

of these pots the earth-extract mentioned above was added. In a few days the plants took on a new growth, totally out of proportion to what could have been caused by the minute quantity of combined nitrogen contained in the extract. The plants in the pots not receiving this remained in a dying condition. The micro-organisms in the case just mentioned inhabit a small bulb which appears on the roots of the plant, and in this laboratory the transformation of the nitrogen appears to take place.

These later investigations lend emphasis to the statement I made in my Buffalo address: "These views of chemists so distinguished, based as they are on a series of experiments, extended and laborious, even if not above criticism, must command our most serious attention. They expressly admit the possibility of the use of the free nitrogen of the atmosphere, but are careful not to literally affirm it."

H. W. WILEY.

Washington, Jan. 28.

### Halos seen at Denver.

On the afternoon of Friday, Jan. 7, and in the evening, there was a brilliant display of halos, etc., at Denver. I have been told that it began at about 1 p.m., but I did not see it until 2.30 p.m. At that time the sky was of a milky hue, from the presence of the ice-clouds. The parhelic circle, passing through the sun, parallel to the horizon, could be traced entirely around the sky, except in the immediate vicinity of the sun: parts of it were at times temporarily obscured by small, swiftly passing clouds. The two principal parhelia,  $22^\circ$  distant from the sun, were very bright, and secondary parhelia were seen at a distance of  $120^\circ$ . The halo of  $22^\circ$  radius, encircling the sun, was incomplete. In the zenith was a faint circle of red light about  $20^\circ$  in diameter. The quadrant nearest the sun was expanded into a magnificent lune  $2^\circ$  wide at the broadest place: it displayed the prismatic colors from red to violet, the red border being toward the sun. As the sun descended toward the west, the lune grew narrower and longer, being only  $1^\circ$  broad at 3.30 p.m. During the next ten minutes, clouds rising from the western horizon obscured the sun, and with it the parhelic circle. The lune was visible for a short time after the sun had disappeared, but at 3.40 p.m. it too had vanished. By looking toward the west during the display, the ice-crystals near the earth's surface were plainly visible, and had the form of slender needles.

In the evening the sky seemed clear, and the moon, lacking two days of being full, shone brightly. The paraselenic circle was complete, and beautifully contrasted with the dark sky. It was  $1\frac{1}{2}^\circ$  broad opposite the moon, and grew narrower as it approached that luminary. It could be traced almost up to the moon's disk. At 8 p.m. the halo of  $22^\circ$  radius about the moon was very distinct: at the highest and lowest points there were rudimentary tangent arcs, and a consequent increase of brilliancy at those points. The paraselenae were not at the intersection of the halo with the paraselenic circle, but on the latter about  $3^\circ$  or  $4^\circ$  outside of the halo. The inner edge of the halo was a red circle, but the outer edge was an ill-defined ellipse, the major axis of which stretched between the two paraselenae, while its minor axis coincided with the vertical diameter of the red circle. The space between the inner and outer edges

was filled with milky light. At 8.30 p.m. the paraselenae had disappeared. Secondary paraselenae were seen at distances of  $120^\circ$  from the moon. At 9 p.m. a bright arc having a uniform breadth of  $3^\circ$ , and exhibiting prismatic colors, was seen in the southeast, being a portion of a circle of about  $40^\circ$  radius, in the centre of which lay the moon. It passed through the triangle of conspicuous stars ( $\delta$ ,  $\epsilon$ ,  $\eta$ ) in Canis Major. At 9.30 p.m. all the circles except this one had vanished, and at 10.30 it too had gone. I have been told that after midnight the entire system of circles re-appeared. There was no lune in the zenith before midnight, or after, as far as I have been able to learn. It was possible to see the ice-crystals floating down by looking toward the moon. I regret that I had no instruments for making accurate measurements of the angular distances which I estimated.

H. A. HOWE.

Denver university, Jan. 28.

### Consumption among Indians.

In *Science* for Jan. 21 (p. 76) reference is made to a supposition that "it is change of diet which is the most potent remote cause of consumption among the Indians." Another cause, in my opinion, is change of dress. Before he came under the influence of civilization, the Indian was not clothed in garments that would interfere with the free action of the pores of the skin. If a live rabbit be dipped in a solution of glue, so as to cover its body with a coating impervious to air, it is surprising how quickly the frequency of the respiratory movements increases, showing that the work of the lungs is increased by depriving the skin of free access to the air.

The process of civilization has a somewhat similar effect upon the Indian, though to a less degree. One of the first lessons in the effort to civilize him teaches him to envelop himself in clothing of a kind that tends to impede and impair the normal action of the skin, the pores of which are organs of excretion, — a mechanism by which morbid and waste material may be thrown out of the system. Deprived of the assistance afforded under previous conditions by the skin, the work of the lungs is greatly increased, rendering them peculiarly susceptible to bronchitis and pneumonia, — ailments which are commonly the forerunners of consumption. If we accept the theory of Koch, they make the lungs a suitable habitation for the bacillus tuberculosis.

If we study the pre-tubercular history of man, we find his clothing in those times far different from what it is to-day, when the percentage of death from consumption reaches so high a figure.

The fact that the mortality from consumption among the Indians immediately after they come under the influence of our civilization is so much greater than among the whites proves the truth of what I have advanced. We have had our liability to consumption from overworked lungs tempered by hundreds of generations of ancestors habituated to the use of clothing, so that our risk is much less.

The facts underlying these views are,  $1^\circ$ , the lungs are not the only organs of respiration;  $2^\circ$ , they are important excretory organs, and, like the kidneys or liver, they may be overworked;  $3^\circ$ , the skin, in its natural condition, as an organ of respiration and excretion, is a most important adjunct of the lungs.

HAL. C. WYMAN.

Detroit, Mich., Jan. 22.