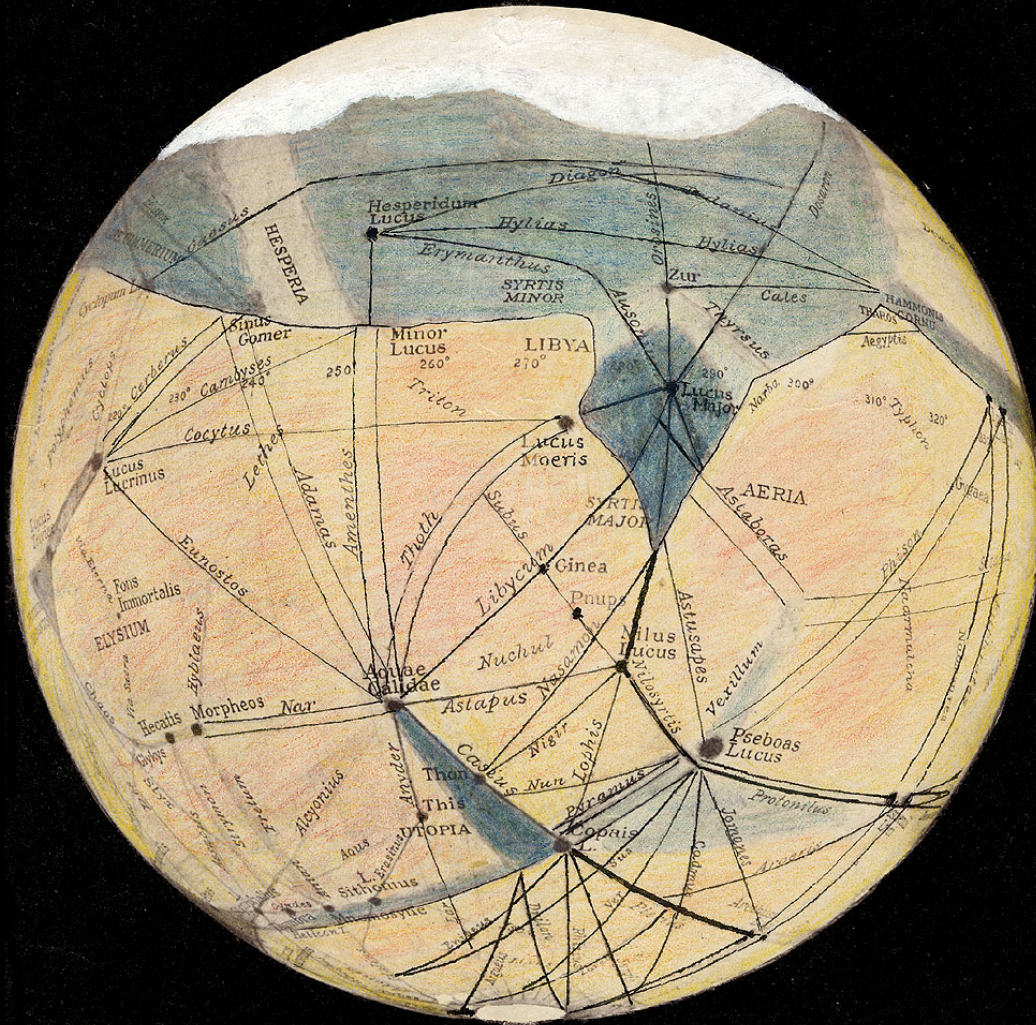


Geographies of Mars



K. Maria D. Lane
18 September 2009
Department of Geography
University of New Mexico
USA

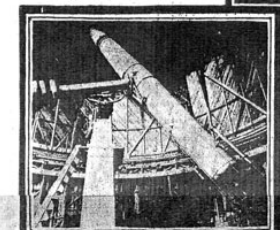
WILL the NEW YEAR SOLVE the RIDDLE of MARS?

Positive Assertion by Professor Lowell, Based on His Latest Discoveries, Indicate That Our Nearest Planetary Neighbor Is Peopled by a Race Superior to Mankind.

ANOTHER and final message from Mars will soon be in general hand. If not such making as a milestone of astronomy, it is the most thrilling and extraordinary word on an ever fascinating subject that has been spoken since Schiaparelli first discussed the habitability of Mars aloud. For Professor Percival Lowell, our greatest Martian student, now declares positively and without reservation that our nearest planetary neighbor is not only alive with vegetation made possible by means of vast artificial canals, but is peopled by an order of beings in many respects quite superior to ourselves.

In other words, Professor Lowell has solved, at least to his own satisfaction, the greatest riddle of the ages—the existence of life in another world.

Since 1877, when Schiaparelli astonished laymen and astronomers by announcing his discovery of the Martian canals, many gazers have kept their eyes focused upon the face of the red planet. Acres of white paper have been covered with notes of what they saw. And, finally, as the writer set forth in the *SUNDAY HERALD*



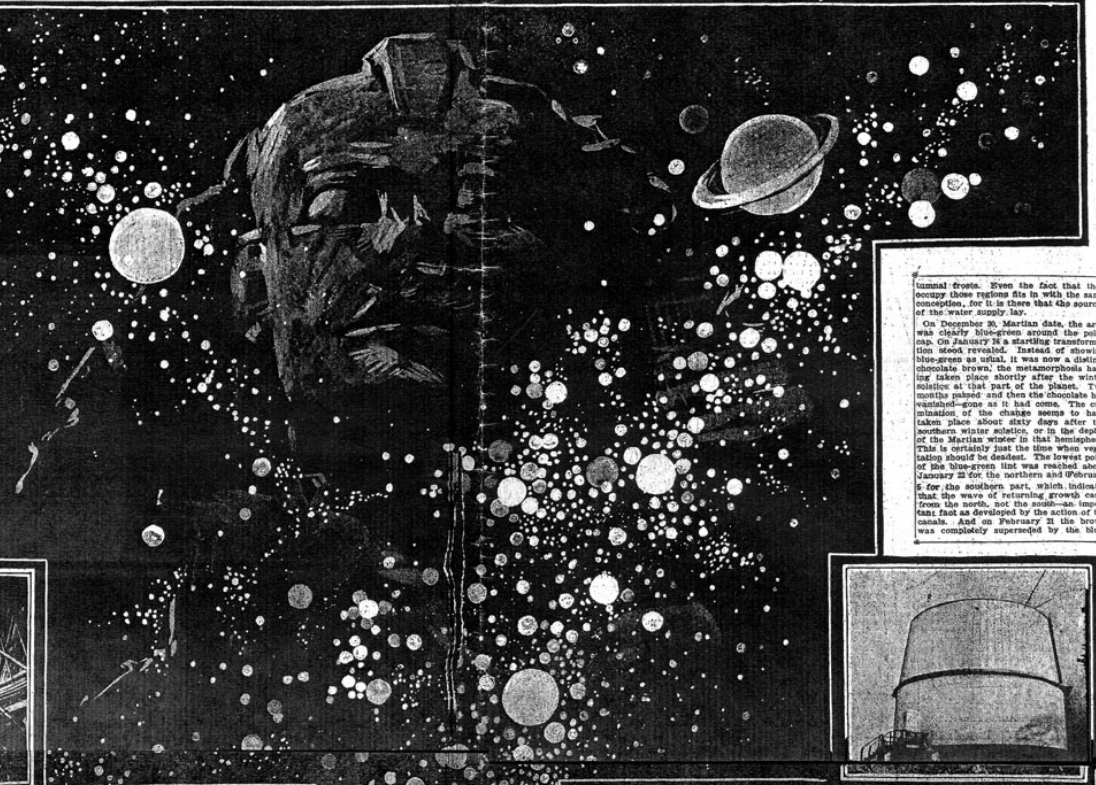
TWENTY-FOUR INCH TELESCOPE OF THE LOWELL OBSERVATORY, FLAGSTAFF, ARIZONA.

In July, 1906, Professor Lowell laid aside at the Flagstaff observatory succeeded in actually photographing the Martian canals. His new volume, issued by the Macmillan Company, is the first formal announcement of the recent observations and conclusions that have been published. Not only is his verdict highly revolutionary from a scientific viewpoint, but it is no less daring than convincing when viewed impartially.

Stipulous as the conclusion is from the facts presented so calmly and dispassionately by Professor Lowell, we are now actually introduced to beings on Mars resembling ourselves in many essential features.

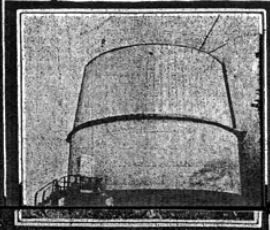
Owing, for instance, to the vast desert areas (there is the other shades of water on most of the surface) it is reasonable to suppose that the Martian means of transportation are other than our own. For the people must communicate with one another, because Professor Lowell is convinced, water from the poles is distributed among the populous oases hundreds and thousands of miles apart. And the only possible agency in vast distances from the center of the planet and of the fact that the force of gravity at any distance from the center of Mars is only one-tenth the gravity toward the center of the earth of the same distance is artificial. If, in other words, our force of gravity is represented by 100, this force on Mars, considering that Mars is only 2 1/2 in the size of the earth. There our pointed would weigh only about 2 1/2 ounces, and a Martian of human size must be more than twice as strong as the average man here.

Without indulging in mental association one reaches the logical conclusion that reasonable means of transportation for that reasonable creature is not for his territory members. These equipped, gratuitous that they are equipped, gratuitous

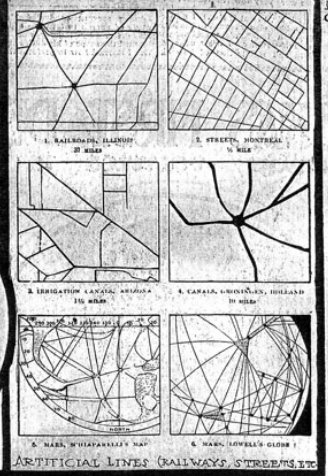
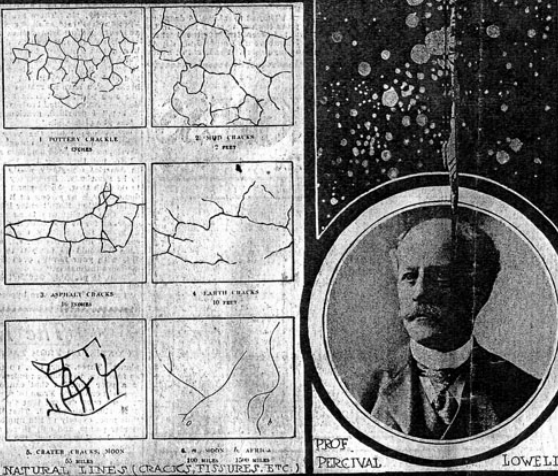


tumal fronts. Even the fact that they occupy these regions die in with the same conception, for it is there that the sources of the water supply lay.

On December 20, Martian date, the area was clearly blue-green around the polar ice. On January 18 a startling transformation stood revealed. Instead of showing blue-green as usual, it was now a distinct chocolate brown, the metamorphosis having taken place shortly after the winter solstice at that part of the planet. Two months passed and there the chocolate hue vanished—gone as it had come. The culmination of the change seems to have taken place about sixty days after the northern winter solstice, or in the depths of the Martian winter in that hemisphere. This is certainly just the time when vegetation should be deadest. The lowest point of the blue-green tint was reached about January 20 for the northern and February 5 for the southern part, which indicates that the wave of returning growth came from the north, but the south—as important fact as developed by the action of the canals. And on February 21 the brown was completely superseded by the blue-



HOME OF THE LOWELL OBSERVATORY, FLAGSTAFF, ARIZONA.



PROF. PERCIVAL LOWELL

green, just as would be the case by the re-appearing of Southwestern vegetation.

Now we will consider the riddle which attracts over the planet. Largely unchangeable, these show essentially the same day after day throughout the year. In hue they range from sand color to brick red, and it is to the latter that the very tint of Mars is due. They are unquestionably desert areas. The pale salmon hue which reproduces best in drawings is that which one can discern near the pole. The Sahara has this look; still more, it finds its counterpart in the far superior the Painted Desert of Northern Arizona. To stand upon the summits of the San Francisco peaks and gaze off from that isolated height upon this other isolation of earth, the resemblance to the telescopic vistas of the Martian globe is striking.

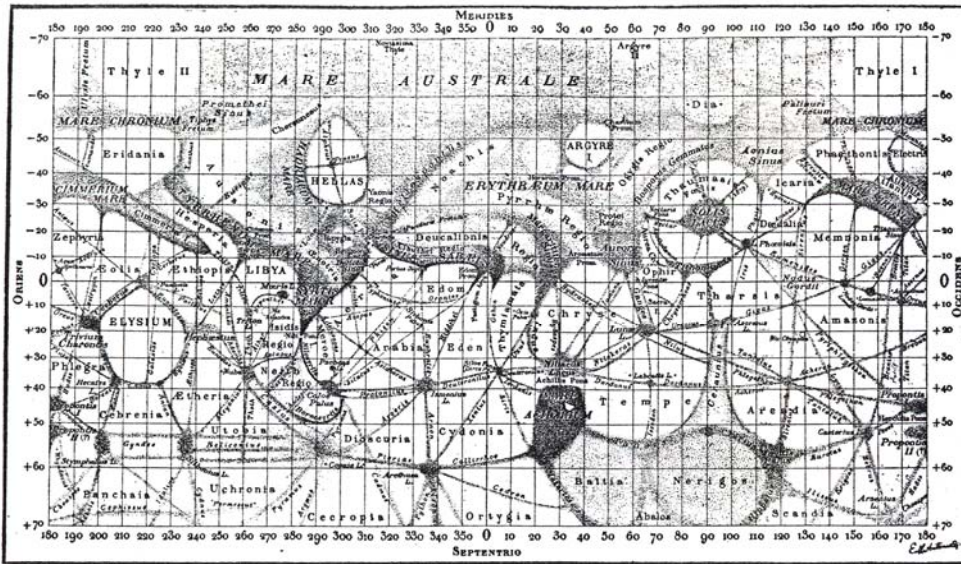
In other words, the gradual encroachment of desert areas on earth finds a parallel on Mars according that, pitiless as our deserts are, they are but faint foretaste of the state of things on Mars today.

From the detection of the main markings on the planet surface we now pass to a discovery so unprecedented that the scientific world was at first loath to accept it—that of the canals. Not everybody can see these darkish lines at first sight, even when pointed out to them. When viewed under the best conditions, however, the lines of the planet taken on a most singular appearance. It looks as if it had been cobwebbed all over—a mesh of fine lines—which, with attention, proves to compass their ends from one to the other.

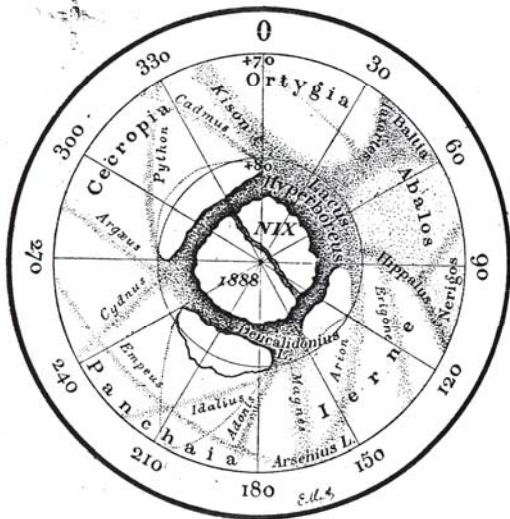
It is due wholly to the lack of suitable conditions that the true form of the Martian lines is usually missed by the unprepared observer. To the eye, the lines appear as if they were made of some soft material which could be stretched or compressed at will. The solution of this riddle is the only method of estimating the true nature of the lines.

New York Herald, 1906

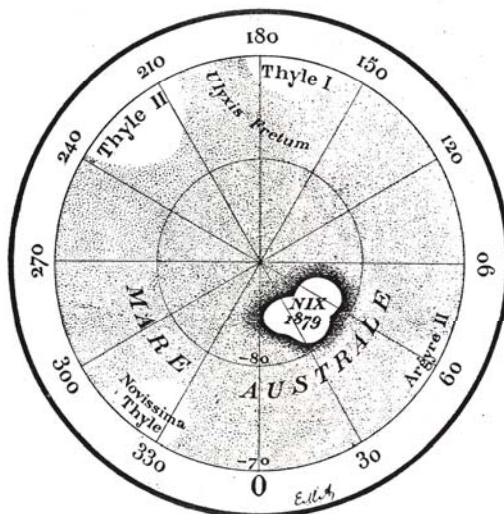
CHART OF MARS.
By E. M. ANTONIADI, F.R.A.S.



THE kindness of Monsieur E. M. Antoniadi enables us to meet the wishes of several of our correspondents who have asked for a chart of Mars brought up to date, and embodying the most trustworthy researches. The chart is based chiefly upon the works of Schiaparelli during the oppositions of from 1887 to 1890 inclusive, and upon the successive Reports of the Mars Section of the British Astronomical Association, together with M. Antoniadi's own long-continued observations.



North Polar Region of Mars.

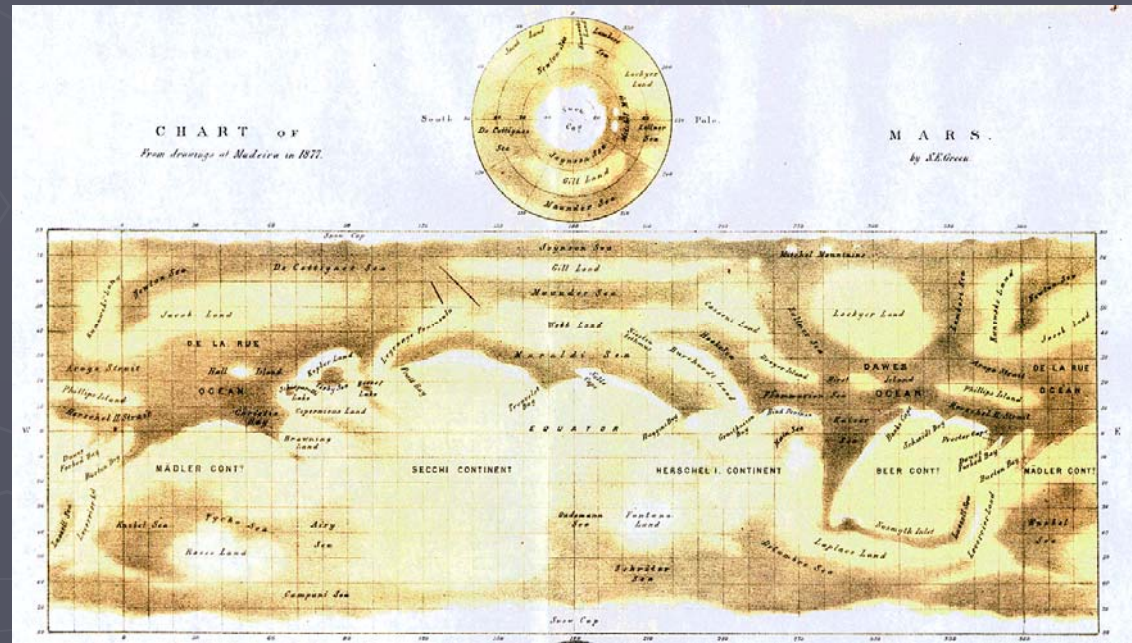
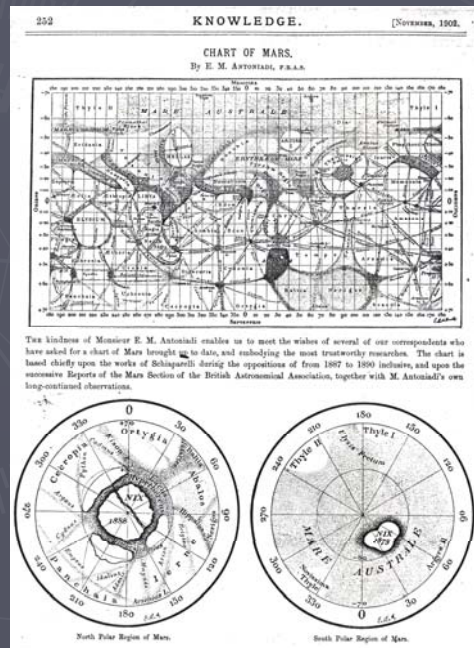


South Polar Region of Mars.

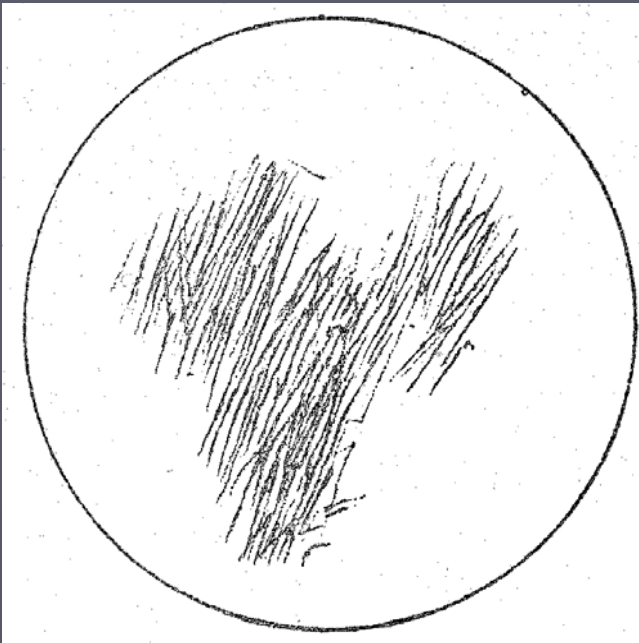
Maps by
E.M. Antoniadi in
Knowledge, 1902

Overview

- Transitions in Mars cartography
- 1877-1878 mapping controversy
- Maps and the inhabited Mars hypothesis
- Mars maps after 1909

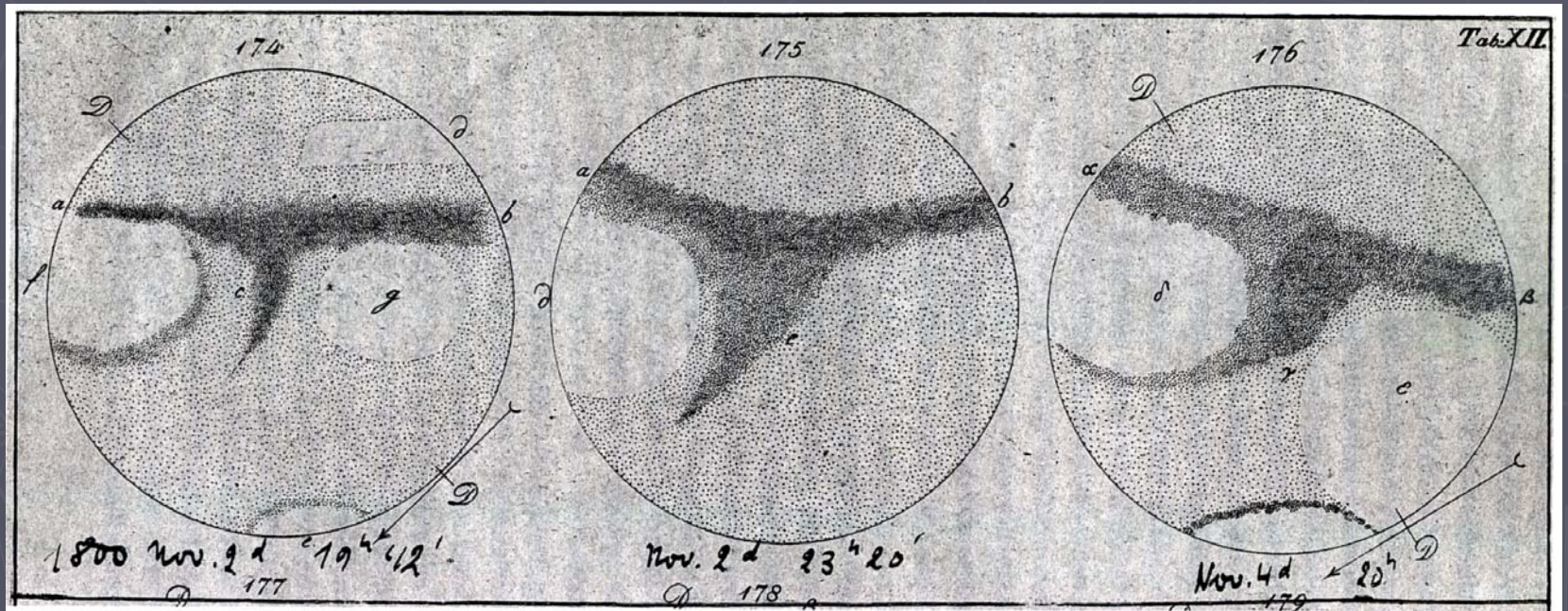


Pre-cartography

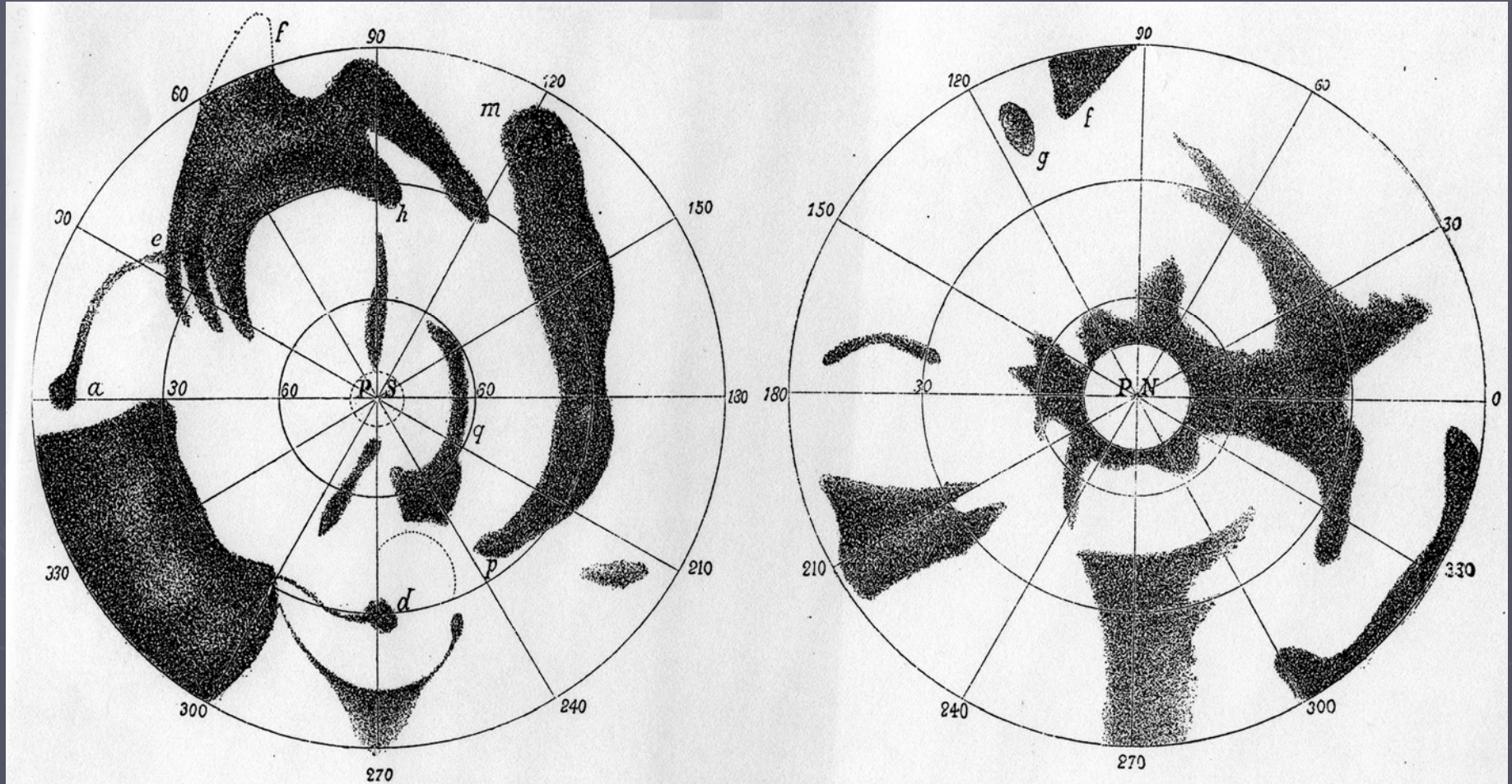


Christian
Huygens,
1659

Johann
Schroeter
1800

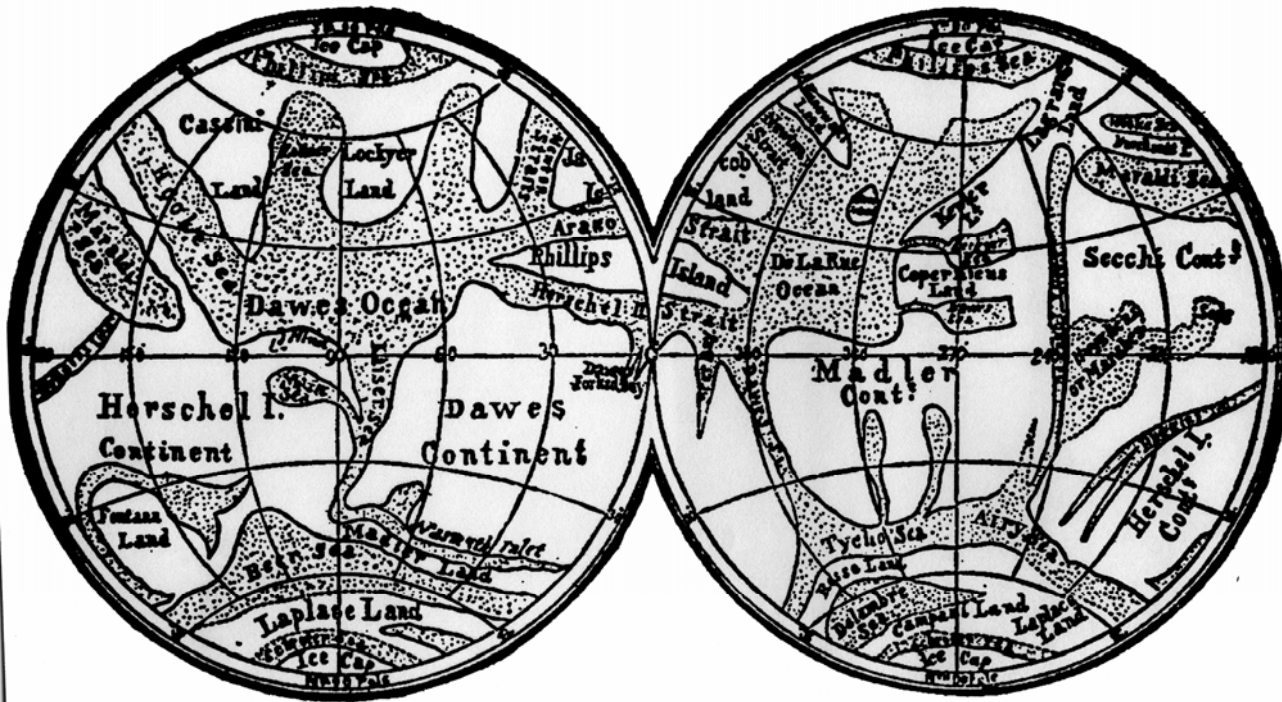


Cartography proper

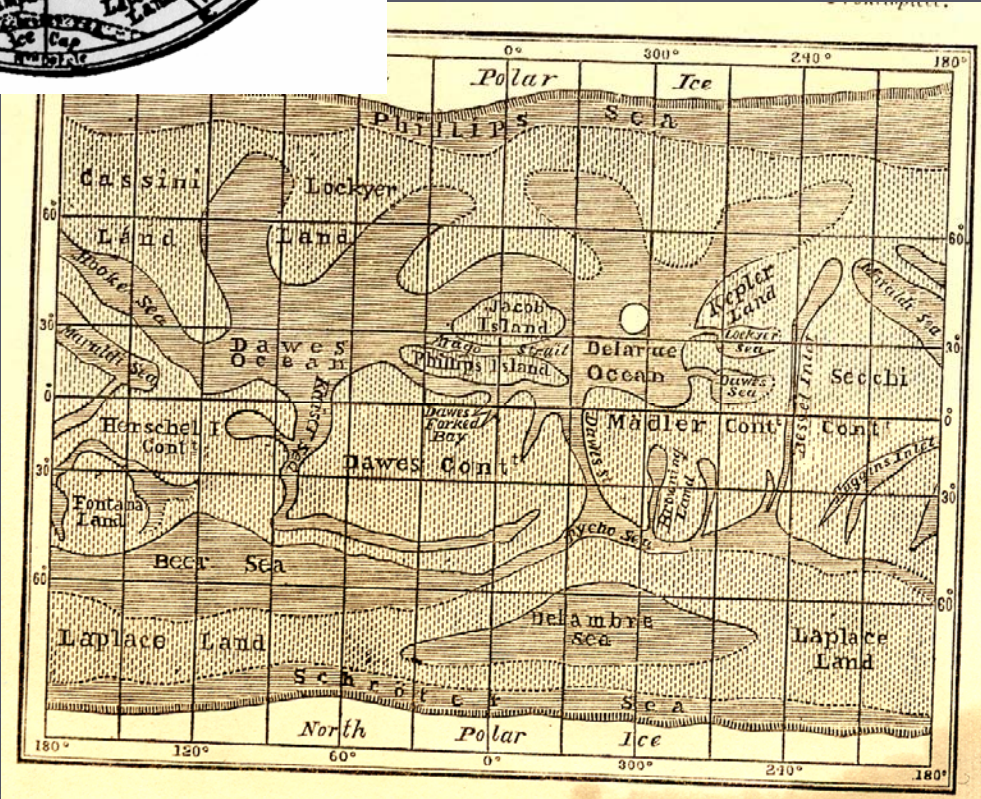


Mädler and Beer, 1840

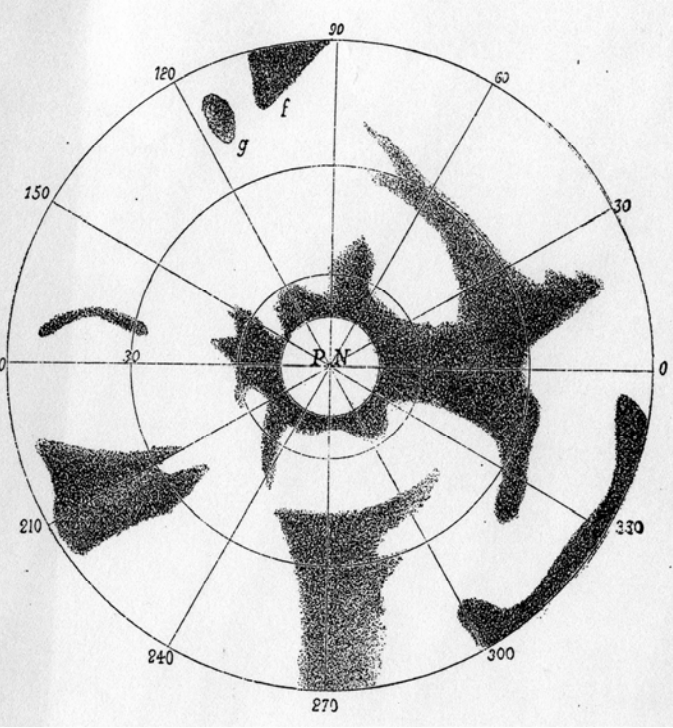
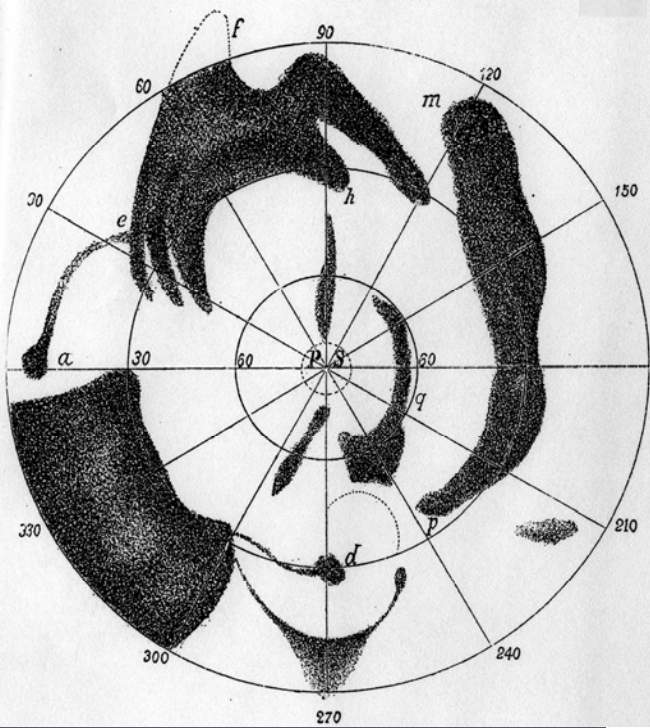
Map projections



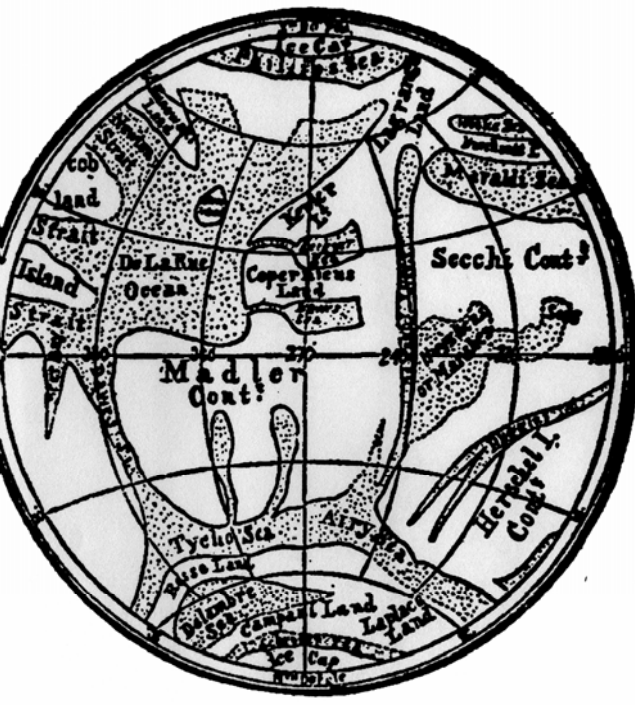
Stereoscopic projection
Proctor 1869



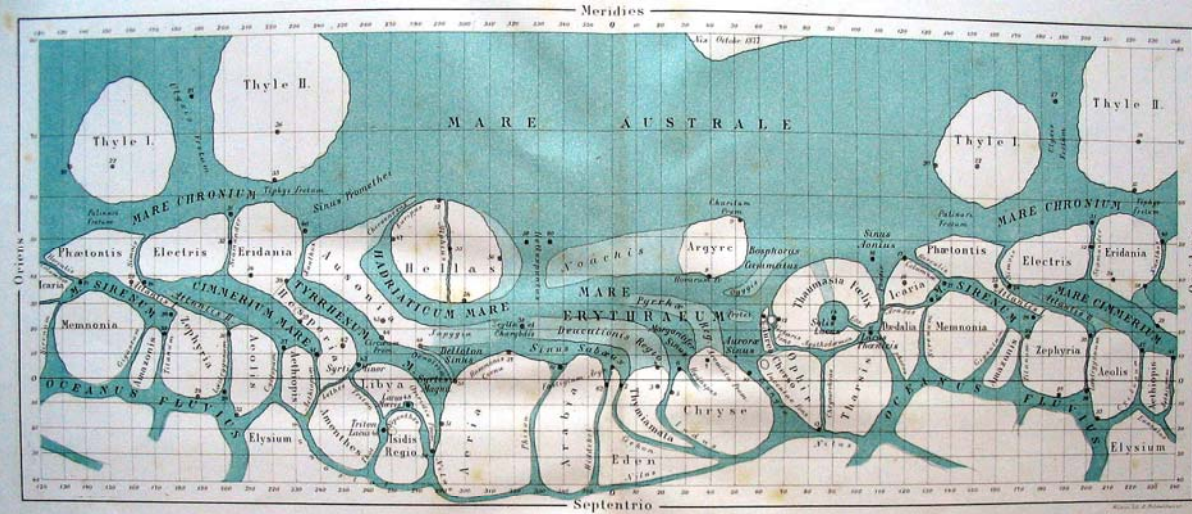
Mercator projection
Proctor 1868



Transition in naming of surface features



Maps of 1877-78



Tab. III

MAPPA AREOGRAPHICA

Exhibens Planetæ Martis Chorographiam inter Polam Australem et Parallellum 40^{am}

Latitudinis Borealis;

Ex propriis Observationibus atque Mensuris ope Tubi Merziani decompedatis

in Specula Braydensi Mediolani habitis

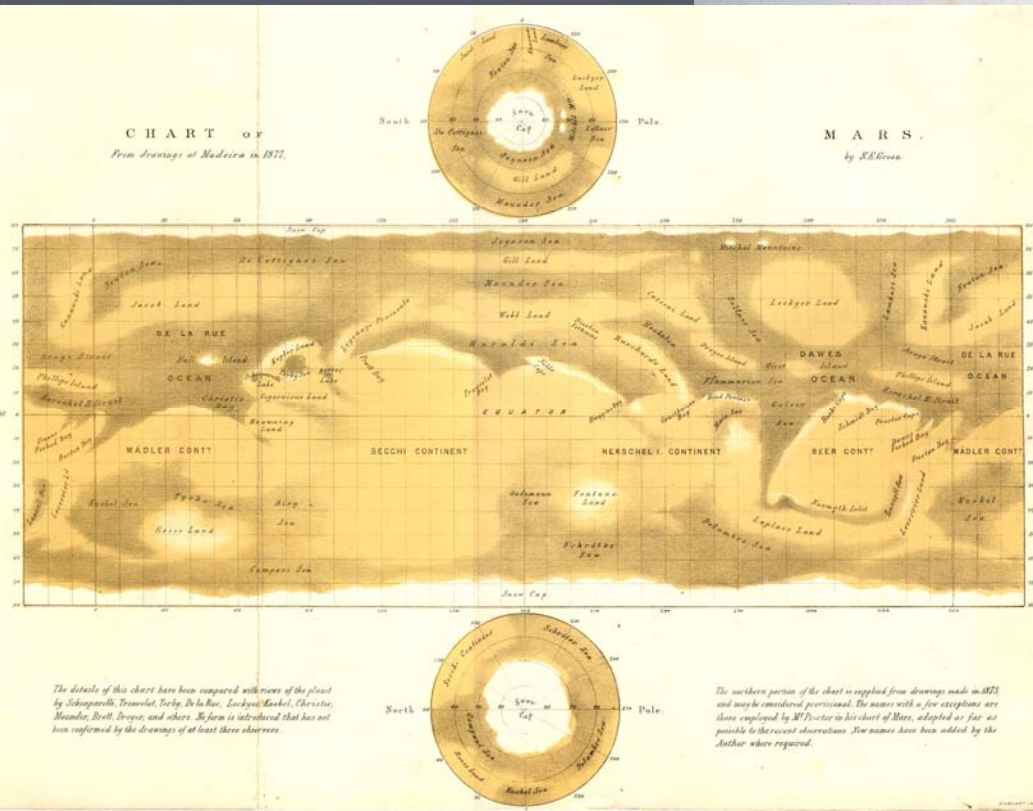
compositi, suppletavit atque delineavit J.V. Schiaparelli

1877 — 1878.

Giovanni Schiaparelli



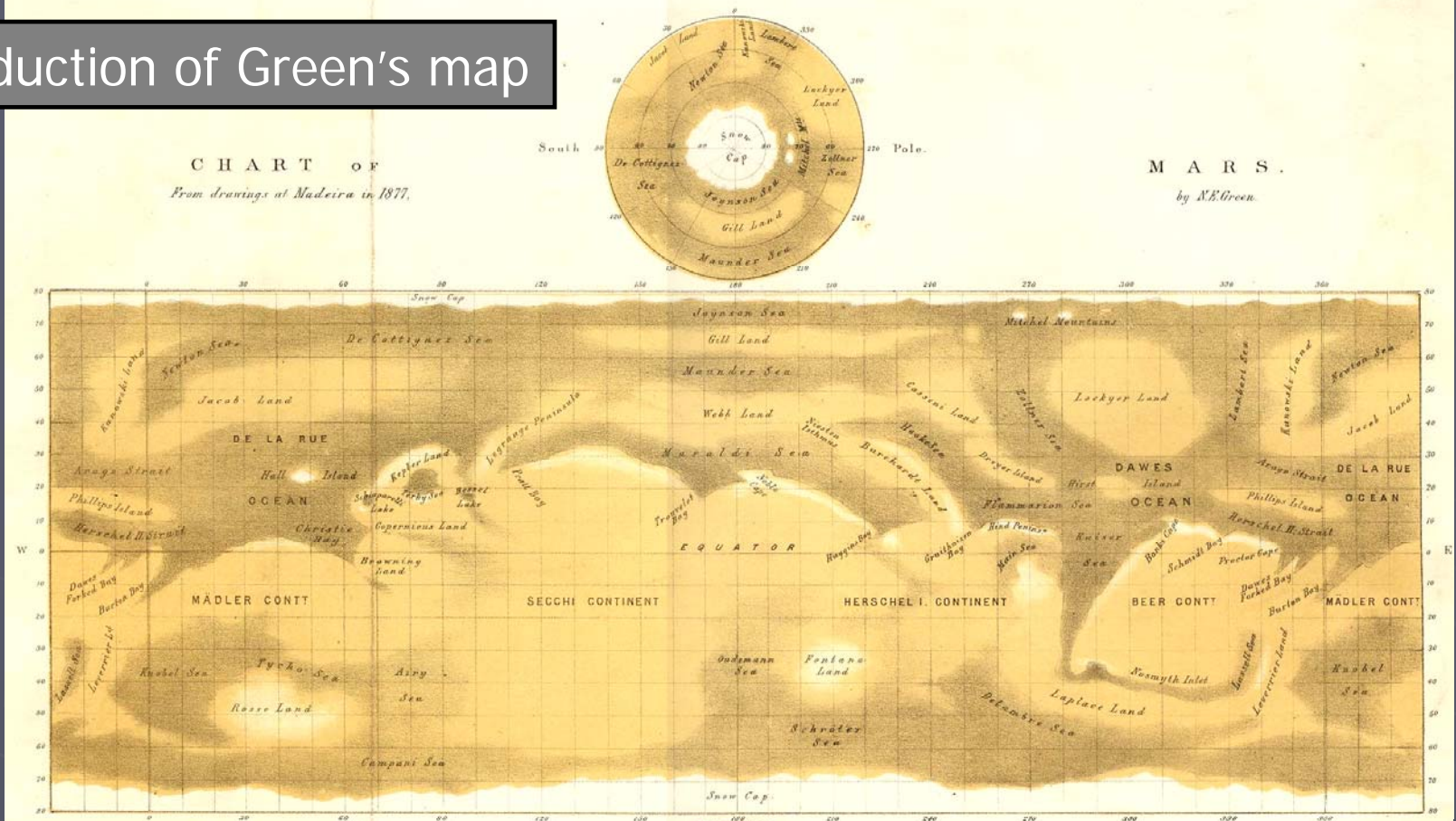
Nathaniel Green



The details of this chart have been compared with views of the planet by Schiaparelli, Traverset, Forby, De la Rue, Lockyer, Marshall, Christie, Maudslayi, Swift, Drayton, and others. The form is introduced that has not been confirmed by the drawings of at least three observers.

The southern portion of the chart is supplied from drawings made in 1875, and may be considered provisional. The names with a few exceptions are those employed by Mr. Forster in his chart of Mars, adopted as far as possible to the recent observations. New names have been added by the Author where required.

Production of Green's map



Sep. 1. 10^h 40^m GMT. Long 7°



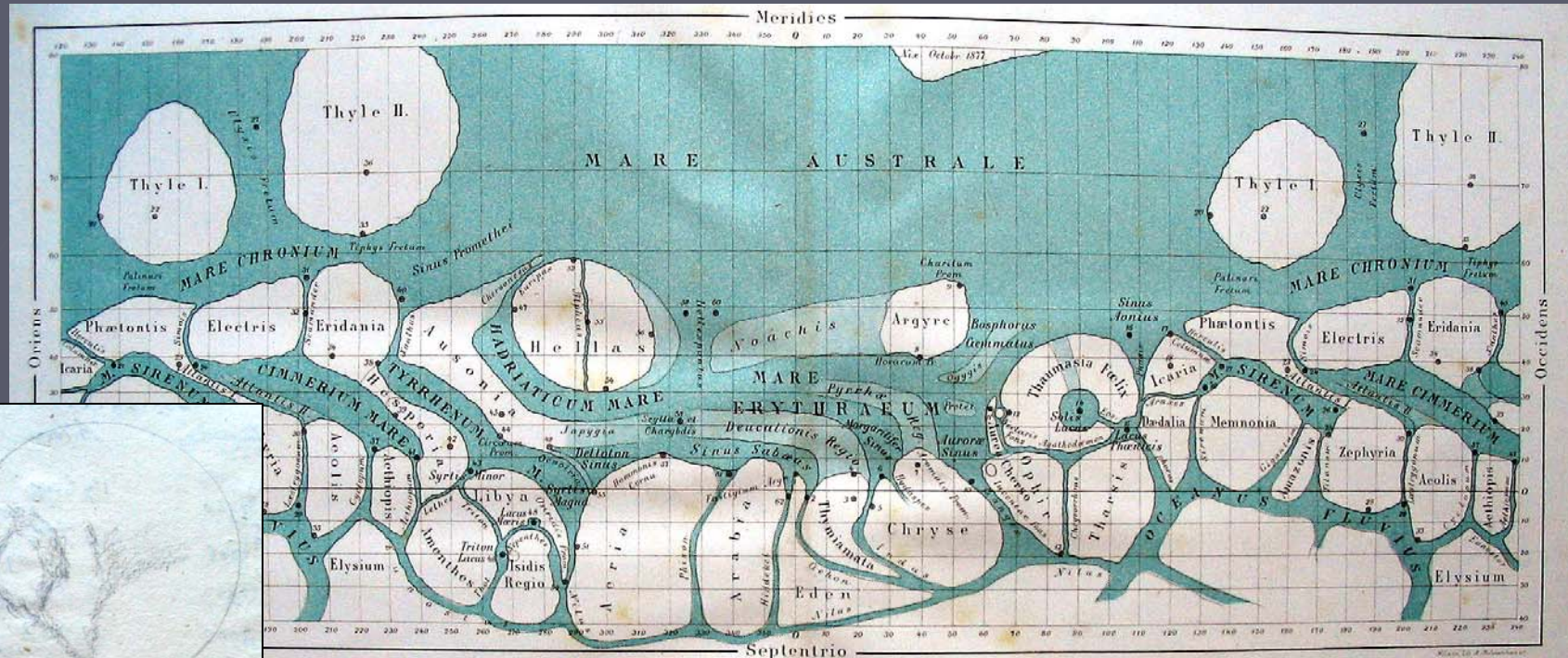
Sep. 1. 13^h 10^m Long 43°



Sep. 1. 11^h 20^m Long 60°

- Observed from Madeira
- 2 months of observation
- 41 sketches, 2 hours each
- Map is composite

Production of Schiaparelli's map



Tab. III

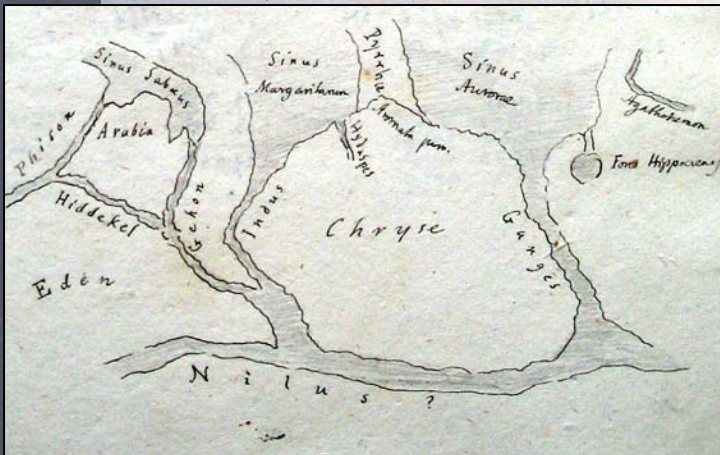
MAPPA AREOGRAPHICA

totae Martis Chorographiam inter Polum Australem et Parallelum 40^{um}

Latitudinis Borealis;

Observationibus atque Mensuris ope Tubi Mercurii
in Speculâ Braydensi Mediolani habitantis
compositus, supputavit atque delineavit J.V. Schiaparelli

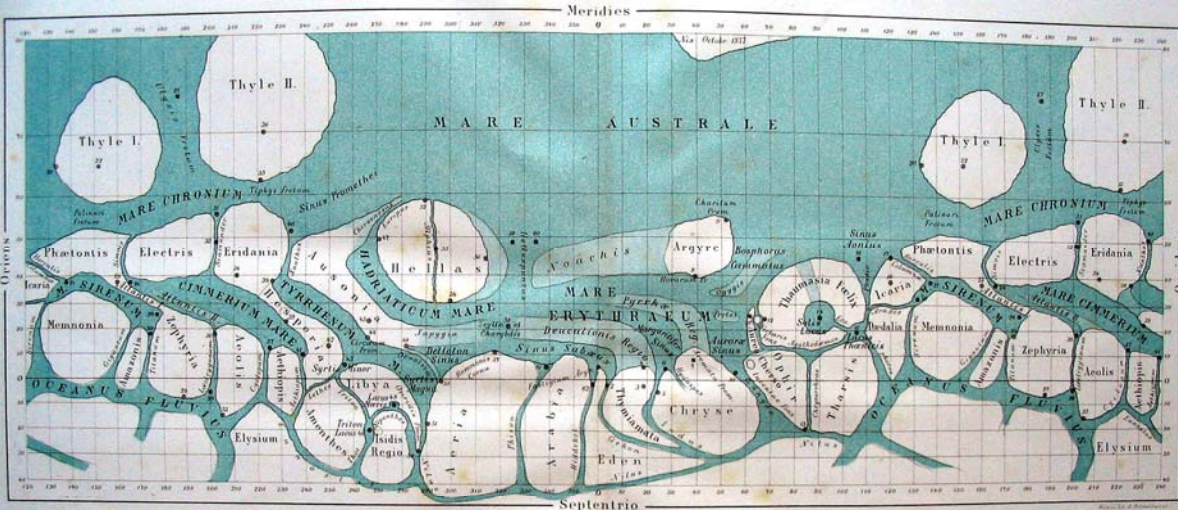
1877 — 1878.



- Observed from Milan
- 7+ months of observation
- 31 drawings, 100+ sketches
- Map not composite

Maps of 1877-78

Nathaniel Green



Tab. III

MAPPA AREOGRAPHICA

Exhibens Planetæ Martis Chorographiam inter Polam Australem et Parallellum 40^{am}

Latitudinis Borealis;

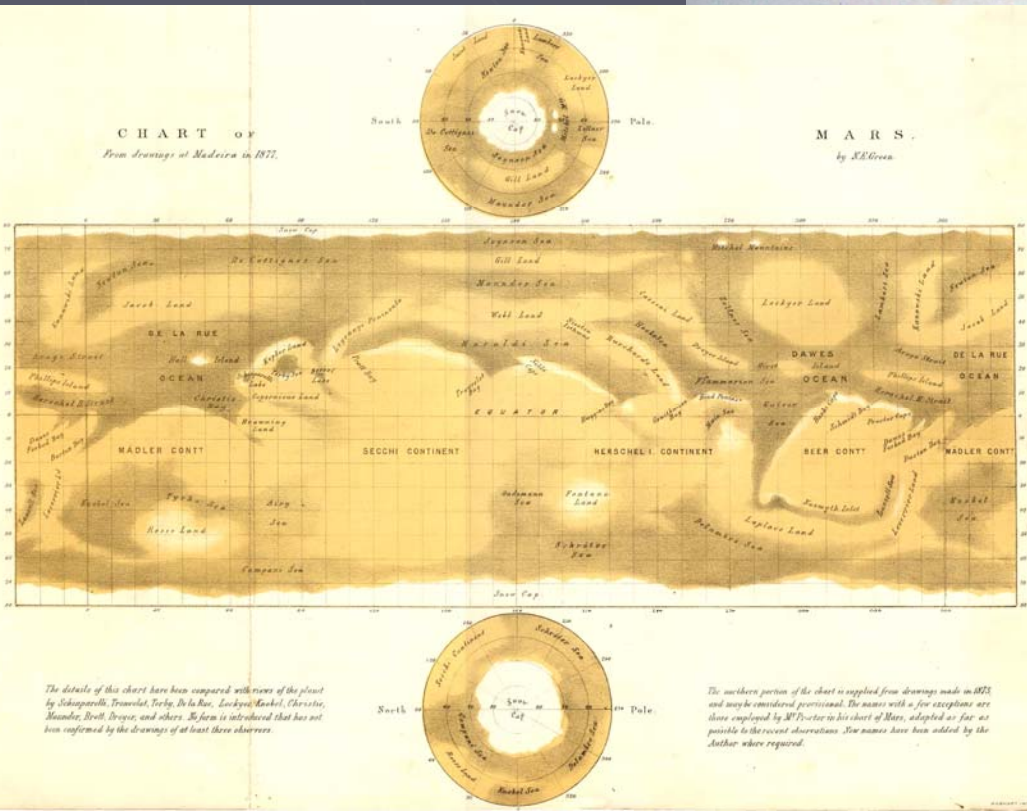
Ex propriis Observationibus atque Mensuris ope Tubi Merziani decompedatis

in Specula Braydensi Mediolani habitis

compositus, suppletus atque delineavit J.V. Schiaparelli

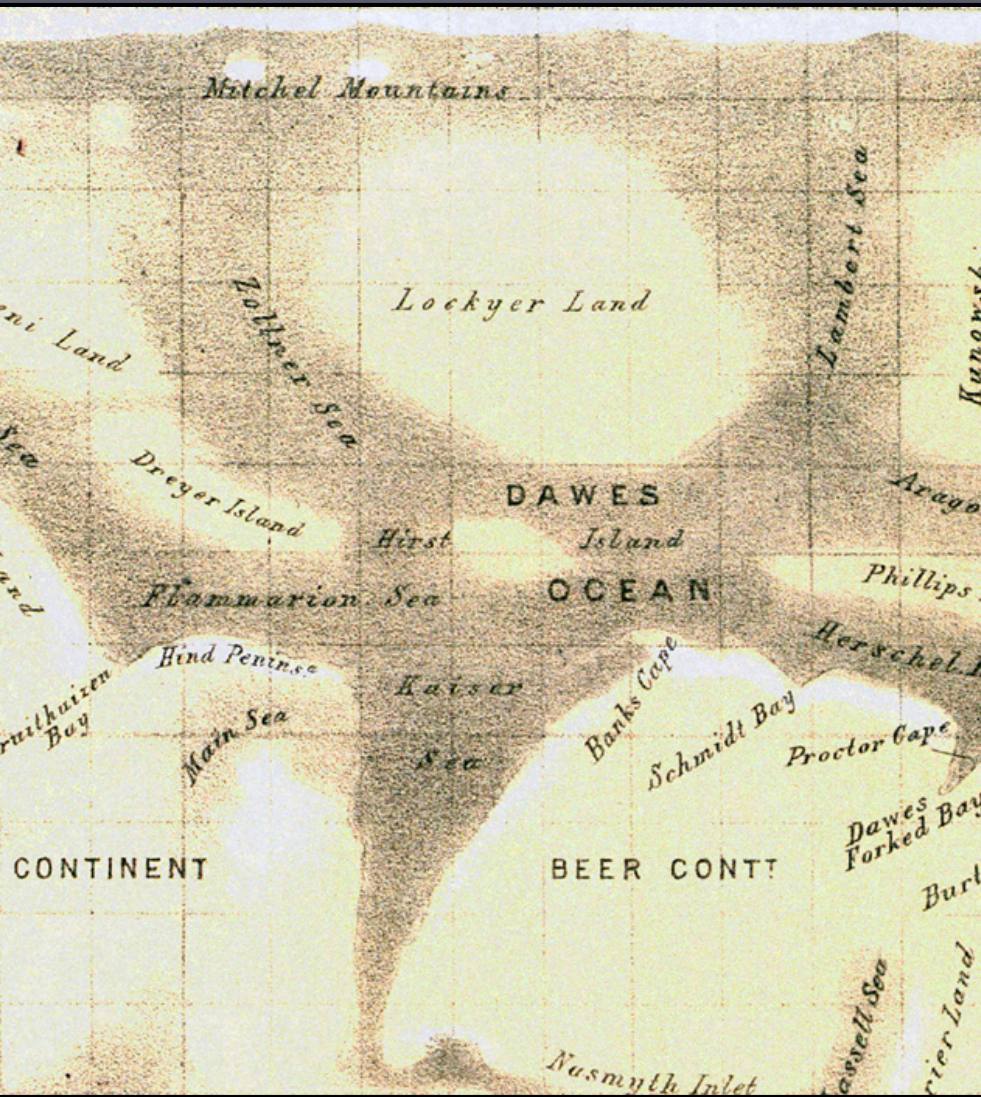
1877 — 1878.

Giovanni Schiaparelli



The details of this chart have been compared with views of the planet by Schiaparelli, Traverset, Peiry, De la Rue, Lockyer, Maskell, Christie, Maudslayi, Swift, Drayce, and others. The form is introduced that has not been confirmed by the drawings of at least three observers.

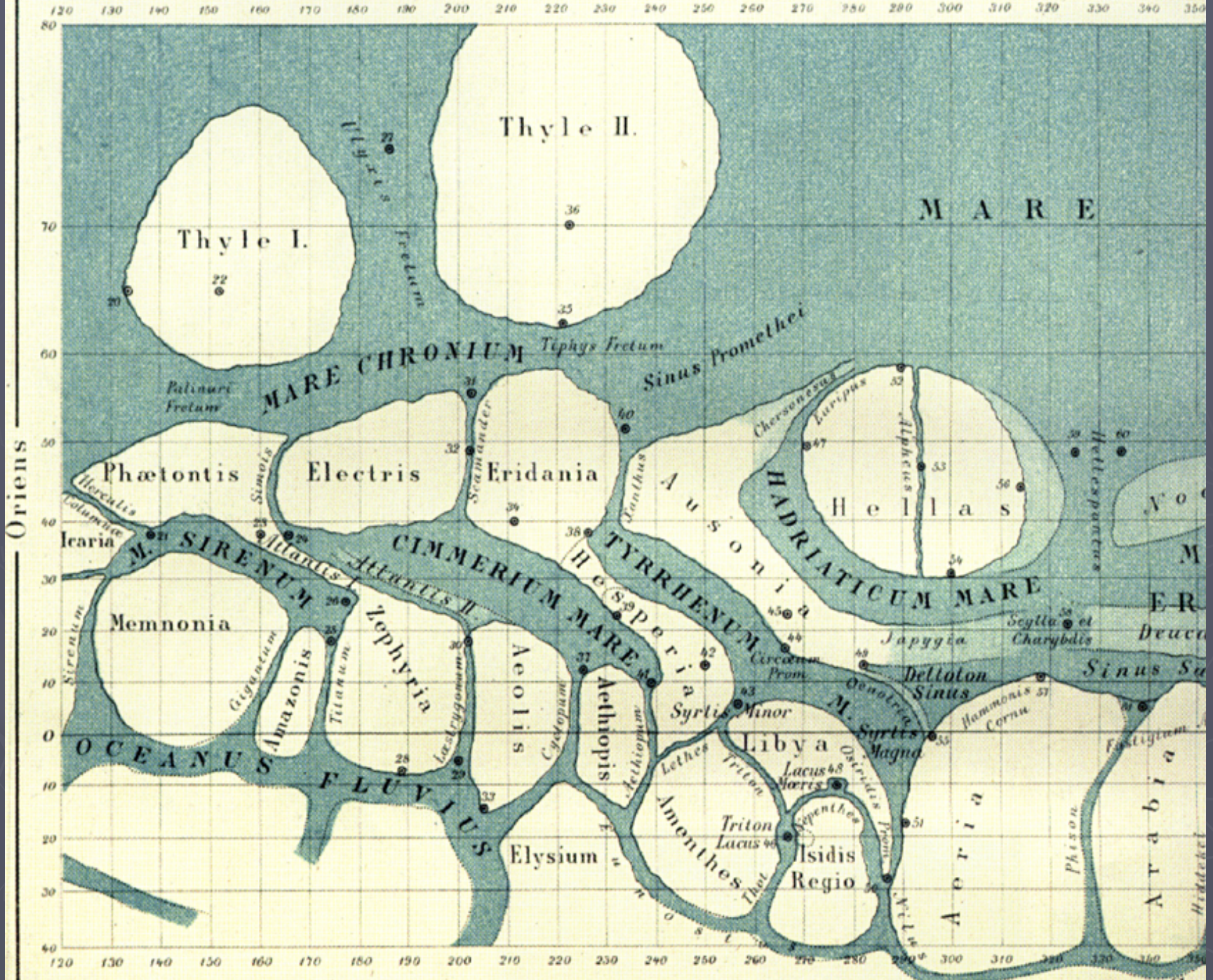
The southern portion of the chart is supplied from drawings made in 1875, and may be considered provisional. The names with a few exceptions are those employed by Mr. Peiry in his chart of Mars, adopted as far as possible to the recent observations. New names have been added by the Author where required.



Green

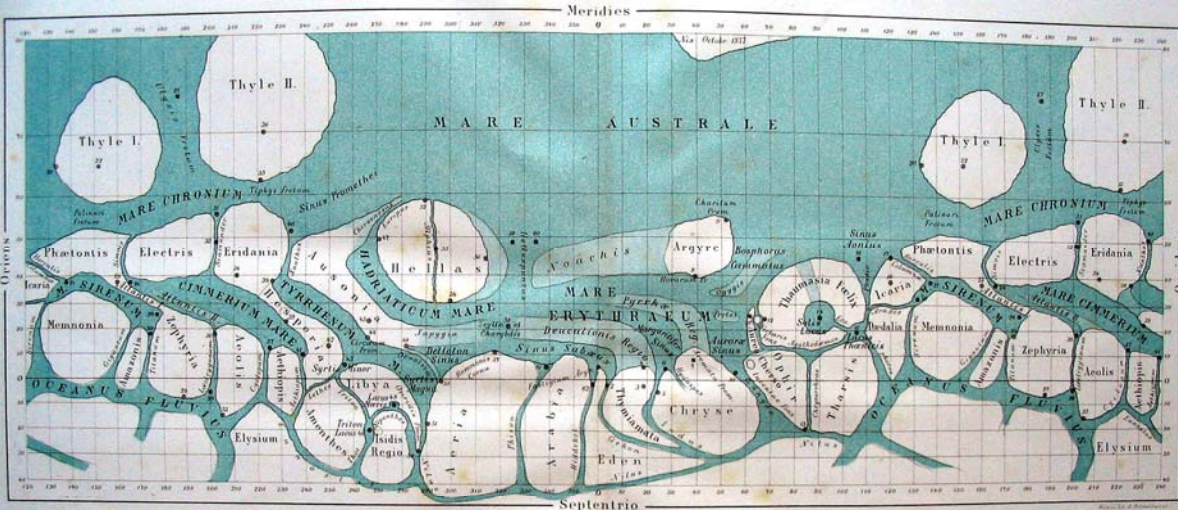


Schiaparelli



Maps of 1877-78

Nathaniel Green



Tab. III

MAPPA AREOGRAPHICA

Exhibens Planetæ Martis Chorographiam inter Polam Australem et Parallelum 40^{am}

Latitudinis Borealis;

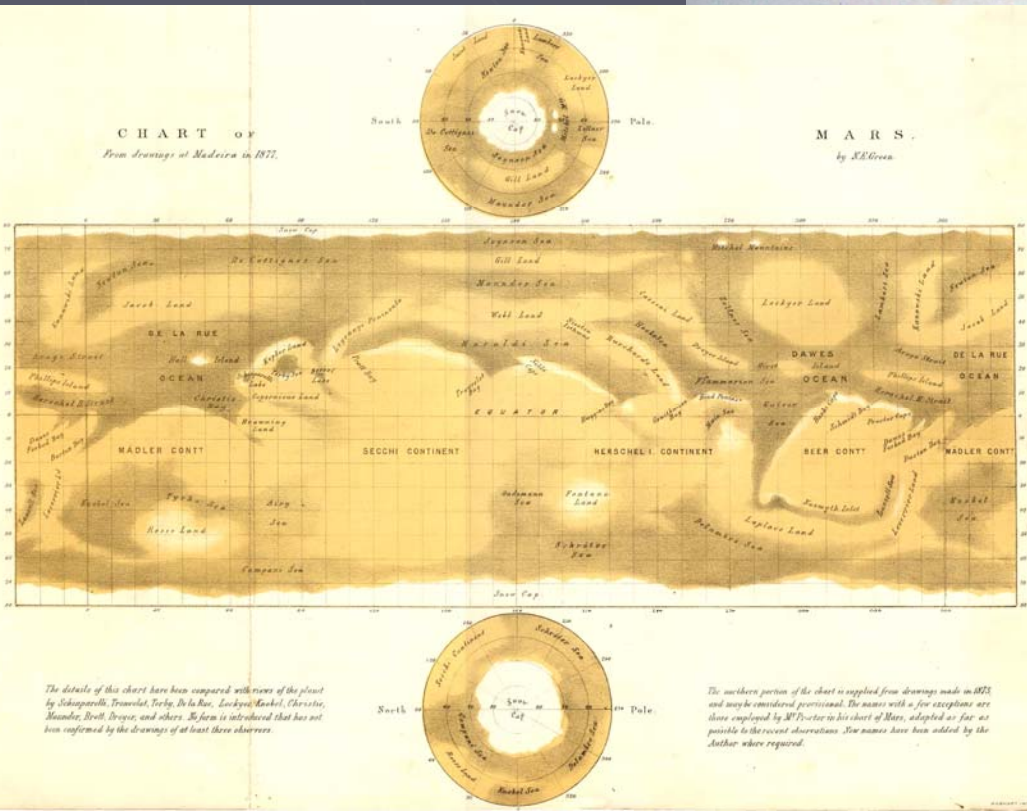
Ex propriis Observationibus atque Mensuris ope Tubi Merziani decompedatis

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compositus, suppletus atque delineavit J.V. Schiaparelli

1877 — 1878.

Giovanni Schiaparelli

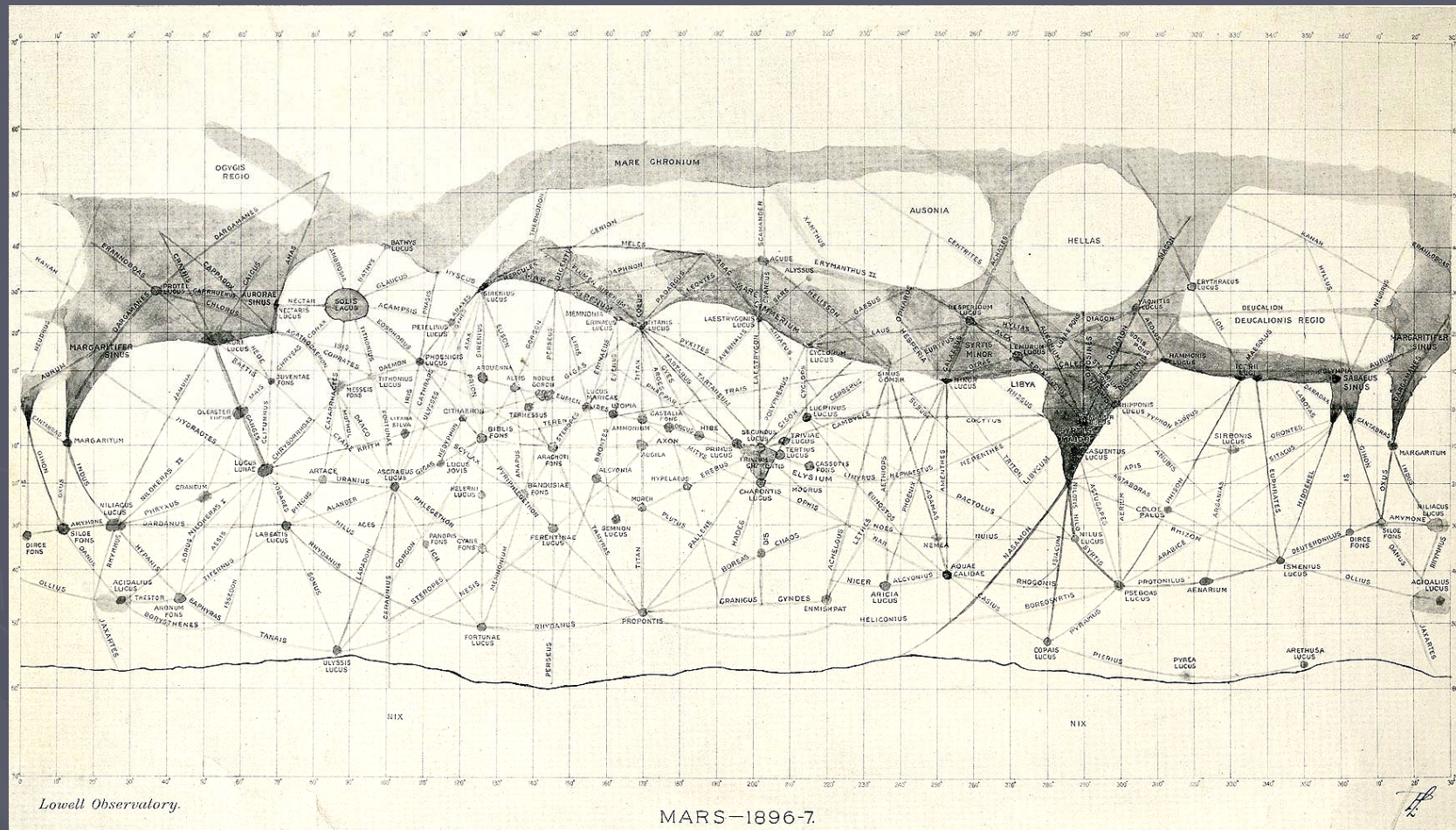


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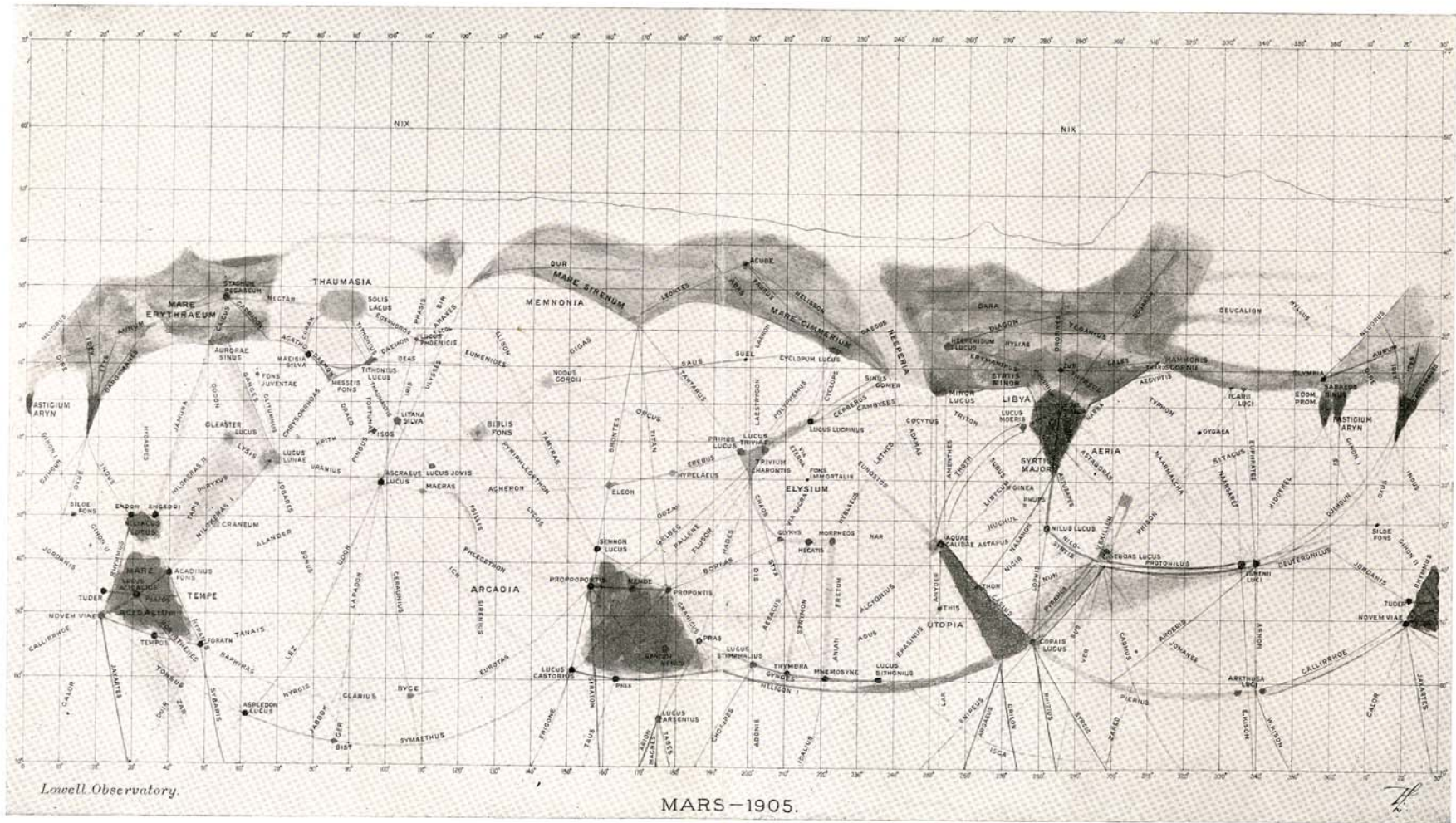
The southern portion of the chart is supplied from drawings made in 1875, and may be considered provisional. The names with a few exceptions are those employed by Mr. Forster in his chart of Mars, adopted as far as possible to the recent observations. New names have been added by the Author where required.

“The only reason I can see for this attempt to discard the old names is that they were of English application, and so hurt the self-love of all who are not English. At any rate the selection of new names seems to have been made on the principle that no English need apply. ... [The names chosen] are a remarkably evil sounding lot.”

Edwin Holmes, in the *Journal of the British Astronomical Association*



Percival Lowell, 1897



Percival Lowell, 1905

First Word of Science as to Life on Mars.

Boston Astronomer, after Years of Study, Says the Planet is Inhabited



PERCIVAL LOWELL

With the first line given to astronomy, Mars has been declared by the leading authority in the study of the planet to be inhabited. This was done by Prof. Percival Lowell.

The right hemisphere of this sphere transmitted nearly the shape of a sphere in approaching the telescope. How Mars was seen to have an atmosphere, this meant, as required in the scientific connection, that a terrestrial atmosphere would be present also. How the clouds, which were seen, showed the existence of water, and how the mountains were seen to have been formed.

The low water in the northern half appeared to the faintest study of years by an astronomer, (Lowell) observed, compared with the best actual facilities modern humanity could furnish. It was undoubtedly a vast extension of the northern ocean to a depth of several miles.

In the course of planetary evolution, there has been a certain amount of water, but as the planet has cooled, the water has been drawn off into the atmosphere, and the water has been drawn off into the atmosphere, and the water has been drawn off into the atmosphere.

The low water in the northern half appeared to the faintest study of years by an astronomer, (Lowell) observed, compared with the best actual facilities modern humanity could furnish.



NORTHERN HEMISPHERE OF MARS. POLAR ICE CAP IN THE CENTER SHADED PORTIONS. BELIEVED TO BE INHABITED PORTIONS WITH VEGETATION.



LOWELL TELESCOPE IN OBSERVATORY AT FLAGSTAFF, ARIZ.

Intellectual development, who had acquired a degree over which, as an astronomer of the first rank, would have been the result, if they were not. This is not an astronomical statement, but the evidence of the fact that the planet has a certain amount of water, and that the water has been drawn off into the atmosphere, and the water has been drawn off into the atmosphere.

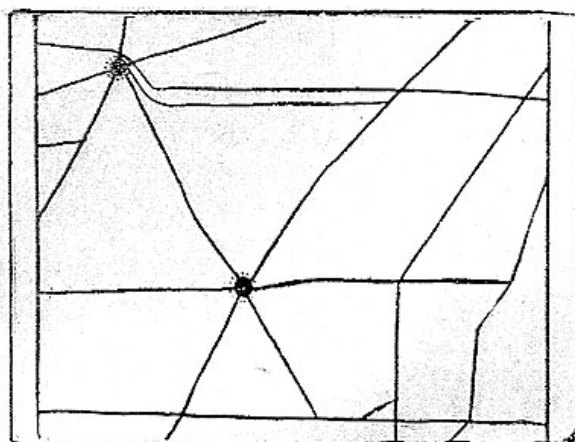
with the knowledge of the world. The following table gives the names of Mars in each country in each language.

Country	Name
American	Mars
Arabic	Al-Mars
Chinese	Hsiao Hsing
Dutch	Mars
English	Mars
French	Mars
German	Mars
Hebrew	Mars
Italian	Mars
Japanese	Mars
Latin	Mars
Portuguese	Mars
Russian	Mars
Spanish	Mars
Swedish	Mars
Teutonic	Mars
Welsh	Mars
Yiddish	Mars

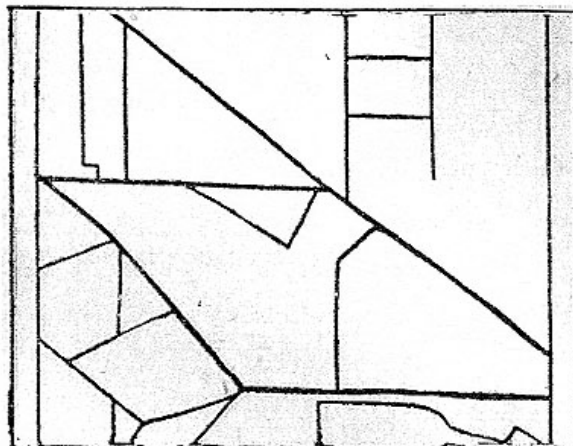
On the earth all the large continents are in the northern hemisphere. The same is the case of Mars. The northern hemisphere of Mars is the larger, and the southern is the smaller. The polar ice cap in the center of the northern hemisphere is the largest, and the polar ice cap in the center of the southern hemisphere is the smallest.

The polar ice cap in the center of the northern hemisphere is the largest, and the polar ice cap in the center of the southern hemisphere is the smallest. The polar ice cap in the center of the northern hemisphere is the largest, and the polar ice cap in the center of the southern hemisphere is the smallest.

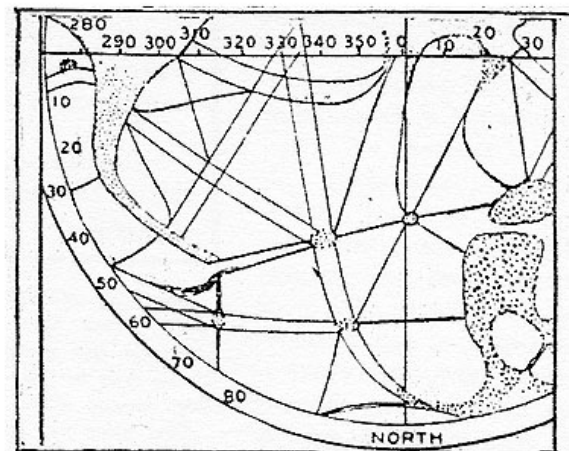
The polar ice cap in the center of the northern hemisphere is the largest, and the polar ice cap in the center of the southern hemisphere is the smallest. The polar ice cap in the center of the northern hemisphere is the largest, and the polar ice cap in the center of the southern hemisphere is the smallest.



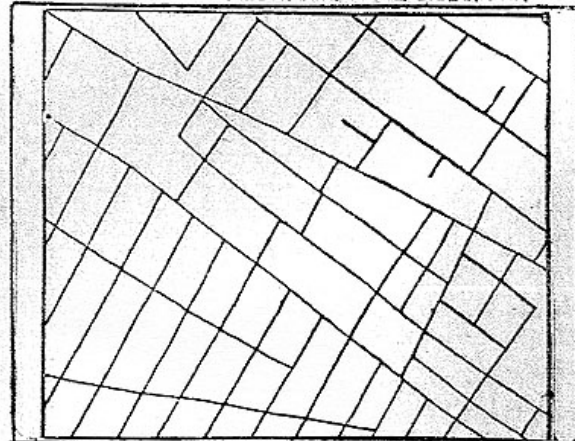
37 MILES OF RAILROADS IN ILLINOIS



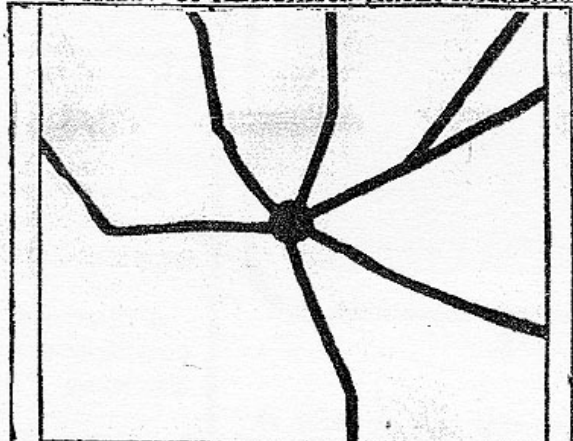
1 3/4 MILES OF IRRIGATION CANALS IN ARIZONA



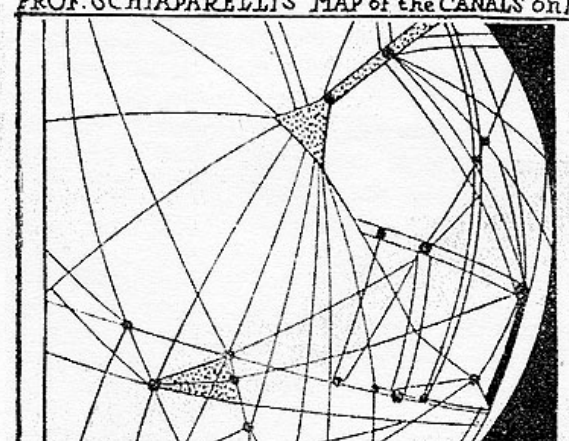
PROF. SCHIAPARELLI'S MAP OF THE CANALS ON MARS



1/2 A MILE OF MONTREAL STREETS

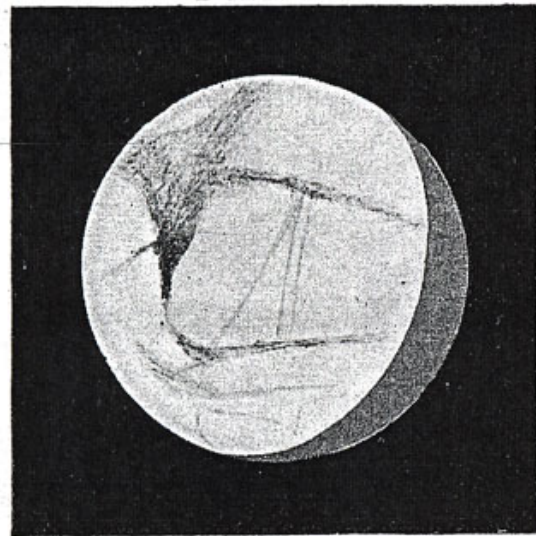


10 MILES OF CANALS AT GRONINGEN, HOLLAND

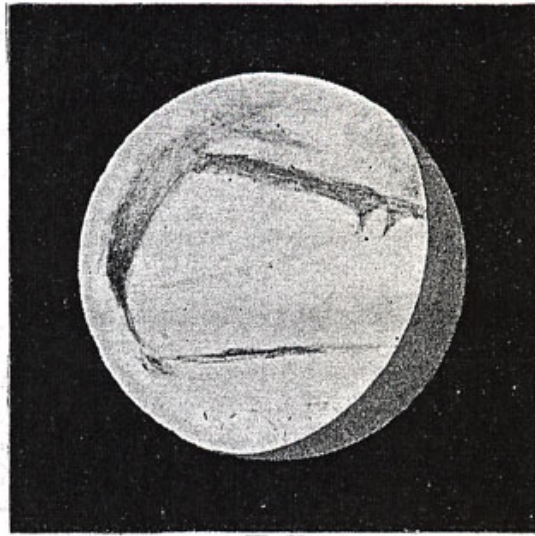


PROF. LOWELL'S GLOBE OF MARS

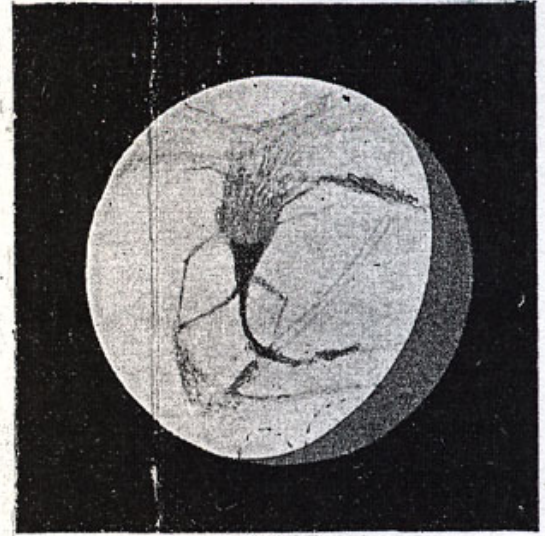
From *Mars and its Mystery*, by
E. Morse, 1905



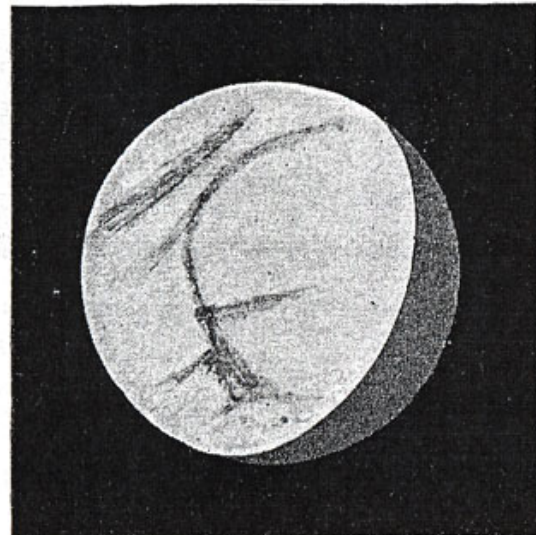
L



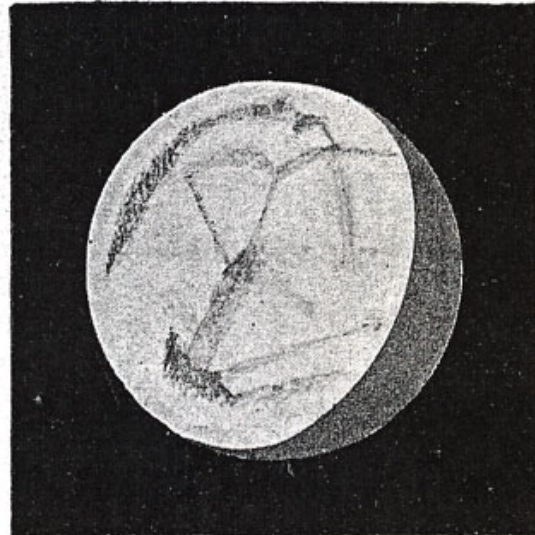
LI



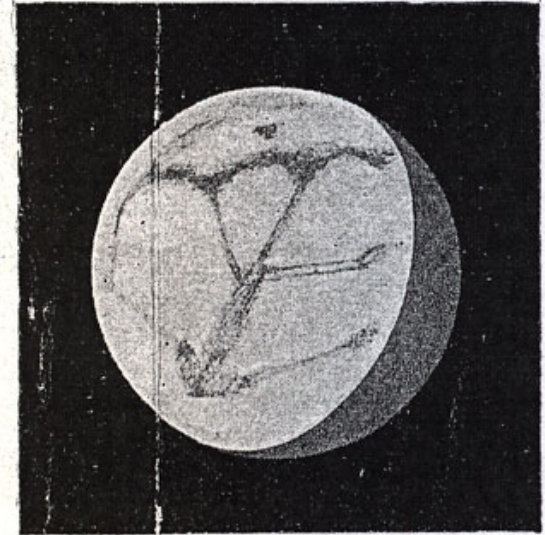
LII



LIV



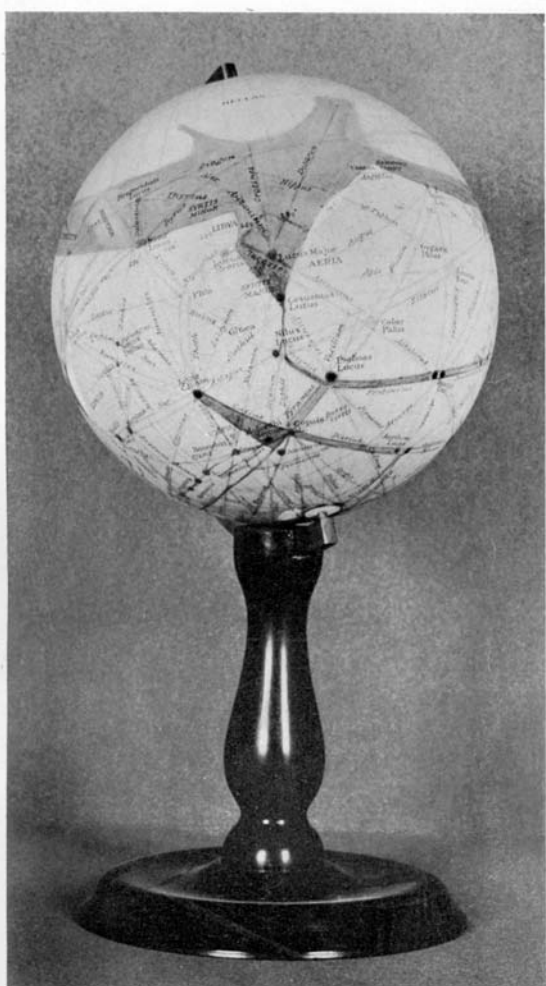
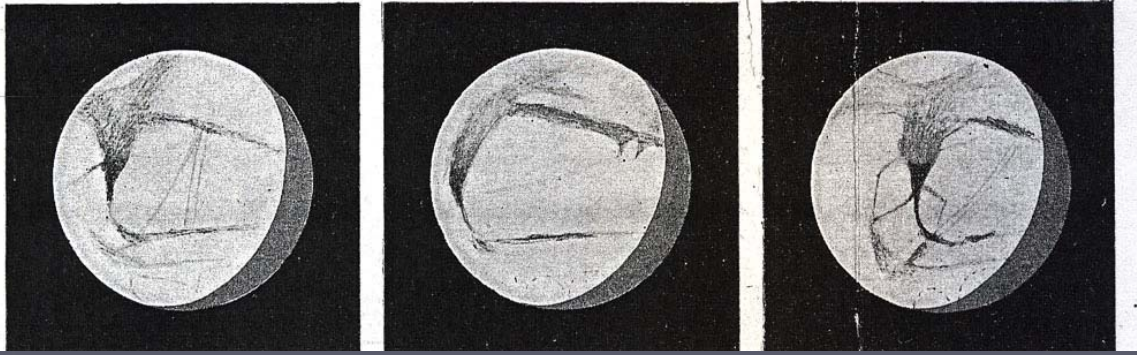
LV



LVI

Sketches by W. Leonard, 1907

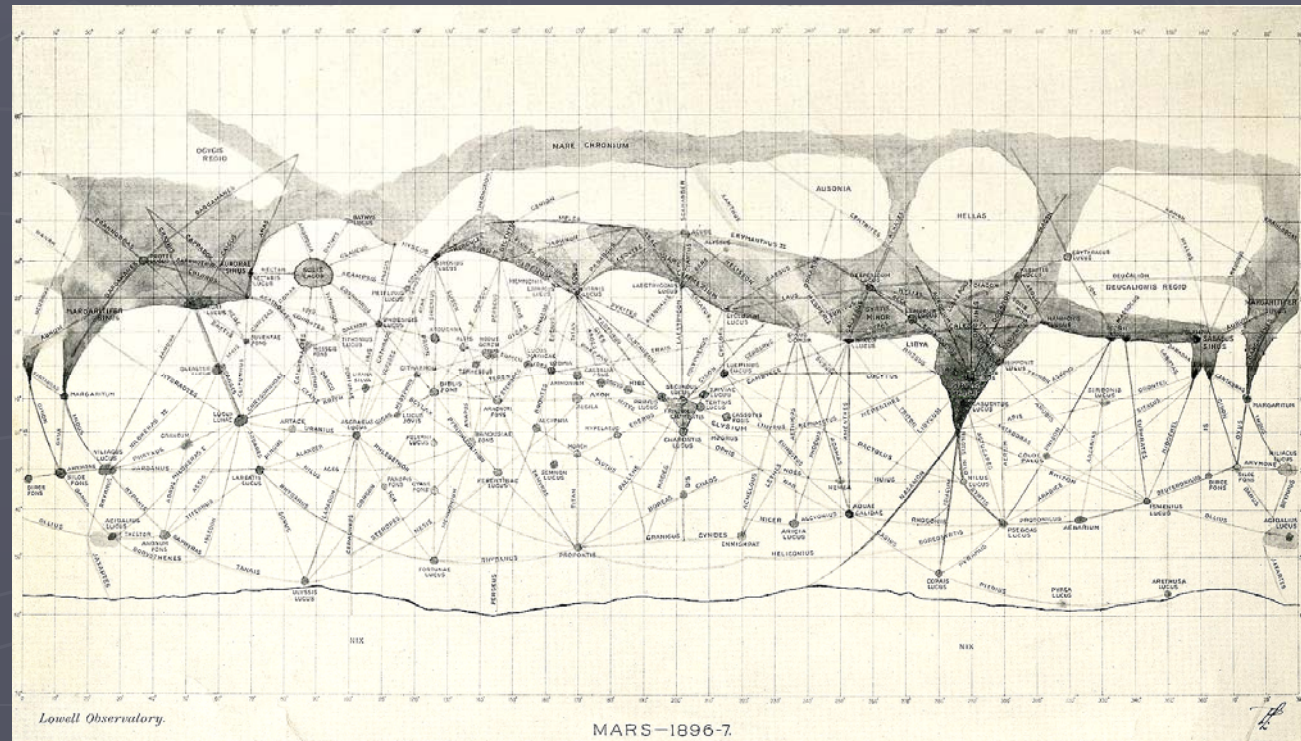
Lowell's cartographic process



LOWELL'S GLOBE OF MARS, 1903. Frontispiece

2

3

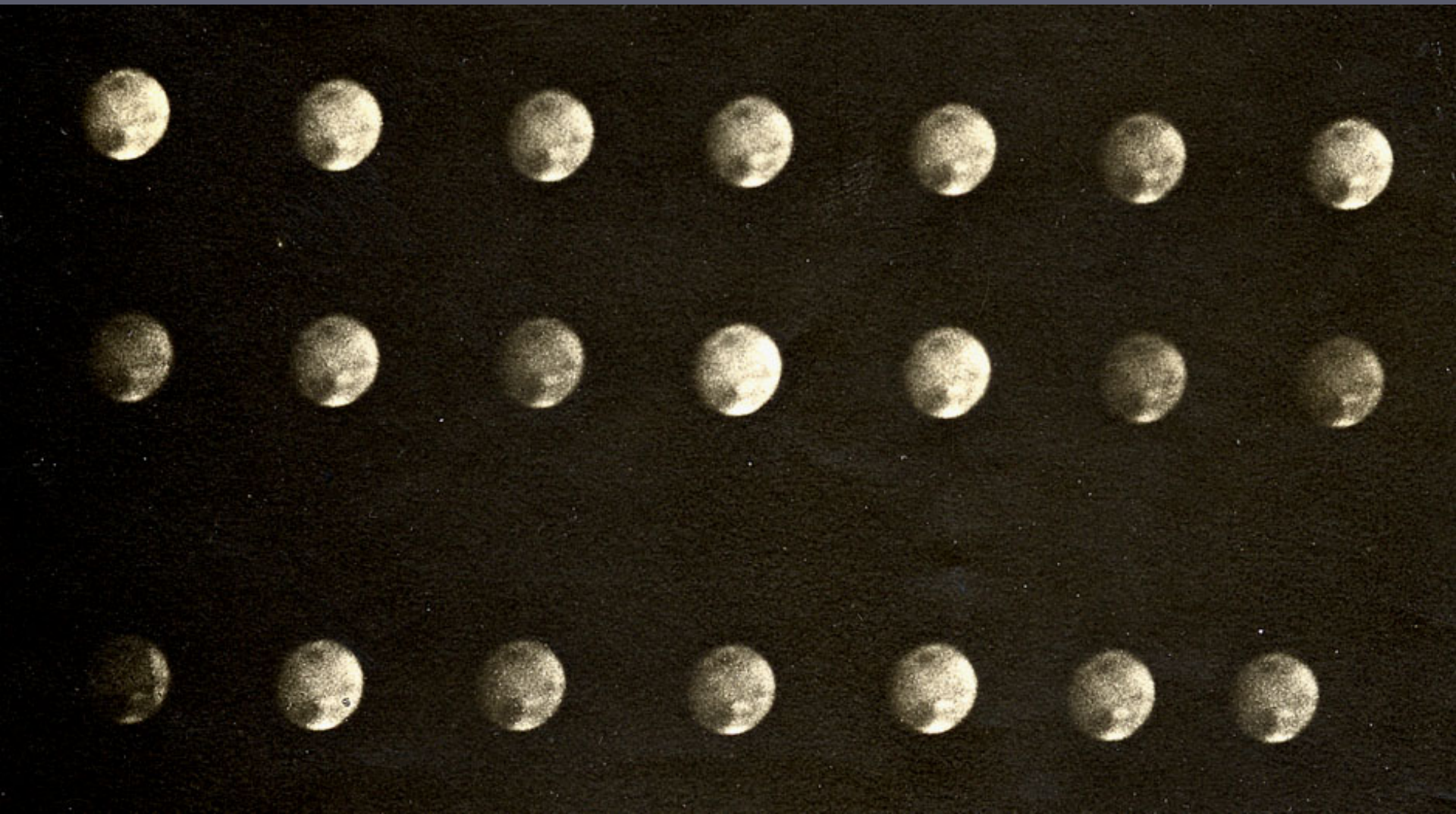


Importance of cartography to the Mars canal episode

- ▶ Maps established the authority of the inhabited-Mars hypothesis
- ▶ Map-related controversies spurred interest in Mars
- ▶ The iconic image of canal-covered Mars was purely an artifact of cartographic projection

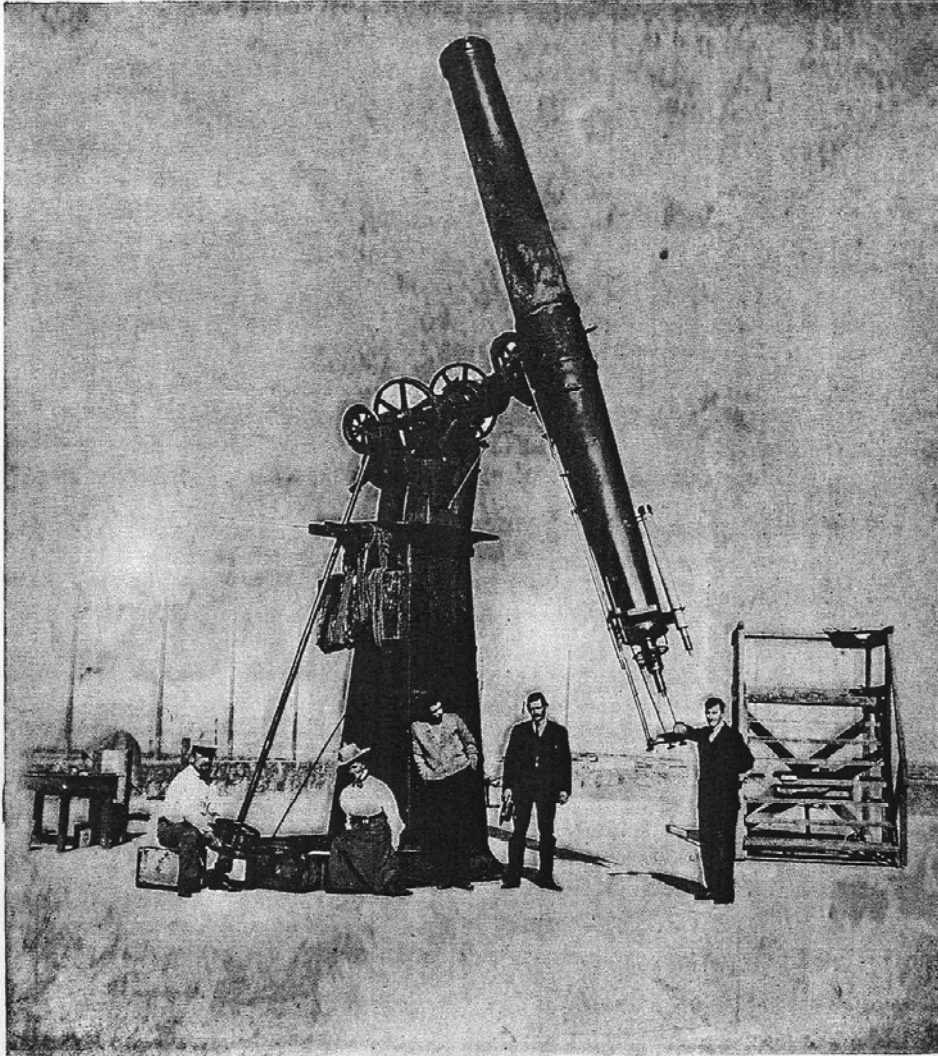
Importance of cartography to the Mars canal episode

Did maps influence the post-1909 decline
of belief in an inhabited Mars?



Lowell's photographs of Mars:
"The photographic plate cannot lie."

Lowell expedition to the Andes 1907



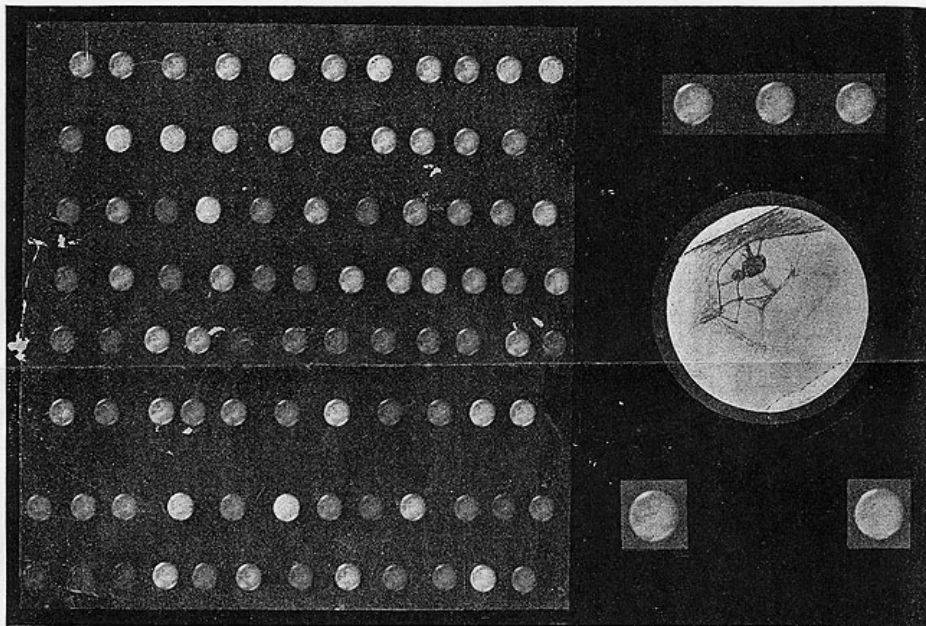
THE AMHERST TELESCOPE IN POSITION AT ALIANZA, CHILE

The telescope was mounted in a cemented tennis-court, 4200 feet above sea-level. The large weight attached by means of a rope was for the purpose of counterbalancing the increased weight of the tube in the Southern hemisphere, it having been constructed for use at 42° North latitude. The planetary camera (not shown here) about five feet in length, was attached to the lower end of the telescope. The observing chair is in the background at the right. The members of the expedition, from left to right, are Professor David P. Todd (in charge), Mrs. Todd, Robert D. Eaglesfield, A. G. Ilse, and E. C. Slipher.

9,000 images
of Mars recorded
on photographic
plates

Before long, cables began to arrive at Flagstaff which showed that the expedition had met with unqualified success—success indeed beyond expectation, and following on their heels as fast as steam could bring them came the actual prints. Even to the expert eyes that scanned them critically they proved little less than astounding. Not only were canals and

plates, which, again, are impressed upon the magazine sheet. If the old saying be true that "three moves are as bad as a fire," it is clear how much has inevitably been lost in these steps made in order that they might be presented to the general reader at all. Later, the original prints will, I trust, be exhibited in the Natural History Museum of New York,



No. 4. SHOWING VARIETY OF INTENSITY OF IMAGE. THE DIFFERENCE IS DUE TO VARIATION IN TIME OF EXPOSURE

REGION OF THE SOLIS LACUS. LONGITUDE OF THE CENTER OF THE PHOTOGRAPH, 90° . ENLARGEMENTS, AND PROFESSOR LOWELL'S DRAWING

oases evident there, but these showed with a delicacy of delineation which spoke for the steadiness of the air through which they had been taken as well as for Mr. Slipher's skill in taking them. When we consider that stability in the telescope is essential, and that in this case the instrument was only temporarily set up, the excellence of Mr. Ilse's mounting and of Mr. Slipher's manipulation of it become apparent.

In scrutinizing these views, one should remember two things: first, that what he sees on the printed page is three removes

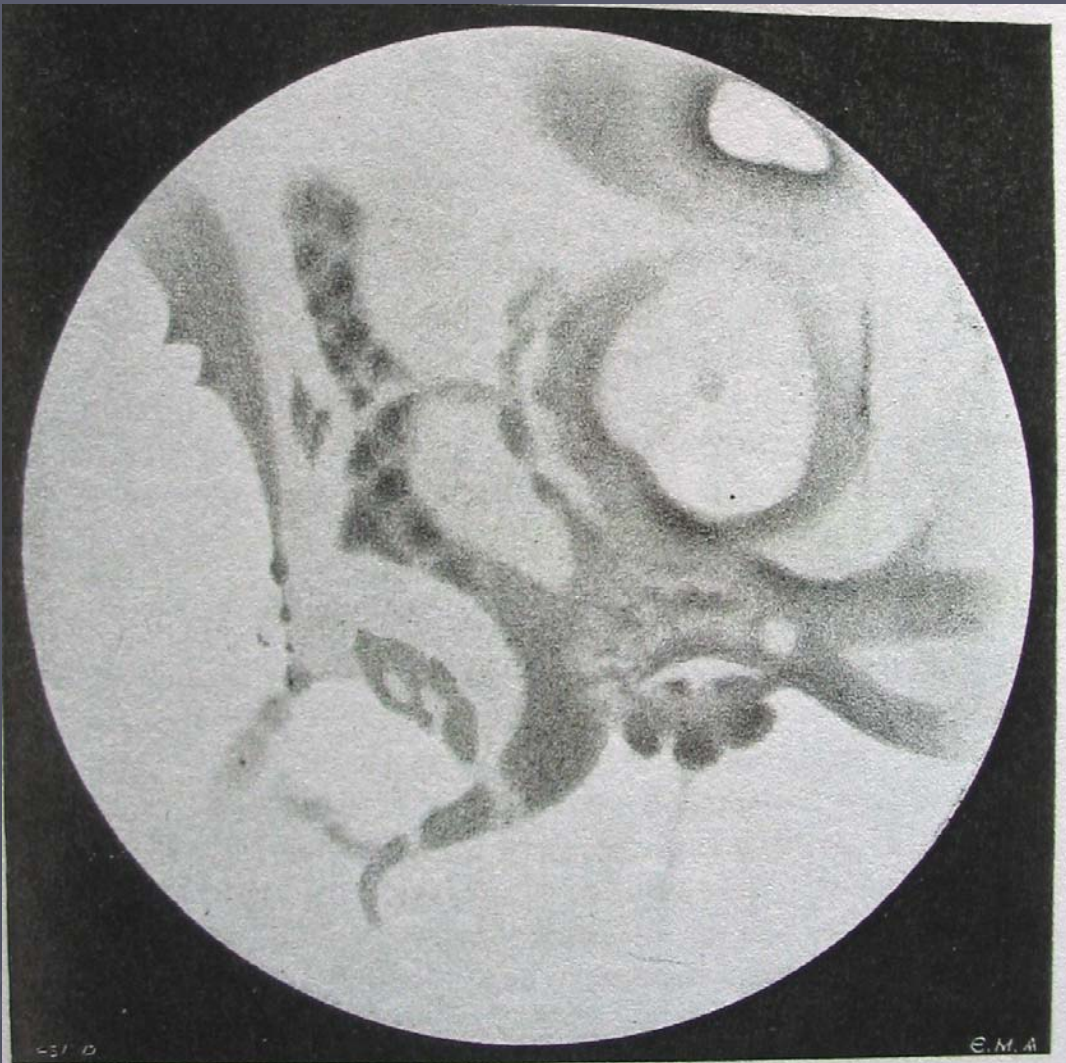
where those interested can scan them for themselves.

Secondly, the reader should be warned against thinking that magnification by a hand-glass will enable him to see them more precisely. For the grain of the plate already magnified opposes itself to any such resolution. For an acute eye they are best as they are, but for those of less penetrating sight a very slight enlargement is necessary. But this must not be overdone.

The small size of these bullets from Mars demanding minute scrutiny to read

Lowell's photographs
published in
The Century
Magazine, 1907

Mars as sketched by Antoniadi 1909



1. - 1909, September 20. $\omega = 279^\circ$, $\phi = -20^\circ \cdot 2$.

Excellent definition.



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