DISCUSSION AND CORRESPONDENCE

NOTE ON THE SPECTRUM OF MARS

I THINK that Professor Very's article on "The Presence of Water Vapor in the Atmosphere of Mars,"[1] though written with the kindliest feelings for all concerned, is certain to convey a wrong impression as to the observations made by Huggins, Vogel and others in the sixties and seventies and by myself in 1894–5. The pioneer observers believed they saw in the spectrum of Mars the modifying influences of oxygen and water vapor in its atmosphere. I held, and published, the opinion that "the polar caps on Mars are conclusive evidence of an atmosphere and aqueous vapor" on that planet;[2] but my spectroscopic observations, made under vastly improved conditions, convinced me that oxygen and water vapor did not exist in sufficient quantities to be detected by the spectroscopic method as then available, for this method is a very insensitive one. The observations by the earlier observers, and by myself, were confined to the spectral region λ5400 to λ6900. The region of wave-lengths *larger than λ6900* was entirely too faint for visual study, and in those days we had not the means of photographing it. About two years ago it was discovered that the application of certain chemicals to an ordinary dry-plate would make it quite sensitive to radiations of greater wave-lengths than λ6900. In the region thus rendered available, at λ7175, is the so-called little "*a*" band, due to water vapor. It is this band, in a region previously unobserved and unobservable in Mars' spectrum, upon which Professor Very's work is based exclusively. His investigations, therefore, afford no evidence as to the correctness of the early observations.

Now comes the point, omitted by Professor Very, which does bear upon the early observations. The spectrum photographs used by Very (made by Mr. Slipher at Flagstaff) recorded not only the new region containing the band "*a*," but also the old region λ5400 to λ6900. Mr. Slipher's published conclusion, as based on his series of seven spectrum photographs, is that "Aside from reinforcement of the '*a*' band (at λ7175), the spectrum of Mars shows no selective absorption not found in that of the moon photographed under the same conditions";[3] that is, *the effects of oxygen and water vapor on Mars were no more visible in the region λ5400–λ6900 of the spectrum than were the effects of oxygen and water vapor existing on the moon!*

Only those who have seen Mr. Slipher's original negatives can judge of their value; but whatever their value, they are absolutely confirmatory of my visual observations of 1894, of my photographic observations of 1895, of Professor Keeler's photographic observations of 1897; and as absolutely opposed to the observations of Huggins, Vogel, Maunder and others as my own observations were. Readers of Very's article would get exactly the opposite view.

If Mr. Slipher, observing from a high altitude and with little water vapor in our atmosphere to embarrass him, could see no difference between the spectra of Mars and the moon in the region λ5400–λ6900, how impotent were the effects of the pioneer observers at sea-level, with small telescopes, looking through ten times as much water vapor as Mr. Slipher and I did; yet, all hail, and nearly all the credit to the pioneers! Their work, though unsuccessful, makes progress possible by succeeding generations of investigators.

W. W. CAMPBELL

MT. HAMILTON,
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A NEW KIND OF PTARMIGAN

TO THE EDITOR OF SCIENCE: The current *McClure's Magazine* (March, 1909) contains a sonnet which I am sure will entertain the readers of SCIENCE, even though it bears the gruesome title "The Shipwrecked Sailor." It contains this striking (in more senses than one) bit of ornithological news:

Yet he smiled,
Abandoning hope and drowning unaware,

[1] SCIENCE, January 29, 1909, p. 191.

[2] *Astronomy and Astrophysics*, 1894, p. 760.

[3] *Astrophysical Journal*, 28, p. 403, 1908.