of existing industry, for the price of tin before the crash in copper, by which it was also affected, had reached the high figure of \$800 a ton. This is because, while the applications of the metal have varied much at different periods, it has always been applied to numerous uses. There is hardly a house so humble that has not its utensils of tin-ware. Wherever woman has advanced beyond the crystal of the fountains, of which Seneca boasts, we are sure to find, if not a looking-glass, a mirror; and there is hardly a country so savage that European glasses silvered with the amalgam of tin have not reached it. It is used in all the applications of soldering, in tin-foil for wrapping preserved foods, and in printing-types. Some of the uses which our forefathers made of it are matters of much interest.

In the middle ages tin passed from the Gauls to the Merovingian Franks; and, according to Gregory of Tours, basilicas were roofed and tombs were covered with it. It was extensively used in convents and churches, where devotional objects of every kind were made out of it—crosses, chandeliers, holy-water bowls, other vessels, organ-pipes, and pilgrim-standards. It was allowed, with gold and silver, to enter into\* the composition of the sacred vessels, when wood, lead, copper, and bronze were prohibited as base or insalubrious, and glass on account of its fragility.

Bishops and priests were buried with their symbols, crosses, and chalices represented in tin. This metal served well in place of silver in the illumination of ancient manuscripts, as it now takes the place of gold in the lacquers of China and Tonquin, in which the metallic luster of tin-foil has given the transparent varnish the yellow shine of gold. Some objects found in the Italian tombs have an interesting resemblance to those of Tonquin and China. Curiously, the custom of the Chinese and Anamites, of burning papers to their ancestors bearing the figures of objects which they use while living, finds its equivalent among the peoples of Europe, who placed in the tombs of their dead tin images of similar objects, such as forks, knives, tongs, tripods, and candlesticks.

Tin was likewise employed for numerous purposes, often exalted ones, in the life of the middle ages. The ceremonial cups in which the wine was formally offered to a sovereign or to a lord making a solemn entry into a city, and the goblets given as prizes to the most adroit bowmen, were usually made of it. So were cups and measures for wine and oil, porringers, and dishes of all sizes. Plates came later. This piece, which it seems to

us so natural to set on the table in front of each guest, is not of older use than the twelfth century. Even at that time every plate served in common for two or three persons. Before that, our ancestors ate, as I have done myself, among the rajahs of Oceania, each one taking the morsels with his hand from the common dish.

Grand commemorative medals, seals affixed to documents, inkstands, and tokens were struck in tin. The use of this metal was still more general in Europe in the fourteenth and fifteenth centuries. The tin eating-dish came into general use, even among peasants and workingmen, and was provided for animals. Queen Isabella's cats and the Emperor Frederick's hunting-birds had them; and tin drinking-dishes were made for the royal birds and for song-birds of every kind. Barbers' emblems, to the seventeenth century, representing a bearded figure, were of tin, to distinguish them from surgeons' signs, which were of yellow metal or brass.

Relegated till then to the kitchen or the offices of the large convents or the houses of the great lords, save in perilous times when it was brought out to take the place of silver plate on the masters' tables, tin passed, in the fifteenth and sixteenth centuries, into the hands of real artists. It then furnished the material for those wonderful pieces of goldsmith's work that were saved by the low price of the metal from the melting-pot which works of gold and silver could not escape, and which have come down to us as precious specimens of middle-age art. The pewterers of England, Flanders, and Spain, particularly of Barcelona, then produced works of real taste. The most remarkable art-works which remain to us from that epoch were produced in France and Germany, especially in Nuremberg, whose pots and plates of tin were as famous as its dolls. Tin thus had then all the honors of the precious metals. It still shares with the precious metals the advantage of cleanliness, which is set forth by many authors, who recommend it for the preservation of medicines that would be changed by contact with any other metal.

The importance of the question of the source whence tin was derived at such a remote age was indicated by M. Daubrey, when he said, in the French Academy of Sciences, that this metal presented a double interest: "On one side, its use in the form of bronze characterized a grand epoch in human history; and, on the other side, the appearance of the mineral, not resembling any metallic substance, and the rarity of its deposits, supposed knowledge among the first miners of which we have hardly any other evidences. What country, then, in which tin is produced, was sufficiently civilized more than fifty centuries ago for its people to have knowledge enough of mineralogy to recognize the metal in the dark mineral that contains its oxide; and which had such a social organization as to make practicable the different operations and enterprises on which its extraction depends?" M. Germain Bapst expressed the opinion, three years before our first visit to Pérak, in one of the most remarkable and interesting works that have been published on the subject, that this country was the peninsula of Malacca.

A curious relation has been traced between the names which the Malays of the peninsula give to tin and lead—*tima pouté* (white), tin, and *tima itam* (black), lead—and the names given by Pliny—*plumbum candidum* (white lead, or tin), and *plumbum nigrum* (black lead, or lead); and also between the Malay *tima* and the English, Dutch, and Danish *tin*, the German *zinn*, and the Swedish *tenn*. Etymologists ask if this Malayan application of tin at a time when the kassterides islands, as yet without a name, were lying in the solitude of their dense forests, and the primitive populations of Switzerland, who also used tin for the ornamentation of their earthen vessels, had not yet built their lake villages, did not start from Malacca, and, carried by slow migrations, but directly, and over the heads of the Assyrians and Greeks, reach the extremity of Europe at a much later period.

Thus, this peninsula of Malacca, which is now covered by virgin forests inhabited by wild orang-sakeys, dotted with swamps that have to be crossed on elephants' backs, peopled by rhinoceroses and tigers, may at that time have been at the head of the world's civilization, and had its railroads, telegraphs, telephones, temples and theatres, artists and journalists, deputies and bankers, speculators and pickpockets—everything, in fact, that appertains to the last expression of progress, but under very different forms—perhaps even its Eiffel Tower in bamboo—while Europe was still in the period of its orang-sakeys. Such is the way of the world. Why should not every country have its turn?—*Translated for the Popular Science Monthly from the Revue Scientifique.*

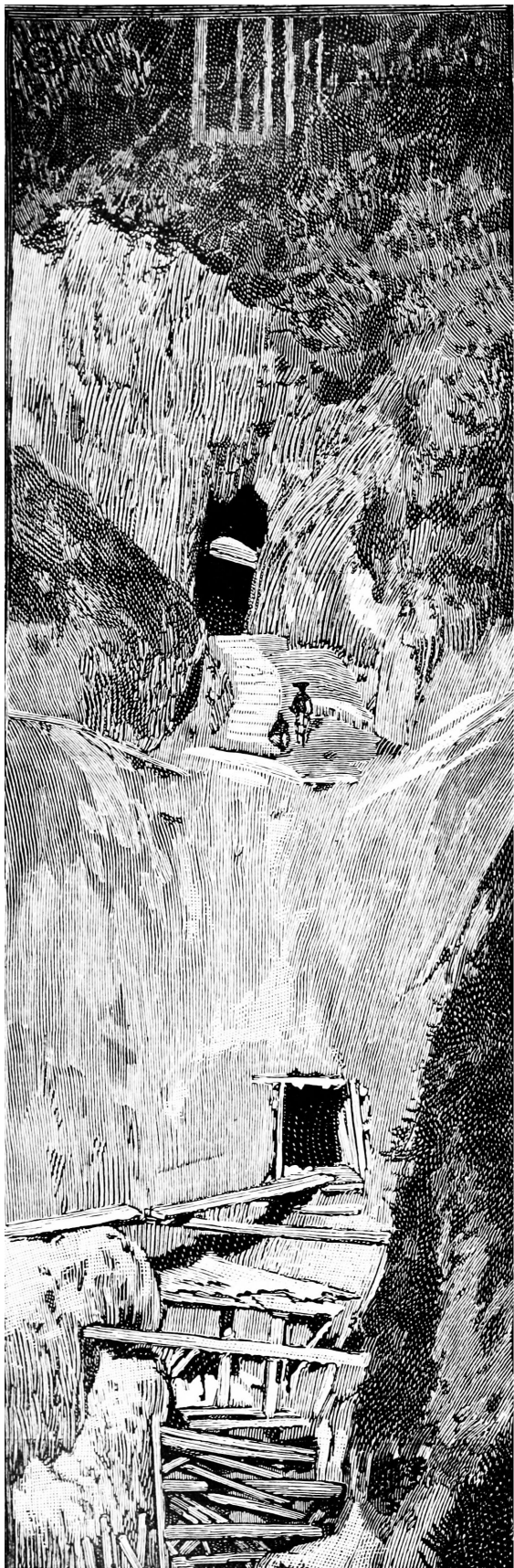


FIG. 3.—CAMPBELL'S TIN LODGE (PAHANG CORPORATION),  
SHOWING ANCIENT WORKINGS.

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A SATISFACTORY report has been made of the results of the first year's working of the new educational programme of the Central Provinces of India, in which special provision is made for technical education.

1. The illustrations in this article are views in the lands of the British "Pahang Corporation," which has been formed to work the mines in Pahang, eastern Malacca.
2. I believe that these figures understate the facts. In a book on the Political Geography and Economical Situation of the Malay Peninsula, in 1888, published by the French Minister of Public Instruction, M. de La Croix gives the production of the peninsula, from official documents, as over 24,000 tons, or more than half that of the entire globe.

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