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The influence which the atmosphere, the waters and the locality, exercise on individuals when congregated in societies and living on determined points of the earth, is very positive, and for this reason very important to the sanitary physician of each place. It is also of importance to him to have a thorough understanding of the climate in which his patients reside, this being a very important consideration in the resolution of the many problems which affect public health.

In this paper I propose to make a brief study of the principal meteorological data of the city of Mexico, in everything referring to its situation, elevation, humidity, temperature, winds, ozone and light.

SITUATION. Mexico (place of Mexitli, God of War) is situated in 19° 26' 26" Nerth Latitude and 99° 6' 45" Longitude West from Greenwich. The greatest width of the city from east to west is five kilometers and 53 meters; and the greatest width from north to south is 4 kilometers 800 meters: the superficial area is 14 square kilometers; without including those grounds on which they are at present forming colonies.

The semi-tropical situation of the city causes the rays of the sun to fall vertically upon it twice a year, whilst in all the rest of the year they are very little far from perpendicular. The longest day lasts 13 hours and 10 minutes and the shortest, 10 hours 50 miuutes.

ELEVATION. The City is situated at an elevation of 2268 metres over the sea level. The mean barometric pressure is 586.40 m. m. the maximum in 15 years has been 594.19 m. m. (1879) and the minimum within the same period has been 579.80 m. m,

The extraordinary elevation at which this city is situated causes a diminution of oxigen, which, instead of being in the proportion of 0.28331 litres of atmosphere with a temperature of 15° as at the sea level, is only in the proportion of 0.20685. This means to say, that at each respiration we introduce almost one fourth part less of oxigen into our lungs than the inhahitants of the lower elevations, and this necessarily causes certain physiological and pathological changes in our condition.

As might very well be suposed, all the inhabitants of Mexico ought to suffer a certain amount of anaemia and for many years this has been the opinion of many intelligent observers, but nevertheless, the experiments practised during the last few years in this City, by Drs Cordero, Gaviño and especially Lope de Vega, appear to prove the following facts: 1st, The number of red corpuscles which each individual has are generally rather more numerous than on the coast; 2nd. The diminution of oxigen in the air is compensated by the increase in the number of respirations, which are from 22 to 24 por minute. These same conclusions are deduced from the experiments which have been lately made by Drs. Muntz and Viault, each one independently of the other, and at altitudes of 2877 metres above the sea level. These experiments were carried out on the "Pic de Midi" and on the summits of the Andes. Dr. Gaviño has also made three experiments to discover

the amount of carbonic acid which was exhaled, and obtained a mean of 4. 25 per hundred of air, arriving therefore to the following conclusion; In Mexico the production of carbonic acid manifests itself almost in the same proportions of volume as in those places which have a pressure of 76 centimeters, and as this is an indication of the organic combustious, we may conclude that we consume approximately the same amount of oxigen, for which purpose we increase our respirations by one fourth part.

Dr. Coindet came to the conclusion after various experiments made in the valley of Mexico at the time of the French Invasion, that the mean volume of carbonic acid exhaled was 3.96% among newly arrived Frenchmen, 4.35% by Mexicans and 4.51% by indians.

But with respect to the results obtained both by Dr. Gaviño and by Dr. Coindet, we cannot but reflect on the remarks previously made by Lombard, that even when the quantity of carbonic acid exhaled, might represent the same volume in Mexico as at the sea-level, taking into account the rarity of the atmosphere at an altitude of 2268 meters, we find a remarkable deficit on the central table land as compared with the lowlands,

The results obtained by Drs. Lope de Vega, Muntz and Viault are not founded solely on a limited number of experiments, and for that reason we await the continuation of these labors so as to be able to form an exact judgement on the point.

ATMOSPHERIC HUMIDITY. Absolute Humidity.

The city being situated at the considerable elevation that we have above mentioned, the general rule follows respecting the amount of water vapor held in the atmosphere which applies to elevated situations, that is to say, that it ought to be scarce considering the latitude. So it turns out to be, as the medium quantity contained in a cubic meter per annum is 8.16 grammes or measured in milimeters of mercury 8,24 m. m. This amount is small com-

pared with the towns at a lower elevation within the republic, where the tension of the water vapor is 12 to 14 m. m. As hot air absorbs a greater quantity of water than cold air, the progress of the tension of the vapor follows an analogous process to that of the temperature, that is to say, that it is is weaker in winter and more elevated in summer. Thus it is that we see in Mexico a general increase from February to July, and a corresponding decrease from the latter month to the following February. Respecting the daily rates of tension, the observations follow the same course, which is parallel to that of the temperature, notwithstanding that at mid-day and in the first hours of the afternoon the lines diverge to a slight dergee, caused by the extra elevation of the atmospheric temperature which carries off a great quantity of water vapor that cannot be quickly replaced by evaporation from the earth.

EVAPORATION. The evaporation in the city is extraordinary, the mean by day being 6. 6 m. m. in the sun and 2. 5 m. m. in the shade.

RELATIVE HUMIDITY. The absolute amount of vapor contained in the atmospere in not of so much importance to us as the relative humidity. The atmospere may contain a great amount of vapor and appear to us dry, and on the contrary it may hold very litle vapor and appear to us full of humidity, as our senses can only appreciate relative humidity, and more especially when this approaches the degree of saturation. The progress of relative humidity is in inverse ratio to the absolute humidity and can be easily understood when we reflect that with the increase of heat in the atnosphere, the latter requires a greater amount of vapor to become saturated. The mean annual relative humidity in Mexico amounts to 61 in place of-75 or 80 that we find at lower elevations. The result is that we have a very dry atmosphere, a circumstance remakable when we think of the five lakes that are close to the

city. In spite of this fact the atmosphere in this city is as dry as that of Puebla, San Luis Potosi and other cities of the central table land. Some years ago, when we discussed in the National Academy of Medicine, the possible evils that might result to the towns of the valley from the drainage of the lakes, I had the honor to read to that honorable corporation a paper in which I made an extensive study of everything relating that question, arriving to the following conclusion: " From all this we find that even if the lakes were a great deal larger than they are they would hardly increase the hygrometry of the city; firstly because it is not situated in the course of the prevailing winds from. N. W.; and secondly because the winds which pass over these lakes are excessively dry and hot and therefore require enormous quantities of vapor before they arrive to the point of saturation.

Fron what is ahove said, it will be easily understood that no prejudice will arise to the hydrometric conditions of the city from the drainage of the lakes.

DEW. As the nights are generally very clear, especially in spring, and the air is calm, the dew falls in abundance on vegetation of all kinds.

FOGS. Fogs are extremely rare in this city, although they do sometimes occur in the early spring mornings.

CLOUDS. During the winter and the greater part of spring the sky over the Mexico valley is perfectly clear; we have a few cloudy days in December and January, but they are by no means common. What is commonly observed is a species of cloud cap sorrounding the valley and resting on the crests of the mountains which limit the view. The current of air which rises from the ground through its own heat, becomes rarified as it elevates itselfr- and for the same reason gives off a great deal of its heat. Itbalso meets with the almost frozen tops of the mountains which oblige it to precipitate its vapor in the form of clouds. These are most commonly seen in the

afternoons, but when night draws on and cools the soil of the valley, the ascending current ceases, the clouds disappear and the sky remains perfectly clear for the rest of the night.

RAINS. The rains are not very abundant in the valley of Mexico, although as a general rule they are not rare, the mean annual rainfall reaching 614.4 m. m. and the number of rainy days averaging 139.

The rainy season can be said to last from June to October, as in the other months of the year we rarely have any rain. The amount of water that falls in each precipitation varies a great deal, being sometimes very excessive, and has occassionaly reached 63.3 m. m. (1888.)

The relative abundance of the rainfall dees not prevent our atmosphere from being very dry, and it is curious to observe, how after a heavy storm the rays of our tropical sun shine afresh, the sky clears and the air is as dry as before.

SNOW. It may he said that we do not know what a snow storm is, as we only see one about once in evary forty years, so that they are hardly worth taking into consideration; nevertheless we have the pleasure of observing the perpetual snows all the year round on the summits of Popocatapetl and Ixtacihnatl.

TEMPERATURE. We have seen that the atmosphere of the valley is very dry, as happens more or less in all elevated localities. As the water vapor absorbs the caloric, this being so scarce in our atmosphere renders it colder than that on the slopes of our mountains or on our coast. On the other hand, the rarification of our atmosphere by the decrease of pressure in its ascent to the central table land is another powerful cause for the diminution of its heat. That is one reason why our dry atmosphere is always fresher and more agreable than that of other cities in the Republic that are situated in the same latitude as Mexico but at a lower elevation. The elevation of our

valley is the principal element of its climate, because as we say in another part "The dimished pressure of our atmosphere which is the cause of the rarification of the atmosphere, of its coolness, and to a great extent, of its dryness, is the principal meteorological cause which gives rise to all our thermometrical phenomena." The mean annual temperature in Mexico in the shade is 15°5 centígrade (59°9 F.) The knowledge of these figures cannot give us even an approximate idea of our climate, seeing that it is well known that there are plenty of places which, with the same annual mean temperature, show a very great difference in the progress of that temperature during the different seasons, during the different months and generally in the modifications which that same temperature undergoes.

The mean temperature in Mexico during the winter is 12.° 9, that of spring 17.° 8, that of summer 16.° 6, and that of autumm 13.° 5. The difference between the mean temperature of the hottest month which is April, and January which is the coldest is 7.° 5. Thus we find that the climate in Mexico can be classed as both temperate and equable, seeing that the annual variation of temperature is exceedingly slight. But if instead of taking into account the general variations of temperature we look at the extreme degrees of heat or cold we find that our climate is also variable. Thus we find that the maximum in the shade for 16 years has been 31.° 6 (1878) and the maximum in the sun has been 49. (1878) the minimum in the shade has been 1.° 7 below zero (1887) and the minimum in the sun 7.° 2 below zero (1887.) The difference between the absolute maximum and minimum in the shade reaches up to 25. degrees in the course of a month, and the difference between these same maximum and minimum in the sun has reachead as high as 53.° 9.

The daily progress of the temperature is as follows: The temperature between five and six in the morning is the low-

est in the day, and from that point it rises gradually until two or three in the afternoon when it reaches its maximum, and thence decreases in as gradual a manner until five or six in the morning.

With respect to the daily oscilation and other phenomena incidental to the inconstancy of our climate, we have on another occasion expressed ourselves as follows on the subject. (1). "The daily oscilation has been 21° 2 in the shade and 50° 7 in the sun. All the changes of temperature are divided by the mean temperature between the annual mean from 10° below zero at 80° latitude and the annual mean of 32°; consequently, between these two extreme temperatures there is a scale of 50°; so that we go through that scale in one single day, as it has been seen, and we can properly say that in one and the same day we experience all the changes, and it seems as if we were conveyed from the Polar frozen regions to the burning zones of Africa.

This difference of temperature constitutes one of the characteristic features of our climate. In Mexico with her dry atmosphere, the sun's rays produce an extraordinary heating power, so as to give our soil the appearence of being scorched. When ths sun sinks behind the tops of the mountains, the radiation towards the heavenly regions in the Valley of Mexico begins, the air which on account of its dryness is enabled to prevent the heat from reaching the soil, is also enabled to prevent its departing from it, and this takes place with extraordinary frequency. We thus have in Mexico, on one side, the burning soil, and on the other, not only in the regions of great altitude but in the moderate altitude of the valley, perpetual eold. In our region the eternal snow begins at an altitude of little more than four kilometers, as can be seen on Popocatepetl and

(1.) The Federal District in the Republic of Mexico as a suitable place for persons predisposed to tuburculous affections and for relief of pulmonary consumption. Public Health Papers and Reports, Vol. XVI,

Ixtacihuatl. The Valley of Mexico, as already said, is situated at 2600 meters above the sea level, and only about two kilometers distant from the eternal snow; that is to say, as distant as a town would be that were situated at 50° or 60° degress latitude."

FROSTS are very frequent in the valley of Mexico, and as they always take place with a clear and transparent, atmosphere the rays of the sun beat on our bodies to an excessive degree, whilst in any other place, perhaps only a yard distant but in the shade, we feel a remarkable degree of cold.

I have myself experienced a cold of 15° C. below zero in New York, and have felt it less than in the City of Mexico with a temperature of one or two degrees above zero, and this is because the irradiation of our bodies is very rapid and extraordinarily intense during a heavy frost, Fortunately these are not very frequent and when they happen, the cold is only felt for one or two hours in the morning and evening. In all other respects the City of Mexico is a place well adapted for winter residence, seeing that here we have not the excesive and continued cold waves of the north or its snows; but it is even a better summer residence on account of the absence of the excessive heat found in the more northern countries. In Mexico we require some covering over our beds during the whole year, on the days of greatest heat we have some delightfully fresh mornings, and even on the coldest days we do not require any fires in our houses. It will therefore be easily understood that our city is a pleasant, residence in winter, and although it appears a paradox to advise the inhabitants of the United States and Canada to take a journey of several thousand kilometers to the south during the month of July; the fact is that they will find in these tropical latitudes, elevations of two or three thousand meters with a fresh aud agreeable temperature.

WINDS. The prevailing winds in Mexico are from

the N. W. The breeze in the City is generally slight, its mean velocity per second not going beyond 0.8.M., and the maximum velocity that has been observed up to date is 21 m. m. (1886.) The strongest wind is that which comes from the north east. With regard to the humidity of each one of these winds that blow over the city we can give them these respective positions: 1st.; N. W.; 2nd, W.; 3rd, S. W. and N.; 4th, S.; 5th, S. E.; 6th, E.; and 7th, N. E. Their respective temperatures beginning with the coolest, can be rated as follows:-1st, N. W.; 2nd, W.; 3rd, N.; 4th, S. E.; 5th S. and N. E.; 6th, E, and 7th S. E.

OZONE. The annual mean quantity of ozone in the air of the city is 4. 2; but as the methods that have been hitherto discovered for determining the amount of ozone in the atmosphere are defective, I will not enter further into this subject.

LIGHT. The geographical situation of the city and its great altitude are the cause of the extraordinary intensity of light in its atmosphere. The rarification of the atmosphere and the water vapors as we have above shown being very scarce, the solar rays exercise on the ground their full luminous, calorific and chemical powers unimpeded by any disturbing influence.

The interesting observations carried out by Downs and Blunt (1) on the effect of light on bacteria and other organisms which are perfectly developed as well as on the protoplasm, has brought to our knowledge some most interesting facts with regard to this question. By exposing to light the Pasteur solution, urine and infusion of hay, and afterwards depriving them of light, we find that this agent is not favorable to the developement of bacteria and of microscopic spores whicr are produced dnring putrefaction. It has also been noted that the direct rays of the sun act in a more powerful manner than when they

(1.) Proceedings of the Royal Society Vol, 26, 1878.

are difused, and that the germs already developed can be destroyed by the sole influence of solar light.

Doubtless it is to this benevolent influence that we owe our almost total exemption from tuberculosis and the fact that when found amongst us it takes such a very mild form, also the fact that the greater part of the infectuous diseases are either rare amongst us or entirely unknown.

It is to this beneficent influence also that we have the pleasure of seeing you again in our own country, and we do not doubt that in your own hearts yon will always preserve a sincere affection for, and desire to see, the beautiful light as well as enjoy the delicious climate of the piturespque valley of Mexico,

Mexico, Oct. 3rd, 1892.

D. Orvañanos.