Topographic Features of Mars
Observed by G.H. Hamilton (1924)
and C.F. Capen (1969)

Authored by
Gene Cross & Rodger W. Gordon

(Presented by Gene Cross, July 20, 2006)
Abstract

- Topographic features on Mars were observed by G. H. Hamilton and C.F. Capen using groundbased telescopes.
- Features such as the craters Huygens, Copernicus, Newton, Tharis volcanoes & Olympus Mons, Valley Marineris, and many others were observed.
- Hamilton (1924) used an 11-inch Alvan Clark refractor at 300X & 430X.
- Capen (1969) used an 82-inch reflector at 800X & 1000X and with cameras.
- Images by the observers themselves, and one by Tom Cave, will be shown.
George H. Hamilton, mentored by W.H. Pickering, Jamaica, 1924

Elizabeth Williams Hamilton with G.H. Hamilton

Hamilton’s 11” telescope at Jamaica in 1928-1929.
Topographic Features of Mars Observed by Hamilton, 1924

- Ringed Plains: Hellas Planitia, Argyre Planitia, Elysium Planitia, Isidis Planitia
- Craters: Huygens, Copernicus, Newton
- Valleys: Marineris
- Volcanoes: Tharis, Olympus Mons, Elysium Mons
Olympus Mons

These two remarkable drawings, done by Hamilton August 22 (left) and August 23/24 (below) 1920, appear to show not only the outline of Olympus Mons, but also the caldera (dotted line). Many other features are also indicated. Note that the sizes for August 22 were recorded as 5.5-6 on a scale of 0 to 10.
Olympus Mons

Hamilton’s drawing of August 22, 1924 apparently showing Olympus Mons. The full color drawing appears in the color section of this book.
Hamilton Versus Trumpler
(280mm in Jamaica Versus 760mm in California)
Photograph Versus Drawing
(Slipher photo, Hamilton drawing)

On October 27, 1926, E.C. Slipher took the photograph of Mars seen at left using the Lowell 24” refractor. Note the crater Flaugergues is just apparent (arrow). One week later, on November 4th, Hamilton made the drawing seen at right using an 12” reflector. Note that he indicates a feature in the same position! This is perhaps the strongest evidence that Hamilton did indeed see at the very least this crater, even if he wasn’t aware of its true nature. (Slipher photo Lowell Observatory Archives, used by permission)
Refracting Telescope used by Hamilton

- Aperture = 280 mm
- Magnification = 300X & 430X (and likely color filters)
- Eyepieces = Tolles
- Telescope Design Type = Achromat (corrected for sph & two colors)
- Maker = Alvan Clark & Sons
- Wavefront Error < 1/8 wave PV at Best Focus (single color, best estimate of WFE)
- Location = Jamaica (Harvard Observatory Station)
Charles F. Capen, director of JPL’s ground-based planetary observation program & Table Mt. Observatory, 1969
Reflecting Telescope used by Capen (1969)

- Aperture = 2,080 mm
- Magnification = 800X & 1000X + (and color filters)
- Eyepieces = Plossls (Ets. S.R. Clave)
- Telescope Design = Classical Cassegrain (corrected for spherical aberration & all colors parfocal)
- Telescope Maker = J.W. Fecker Company (AKA: John Brashear Company)
- Optics Upgrade: Jean Texereau repolished, 1964
- Wavefront Error < 1/8 wave PV at Best Focus (WFE < 1/40 wave RMS, based on published measures)
- Location = Texas (McDonald Observatory, U of T)
Topographic Features Observed by Capen, 1969

- Ringed Plains: Hellas Planitia, Elysium Planitia, Isidis Planitia
- Craters: Huygens
- Valleys: Marineris
- Volcanoes: Elysium Mons
Huygens Crater
(Mariner IV)
Huygens Crater

(495 km diameter and variable light and dark floor favors visibility.)
Huygens Crater
(325mm Reflector, Tom Cave, Long Beach, California, 1993)

MARS 1995
MARCH 8 2000 M.U.T.
12.8” Refl 350x-480x & 660x
5.5 CLARK Refr. 300x

S = 7-9 (H&S)
T = 3-4 (HAZE)

FILTERS: None, Twl Red, Orange Blue

CM = 310
DIA = 12.6”
P = 360°
Q = 121°
T = 17°
He = 154°
Ls = 68°
Huygens Crater
(2080mm Reflector, Capen, 1969)
Huygens Crater
(254mm Refractor, groundbased, ccd webcam)
### Predicted Observability of Martian Topographic Features (Capen, 1982)

#### Table 1

Telescope Aperture vs. Martian Topographic Feature Sizes in Kilometers and Aerographic Degrees that Can Be Resolved with an Apparent Disk Diameter of 23 Arcsecond

<table>
<thead>
<tr>
<th>Telescope Aperture</th>
<th>Feature Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm / inch</td>
<td>Km / Degrees</td>
</tr>
<tr>
<td>20 / 8</td>
<td>165 / 2.8</td>
</tr>
<tr>
<td>25 / 10</td>
<td>127 / 2.1</td>
</tr>
<tr>
<td>31 / 12</td>
<td>103 / 1.7</td>
</tr>
<tr>
<td>41 / 16</td>
<td>83 / 1.4</td>
</tr>
<tr>
<td>51 / 20</td>
<td>65 / 1.1</td>
</tr>
<tr>
<td>61 / 24</td>
<td>53 / 0.9</td>
</tr>
<tr>
<td>76 / 30</td>
<td>44 / 0.7</td>
</tr>
</tbody>
</table>
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