

the height of 11,019 feet. The socabon, or adit of the Mine, (commenced in 1780, and concluded in 1794, at an expence of 90,000 dollars,) lies 753 feet below the village. It is 966 varas in length, but, from some miscalculation in the measurements, it did not enter the Mine below the lowest levels, and is consequently of little use at present.

The creation of a populous village in such a spot as that upon which the Pueblo of the Döctör stands, is a proof of the influence which the Mines, when successful, always exercise upon the population. The whole surrounding country is now settled, and should the vein, upon examination, be found sufficiently accessible to induce the Catorce Company to continue its operations there, a few months will ensure them an abundant supply of all the necessaries of life. The district contains a number of metalliferous lodes, by which the Indians, not employed in agriculture, have gained a subsistence during the last twenty years; and although none of them have been explored to any extent, they present sufficient indications of richness to render a more minute examination of them expedient. The Haciendas formerly belonging to the mine are situated at Măcönĭ, (four leagues to the South-west,) where there is water in abundance; and at three leagues North of the Döctör, are the mines of San Crĭstöväl, which abound in lead ores, and furnish large quantities of liga, or flux, for smelting. Two leagues and a half

beyond these, again, in a deep ravine, is the quick-silver mine of San Önöfrĕ, with a vein about nine feet wide, composed of Cinabar, and other mercurial oxydes. The ores differ from those of Almădĕn and Huăncăvĕlică, inasmuch as they contain much native mercury, which is seldom found in sufficient quantities to be of much value. It exudes, however, in large drops from the ores which I possess, and the mine has been worked for some time by the present proprietor, with profit.

On the 20th of July we reached the town of Ăctöpăn, about ten leagues from Itzmiquilpan. The first part of the road is stony and barren, but after passing the village of Yölö, (five leagues from Itzmiquilpan,) the valley of Ăctöpăn commences, and on each side of it there are some fine Haciendas, following in their position the line of the mountains, from which they are supplied with water. The country is inhabited by Ötömĭ Indians; and in the vicinity of Ăctöpăn is covered with rich crops of maize and barley.

From Ăctöpăn to Chicö the road is wild and bad, but particularly the last six leagues, two of which lead, by an almost precipitous path, down the side of a very bold mountain, to a little eminence at the foot of it, upon which the town of Chico stands.

The whole distance does not exceed twelve leagues.

The great German Mine of Ărĕvălö stands upon another little hill, nearly opposite the town.

It enjoyed no sort of celebrity until the beginning of this century, when it fell into the hands of the present proprietor, Don Antonio Revilla, who, after working it for some time in an obscure way, was fortunate enough, in 1803, to fall in with a Bonanza, or mass of rich ore, which enabled him to carry on his operations upon a larger scale. In 1811, from one part of the level, called "El Divino Pastor," he obtained, in seven weeks, a clear profit of 200,000 Dollars.

During the Revolution, Revilla suffered, as all other Mining proprietors did, and was forced to mortgage the large estates in the neighbourhood of Arroyo Sarco, which he had purchased during the time of his prosperity. Having no means of paying off this mortgage, or of recommencing his mining operations and repairing his Haciendas, he was glad to accept the proposals made to him by the German Company, which undertook to advance him 100,000 Dollars, and to take his stock at a valuation, on condition that he should make over to them the entire management of the mine, and twelve Barras, or a Half-Proprietorship in it, for thirty years. The 100,000 Dollars advanced to Revilla in the first instance are to be deducted from his share of the profits, as is half the value of the stock on hand, which amounted to nearly as much more.

Upon these terms the Germans obtained possession of the mine, and there can be little doubt that it will prove a most lucrative speculation; for the

vein is, in many places, from *fourteen* to *seventeen varas* in breadth. The mine contains little or no water, and what there is, is carried off by a Socabon, or Adit, which enters it at the depth of 113 varas. The lowest workings do not exceed 168 varas, and that only at one particular point.

I had the advantage of visiting every part of the mine with the proprietors, who passed nearly three hours with us underground, and I certainly never saw so enormous a mass of metal. Of course, the quality varies, but although there are richer and poorer ores, there are none so poor as not to be worked with profit.

The most valuable ore, called Pepena, has been found, when smelted, to yield five Marcs to the Arroba, or 162 ounces to the Quintal; but this is rarely met with. The ordinary ores, which I saw amalgamated, produced seven and a quarter ounces to the Carga of three quintals, (equal to seven dollars and two reals;) and the expences of the process amounted to four dollars and four reals, leaving a profit upon each Carga of very nearly three dollars. Baron Humboldt's theory as to the saving which may be effected by the introduction of the Freiberg process of amalgamation into Mexico, has not yet been verified. The Germans merely shorten the process by placing the amalgam in stoves for twenty-four hours, which is regarded as equivalent to a week's exposure in the Patio. When the Hacienda is completed, it is their intention to carry flues under

the whole floor, by which means a small *Torta* may be amalgamated perfectly in four or five days, instead of employing as many weeks to effect it, as is the case at present.

It being absolutely impossible to avoid the use of Mexican mining terms, in an account of the mines of that country, it may be advisable to give here a concise explanation of their signification. The *Torta* contains fifteen *Montones* of ore, which has already undergone the process of dressing and stamping; and each *Monton* contains ten *Cargas* (or loads) of twelve *Arrobas* (25lbs.) or three quintals each.

To extract the silver contained in this mass, seven hundred pounds of quicksilver are required, of which from seventy-five to one hundred pounds are lost. To this are added eleven *Cargas* of Rock Salt, or four and a-half of Sea Salt, and from three to three and a-half *Cargas* of *Magistral*, (red copper ore roasted,) which is worth at Chico from eleven to sixteen dollars the *Carga*, being brought from Zacualpan, Angangeo, or San José del Oro, a distance of full thirty leagues.

All these ingredients are entirely lost in the process: the expense of which varies, in the different Mining districts, in proportion to the greater or less facility with which they are obtained.

The German Directors at Chico, Messrs. Du Berg and Kloppenberg, informed me that they found that no general rule or theory would apply to amal-

gamation in Mexico; and that they could give, as yet, no explanation of the peculiarities of the process. Long practice had given the old Mexican amalgamators a perfect knowledge of the quantity of the different ingredients required by their ores, and they added to the *Tortas*, Salt, *Magistral*, and sometimes Lime, with a precision which a scientific man would be glad to attain, although unable to assign any reason for what they did. The only improvements which the Germans have been able hitherto to introduce, consist in preparing the ores, by the Concentrating Machine,* either for smelting or amalgamation; and in collecting more carefully the quicksilver which may remain in the *Tortas* after the Amalgamation has taken place. The residue of the *Torta* is then washed, and carried afterwards, in troughs constructed for the purpose, round the whole Hacienda, until it is deposited in an open yard, where, after the earthy particles have been again separated by water, that which remains is called *Polvillos*, and on being smelted, is often found to produce from two to three Marcs of silver to the hundred weight. The little quicksilver which may remain is lost in this last operation.

* The concentrating machine (Stossheerd) is an inclined plane or frame work, upon which a quantity of pulverised ore is deposited, and subjected to the action of a small stream of water, which, by the peculiar motion of the machine, is allowed to carry off the earthy particles, and thus to concentrate the silver contained in a given quantity of ore, from one to ten or twenty Marcs in the *Arroba*.

The Germans have another Mine, between Actopan and Chico, called Santa Rosa, which, although the works are in a very dilapidated state, is free from water, (a circumstance to which they have always paid great attention,) and is producing ore even richer than that of Arevalo.

In their Hacienda they can command a water power to almost any extent; their smelting furnaces are completed; the country about them abounds in wood, and provisions are not particularly dear.

To set against these advantages, there is the smallness of their capital, which prevents them from acquiring a proper influence over the natives, and obliges them to introduce their improvements with the utmost caution; and the difficulty of obtaining workmen, except on the unreasonable terms which Revilla was compelled to grant during the Revolution, when one *Third* of the Pepena, or rich smelting ore, raised by each barretero, (common miner,) was allotted to him to be sold upon his own account. But these are drawbacks which time and perseverance will enable the Company to surmount; and they have displayed throughout such a thorough knowledge of the business which they have undertaken, so much assiduity, and such extraordinary economy, that I entertain not the slightest doubt as to their success.

Some of the English Companies have Mines in the vicinity of Chico, from which, however, but little is to be expected. At Cápulá, the United

Company is working the Mines of Las Papas, Santa Ana, and Santi Christi, the last of which, it is thought, may prove productive. In general, the Mines both of Capula and Chico (with the exception of Arevalo) are poor; and although, where one good mine has been discovered, others may be found, there are so many districts in which the chances of success are greater, that the investments made by the New Mexican, United Mexican, and Anglo-Mexican Companies, in the inferior Mines of Chico and Real del Monte, appear to me to belong to that class of injudicious experiments into which Foreign Adventurers were betrayed, in the beginning of 1825, by the absurd competition for contracts which the mining mania in England created.

On the morning of the 23rd July, we left Chico, and proceeded to Real del Monte. The distance is not above three leagues and a-half, but the road is one continued ascent, and, in many parts, so very rugged, that it requires as many hours to perform the journey.

There is, perhaps, no British Company to which so little justice has been done by the Mexicans as that of Real del Monte; a circumstance which is to be attributed entirely to a misconception of the system pursued there. Many people imagined that Captain Vetch, the Director, having it in his power to make the Mines pay at once, had not done so, in order to allow time for the completion of surface works; which, though highly advantageous at

a more advanced stage of the negotiation, were not essential in the first instance. Indeed, I had myself heard this statement so often repeated, that I could not but conceive that there must be some foundation for what so many agreed in affirming. Upon this point my visit to Real del Monte completely undeceived me, by enabling me to convince myself that the delay which had occurred, was owing entirely to the immense scale upon which the undertaking was carried on; and to the impossibility of effecting the drainage of any of the principal mines, before the arrival of the steam-engines, the departure of which from England had been unfortunately retarded.

A reference to the account of the operations of the Company contained in the Second Section of the preceding Book, will sufficiently prove the use which had been made of the interval.

By pursuing steadily one well combined plan, Captain Vetch had brought all the principal works upon Count Regla's grant, including the old Adit, which may be regarded as the key to the whole, into a fit state for the application of the powers of steam; a task which it required the labour of two whole years to complete. On the Santa Brigida vein, the shafts of San Jose and El Sacramento, and on the Biscaina vein, those of San Juan, San Francisca, Guadalupe, Santa Teresa, San Cayetano, Dolores, and El Zapatero, had been repaired and re-timbered down to the Adit level, (about 213 varas,)

in addition to which two new shafts had been sunk, (St. George and St. Patrick,) about fifty varas each, in order to render accessible the workings of some old shafts, upon a very rich portion of the vein, (between La Palma and San Ramon,) which it was found impossible to open anew.

One shaft on the Acosta vein, had been likewise re-timbered down to the Adit level. The shaft of San Estevan had been completely cleared, and was beginning to produce very rich ores.

The mine of Mörän had been likewise cleared down to the water, (about eighty feet,) and a horizontal steam-engine erected there, which was to begin working on the 12th of August. It is of fifty-horse power, when worked only to a pressure of 45lbs. on the square inch, but it is calculated to bear a pressure of 200lbs.

With regard to its being fully adequate to clear the mine of water, no doubts are entertained. The deepest workings of the Moran mine do not exceed one hundred and sixty varas; and a few weeks would, consequently, suffice to drain it entirely, were it not for the necessity of re-timbering the whole shaft, as the workmen proceed. There is one curious circumstance with regard to this mine; it has always borne a very high character, and yet, like San José del Oro, no accurate information can now be obtained with regard to the state or extent of its works. About thirty years ago an attempt was made to drain it by some German engineers

brought over for the purpose, who constructed a high-pressure engine planned by Don Andres del Rio. In order to obtain a sufficient command of water, a Presa, or dam, was built, at a great expence, upon the summit of a neighbouring mountain; but the plan failed, because the force of the water having been calculated during the rainy season, it was found insufficient, during the dry, to keep the engine at work for more than six hours out of the twenty-four.

Moran may be regarded as one of the most interesting points at Real del Monte. The old Adit, from which the wealth of the first Conde de Regla was derived, commences within one hundred yards of the shaft. The new Adit, the level for which is taken at the Hacienda of Sanchez, (about eight hundred yards distance,) is to be driven exactly in the same direction, and the new road to Regla passes close to the mouth of the mine.

This road is one of the enterprizes for which the Company has been blamed, and yet, without it, not a single steam-engine could have reached Real del Monte. In the time of the old Count Regla, when six hundred mules were employed daily in conveying ore from the mines to the Hacienda of Regla, which is nearly six leagues from the Real, there was no other mode of communication than a very dangerous path across the mountains. This has now been transformed into a road for wheel-carriages, which is beautifully laid down, and upon

which timber, of a size never transported before in Mexico, is brought to the mines in the waggons that were originally sent out for the conveyance of the steam-engines from the coast. Another road, equally good, and equally necessary, leads to the farms of Gūajālōtē and Zimbō, from the last of which the largest timber is principally supplied.

When, in addition to the works already enumerated, it is recollected that seven steam-engines have been transported from Veracruz to Real del Monte, the aggregate weight of which amounted to fifteen hundred tons;—that one of these (that of Moran) was already on the point of beginning to work, and that two others (those of Guādālūpē and Dōlōrēs) were in a state of great forwardness, it is impossible not to confess that the greatest praise is due to those, by whose exertions so much had been effected in the short space of two years.

Disappointed speculators may complain of the want of speedier returns; but their murmurs must be ascribed, as I have already stated, to their ignorance, in the first instance, of the nature of the enterprise in which they engaged. They know neither the hardships which have been endured, nor the difficulties which have been overcome, in their service; many of which, it is my firm conviction that it would have been impossible to surmount, but for the science and energy displayed by Captain Vetch, and Captain Colquhoun, to whom, most fortunately for the Company, the direction of this ardu-

ous enterprize was entrusted. The German Directors, two of whom accompanied me from Chico to Real del Monte, were astonished at the size of the boilers, and other pieces of machinery, which had been brought up from the coast, and confessed that they should neither have regarded the attempt as practicable, nor would have undertaken it themselves on any terms.

I was happy to find that these gentlemen, to whose opinion as miners, from what they have done themselves, I should be inclined to attach great weight, were highly gratified with all that they saw at Real del Monte, and expressed, in the warmest manner, their approbation of the system pursued there.

They were particularly struck with the plans for the new Adit, which is, indeed, a stupendous undertaking. It is to commence 800 yards below the mouth of the old Adit at Moran, and must consequently be driven 3,607 yards before it enters the Biscaina vein at the Dolores shaft. In this space it will cut a number of small veins between Sanchez, Moran, and the Santa Brigida lode, the course of which it will then follow, at 140 varas below the level of the old Adit.

As the quality of the ores was not found to be at all deteriorated in the deepest workings of the old Count Regla, who was only prevented from carrying them farther by the difficulty of keeping down the water, there is every reason to hope that, from the

time that the new Adit reaches the Santa Brigida vein, it will not only cover its own expences, but will become a most lucrative speculation. Indeed, were it not for this expectation, no Company could undertake a work, upon such a scale, in such unfavourable ground, as part of the Adit must be driven through the porphyry rock, where the expence of each vara will amount to twenty-five dollars.

It is in consideration of this circumstance that the prosecution of this enterprise has been suspended, until the mines themselves furnish the means of carrying it on, without increasing the outlay of the Adventurers, which already amounts to the whole of the capital originally subscribed. Many are of opinion, however, that had the resources of the Company been devoted to this undertaking, in the first instance, the result, at the end of the term of twenty-five years, to which their contracts entitle them to look forward, would have been more advantageous than the partial drainage which the steam-engines will more immediately effect.

This is a question which it is now unnecessary to discuss, as the opposite system has been preferred, and is likely to succeed, in which case the Adit of Sánchez, or Omítlán, may be resorted to when the goodness of the mines is demonstrated to some extent below the deepest levels which the Mexican proprietors were enabled to reach. These now extend from forty to seventy varas below the old Adit, so that the new one would render accessible