

tion, rush back towards the Capital, and fill the streets which approach nearest to their own level. This was the case in 1553, 1580, 1604, and 1607, in each of which years the Capital was laid entirely under water, and the dikes, (Albaradones,) which had been constructed for its protection, destroyed. The rapid succession of these misfortunes at length compelled the Government to turn its attention to some other mode of averting the danger; and in 1607 an engineer called Enrique Martinez, was commissioned by the Marquis of Salinas, who was then Viceroy, to attempt the drainage of the lake of Zumpango by the stupendous canal now known under the name of the "Desague de Huëhuetōcā.

The plan of Martinez appears to have embraced two distinct objects, the first of which extended to the lakes of Tezcuco and San Cristoval, while the second was confined to the lake of Zumpango, the superfluous waters of which were to be carried into the valley of Tula, by a subterraneous canal, into which the river Guautitlan was likewise to be compelled to flow.

The second of these projects only was approved of by the Government; and the line of the canal having been traced by Martinez between the Cerro (mountain) of Sincōque and the hill of Nōchistōngō, to the North-north-west of Huëhuētōcā, where the mountains that surround the valley are less elevated than in any other spot, the great subterraneous gallery of Nōchistōngō was commenced on the 28th

November, 1607. Fifteen thousand Indians were employed upon this work, and as a number of airshafts (lumbreras) were sunk, in order to enable them to work upon several different points at once, in eleven months a tunnel (Socabon) of 6,600 metres\* in length, three metres five in breadth, and four metres two in height, was concluded.

From the Northern extremity of this Socabon, (La boca de San Gregorio,) an open cut of 8,600 metres conducted the waters to the Salto (fall) of the river Tula, where, quitting the valley of Mexico, they precipitate themselves into that of Tula, from a natural terrace of twenty Mexican varas in height, and take their course towards the Bar of Tampico, where they enter the Mexican Gulph. An enterprise of such magnitude, concluded with such extraordinary expedition, could hardly be free from defects; and Martinez soon discovered that the unbaked mud bricks, (Tēpētātē,) of which the interior of the Socabon was composed, were unable to resist the action of the water, which, being confined within narrow limits, was at times impelled through the tunnel with irresistible violence. A facing of wood proved equally ineffectual, and masonry was at last resorted to; but even this, although successful for a time, did not answer permanently the purpose for which it was intended, because the engineer, instead of an elliptical arch, constructed nothing but a sort

\* The Metre is equal to 39,371 English inches.

1320  
1000.000



of vault, the sides of which rested upon a foundation of no solidity. The consequence was, that the walls were gradually undermined by the water, and that the vault itself, in many parts, fell in.

This accident rendered the Government indifferent to the fate of the gallery, which was neglected, and finally abandoned in the year 1623, when a Dutch engineer, by name Adrian Boot, induced the Viceroy to resume the old system of dykes and embankments, and to give orders for closing the Socabon of Nochistongo. A sudden rise in the lake of Tezcuco caused these orders to be revoked, and Martinez was again allowed to proceed with his works, which he continued until the 20th June, 1629, when an event took place, the real causes of which have never been ascertained.

The rainy season having set in with unusual violence, Martinez, either desirous to convince the inhabitants of the Capital of the utility of his gallery, or fearful, (as he himself stated,) that the fruits of his labour would be destroyed by the entrance of too great a volume of water, closed the mouth of the Socabon, without having communicated to any one his intention to do so. The effect was instantaneous; and in one night the whole town of Mexico was laid under water, with the exception of the Plaza Mayor, and one of the suburbs. In all the other streets the water rose upwards of three feet, and during five years, (from 1629 to 1634,) canoes formed the only medium of communication between

them. The foundations of many of the principal houses were destroyed; trade was paralyzed; the lower classes reduced to the lowest state of misery; and orders were actually given by the Court of Madrid to abandon the town, and to build a new Capital in the elevated plains between Tăcubă and Tăcübăyă, to which the waters of the lakes, even before the conquest, had never been known to extend.

The necessity of this measure was obviated by a succession of earthquakes in the dry year of 1634, when the surface of the valley was cracked and rent in various directions, and the waters gradually disappeared; a miracle for which due credit should be given to the Virgin of Guadalupe, by whose powerful intercession it is said to have been effected.

Martinez, who had been thrown into confinement in 1629, was released upon the termination of the evils which his imprudence was said to have occasioned; and again placed by a new Viceroy, (the Marquis of Ceralvo,) at the head of the works, by which similar visitations were to be averted in future. Under his superintendence the great dike, or Calzada of San Crïstobăl was constructed, by which the lake of that name is divided from that of Tăz-cūcō. This gigantic work, which consists of two distinct masses, the first one league, and the second 1,500 varas in length, is ten varas in width, (or thickness) throughout, and from three and a half to four varas in height. It is composed entirely of



stone, with buttresses of solid masonry on both sides, and three sluices, by which, in any emergency, a communication between the lakes can be effected, and regulated at the same time. The whole was concluded, like the gallery of Nöchistōngö, in eleven months, although as many years would now be required for such an undertaking. But in those days the sacrifice of life, (and particularly of Indian life,) in public works, was not regarded. Many thousands of the natives perished before the Dēsāgüe was completed; and to their loss, as well as to the hardships endured by the survivors, may be ascribed the horror with which the name of Hühüetōcä is still pronounced by their descendants.

It is not my intention to follow the progress of the canal of Hühüetōcä through all the various changes which occurred in the plans pursued with respect to it from 1637, when the direction of the works was again taken from Martinez, and confided to the Monks of the Order of San Francisco, until 1767, when, under the Viceroyalty of the Marquis de Croix, the Consulado, or corporate body of merchants of Mexico, engaged to complete this great national undertaking. The necessity of converting the Socabon of Martinez into an open cut, (Tajo abierto) had long been felt, it having been found impossible to prevent the Socabon from being continually choked up by the sand and rubbish deposited by the water on its passage; but as the work was only prosecuted with vigour, when the danger

of an inundation became imminent, and was almost suspended in the dry years, 2,310 Mexican varas of the northern part of the Gallery remained untouched, after the expiration of one hundred and thirty years, when the Consulado was entrusted with the completion of the arduous task. As the old line of the gallery was to be preserved, it became necessary to give the cut, which was to be sunk perpendicularly upon it, an enormous width at the top, in order to prevent the sides from falling in; and in the more elevated parts, between the mountain of Sñncōqüe and the hill of Nöchistōngö, for the space of 2,624 feet, the width across varies from 278 to 360 feet, while the perpendicular depth is from 147 to 196 feet. The whole length of the cut, from the sluice called the Vertideros to the Salto of the river Tula, is 67,537 feet, or 24,530 Mexican varas. The highest point of the hill of Nöchistōngö, is that called Boveda Real, and it would be difficult when looking down from it upon the stream below, and following with the eye the vast opening through which it seeks an issue, to conceive that the whole is indeed the work of man, did not the mounds on either side, as yet but imperfectly covered with vegetation, and the regular outline of the terraces, denote both the recency of its completion, and the impossibility of attributing it to any natural convulsion.

The Obra del Consulado, as the open cutting is called, was concluded in the year 1789. It cost nearly a million of dollars; and the whole expence



of the drainage, from 1607 to the beginning of the present century, including the various projects commenced, and abandoned when only partially executed, the dikes connected with the Desague, and the two canals, which communicate with the lakes of San Cristóbal and Zumpāngō, is estimated at 6,247,670 dollars, or 1,249,534*l.* sterling. It is supposed that one-third of this sum would have proved sufficient to cover all the expences, had Martinez been furnished, in the first instance, with the means of executing his project upon the scale which he had judged necessary; for it is in the reduced dimensions of the gallery of Nōchistōngō, which was never equal to the volume of the water, to which, at particular seasons, it afforded an outlet, that all the subsequent expenditure has originated.

The works are now in a very bad state, having been entirely neglected during the Revolution. In a report drawn up by Don Jose Maria Moro, in October 1823, the necessity of immediate repairs is forcibly demonstrated; but as the last few years have been remarkably dry, it is probable that the old Spanish system of procrastination will be adhered to, and that nothing will be done until the dread of an inundation compels the Government to turn its attention to the subject. A few thousand dollars would suffice to clear the Tajo of the accumulations of earth and rocks, by which the passage of the water is at present obstructed; but as these, if suffered to remain, form a sort of dam,

in the vicinity of which the water accumulates until it hollows out a basin, or reservoir, by undermining the banks on each side, the consequences will, in a few years, become very serious, and may probably render the whole work useless, at the moment when its services are most indispensable.

If in an effective state, the canal of Nochistōngo is regarded as fully sufficient to ensure the Capital against any risk of inundation from the North; but to the South, as Humboldt very justly observes, no precautions have been taken; not because there is no danger of a similar visitation, but because that danger has not so frequently occurred. The level of the lakes of Chālcō, and Xōchīmīlcō, which are distinguished by the peculiarity of their water being sweet, instead of brackish, like that of the other three lakes, is higher by one vara and eleven inches than that of the Plaza Mayor of the Capital, and, consequently, exceeds by two varas and two feet the mean level of the waters of the lake of Tezcuco. A junction between these two lakes would, therefore, be productive of exactly the same effects, as that of the Central and Northern lakes; against which so many precautions have been thought necessary. In the great inundation, which took place before the Conquest, the history of which has been preserved by the Aztec historians, the case actually occurred, and the water rose, in the streets of Mexico, to five and six metres above its ordinary level, although not one drop of water from the Northern



lakes entered that of Tezcucó. At that time, it is stated that the water issued in torrents from the sides of the mountains, and that in it were found fishes peculiar to the *Tierra Caliente*, and unknown, either before or since, upon the Table-land. It is not probable that a similar phenomena should be of frequent recurrence; but causes much less extraordinary in their effect, would be sufficient to endanger the town. Should the snows of Pöpcätēpētl, for instance, be melted by a violent eruption,\* (an event by no means improbable, since that volcano has been very recently ascertained to be in a state of activity,) an immediate inundation from the lakes of Chālcō and Xōchīmīlcō would take place; nor is there any channel, through which their waters could now find an issue. In the rainy years of 1768, and 1764, Mexico was in the greatest danger, and formed an island for several months: in 1772 it would have been reduced to a similar state, had not a water-spout, (*una manga de agua*), which traversed the valley, fortunately burst near the Northern, instead of the Southern extremity, where its effect was diminished by the vicinity of the Canal of Hūehūetōcā.

\* Humboldt proves the possibility of such an event, by stating, that when at Guyaquil, on the coast of the Province of Quito, in 1802, he himself saw the cone of the mountain of Cotopaxi, (superior in height to Popocatepetl) so thoroughly heated in a single night as to be entirely divested of its enormous coating of snow, (*son enorme calotte de neige*).

The Viceroy Don José Iturrigaray, was induced, by these repeated warnings to resume the project of a canal, so traced as to effect a communication between the Northern extremity of the lake of Tēzcūcō and the tunnel of Nōchīstōngō, the length of which, from the Calzada of San Cristobal to the sluice of Los Vertideros, would be about 34,888 yards, or 37,978 Mexican Varas.

This idea was originally suggested by Martinez, but rejected by the Government on account of the expence, which consists not so much in the length of the canal, as in the necessity of deepening the whole of the cut of Nochistongo, from Los Vertideros to a little beyond the Boveda Real, (a space of 12,280 Varas,) in order to bring it to a level with the waters of the lake of Tezcucó. Notwithstanding this circumstance, the undertaking was commenced in 1805, but was suspended upon the imprisonment of Iturrigaray in 1808, and entirely lost sight of during the civil war. In the present state of the country, it is improbable that it will be resumed, for some years at least, during which time the Mexicans must entrust their protection to the Virgin of Guādālūpē, to whose kind attentions they are already so much indebted.

I visited Huēhuētōcā in February 1826. The village is in a wretched state, and affords no sort of accommodation; but this we were fortunate enough to find at the Hacienda of Xālpā, which is situated about a mile from the bridge, at which the great



Northern road of *Tierra adentro* crosses the canal of Nōchistōngō. The distance from Mexico to Huēhuetōcā is eleven leagues; the road passes through the little towns of Tācūbā, or Guādālūpē, (according to the gate by which you leave the Capital,) Tānēpāntlā, and Guāutitlān; the last of which, from the number of wooden columns by which a succession of porticoes in the front of the houses is supported, has, at a distance, quite a Grecian look.

The morning after our arrival at Xālpā, we rode along the whole course of the *desague* to the Hacienda del Sālto, (a distance of nearly four leagues,) below which, at the bottom of a very abrupt natural terrace, the valley of Tula commences. The situation of this Hacienda is very wild and romantic; but, after surveying the gigantic works described in the preceding pages, one cannot repress a feeling of disappointment on seeing the comparative insignificance of the waterfall, (el Salto,) in which they terminate. The height is (as I have already stated) about twenty varas,\* or forty-three English feet; but the volume of water, which, during the rainy season, is considerable, was, when we saw it, reduced to a little tiny stream, that seemed to thread its way with difficulty through the masses of rock by which the passage was obstructed.

From Jalpa we returned to Mexico by an entirely new route, which led us through the Indian village

\* The Mexican Vara is equal to 2 feet 2 inches 0.46 lines English.

of Silcāltēpēc, along the borders of the Lake of Zūmpāngō, to the town of that name, and from thence, across the mountains, to Sān Juān de Tēōtīhūacān, where we passed the night. On the following morning we visited the pyramids, which lie about two miles from the Pueblo, and afterwards rested for nearly an hour in an avenue of cypresses terminated by a large church. One of these cypresses is of singular beauty: we thought it but little inferior to those of Chāpōltēpēc.

I can add nothing to the description of the pyramids given by Humboldt, whose work contains infinitely more than is known respecting them by the natives at the present day. The first, (Tonatiuh Ytzaqual,) the House of the Sun, has a base of 682 feet in length; its height is 180 feet. The second, (Metzli Itzaqual,) the House of the Moon, is thirty-six feet lower than the other, and its base is much smaller. Both are truncated, like the pyramid of Chōlūlā, and are of Toltec origin: they are composed of stones, and clay intermixed, and, although the form of the exterior is now almost lost amidst the quantity of aloes, cactuses, and thorny brushwood, by which it is covered, there are parts where the steps, or terraces, which rose gradually to the summit, can be still distinctly traced.

A group, or (as Humboldt calls it) a *system* of little pyramids, symmetrically arranged, extends for some distance around the Houses of the Sun and Moon; and amongst them are found continually



knives and arrow heads of obsidian, which denote how much the place must have been frequented by the priests and warriors of the tribe. I am not aware that the interior of any of these pyramids has been examined, although from their Aztec name, Micoatl, (the Plain of Death,) it is probable that they were used as burying-places, either for the chiefs, or the victims sacrificed in their religious rites.

From Těōtīhūacān we proceeded to Tězcūcō, a town formerly the residence of a tributary Indian prince, but now almost in ruins. Traces of its former importance are, however, still evident in the remains of fortifications, which must have been formidable to enemies armed only with arrows and slings.

There is a curious bridge, too, near the town, of a date anterior to the Conquest, although it is in a perfect state of preservation at the present day. From the Hacienda of Chăpīngō, about a league beyond Tězcūcō, where we were most hospitably received by the Marquis of Vibanco, to whom it belongs, we visited both this bridge, which is thrown over the river of Tezcucō, and the pretended bath of Montezuma, of which Mr. Bullock's book contains so singular an account. What it may have been, it is not easy to determine, but I think it may safely be pronounced never to have been used as a bath, from the smallness of the size, and the extreme inconvenience of the position, to which the Imperial