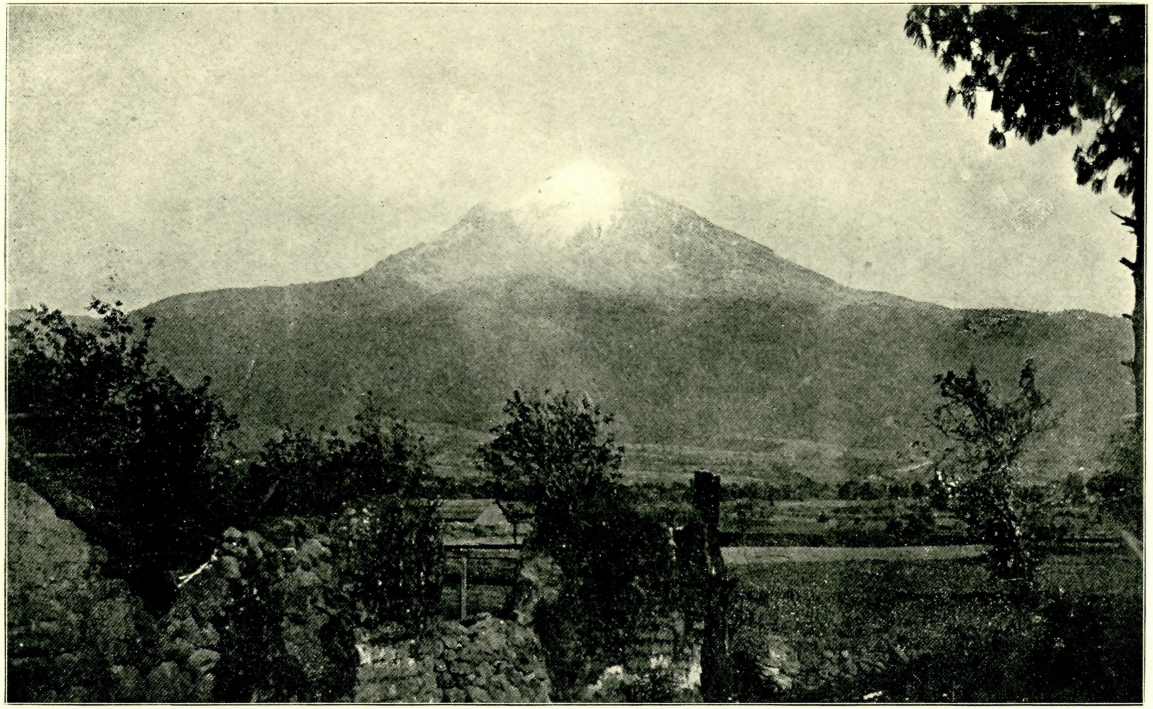
Ascent of Popocatepetl.

Feb. 98



POPOCATEPETL FROM THE WEST. (AMECAMECA).

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AN ASCENT OF POPOCATEPETL.

A. E. DOUGLASS.

An expedition, consisting of Mr. W. A. Cogshall and the writer, accompanied part way by Dr. T. J. J. See and his brother, who went for a brief outing in the mountains, left Mexico for the ascent of the great volcano on April 12 of this year. Horses and mules were procured at Amecameca, and the fourteen-mile ride from there to the sulphur-smelting works, at a locality called Tlamacas, at the foot of the mountain, was made in five hours, from 2 to 7 P. M. This is an ascent from 8200 feet (2532 metres) to 12,900 feet (3937 metres), but no one experienced any marked inconvenience from the altitude, although the increasing cold after nightfall became very disagreeable. Very little was eaten by us that night or the next morning, to avoid the indigestion which high elevation is apt to bring on.

We left Tlamacas at 5 A. M., on horseback, and at 6:30 reached Las Cruces, at an altitude of about 14,000 feet, whence we proceeded on foot, as is customary. The path is on the northern slope of the cone, and at the time of our trip was but a short distance east of a large field of ice and snow impossible to traverse. On the entire ascent to the crater no snow was encountered, although in some places there were traces of it under the sand, lending to the latter its solidity, and greatly helping us. Mr. Cogshall reached the crater in $4^h\ 10^m$ from the time he left Las Cruces. I was longer, taking fully $4^h\ 50^m$. Frequent rests were necessary to regain breath and allow the pulse to quiet down. An attempt to climb more quickly brought on a very disagreeable but temporary feeling of exhaustion and inability to climb higher. One should be very careful of this, and, on the first sensation of overdoing, rest until entirely relieved, and then go more slowly.* Timing one's self with a watch, taking twenty or thirty steps, and then resting one minute, is the correct way to make a climb of such magnitude at high altitudes.

The view of the crater is strikingly sudden. When I was approaching it without, however, seeing any signs, my guide, who

* One week after writing the above I tried the ascent of a still higher mountain, and failed to reach the top from disregarding this very caution.

carried the barometer and camera, and was always beside me, kept offering encouragement, and finally pointed to a bit of stone some two hundred feet ahead, and said the crater was there. So it proved. On reaching that spot the slope, without warning, rounded over, became level, and descended precipitously into a huge pit, and the strong smell of sulphur showed its volcanic character. The pit is fully two thousand feet across and probably more than a thousand feet deep. Its sides are perpendicular, exhibiting the non-conforming layers of successive lava streams, with here and there, especially on the near side, boulders and cliffs of basalt. Around the edge at the bottom the heaps of the talus are small, suggesting recent activity, while the floor is of a yellowish tint, showing half a dozen bright yellow spots whence sulphur and vapor are ascending. In the center there is a large pond whose water is a brilliant green in color.

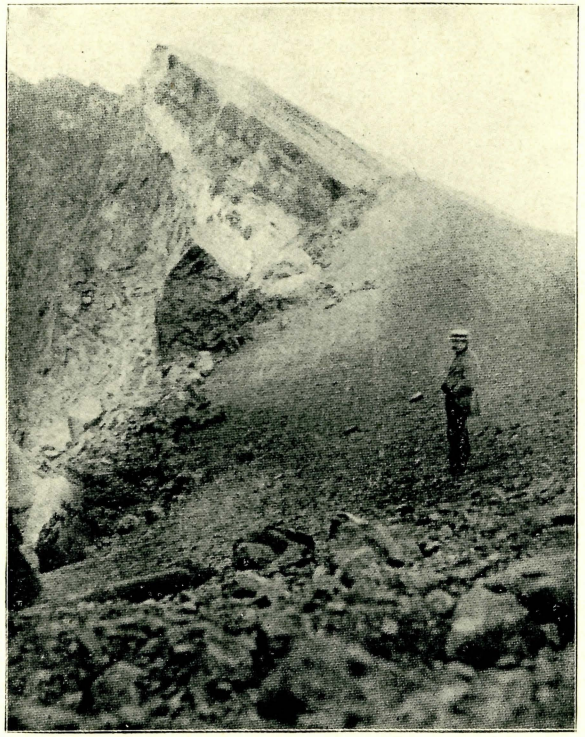
The ridge surrounding the crater is serrated, broken into peaks and hollows. The approach is at the lowest point and is upon a ridge formed by a long curved sweep of volcanic sand. The highest point is nearly opposite, and some six hundred feet higher.

One's honor is vindicated on reaching the crater; but having with us a mercurial barometer, through the kindness of Señor Zendejas, Sub-Director of the Central Meteorological Observatory of Mexico, it became necessary to push on as far as possible toward the highest point. A pole was visible on a small peak of the western wall of the crater, which some one had placed there "because he wanted to,"—"*por gusto*," the guide told us. Without expecting to go beyond the pole, I set out with one guide and reached it in half an hour. Thence the way to the summit was in plain view and was obviously difficult. In the mean time, another guide came to help in the attempt, and, incidentally, to accept an extra fee, and we set out after discarding everything not absolutely necessary.

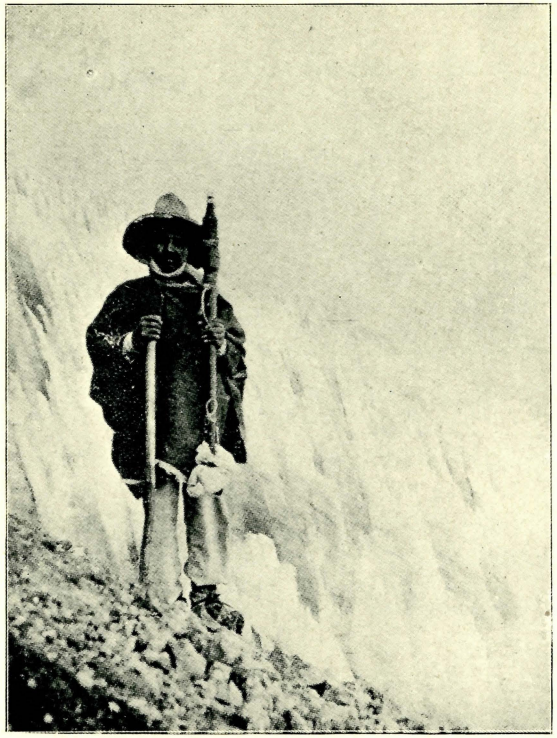
At first the ascent was not steep, but it was in a measure dangerous, if one did not have a good head for high places. The rock was a soft, crumbling lava, which projected in a series of slightly inclined knife edges out over the crater, presenting as we progressed, on our left hand a precipice of a thousand feet, and on our right a sharp descent into deep ice caves. Passing this, a steep narrow ridge of sand led straight to the summit.

The summit is worthy of the mountain. Although composed of sand, it is hardly three feet across. Twenty feet on one side is the crater, and thirty feet away on the other the slope drops

PLATE XXX.



WESTERN CLIFFS OF CRATER.



ICE FIELD NEAR SUMMIT, POPOCATEPETL.

suddenly into the ice-sheet. To the south a great ridge of rock stands out conspicuously, and can be followed by the eye for thousands of feet downward. Far away to the north Ixtaccihuatl, of nearly equal height, mounts into the sky, and one seems to look across a grand cañon worn in some plateau, whose sole remaining points are these two mountain tops.

The air below was hazy, but above the haze a narrow strip of blue showed where the horizon was,—and how high it seemed in comparison with the nearer regions! At this hour of the previous day, between one and two o'clock of the afternoon, clouds had been upon the summit, so, to avoid being caught, the photographs were quickly taken and the barometer readings made, and we prepared to descend.

The ascent from the entrance of the crater to the summit had taken 1^h 40^m. The descent, owing to the character of the way, required 30^m. After stopping a few minutes on the edge of the crater, we began the great descent at 2:30, and in exactly 30^m reached Las Cruces. From there, still on foot, we arrived at the Ranch at 3:48, finding our companions ready for us with a lunch, which, from exhaustion, we could hardly touch. Mr. Cogshall, always more robust, ate sandwitches for both of us. I drank a few swallows of wine and ate a small piece of sweet chocolate. The chocolate, the wine, a few swallows of beef tea, and a little water were all that passed my lips from the time of leaving Amecameca to the return thither.

At half past four we set out for Amecameca, and reached there in four hours, passing through a steeper and more picturesque road than the day before. We were indeed greteful for the good supper and comfortable beds of its pretty little hotel.

The barometer readings at the top of Popocatepetl were 15.897 and 15.864 inches, reduced to freezing (403.8 and 403.0 millimetres, respectively), and the standard thermometer registered a temperature of 32°.7 F. (0°.4 C.) When compared with readings at Mexico at one and two o'clock, they gave an altitude for the mountain of 17,775 feet (5418 metres. This is the result by the Smithsonian Tables of 1893; by certain French Tables of a less recent date the result is 17,721 feet, or 5401 metres).

It seems to the writer that during the winter season very valuable series of meteorological observations might be carried on at the top of this mountain. It would then be decidedly the highest in the northern hemisphere and the second highest station in the world, the highest being on El Misti, at Arequipa, Peru, at an altitude of over 19,000 feet (5800 metres), to whose top, by

the way, the observer regularly ascends on mule-back. It would do for this hemisphere what the El Misti station is doing for the southern.

The ascent is inexpensive, both in time and money. We were absent exactly forty-eight hours from the city of Mexico, and our entire expenses reached only nine dollars (gold) for each man. General Ochoa, residing at the Hotel Iterbide, in Mexico, is the owner of the mountain and of the sulphur deposits in the crater, and we were indebted to his courtesy for a note of recommendation to his manager in Amacameca.

For the physical exertion of climbing, the atmosphere we encountered was particularly well adapted. The sky was hazy, cutting off the fiercest rays of the sun, and the air was quiet, so that we did not suffer from cold. It was also especially favorable for obtaining the altitude; for, so far as could be judged by signs, the air was without irregularities in density between the top of the mountain and the city of Mexico. The sheet of thin cloud was far above the top of the mountain, and there were no cloud levels below it. The wind was light, both in the city and on the mountain, and the absence of direct sunlight prevented any local convectional action which might alter the barometric readings. These facts compensated to some extent for the loss, which we greatly felt, of the marvellous view of the table-land of Mexico.

PROFESSOR CHAMBERLIN ON THE NEBULAR HYPOTHESIS.

F. R. MOULTON.

FOR POPULAR ASTRONOMY.

Professor T. C. Chamberlin, Head Professor of Geology in the University of Chicago, read a paper before the *British Association for the Advancement of Science* at Toronto August 20, 1897, on *A Group of Hypothesis Bearing on Climatic Changes*. It was necessarily somewhat summary but has been published *in extenso* in the October-November issue of the *Journal of Geology*, and proves to be of great interest to astronomers since a large part of it is devoted to subjects which have long been of interest to students of astronomy.

Professor Chamberlin finds that in the earlier periods of geological history the Earth's atmosphere could not have been at all times so extensive and so rich in carbon dioxide as has been very