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FROM SILVER TO SILICON

HUBBLE VIEW OF THE ORION NEBULA

Over five hundred Hubble Space Telescope images, in five different wavelength bands, have been stitched together to create this stunning mosaic of the Orion Nebula, one of the best-studied star-forming regions in the sky. The image shows over 3000 stars, most of which were born recently. Digital image processing makes it possible to combine optical and near-infrared data in one picture.

Observing the Universe through the eyepiece of a telescope is one thing, but recording the observations for posterity is something quite different. Originally astronomers used pen and paper to draw what they saw, but the human eye is a lousy detector and our brain can play tricks on us. Astrophotography, first explored in the mid-nineteenth century, has proved to be a powerful, objective way of recording telescopic images with the advantage that long exposures revealed much more than the eye could ever see. But the true revolution arrived with electronic detectors and digital image processing.

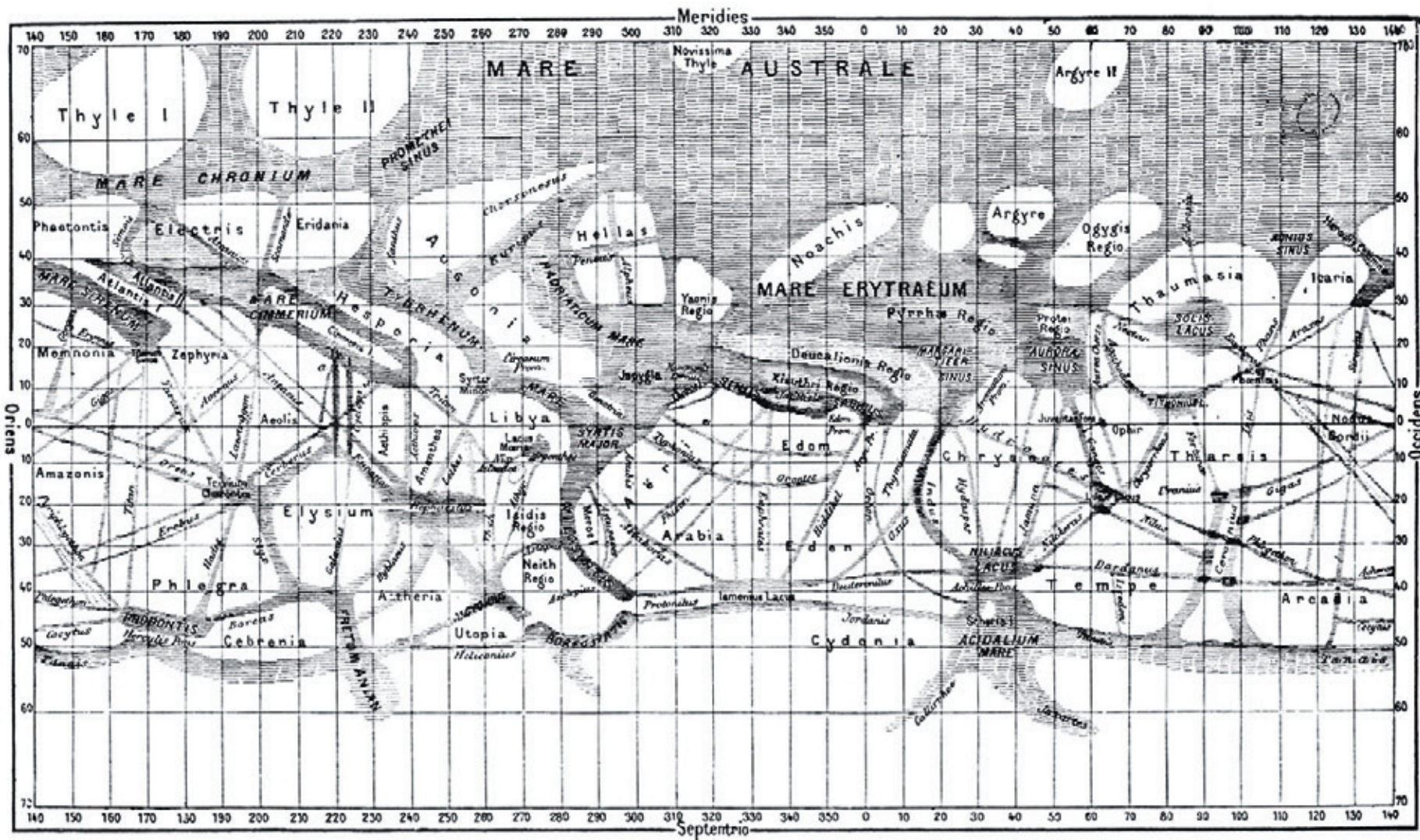
“For well over two hundred years,
astronomers also had to be artists”

Four centuries ago, Galileo Galilei made pencil sketches of what he saw through his telescopes: the pockmarked face of the Moon, the dance of the jovian satellites, dark spots on the Sun and the stars of Orion. To share his discoveries he published his drawings in a small pamphlet called *The Starry Messenger*.

For well over two hundred years the astronomers who peered through their eyepieces and made detailed drawings of what they saw also had to be artists, sketching the stark landscape of the Moon, storms in the atmosphere of Jupiter or subtle veils of gas in a distant nebula. Although it was possible to use crosshairs, micrometers and precise timing devices to measure positions and dimensions on the sky accurately, the final depiction of the telescopic image remained a very personal, artistic endeavour.

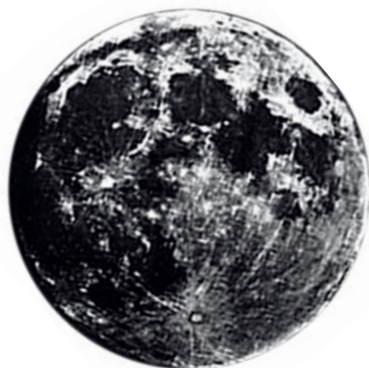
Sometimes astronomers would draw features that didn't exist — like canals on Mars. Mars is a small and distant planet and the telescopes of the late nineteenth century were barely able to reveal surface details on its tiny, reddish disc. During rare, brief moments of perfect seeing, Italian astronomer Giovanni Schiaparelli picked out *canali* — dark linear features spanning the Martian globe. Percival Lowell in the United States saw them too. According to Lowell, these canals constituted a giant network irrigating the dry equatorial regions of Mars with water from the poles. Apparent signs of civilised life on the red planet!

It was all wishful thinking. There is no civilisation on Mars. We now know that the canals are an optical illusion, produced by the eye's tendency to find patterns everywhere. The human eye can be deceived: astronomers needed an objective technique for recording telescopic images.



“Photography came to the rescue”

Photography came to the rescue. The first daguerreotype of the Moon was made by John William Draper in 1840. Photography was less than fifteen years old, but astronomers were already alive to its revolutionary possibilities. Ten years later, at Harvard College Observatory, astronomers took their first daguerreotype of a star, Vega. And in 1880, Draper’s son Henry took the first photo of the Orion Nebula — no small feat, given how faintly the nebula glows.



THE FIRST PHOTOGRAPH OF THE MOON

On 18 December 1839, British-American scientist John Draper was the first person in history to take a photograph — or, to be more precise, a daguerreotype — of the Moon. Draper’s moon shot was the start of astrophotography, a technical discipline that would completely revolutionise astronomy.

GIOVANNI SCHIAPARELLI’S MAP OF MARS

The human eye can easily be misled. In the late 19th century, Italian astronomer Giovanni Schiaparelli thought he saw straight, dark lines on the surface of Mars. In this Mars map, based on his sketches and adorned with Schiaparelli’s nomenclature, it is suggested that the Martian “canals” are indeed waterways connecting “seas” and dividing the terrain into a large number of different “lands”. Astronomers later realised that the canals on Mars are an optical illusion.