

The German Company has three mines, Nuestra Señora del Carmen, (on the vein of that name,) San Antenogenes, (on another vein, which is from six to twenty varas wide,) and La Purisima, in a valley above the town, to the North.

The Mine of El Carmen was the only one, from which ores were raised, at the time of my visit. These averaged from six to ten marcs per monton, and, as they were found in great abundance, the produce would have covered all the expences, had not an establishment of two hundred and fifty horses been required for the drainage.

A water-wheel has been since substituted for the malacates, in which these animals were employed, and it is probable that, at the present day, the Company derives a considerable profit from this undertaking.

Two small Haciendas were attached to the German establishment; one, La Trinidad, with six arrastres, and the other, San Juan Nepomuceno, with stamping machine of ten stampers.

The Raya, or weekly payments, did not exceed 1,000 dollars; and was nearly covered by the produce, one hundred marcs, (equal to eight hundred dollars.)

Angangeo was said to have been in a much more flourishing state two years before my visit: forty-six Arrastres, or mills, and four Morteros (stampers) were then at work, which had been reduced to twelve by the increasing difficulty of obtaining ores. These

were found, at first, in abundance, in the upper levels of the old mines, abandoned during the Revolution. But when it became necessary to work the deeper levels, few had capital enough to enable them to keep down the water, although with very moderate resources it might be easily effected.

Angangeo may, however, be considered, as a rising district, and one in which with very little risk a great deal might be done. The largest mines there would not require a capital of above thirty or forty thousand dollars; and the metallic riches of the surrounding mountains have been so little explored, that they may be regarded as quite a new field. Labour is cheap; water abundant, and with a fall sufficient for any kind of machinery;—wood, and provisions, are plentiful, and the climate good, though cold.

There are some local peculiarities, however, to counterbalance these advantages. In the first place, the ores are seldom found in a pure state, but contain, on the contrary, a most extraordinary mixture of metals, which vary with the different veins.

In the Veta del Carmen, the silver ores contain a large proportion of arsenic, with which the whole mass is so impregnated, that, when brayed in the arrastres, it is of a dull greyish blue, or slate colour, by which the montones of ore from this vein are easily distinguishable, while undergoing the process of amalgamation.

These ores are reduced in less time than any



others, seldom requiring more than eight days for the completion of the process.

The vein of the Descubridora, as well as that upon which the German Mine of San Atenogenes is situated, contain a large proportion of bleierze, or silver mixed with lead. In all, there is a considerable mixture of zinc (*blende, estoraque*), and native antimony (*spiesglaserz*), which are very troublesome, as they must be separated by the *pepenadores* (ore-dressers), before the ores are stamped, both being unfavourable to the action of the quicksilver. Besides these, there is much *acaporosa* (carbonate of iron).

In order to get rid of a part of these extraneous substances, it becomes necessary to roast the ores after they are dressed; the process lasts about three days, and is continued until fourteen *cargas* of ore are reduced to ten. The expence is from five to six dollars per *monton*.

The ores called *Colorados* may be reckoned also amongst the peculiarities of Angangeo. They are generally found in the levels nearest the surface, and are, in fact, metals in a state of decomposition, strongly impregnated with a reddish oxyd of iron. They are usually rich, containing as much as sixteen, eighteen, and even twenty *marcs* of silver in the *monton* (of thirty hundred weight). When amalgamated, they require more time, and more quicksilver, than the other ores of this district, but no *magistral*. In

all the Mines it is observed that the silver mixed with arsenic is found only in the deepest workings.

Iron pyrites (*schwefelkies*) abound in the higher levels, and it is to them that the red colour of the ores extracted from these levels is to be attributed: they are prepared by fire for the *arrastres*, when the sulphur evaporates, and leaves a red oxyd of iron; which distinguishes these *montones*, as the blue colour does those in which arsenic predominates.

The *Colorados*, as I have already observed, only occur at a certain distance from the surface.

In a new mine, worked by the Cura of Angangeo (San Severiano), the transition from the *Colorados* to the ordinary metals, occurs within a space of twenty *varas* from the mouth of the shaft; and from the moment that this line is passed, *magistral* becomes necessary for the amalgamation of the ores, although a little higher it is not required.

The following is a fair estimate of the expences of extraction and amalgamation at Angangeo, per *monton*, of ten *cargas*, (each of three *quintals*):—

<i>Extraction.</i>	Dollars.	Reals.
Ten <i>Barreteros</i> . . . . .	5	0
Peones . . . . .	1	0
Powder and Candles . . . . .	1	2
Tools, &c. . . . .	1	0
	8	2



<i>Amalgamation.</i>		Dollars.	Reals.
Hacienda . . . . .		3	4
Repasadores . . . . .		2	4
Azoguero . . . . .		1	0
Salt . . . . .		2	0
Magistral . . . . .		0	4
Quicksilver lost . . . . .		5	0
Separation of Quicksilver from Amalgam		0	4
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		15	0
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In all, twenty-three dollars and two reals; while the value of the ores contained in the Monton, taking them at an average of six marcs, (some are much richer, and few, or none, poorer,) is forty-eight dollars; which leaves a clear profit of twenty-four dollars and six reals upon each monton.

There are few districts in which the use of Arrastres, in lieu of stampers, is so general as at Angango.

They are more economical in some respects than Morteros, (stampers,) as they require much less attendance; but they also do less work: for an arrastre cannot bray more than three montones of ore in the week; while a twelve stamp Mortero will pulverize the same quantity in twenty-four hours. They have, however, the advantage of reducing the ore at once to a fine impalpable power, free from all gritty substances, and perfectly ready to be sub-

mitted to the action of the quicksilver; a state to which it is seldom brought by passing once, or even twice, under the Mortero. But then their powers are limited, and would prove of no avail with the hard ores of some districts, where quartz or porphyry predominates, and for which the powerful blow of the mortero is absolutely required.

With regard to the former produce of Angango, I found it impossible to procure any exact information, the records being lost, and the mine owners having long been in the habit of remitting their silver, in the first instance, to Tlalpujahuá, from which place many of them were furnished, before the Revolution, with the means of continuing their works. It is, however, generally thought that a Company with a small capital might do well there, and the favourable prospects of the Germans seem likely to confirm this supposition.

The road from Angangö to Tlalpujähüa traverses one steep and rugged mountain, with an ascent of nearly two leagues, through a forest of magnificent pines. From the summit to the Hacienda of San Rafael, the descent is gradual, but constant, and the distance about four leagues. I had not the pleasure of seeing this establishment completed, the labours of Messrs. Moro and Enrico having been a little retarded by the rainy season; but the progress which had been made since my first visit was surprising, and, on my arrival at Tlalpujahuá, where I again passed some days, I found, both in the town and in



its vicinity, abundant cause to admire the diligence which had been displayed. A number of additional mines had been brought into activity, in order to explore the veins upon the greatest possible number of points at once; and on the lode of Las Virgenes, an entirely new shaft, called the mine of Arevalo, from its proprietor, the Cura, had been sunk, the ores of which appeared to be very promising. In the town, improvements were proceeding with equal rapidity, and the market was thronged with well-dressed natives; many of whom, a few months before, had no other attire than a Queretaro blanket of the commonest kind.

From Tlalpujahuá I returned to the capital, by the Rancho del Oro, which is situated just within the confines of the State of Mexico. The United Mexican Company is in possession of nineteen Mines there, the former produce of which is known to have been very considerable. Nine of these Mines are situated upon the Veta Descubridora,\* and may be considered as one work; five other shafts are sunk upon the lodes of San Rafael and San Acasio.

The state of the whole, at the period of my visit, afforded a striking exemplification of the evils with

\* This name is common to all the Mining Districts, and means merely the vein, or lode, to the discovery of which the establishment of the Real is due. Thus the Coronas Vein was the "Descubridora" of Tlalpujahuá; the Milagros Vein of Catorce; and the Vein of San Bernabé, of Zacatecas.

which the absence of the master's eye must always be attended. Under the injudicious management of a Mexican Administrador, (steward,) 130,000 dollars had been spent in two years, without the drainage of any one of the shafts having been effected, although none of them exceeded 155 varas in depth. A visit from Mr. Alaman, the principal Director of the Company, had led to the dismissal of this unprofitable servant, and an Englishman, Mr. Walkinshaw, was associated with a Mexican miner of some reputation, in the management. But time was requisite in order to do away with the effects of the slothful and dilatory system which had been fostered by their predecessor; and the same men, who, at Tlalpujahuá, under the eye of Mr. Rivafinoli, worked with an energy which could not easily be surpassed, seemed to lose all their activity on entering the district of El Oro, and performed their several duties with a sluggishness which it was painful to witness.

In August, 1826, the mine of El Rosario was the only shaft from which ore was raised. The vein appeared to be rich, but small. The gold is found in particles, imperceptible to the naked eye, in a matrix of quartz, which contains sulphuret of silver, disseminated throughout the mass in such narrow stripes, that unless the dimensions of the vein increase, they will hardly repay the expences of working.

Gold mines in Mexico generally diminish in value.



as they increase in depth, and it is to be apprehended that the district of El Oro will not form an exception to this rule. The mines, however, were worked to advantage as late as 1810, and it is upon record that, in 1805, a single Carga of Ore was sold at the mouth of the shaft for eleven thousand dollars. A very few montones of ore, of a quality much inferior to this, would repay the Company for all its advances; although these are likely to be increased by the construction of a Hacienda, which is indispensable, if the enterprise of working the mines is persevered in; every building connected with them having been destroyed in 1811, in order to furnish palisades for Rayon's camp upon the Cerro del Gallo.

The plans for this Hacienda were not completed when I was at El Oro; but I have been since informed, that it is to be situated in the valley of Tēpētōngö, where a Presa, or dam, has been constructed, during the last year, of sufficient size to form a reservoir of water in the rainy season, for the supply of the machinery during the dry months. This Presa is built across a ravine, and is seventeen varas in thickness at the foundation, terminating, at the height of sixty feet, in a wall three varas thick, and 200 feet in length, from side to side. The whole is solid masonry; so that the cost, in addition to the other expences connected with the construction of a Hacienda, must be very considerable.

I took my former road, on my return to Mexico,

through Īstlähūacā and Lerma; the rainy season being too far advanced to render it advisable to explore any new path across the mountains. By setting out very early in the morning we had succeeded, during the whole expedition, in avoiding the rains; although they rendered many parts of the road nearly impassable, particularly in the neighbourhood of Temascaltepec, where there is a great deal of red clay, upon which neither horse nor mule could preserve its footing. With the exception of a few falls, however, on our way to the least accessible of the mines, and the misfortunes of a Carga mule, that was nearly drowned in crossing a torrent, we met with no adventures; and the freshness of the country around us made ample amends for the additional difficulties with which our progress was attended, in consequence of the rains.

I never saw, in any part of the world, a greater variety of beautiful scenery than is to be met with between Tēmāscāltēpēc and Zītācūarō, but particularly in the vicinity of the Valle de Temascaltepec, where the road winds repeatedly up and down a Cañada, of just sufficient depth to produce, in alternate layers, the vegetation of every different climate.

I likewise recollect with pleasure the Barranca of Hōcōnūscō, which, on one side, led us, by a slope of nearly a league, to the foot of a precipitous ridge of rocks, to climb which, with our tired animals, seemed almost impracticable. Upon the summit



there is a sort of Table-land, upon which the Hacienda stands; and from this another long and sweeping descent leads to Zitacuaro, through a succession of woods, with occasional openings, so natural, and yet so varied, that you can hardly conceive them not to have been made to ornament some stupendous park. At Zitacuaro, where we arrived on a market-day, we found provisions of all kinds in the greatest abundance, and made a most delicious breakfast, on new milk, the finest wheaten bread, and eggs, with oranges, pines, and sugar-cane, all the produce of the surrounding district. From thence to Angangö, the country assumes a more rugged character, and pine-forests, similar to those about Tläl-pühüa and El Oro, mark the transition from the *Tierra Templada* below, to the less genial atmosphere of the higher regions.

I arrived in Mexico on the 5th of September, and immediately commenced my preparations for my great journey into the Interior, which did not, however, take place until the beginning of November; all my plans having been deranged by the illness of my eldest little girl, who was very nearly killed by a *coup de soleil*, which brought on a brain fever, and left us, at one time, very little hope of her surviving. To the skill and unremitting attentions of Doctor Wilson we were indebted for her recovery, but she was long in too weak a state to bear the fatigue of travelling; and as Mrs. Ward had resolved

upon accompanying me, and could not reconcile herself to the idea of leaving her children for two whole months, our departure was put off from day to day, in order to allow time for our little invalid to gather strength.