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C. FITZHUGH TALMAN, Acting Librarian.

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NOTES AND EXTRACTS.

METEOROLOGY OF THE PLANET MARS.

Many generations of astronomers have been interested in studying the appearances of the various planets as seen through the best telescopes. Most of the planets appear to have gaseous atmospheres analogous to that of the earth, and meteorological phenomena have been observed on their surfaces that are described as clouds, storms, snow fields, etc. In the case of the moon, there are even brilliant points that shine like the reflection from ice. If we could get nearer to these distant celestial bodies we might hope to study the meteorology of their atmospheres as we do that of the earth, for they undoubtedly receive their heat from the sun and are subject to annual and diurnal periods. As it is, however, the best results at present give us only a very imperfect idea of what is going on in their atmospheres. Professors E. C. and W. H. Pickering, of Harvard University, with the help of a magnificent series of photographs of the moon, have demonstrated the probability that here and there on its surface there issue jets of some heavy vapor like carbonic acid gas (since aqueous vapor is too light to stay there), and that this vapor forms white frost-like deposits in shady regions until dissipated by the sun's heat.

Mr. Lowell, of the Flagstaff Observatory, has made an elaborate study of the planet Mars, confirming much that had been done by Schiaparelli, of Milan, and adding some observations and some theories to our previous knowledge. He finds the changes from summer to winter not only well pronounced but varying very much from year to year, just as occurs in our own atmosphere. The melting of the great fields of "snow" around the planet's polar regions, as each Martian winter closes and spring comes on, gives rise to great streams of water (we call it water in the absence of any evidence as to the specific nature of the fluid), and as these streams flow toward the equator a band of green, like grass or foliage, spreads out on both sides so that we seem justified in concluding that the atmosphere and the vegetation as well as the climate of Mars have some analogy with our own. It is, however, very strange that we find no appearance of clouds on that planet, as though it were possible for water, snow, irrigation, and vegetation to exist without clouds or rain. Of course vapor could diffuse from a region of water to one of snow, but not vice versa. We must still study to find out whether this occurs on Mars.

Owing to the inclination of the axis of rotation of Mars and the location of his equinoctial points, his midwinters do not occur at the same time as our own: Thus, a recent report from the Flagstaff Observatory states that the first layer of winter snow (or possibly winter frost work) was observed on Friday, May 19, 1905, and covered a vast area in the northern or arctic region of the planet.

It is quite possible that the atmosphere of Mars has much less of the dry gases, such as oxygen and nitrogen, and relatively more moisture, so that its general circulation is based on small differences of vapor pressure. Consequently the transfer of moisture from its poles to its equator and back again takes place in a gentle way, more like diffusion through a vacuum than like convection by a gas; so that there are fewer cyclonic storms, perhaps none at all.

MR. HARRY B. WREN.

Mr. Harry Bertrand Wren, Observer, Weather Bureau, died October 1, 1905, at Paola, Kans., of a pulmonary affection. Mr. Wren entered the Weather Bureau in June, 1898, and served at Denver, Cheyenne, Baltimore, and the Central Office. He was a graduate of Baker University, Baldwin, Kans., from which institution he received the degrees of Ph. B. and M. A. Mr. Wren was a man of high character and attainments and of a pleasing disposition; he gave excellent service as an observer in the Weather Bureau.—*H. E. W.*

EIFFEL'S "ETUDES PRATIQUES."

The eminent engineer, Monsieur G. Eiffel, of Paris, to whom we owe the Eiffel tower and its unique meteorological observatory in midair a thousand feet above the ground, has published a very elegant volume of studies based on observations at three stations established by himself, in order to investigate three special types of climate in France. These stations are Beaulieu-sur-Mer representing the climate of Nice; the chateau of Bruyères representing the climate of Sévres, near Paris; and finally, a station on his estate, Vacquey, representing the climate of Bordeaux. These three stations, he says, should give us a general idea of three important portions of France, viz, the southern shore of France known as the "Côte-d'Azur", and the oceanic coast in the neighborhood of Bordeaux, and the climate of Paris, which latter may serve as a common standard of comparison for the other two. At each of these points Eiffel established a thermometer shelter of the model adopted by the Central Meteorological Bureau of France, which allows of the freest possible circulation of the air while protecting from the direct rays of the sun and direct radiation into space.

He first calls attention to the fact that ordinary self-registering thermometers show such rapid oscillations in temperature every few minutes during the whole day that the thermometers in ordinary meteorological use can not follow them accurately, nor is it desirable that they should, that in fact the climatologist wants only the average warming and cooling of the air, and that the mixture of hot and cold masses in the atmosphere must render illusory any attempt to determine the temperature of the air at any moment to the tenth of a degree centigrade. The mean temperature of the day can be obtained from thermometers so sluggish that they are always two or three tenths behind. Nothing is easier than to read a thermometer to the tenth of a degree, but there is no reason to attach much importance to these tenths except in the cases where the difference of two adjacent thermometers is desired, as in using the whirled psychrometer, or where we are determining vertical or horizontal gradients of temperature.[1] On the other hand, the continuous registers, with all their oscillations, show what a very imperfect idea we get of the atmospheric temperature when we have only three readings a day. Notwithstanding the imperfections of the thermographs due to the nature of the liquid employed and the friction within the apparatus, and notwithstanding the fact that they

[1] It is by observing the tenths of divisions that astronomers, physicists, chemists, and meteorologists have been stimulated to greater precision in all their work, and have attained a better knowledge of nature.