1. van de Hulst, Muller and Oort, *B. A. N.* **12**, 117, 1954.
2. Spitzer, values taken from the Henry Norris Russell Lecture, *Ap. J.* **120**, 1, 1954.
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McLaughlin, Dean B. Interpretation of some Martian features.

The morphology of Martian maria, long neglected, is believed to contain important clues to their origin. (1) Most maria of the south tropical belt are elongated strips trending southeast. (2) All have tributary or terminal pointed bays on their north sides or northwest ends. (3) Bays that lie north of the equator hook back, barbel-like, towards the northeast (Dawes' forked bay, Syrtis Major, Margaritifer Sinus). (4) Bays south of the equator do not hook back. (5) Some of the strongest canals of the northern hemisphere trend northeast (Cerberus, Thoth).

Trends of maria and strong canals are those of the trade winds. They are interpreted as dust deposited by prevailing winds. The strongest winds will be those of the southern summer, near perihelion. These must show a monsoon effect, crossing the equator from north to south, being deflected to the left by the planet's rotation, to become northwest anti-trade winds. The Martian map shows a striking flow pattern agreeing with this expectation.

Vertices of the bays are now recognizable as point sources of dark dust. Consideration of all geological processes points to only one possible explanation. These vertices are interpreted as sites of active volcanoes that erupt great amounts of ash.

The green color of the maria, long attributed to vegetation, is regarded as due to weathering of ferromagnesian ash. On earth, with abundant oxygen, soils are colored red, yellow, and brown by iron oxide and hydroxide. On Mars, with no oxygen, reaction with water and carbon dioxide yields the green secondary minerals, chlorite and epidote, a process well-known in underground terrestrial weathering.

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McMath, R. R., O. C. Mohler, A. K. Pierce. The 50-foot focal length vacuum spectrograph for solar research.

It is plain that an adequate study of the profiles of a large number of Fraunhofer lines de-

mands a spectrograph of high resolving power and great linear dispersion. Through the kindness of Drs. I. S. Bowen and H. W. Babcock we have been able to use one of their fine gratings, 6×8 inches, in our Pfund system.¹ With this arrangement we immediately found an asymmetry and variable features in the center of $H\alpha$.² However, further work on faint solar lines and on the absorption spectrum of iodine indicated a resolving power lower than anticipated with this particular grating.

Photoelectric traces made by placing the steep portion of an absorption line or the very steep intensity change at the zero order on the exit slit of the spectrometer indicated from the strong random fluctuations of the signal that spectrographic seeing was the undoubted cause of lowered resolution.

For photographic work the criteria for the design of large stellar spectrographs, as given by I. S. Bowen,³ require that the resolving power of the photographic plate be matched to the linear resolving power of the grating at the focal plane. A photograph taken with a spectrograph approximating this condition will show considerable graininess if a narrow slit of width equal to the resolving power is used in the photometer. Where there is ample light the use of a longer focal length and a larger scale permits the use of wider microphotometer slits with a gain in smoothness of the recording with no loss in resolving power. In addition, with the larger scale spectrograph the slits are mechanically easier to construct and the effects of dust, defects and non-parallelism of the slit jaws are percentage-wise less. The latter points are of considerable importance in problems which involve photometry of details of the solar surface that the slit intersects along its length. However, a longer focal length aggravates the seeing problem.

Following the high resolution work on $H\alpha$ and an experimental investigation of our spectrographic seeing, both at Lake Angelus and at the Snow telescope at Mount Wilson, Dr. McMath started in January 1954 the design and construction of a large vacuum spectrograph which would completely eliminate the spectrograph seeing problem, and which would give adequate scale and vacuum wave lengths. The design utilizes the 50-foot focal length off-axis mirror system of the existing McGregor Tower to form an image of the sun at the first slit of a predisperser before the grating spectrograph. The optical arrangement of the spectrograph follows the design de-