has a fancy for mutton. He casts the lasso about his neck, on which Bruin rises on his hind legs, and seizes the cord with both paws. Always keeping the lasso tight, the shepherd approaches, strikes him with his heavy hunting-knife on the head, so that he is stunned, and presently despatched.

Towards the end of the rainy season the flocks are collected, the fat wethers and old ewes are selected and slaughtered. In a building set apart for the purpose, there is a range of large coppers, in which all the flesh is stewed down. The firm tallow, in masses of about two hundredweight, is packed in sheepskins, and forwarded to the cities, and especially to the mining districts, as tallow alone is burnt in the mines.

The slaughtering period (*matanza*) lasts usually a month, and is a holiday for the shepherds, fully recompensing them for what they must endure the rest of the year. They have, namely, to perform the slaughtering, skinning and cutting up, and receive as extra wages the head and the intestines of the victim. Of the intestines they manufacture bad gut-strings, of which immense quantities are used throughout the country; and fatten themselves and their families for a long time with sheep's heads and livers.

The cooked meat, from which the fat has been extracted (*carne de chito*), lies there in complete mountains after a matanza: it is bought up by the dealers and conveyed to the villages, where the Indians buy it at the market for a mere trifle; they seasoned with Spanish pepper, regard it as a delicacy.

Goats are reared in a similar manner, and are considered very lucrative. The goat is much hardier than the sheep, suffering little from change of climate and humidity. The steep, barren mountains, volcanic soils or limestone hills covered with thorns and creeping plants, constitute the paradise of the goats. In the summer they clamber up to the highest points of the Cordilleras, but in winter they are tended on the plains and on the spurs of the mountains.

During the summer the milk is used for preparing cheese; the small round goats' cheeses are sold throughout the country. As with the sheep, the chief profit is the tallow. Towards autumn, when the animals are fattest, the annual slaughtering takes place. A fat he-goat is calculated to yield twelve, a she-goat from eight to ten pounds of tallow, which is disposed of to the soap-boilers and candle-makers. The skins are for the most part sent to Europe.

The goat-herd is the poorest of all the herdsmen (mostly an Indian), but a great rogue, who cheats his master of many a kid. He feeds on the fruit of the cactus and all sorts of roots, but takes care always to be supplied with dried meat, and not to let his horn be quite emptied of pinole (the flour of roasted maize mixed with sugar). Sometimes he is seen to weave baskets and mats of palm-leaves, sometimes to carve wood.

We must also devote a few words to the swine, which are met with in great numbers. Moses and Mahomet forbade pork from wise considerations of health, and in the warm regions of Mexico a similar prohibition would not be unwise. The fat, soft flesh weakens the organs of digestion, already enfeebled by the climate, and

increases the disposition for fever and skin-diseases. The villager as well as the ranchero alwayskeeps pigs about his house, which are seldom stied, but are allowed perfect freedom. They know their house, and never lose themselves, although they make long excursions in search of water and food. As long as they are not full-grown, they get merely the leavings of the kitchen, in order to accustom themselves to the house, and sleep in the open air, near their master's cottage. When older, they have a small sty, constructed with logs, and are fattened with maize. Both the European and the Polynesian race are bred; the latter is small, short-legged, with curly bristles; but becomes exceedingly fat.

The Mexican breeds swine chiefly for the sake of the fat. The bakers use considerable quantities, and soap is mostly manufactured from it. An immense quantity of soap is used in the country, partly because the linen is always washed in cold water, partly because the people bathe much, and invariably employ soap.

Swine are bred on an extensive scale in the districts where there is abundance of agricultural produce. Estates which grow vast quantities of maize, barley, horse-beans and pease, without having a market at hand for the produce, turn much of it to good account by fattening. In Guadalajara and Mechoacan, in the valley of Toluca and in the plains of Perote, many estates fatten a thousand swine annually and sell them in troops to the soap-boilers and ham-salters. The Mexican hams are far from resembling those of Westphalia; they are very fat, and are used in the kitchen chiefly for eking out the olla podrida and other dishes.

Where swine are bred on a large scale, the herds are driven every day to some marshy locality, and brought back in the evening to the enclosures, when a small quantity of dry food is spread before them. The full-grown porkers are removed to separate pens, where they are plentifully fed with pulse and barley; they are often driven out into the plain for a short time, more for the sake of exercise than to seek for nourishment. Here they soon grow fat, and are subsequently promoted to another pen, where the fattening is completed.

XXV.

MINING AND MINERS.

When at the beginning of the 16th century the Spaniards landed in Mexico, they first met with the natives in the valley of Sempoallan, not far from the sea. They were agricultural Totonacs, ,subject to the Aztecs; the chiefs wore gold and silver ornaments, which attracted the rapacious glances of the white adventurers.

Their first questions were; "Whence comes this?" The natives pointed to the west. When soon after, the ambassadors of Montezuma brought rich presents of the precious metals, adorned with emeralds, in order to induce the unbidden guests to turn back, they were confirmed in their opinion, that there were literally golden mountains in the interior, and the cry was: "Forwards!" When after great exertions, they had at lenght crossed the mountains, they perceived a city on the outskirts of the table-land, glancing in the sunshine, and fancied they recognized silver-walls and golden roofs. Though they soon found out their error, they still believed that what they sought was to be met with further in the interior.

After infinite toil and dangers the mighty empire of Tenochtitlan was subdued, the conquerors had obtained immense booty, but were still not satisfied. The report of treasure attracted thousands of Spaniards, whose first and last idea was, to seek for gold mines. Thus in the first decennium after the conquest of Mexico gold and silver mines were worked, and rich veins were discovered in all directions.

The Aztecs knew the art of smelting, perhaps also of amalgamation, but being unacquainted with the use of iron, their mining remained imperfect. According to the traditions of the Aztecs, the Toltecs understood the art of working metals at a very early period, and had learnt it from their divine hero Quezalcoatl.

The conquering Aztecs improved their inheritance, and acquired considerable skill. Cortes, in his report to the Emperor Charles V., describes the city of Mexico, and the market-place, as he found it on his first visit before the place had been taken. "Here", says he, "are all kinds of goods, which are found in the provinces, namely provisions and vegetables, as well as ornaments of gold, silver, lead, brass, copper, tin, stone, bone, mother-of-pearl, shells and feathers. They sell also hewn and unhewn stones, tiles, bricks, etc." They constructed looking-glasses of finely polished gold, pyrites and obsidian, arms, ornaments of all kinds, vases, etc. Among the presents which Cortes received from Montezuma, and sent to his sovereign, was a fish, which Charles V. forwarded to the Pope. Benvenuto Cellini saw it, and calls it a great work of art, as the body, made of silver, and the scales of gold were cast in one mould, which appeared to him inexplicable. Amalgamation was then not known in Europe, but it appears the Aztecs were acquainted with it. Although the ancient Indians understood working metals, their mining was evidently in its infancy; but in a country, endowed by nature with inexhaustible treasures, it was natural that rich veins of ore should be found on the surface, that whole masses of pure metal should be detected by their brightness. We know from the history of the country, that the Aztec kings imposed a heavy tribute of gold-dust, and grains of gold on the subjugated tribes, wherever the country brought forth these treasures. Even now pure silver is found in large masses, in veins as well as in layers, of which there are still innumerable in the uninhabited mountains.

Copper is not less plentiful, and is also met with in great purity in the important layers of Chihuahua. The ancient Aztecs understood the smelting of copper: their

very simple mode of smelting without furnaces may still be seen in the mines of Santa Clara, in the state of Mechoacan.

Where the aborigines got their silver from, and how they smelted it, is not known with certainty; it is, however, affirmed, that Tasco (situated 30 leagues to the south-west of the capital) and Pachuca on the table-land, 24 leagues to the north) are the oldest mines. It is certain that the Spaniards began their mining operations here at a very early period. In the first half of the sixteenth century many mines had been opened, and Charles V. issued various edicts, in which he recommends carrying on the operations regularly in the same manner as in Germany, and with the tools there in use, also to pay the tithe due to the crown.

Wherever there appeared a certainty of a good return, a village or a town, arose, however rude and inhospitable the district might be. As in the cold dreary deserts of Pasco in Upper Peru, at an elevation of more than 3000 feet, the rich yield of silver ore suddenly called forth a populous city, so in Mexico, certainly under less unfavorable circumstances, the cities of Guanajuato and Zacatecas, Durango, San Louis Potosi, Fresnillo, Tlalpujahua and many others were founded.

After the fall of the Aztec empire, the conquest of the country proceeded with wonderful rapidity, chiefly because the invaders hoped to meet with new and greater treasures in every mountain they beheld. The manner in which the Indians were forced to labour in the mines is well known, and how, accustomed hitherto to the gentler pursuits of agriculture, their numbers rapidly diminished. By degrees laws were framed for their protection, and for better regulating all mining operations. The prosperity of numerous districts is exclusively owing to this branch of industry.

Mexico has immense tracts of the most fertile soil, and exports scarcely any produce. Wine, oil, wax and other agricultural products, which the country might produce in abundance, are imported. The unjust policy of Spain towards its colonies laid the foundation of this evil; and since they have been independent, civil commotions have hindered the development of all native industry. Mining alone progressed, so that the present annual produce of from 32 to 34 million dollars annually, is higher than at the best period of the Spanish government, when it never exceeded 27 millions.

In the year 1810 the struggle for independence commenced, owing to which mining, and every other branch of industry suffered immensely. The produce declined to one fifth and even one sixth of what it had been; in the most important works the water was suffered to obtain the upper hand, and the miners proceeded in their search for ore in the most reckless manner. It was not till the year 1823 that a new epoch in Mexican mining commenced. European companies resumed operations, furnished with large capitals, associations of the natives emulated their endeavours, the government issued fresh decrees, and at length the produce equalled and even surpassed that of former times.

In no country in the world are similar elements for mining united, as in Mexico. Not only are the precious metals met with; but also copper, lead, zinc, tin, quicksilver and iron. The layers of the last metal are numerous and productive, but

as yet little has been done in this particular branch. Foreign iron is almost exclusively used, in a country which might supply other lands with iron and steel. Capital and labour have hitherto been devoted to acquiring silver and gold, and for this end the grandest works are erected. Guanajuato, now a city of more than 80,000 inhabitants owes its origin to mining. The mines of Valenciana, Rayas, Marfil etc., build mighty levels, the mining-buildings are palaces, massively built of stone in the midst of a city of workmen's houses, the shafts are sunk in the most luxurious manner, partly faced with hewn stone, and carried to a considerable depth. Thus, for example, the magnificent shaft of Royas is octangular, 40 feet in diameter, and about 1200 feet deep.

In Valenciana, a mine which for many years has yielded its owners an annual profit of a million piastres, the shafts and adits cost several millions, a lofty and broad spiral path is cut through firm rock to a depth of 500 feet, so that troops of mules can descend into the bowels of the earth, and convey the ore to the surface. In its best days it yielded annually 700,000 cwt. of ore. Upwards of 3000 persons were occupied by it; about 160,000 pounds of powder were used, and the annual outlay amounted to a million of piastres. There were, and are still, many such mines in operation.

Similar arrangements are seen in Zacatecas, a mining-town of 35,000 inhabitants, older than Guanajuato, and for some centuries the source of great treasure. Situated in a rude district, void of vegetation (about 7978 English feet above the sea), it owes its origin and prosperity to its mineral wealth. The mines here are among the most important in the country, their outworks appear like immense castles reared against the face of the barren rock, and long strings of mules, proceeding to the smelting-houses, enliven the dreary landscape. Fresnillo, Plateros, Catorce, Sombrerete, Real del Monte, and many other districts have works on a large scale, but the greatest are incontestibly those of Guanajuato and Zacatecas.

The works of Sauceda and Fresnillo in Zacatecas, as well as some in Guanajuato, seen from the heights, appear like small towns, and present an animated appearance with their numerous horses and mules, which, in the absence of water-power are used for setting the machines in motion and for triturating the ore. Not all kinds of ore are adapted for smelting, but much is subjected to a chemical process termed amalgamation. A Spaniard, named Bartholomew Medina, made this important discovery in the Mexican mining-town of Pachuca, in the year 1557. A few years later his process was employed on an extensive scale all over Mexico, and in 1571 was also introduced into Peru. The ore having been crushed into a fine powder is mixed with a strong solution of common salt, to which sulphuretted oxide of copper (vitriol) is added; it is then carefully kneaded by horses or men, and finally quicksilver is worked up into the mass. The silver amalgamates with the mercury, the strange particles are then carried off by water, and at length the quicksilver is separated from the silver by distillation. When in the year 1786 Born and Gellert at Freiberg discovered amalgamation, it was without the least acquaintance with the Mexican invention; the chemical process, too, is quite different, and it is only to be

wondered at how a process that had been carried on, on a large scale, for upwards of two centuries, could have remained unknown in Europe.

At the works of Zacatecas alone, about 40,000 cwt. of ore are amalgamated weekly, 24,000 of which in the foundry of Sauceda. The great works of Fresnillo, six leagues from Zacatecas, have eight crushing-mills, and 320 ore-mills (*arrastras*) in operation; 60,000 cwt. of ore are usually subjected to the amalgamating process at once, which lasts four weeks, so that every week 15,000 to 18,000 cwt. are brought here from the mines, and the same quantity washed. Humboldt at the beginning of the century estimated the quantity of ore amalgamated in the country at 2,000,000 cwt., and this amount has doubtless increased. Compare this with Freiberg in Germany, where annually from 50,000 to 60,000 cwt. are amalgamated, consequently only a twelfth part of what is done in Fresnillo alone.

These immense foundries occupy naturally many of the people, and thousands of beasts of draught and burden, because all the machines, owing to the want of running water, must be set in motion by horses and mules. Our remarks are to be referred chiefly to Zacatecas and its neighbourhood; for other districts, although not all, have water-power.

The quicksilver required for the amalgamation, about 20,000 cwt. annually, was formerly supplied by the Spanish government, at a fixed price. After the defection of the colonies, the traffic was managed by England, and although the prices rose from 70 to 90 and 100 dollars per cwt., this important article was not wanting. Some twelve or fifteen years ago the house of Rothschild in London monopolized the trade with quicksilver by buying up the produce of Almada in Spain, and raising the price at pleasure. The consequence was, that the smelting process was resorted to, wherever it was possible. Owing to the discovery of rich quicksilver mines in California, the prices have again fallen (from 120 and 130 dollars to 45 and 50), a circumstance of no mean importance for Mexican mining.

Salt is obtained in the country itself. The salines of Pennon Blanco, between Zacatecas and San Luis are of a peculiar nature: there is, namely, a shallow cavity in the plain, which during the rainy season becomes filled with water, forming a lake. The whole neighbourhood is saline; the earthy particles carried by the water into the lake are impregnated with salt, and as in the dry season all the water evaporates, the loose earth, containing 25 per cent of salt, remains. Of this earth, a fourth of the weight of the ore is added for the amalgamation, consequently for 100 cwt. of ore 25 cwt. of saline earth; the district of Zacatecas alone requires annually 520,000 cwt. of this material, and Guanajuato about the same quantity. In other districts sea-salt is used, or the produce of the salines.

In general nearly the same rules are observed in working the mines as in Europe; as much care as possible is taken to preserve the lives of the miners, by ventilation, by proper supports etc. The manner in which the labour is performed in the mines is somewhat different from that of Europe. The miners labour mostly in pairs, one holding the borer, the other the hammer, but occasionally changing tools with each other. In many districts the miners have a share of the profit.

Saturday is always a very busy day, the mines then become markets, the owners of foundries and speculators buy up the ore, large sums change hands, and the miners spend part of their earnings in the booths and liquor-shops. In Guanajuato it is customary in all the mines for the labourers to receive a third part of the refined ore *(pepena)*. The proprietors of mines have rarely their own foundries but sell the ore on the spot. In Zacatecas the miners have seldom a share in the profit.

We have already alluded to the great weight of ore dragged by the Indians to the surface. Frequently they have to ascend a thousand or fifteen hundred feet, not by ladders, but by means of trunks of trees in which steps have been hewn. As tallow candles only are used in the mines, the workman must shelter his light with one hand, so that the draught may not extinguish it, and has therefore only a slight hold with the other. He thus moves upward with his burthen, the trunks being slightly inclined, and secured by props every fifteen feet, the abyss on either side, into which a false step precipitates him. Indians have been known to carry up five hundredweight in this manner, in their leathern sacks.

The mine-pits are frequently spacious and furnished with gates, under the care of porters. The miners on leaving are carefully examined by the porters, so that no rich ore may be stolen. The desire of the Mexican miners to carry away ore is invincible; the most honest of them, who might be trusted with any sum of money, cannot resist picking up a piece of pure silver, if he feels sure of carrying it off in safety. All kinds of tricks and manœuvres are practised, in order to deceive the searchers. They crush the ore to powder, mix it with tallow, and rub it as pomatum into their bushy hair, they hollow the handle of their hammers, in order to fill them, they conceal grains of gold or silver in their mouth, ear, or any other orifice. To pass the searchers with booty is regarded as a triumph of industry, and the *esprit de corps* admires the deed. Their inventive powers are never at rest. Once, for instance, a dog had got into the mine. The overseer was dissatisfied, and the owner of the animal, to get over the difficulty, killed the dog with a blow of his hammer, and threw it aside. After some days there was a fearful stench in the mine, and on the overseer enquiring into the cause, several of the workmen told him it proceeded from the dead dog, and that the man who had killed it, must remove it. With apparent reluctance this was done, the carrion was dragged out and flung on to the rubbish heap. But the whole of the dead animal was filled with rich ore; the trick having been deliberately planned. In another mine the men went still further. The overseer had fallen down the shaft and broken his neck. The corpse was raised by means of a gin, but at the way-board it was remarked to be unusually heavy, and on being examined was found to be laden with rich ore, even the abdomen being filled with it. The miners did not deny it, and observed, that they had intended to comfort the poor widow with it.

In many mines the workmen enter quite naked, rendering it apparently impossible to conceal the ore, and yet it daily happens that some is carried off and placed in security.

It is interesting to visit a mine at daybreak. The night task issue forth, brown fellows, partly of athletic make, the upper part of the body naked. The tools are handed over to the smiths, the ore brought up, the overseers report to their superiors, the inspector (*rayador*) registers the work done. Meanwhile the gang assemble for the day-task, and arrange themselves in pairs; their names are entered, the work to be undertaken intimated, tools, candles, powder are distributed, and now the procession begins. They are conducted by an overseer (or by several), who crosses himself before the crucifix, or the image of the patron saint at the entrance. The whole gang imitate the example, and the overseer sings a strophe of the Ave Maria, which is repeated in chorus. The descent commences with the hymn; the tones are soon heard feebly ascending from the pit, and should the procession be somewhat long, the song of those who first entered is lost in the distance before all the singers have commenced their descent. There is a landing-place in every mine, where the workmen have erected a stone altar, on which the image of the patron-saint is erected. Lighted tapers are placed before it, and every morning fresh flowers and foliage are brought, with which the altar is decorated. From this point the miners disperse in all directions, and begin their labours.

At the foundries the task is also usually begun with an Ave, but the workmen who have to perform their labours by daylight, or at least on the surface of the earth, have no peculiarities worthy of note. Where the smelting-process is in vogue, more skill is required. The smelters rank somewhat higher, whilst at the amalgamation-works nearly all the workmen are ordinary day-labourers. Even at the foundries the people must be carefully observed; and all who go out are searched.

The silver is cast into bars of a certain form, weighing from a hundred and twenty to a hundred and fifty marks (60 to 75 pounds). It is thus conveyed to the mints. Mexico, Guanajuato, Guadalajaro and Zacatecas have mints. The bars are assayed, and reduced to coinage. The government retains for this operation 3 per cent, the mint a quarter dollar in the mark, the eighth of a dollar for the board of superintendence. The owner of the silver receives the value in new piastres. Bars are occasionally exported; but only after paying the dues.

The miners have their own peculiarities, and form a distinct class of the population. In the mining-districts little or nothing is done in the way of agriculture, the miner knows nothing else and desires nothing else than his mines, he regards all other occupations with contempt, and rarely takes to any other, although he has to pass his life in the depths of the earth, deprived of every ray of sunshine.

Almost every inhabitant of a mining-town tries his fortune in the mines. The daily accounts of the miners about rich ores, the bars of silver which are carried through the streets, the true or exaggerated tales of the thousands which this or that fellow citizen has earned in a short time, have an electric effect on the imagination of a people already exciteable, who calculate the value of money in proportion to the enjoyments it can command. There are people who occupy themselves exclusively in seeking new veins. They are called *cateodores*, openers or ore-seekers; usually they are old workmen, who have an objection to exerting themselves.