ceives the rivers Chixoy, La Pasion and San Pedro; before reaching Jonuta in Tabasco, it divides into two branches one of which takes the name of Rio de la Palizada and discharges into the Laguna de Términos, a bayou on the Coast of Yucatan. The other branch preserves the name of Usumacinta, and again divides itself into two branches, one of which discharges into the Rio Grijalva and the other over the bar of San Pedro y San Pablo.

All these currents, which are interlaced one with the other and consequently form new rivers, constitute altogether, a hydrographic region of the greatest importance.

Basin of the Papaloapam.

The streams which form this picturesque and powerful river, originally proceed from the broken ranges of Oaxaca, and afterwards spread themselves out on the level plains which border the coast of the southern part of the State of Veracruz. The rivers Tonto and Quiotepec, rising in the districts of Villa Alta and Tesechoacan in the State of Oaxaca, and the Rivers Limon and Rio Blanco in the State of Veracruz, irrigate a magnificently fertile country, giving it a richness and productiveness that are seldom found. These rivers are all tributary to that which is eventually called the Papaloapam River, and which flows into the gulf over the Barra de Alvarado.

It would be an interminable task to enter into a description of all the watersheds that form the beauty of the Mexican territory, and we will only go on to say that those which have been already mentioned are followed in importance by that of the River Coatzacoalcos, which is called El Corte at its rise; by those of the rivers Yaqui, Mayo and Magdalena, in Sonora; by the Fuerte, Mocorito and Culiacan in Sinaloa; by the Rivers Nazas and Mesquital, in Durango; the Purificacion or Soto la Marina, in Tamaulipas; and by the rivers on the Northern coast of Veracruz of which the Necaxa and San Marcos or Cazones are the most picturesque.

In the interior of the country the mountain ranges enclose certain parts of the valleys, and prevent the outflow of the waters which flow into them. Extensive lakes are thus formed, which even in the dry seasons are not dried up by the active evaporation and dry winds natural to this elevation. Amongst the basins which are thus enclosed the most remarkable is that of the valley of Mexico, the only outlet to which is by the River Cuautitlan by way of the enormous cut of Nochistongo. This remarkable work was excavated between the hills of Jalpam and Sincoque during the time of the Spanish Government the Engineer of the work being Don Enrico Martínez.

Another enclosed basin, and not less important than the others, is that known under the name of Barranca Grande in the State of Hidalgo, and to the North of Pachuca. This remarkable depression takes its rise in the valley of Apulco, to the North of Tulancingo; it first runs in a westerly direction which eventually changes to the north west, and it increases in width as well as in depth until it terminates in the beautiful and fertile Vale of Metztitlan. In many places the sides of this remarkably Valley show beds of obsidian, or of basalt in the form of columns or of amorphous masses, while the bottom of the valley is watered by a large stream which proceeds from the picturesque falls of Alcholoaya and discharges into the Lake of Metztitlan. This river is fed by others which come from Tulancingo, Regla, Guadalupe and other parts, each one of them being enclosed in its corresponding ravine.

The sides of these ravines show the most varied geological formations, which the scouring of the water has now uncovered for the study of the geologist; whilst in others we find walls of handsome basaltic columns, which with their prismatic forms and well arranged layers are the admiration of all who see them. A very unique and remarkable specimen of this formation is found in the Ravine of Regla, where there is a large reduction works moved by the water which flows through it. This extraordinary formation constitutes one of the most

wonderful natural spectacles to be found in the country, but others of more or less interest to science will be found in the valley of the Zacatlan in Puebla, in Actopam and in the State of Veracruz. In Jalisco, in Oaxaca, in Guerrero, and in almost all the States which are traversed by the Sierra Madre, remarkable works of nature are found, a minute relation of which would extend this book to undue limits.

The Lakes found in the country may be divided into five groups:

1st. Lakes which do not receive any current and which have no outflow, being only fed by the rain: In Chihuahua, Lagunas del Castillo, Encinillas and Jaco; in Durango, the Lake of Guatimapé. In Coahuila, the Lakes of Santa María and Agua Verde. In San Luis, the Lake of Santa Clara and many salt water lakes in the western part of the State. In Jalisco, the Lake of Magdalena, which was formed by a cloud burst which caused great destruction, and besides that, the Lakes of San Marcos, Zacoalco, Atoyac, Sayula and Zapotlan. In Michoacan, Tacáscuaro and Pátzcuaro, although the latter receives the waters from the stream of the same name, and a few others. In the Valley of Mexico, Xaltocan and San Cristobal. In Puebla, Quecholac and Alchichica. In Hidalgo, Tecocomulco and Zupitlan In Morelos, Tequesquitengo and Mazatepec.

2nd. Lakes formed by the widening of the beds of the rivers and traversed by the same:

In Jalisco and Michoacan; Chapala which is traversed, by the River Lerma. In the State of México; the Lake of Lerma which receives the river Acalote, draining the slopes of Atenco, Jajalpa, Techuchulco, Tescaliacac and the springs of Almoloyita, and which has an outflow in the River Lerma. In the Valley of Mexico, Lake Xochimilco receives the River of San Buenaventura which descends from the Ajusco ranges, and feeds the Viga canal which unites it to Lake Texcoco.

3rd. Lakes which do not receive any stream but are the sources of rivers:

In Guanajuato the Lake of Yuririapúndaro, a stream from which discharges into the River Lerma. In Michoacan, Lake Zipimeo, from which a stream also falls into the same river. In Veracruz, Lake Catemaco from which rises the River San Andres which discharges into the San Juan River, and the Laguna del Salado forming the source of the river Acula which discharges in the Alvarado Estuary.

4th. Lakes which receive streams without having any outflow:

In Sonora; Lakes Guzman, Santa María and Carmen, which respectively receive the rivers of Casas Grandes, Santa María and Patos. In Coahuila, Lake Muerto or Mayran into which the picturesque river Nazas discharges. In the Valley of Mexico, Lake San Cristobal which receives the flood waters from Pachuca; Lake Texcoco, which is fed by the rivers Mesquipayac, Papalotla, Texcoco and others of less importance on the eastern side, as well as the Consulado and Guadalupe on the western; Lake Chalco, which is fed by the rivers Tlalmanalco and Tenango. This Lake is divided from that of Xochimilco by the causeway of Tlahuac. In Michoacan, Lake Cuitzeo is principally fed by the River Morelia and by occasional floods in the Guadalupe and Bosquecillo streams. In Hidalgo the Lake of Metztitlan receives the waters of the Rio Grande; the Lake of Apam, in the rainy season receives the waters from the streams of the same name.

5th. Lakes which have communication with the sea and which are commonly called Penilages or Albuferas:

In Tamaulipas, Laguna Madre. In Veracruz, Tamiahua, Mandinga and Santecomapan, the Camaronera and Tequiapan, which form the Estuary of Alvarado. In Tabasco, Santa Ana, Cupilquillo and Mecoacan. In Campeche, the Laguna de Términos. On the Pacific Coast: in Jalisco, the Albufera de Mezticacan. In Colima, Cuyutlan. In Guerrero, the Laguna de Tecpan, Coyuca and Nexpa. In Oaxaca, Chacala, Altotongo and the upper and lower lakes in the Isthmus of Tehuantepec.

EXTENT OF THE COASTS.

The Mexican Republic being situated between the Atlantic and Pacific Oceans, it necessarily has a long extent of coast, the two seas being separated by the distance of two thousand kilometres, measured in a direct line between the two extreme points of the boundary line with the United States.

As the Pacific Coast has a general bearing towards the southeast, it keeps continually approaching the Atlantic, thus narrowing the continent until it arrives at the Isthmus of Tehuantepec, where the distance between the two seas does not exceed 210 kilometres. From this point the coasts again separate, forming the Peninsula of Yucatan on the Atlantic side, whilst the coast on the Pacific side continues in the same general direction towards Central America.

The Coasts of the Mexican bight and of the Carribean Sea have a length of two thousand five hundred and eighty kilometres of which four hundred belong to the State of Tamaulipas, six hundred and forty to Veracruz, one hundred and ninety to Tabasco, three hundred and sixty to Campeche and nine hundred and ninety to Yucatan.

On the Western side, the Coast has a length of six thousand two hundred and fifty kilometres, of which three thousand belong to the Peninsula of California, eight hundred and sixty to Sonora, five hundred and ten to Sinaloa, five hundred to Jalisco, one hundred and sixty to Colima, a hundred and thirty to Michoacan four hundred and sixty to Guerrero, four hundred and ten to Oaxaca and two hundred and twenty to Chiapas.

NATURAL MINERAL WATERS.

The Republic is rich in springs of water both cold and thermal, which are impregnated with mineral substances, whilst many of them contain matter in solution which will incrustate or petrify whatever they touch. Some of these waters have

been analyzed by Messrs. Rio de la Loza, Oliva and Lambert, and the results of these studies having been condensed by Mr. Alfonso Herrera in the Mexican Pharmacopea, we are enabled to give the classification of some of the principal springs.

Acid waters are found in the crater of Popocatepetl, and contain sulphuric acid.

Alkaline or carbonated waters, whose principal characteristic is the great quantity of carbonate of soda which they hold in solution, combined with free carbonic acid which makes them effervescent.

To this class belong the waters of the Well of Guadalupe, four kilometres to the north of Mexico City, Peñon de los Baños, four kilometres north east of the same city, which present a great similarity to the waters of Carlsbad and the Mont d'Or; Cuincho, 10 kilometres to the northwest of Morelia, and Salatitan, eight kilometres to the northeast of Guadalajara.

Sulphureous waters, which are distinguished from the others by their charasteristic odour of sulphurated bydrogen and by their special property of precipitating lead, silver and other metals in the form of black salts. The most important of this class are: Those in the Springs of Santiago and of San Pablo in the City of Puebla, those of Puruándiro, Monterey and Islas Marías, those of Las Derrumbadas, 72½ kilometres to the east of Puebla, and those of La Laja to the southeast of Ahualulco, State of Jalisco.

Ferruginous waters; the taste of which is very similar to that of ink; they become black by the admixture of tincture of gall nut; they become blue on mixing protocyanide of iron or of potasium, though the treatment for this purpose takes a little time. These waters contain a remarkable amount of iron, which is generally found as a carbonate of protoxide, which is dissolved by the excess of carbonic acid held by these waters in solution. Allowed free contact with the air, the gas frees itself and the protoxide absorbs the atmospheric oxygen and transforms itself into sesquioxide which is precipitated under the

form of hydrate. To this class belong the waters of Valparaiso near Durango, of Santa Cecilia to the north of the City of Mexico, and of Alonso or Llamas in Guadalajara.

Saline water, which contains more or less proportions of different salts, which commonly are sulphates or carbonates of soda, lime or magnesia; chlorides of sodium, calcium or magnesia; some contain potasium, others lithia, whilst other have been found to contain rubidium, iodide and bromide.

To this class pertain the waters of Atotonilco, situated 52 kilometres north of Mexico, and those of Lake Texcoco which is on the eastern side of the city.

The following table shows the temperature of the different waters:

Peñon de los Baños	44°5
Guadalupe Well	21.5
Cuincho	30
Salatitan	41
Springs of Santiago and San Pablo	28 to 28.5
Monterey	41
La Laja	101
Atotonilco	54 to 58
Texcoco	20

The name of Atotonilco is very common amongst Mexican towns and always indicates the proximity of thermal springs.

Besides the above, I have also acquired information with respect to other springs; such as the Baths of Peñita and Chichimequillas, Tequisquiapam and Toliman in Querétaro; Pathé, Taxidó and Manguani, in the Municipality of Tecozautla, in the State of Hidalgo.

The springs at Chucándiro in the State of Michoacan; San Sebastian, Tarameo, Chuen, Isla de los Hervores, Temascal, Araron, Tiquicheo de la Laguna, Taymeo, el Barreno and Zinapécuaro, are generally found to contain hydrocloric acid and sulphureous substances. The calcareous waters of Purrua near

Jungapeo, deposit an incrustation on any article that is left in them. In Sonora we have several thermal springs of sulphureous and ferruginous waters, with a temperature varying from 60° to 70°. The principal ones are found between the towns of San Marcial and Baroyeca.

In Nuevo Leon, mineral springs are found in several places, the principal being these of Topo, and Potrero Prieto, sixteen kilometres to the north of Galeana: Las Huertas, 25 kilometres south of Montemorelos, and the Spring of Huajuco close to the town of the same name. The water from these springs, on cooling liberates the sulphurated hydrogen which it contains, and although selenitous is drinkable.

In the State of Aguascalientes, which has received its name from the abundance of thermal springs which it contains, the principal are those found in the capital, in the Hacienda de la Cantera and those of Ojo Caliente and Ojo Calientillo in the district of Calvillo. Near Silao in the State of Guanajuato thermal springs exist on the Hacienda of Aguas Buenas and of Comanjillo, as well as others which are known under the name of Lodos de Munguía.

In San Luis Potosí the following can be enumerated: Ojo Caliente in Santa María del Río: its waters contain salts of soda and magnesia, and ferruginous waters in the Hacienda Labor del Rio. Thermal springs at Lucio in the Municipality of Reyes. Hacienda de Vanegas in the Municipality of Cedral, Ojo Caliente, Vigas and San Sebastian at a distance of thirty to thirty–four kilometres from the City of Rio Verde. Baños Grandes, near the town of Tamuin. Ojo Caliente, 8 kilometres to the north of Tanlajas. Bañito de Ojo Caliente, 17 kilometres to the South of Ciudad de Valles: these two last springs contain sulphureous waters. Cruces in Moctezuma, Tule and Freno in Santa María del Rio.

In the State of Morelos the best known springs are: Agua Hedionda, near the town of Cuautla, and La Vega near Xochitepec.

In the State of Mexico we have springs of sulphureous waters, such as the Ojo de Almoloya and the Baths of Ixtlahuaca, Tilvito and the Rio San Gaspar in the Villa del Valle. Besides these we have Atempa in Yahualica, and Puentecillos in Sultepec.

From the studies of Messrs. Alfonso Herrera and Andres Almaraz I have extracted the following data.

The waters of Araró at Zinapécuaro in the State of Michoacan:

Temperature		85°
Fixed substances	per litre	1.50

Contents: chloride of sodium in abundance, sulphate of magnesia, free and combined carbonic and silicic acid.

Water from Tarameo, San Juan, State of Michoacan; contains 6.50 per litre of fixed substances, which are: chloride of sodium, magnesia, free and combined carbonic acid.

Water from Bartolilla, Zinapécuaro, Michoacan.

Temperature	32°

It contains a small proportion of fixed matters which mostly consist of silicic acid and carbonate of potasium. This water is so pure that it can be compared with that of certain artesian wells, the waters of which have passed through impermeable strata without having dissolved any large proportion of soluble matters. This water may very properly be used in all those operations for which distilled water is recomended.

XIV

HISTORICAL SECTION.

IMMIGRATION AND ANCIENT HISTORY.—FROM PREHISTORIC TIMES, UP TO 1521.

Up to the present date nobody has been able to penetrate the veil that hides the origin of the first inhabitants of Mexico. The ruins of buildings which are found scattered throughout our territory demonstrate a series of immigrations from the North to the South, a fact that is further confirmed by the way in which languages are distributed in this part of the American continent. These ruins, the importance of which is every day better appreciated, as well as the division of languajes, show at times, traces of the passage of different tribes in search of lands suitable for their purposes, and in other places show a fixed residence where the people had formed an organized community. In America, the same as in Europe, neither history nor tradition reveal the origin of the first inhabitants; in the new continent as well as in the old, we find the remains of great buildings, which have been destroyed in the course of centuries, but which are a standing proof of the persevering and laborious character of ancient and unknown generations.

Different historians, basing their suppositions on the interpretation of hieroglyphics and native papyri, have attempted to fix the itineraries which were followed by the races which populated the fertile regions of Anahuac, and particularly of