

is “particular” because it was a rare phenomenon and attracted a great deal of attention; and it was a “star,” because, like SN1572, it was starlike in appearance and appeared fixed among the other stars on the celestial sphere (Drake 1978, 104–5).

In *All's Well*, Helen's fixation on SN1604 plays out for the duration of the play, just as the Ghost in *Hamlet* that appears from the direction of SN1572 is central to the structure of that plot. Just as the identification of SN1572 is confirmed by subsequent events in *Hamlet* (Usher 2010, 100–107), so we expect that the present identification of SN1604 will be validated by ensuing developments in *All's Well*. In fact, 12 lines after Helen invoked the bright particular star, the script delivers the necessary confirmation.

Immediately after Helen has finished analogizing Bertram to a bright particular star, a soldier Paroles enters, whom Helen defines as foolish, mendacious, and cowardly. Paroles is decked out in outlandish garb, and he talks a good line. His appearance is comedic, as is his choice of a conversational topic. He is not supposed to have overheard Helen's soliloquy on her love for Bertram, yet straightaway he asks Helen whether she is meditating on virginity. His obsession is amusing, but it “has puzzled commentators” (Hunter 2000, p. xli).

When it comes time for Paroles to leave, his farewell is patronizing. “If I can remember thee, I will think of thee at court,” he tells Helen. But she is equal to the challenge, and her rejoinder only seems complimentary. “Monsieur Paroles, you were born under a charitable star,” she says. Paroles takes the bait, and the pusillanimous warrior cannot resist adding that he was born “Under Mars,” which is a reference to the Roman god of War. Helen seizes the opening. “I especially think *under* Mars,” she says, emphasizing the word *under*. The emphasis puzzles Paroles. “Why *under* Mars?” he asks, to which Helen explains: “The wars hath so kept you under that you must needs be born under Mars.” Once again, Paroles' addiction to self-promotion gets the better of him: “When [Mars] was predominant,” he says, but Helen's rejoinder scores the equalizer: “When he was retrograde, I think rather, [because you] go so much backward when you fight.”

Helen alludes to the retrograde motion of planet Mars, where in astronomical usage, “retrograde” refers to apparent angular motion in the opposite direction of the Sun around the ecliptic, *i.e.* from east to west relative to the background stars. In reality, in the heliocentric model of Nicholas Copernicus (1473–1543), the Earth overtakes Mars every 780 days (≈ 26 months) because Earth moves more swiftly and in a smaller orbit. Mars is then closest to Earth and at its brightest, and thus prominent in the night sky. Over a period of weeks and months, Mars appears to reverse its direction of motion, even though, of course, a hypothetical observer located among the stars would see Mars continue to go around the Sun in the same sense as the Earth. This gives Shakespeare a perfect

opportunity to exemplify the “dilemma most persistent in Shakespeare—that of appearance and reality” (Hunter 2000, p. xl).

Other meanings of the verb “to retrogress” listed in the *Oxford English Dictionary*, and prevalent in the early modern age, are: “to turn back,” “to reverse,” “to retrace one's steps,” or “to return along a former course.” The emphatic reference to Paroles (*i.e.* Mars) retrogressing (*i.e.* retracing his steps), and the fact that Helen refers to Paroles' past endeavours, suggests that we turn back the clock and let Mars retrace its steps. The starting time of the retrogression is likely to be the date on stage at the time, which as posited, is the date of the first sighting of SN1604, 1604 October 9. We discover that Mars undergoes retrograde motion from 1604 March 1 to May 19, and remarkably, it does so across the constellation Virgo, the Virgin (Figure 2). It is not coincidental that the immediately preceding dialogue between Helen and Paroles is a lengthy discourse on virginity, and that both contain starry conceits.

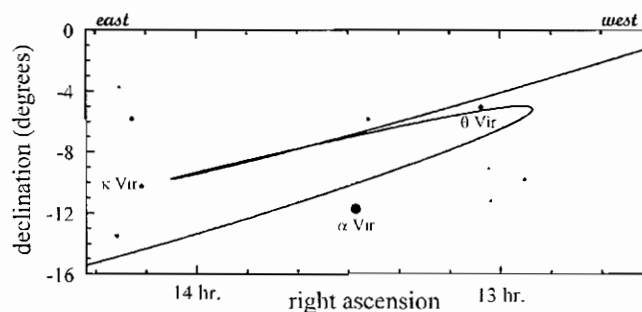


Figure 2 — Mars moves progressively from west to east (right to left on the chart) relative to the background stars, but from 1604 March 1 to May 19, it moved retrograde from east to west, before resuming its prograde motion. The looping occurs across the constellation Virgo, whose brightest star is α Virginis (Spica). The period covered on the chart is from 1603 December 24, to 1604 July 30. (Data from Voyager 4.0.6 by Carina Software © 1990–2008.)

There is additional support for the mooted identification. As posited, the present argument dates the beginning of *All's Well* as the time of the first observation of SN1604, which sets an early limit of 1604 October 9 for the time of writing of the play. This lies well within the dates 1603–5 suggested by other arguments (Bate and Rasmussen 2011, 182; Hunter 2000, pp. xviii–xxv; Leggatt 2003, 10–11; Snyder 1993, 24). The prior and next intervals when Mars undergoes retrograde motion are 1602 January to April, and 1606 April to July, neither of which occurs in the foreground of Virgo and both of which lie outside the commonly accepted range of writing.

Helen associates Bertram with SN1604 and Paroles with Mars, so the two roles are associated with celestial phenomena. The nobleman Bertram has the superior position relative to the commoner Paroles, just as a star fixed on the celestial sphere of the stars has a superior position to any foreground planet.

Both Bertram (as SN1604) and Paroles (as Mars) are flawed according to the rubric of Aristotelian philosophy (and their flaws are quite evident as the play progresses), because the phenomena they represent violate the old dogma of celestial perfection, the former owing to the violation of the dictum that the sky be perfect and therefore unchanging, and the latter because retrograde motion is a flagrant violation of the dictum that celestial sources are supposed to move prograde across the celestial sphere.

Finally, in the next scene 1.2, “catastrophe” and “heel” occur in the same line (1.2.57), and in the scene after that, we find the word “serpent” (1.3.141). Shakespeare writes always to a purpose, yet these occurrences are seemingly unwarranted by context. Probably, they refer to the new star that erupted, as if catastrophically, in the heel of Ophiucus, the Serpent-Bearer, which Kepler in his treatise *De stella nova in pede Serpentarii* called the Serpent.

Is SN1604 the only option? Helen says that the candidate must be bright, particular, starlike, and “far above me.” In olden days, “star” meant any celestial light source, and the next best guess for an exceptionally bright object is the Sun. But, in the ancient model of the Universe, the Sun’s orbit lies inside the orbits of Saturn, Jupiter, and Mars, and is therefore not particularly far above the Earth. Another candidate at high altitude would be Saturn, which is next highest compared to SN1604, and could be regarded as particular because it is the slowest of the planets to complete a circuit of the celestial sphere. But, Saturn is not particularly bright as it reaches an apparent magnitude of only -0.5 , which is fainter than the two brightest stars in the sky (Sirius and Canopus). *

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Lowell Observatory and its New Discovery Channel Telescope

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In addition to its breathtaking mountain scenery—including the soaring San Francisco Peaks and Sunset Crater National Monument—Flagstaff, Arizona, is home to a number of important astronomical landmarks. The region enjoys a high percentage of exceptionally clear, transparent nighttime skies, largely due to its average elevation around 2100 m and dry, semi-desert setting. Flagstaff also takes pride in being named the first International Dark-Sky Community in 2001 by the International Dark-Sky Association. Consequently, light pollution in the region is minimal and well contained, thanks to sensible lighting ordinances that keep regional skies pristine for astronomers and nature lovers alike.

Meteor Crater, the best-preserved impact basin on Earth, lies some 40 miles east of Flagstaff, a stark reminder that our planet has been, and will continue to be, the target of debris from space. As if to underscore that very possibility, the US Geological Survey’s Shoemaker Center for Astrogeology is also located in Flagstaff. Named after its founder, the late Eugene Shoemaker, the centre is a major hub of planetary research. Shoemaker, his wife Carolyn, and amateur astronomer David Levy, are probably best known for their discovery of the spectacular Comet Shoemaker-Levy 9, which struck Jupiter in 1994. Another important astronomical facility a few miles west of the city is the U.S. Naval Observatory’s Flagstaff Station. Important astrometric work and related research are carried out there with several telescopes including the 1.55-m Kaj Strand reflector.

The region’s prime astronomical attraction, however, is Lowell Observatory. Established in 1894 by Percival Lowell, a prominent Bostonian, it is among the oldest observatories in the United States, and was designated a National Historic Landmark in 1965. In 2011, the observatory was named one of “The World’s 100 Most Important Places” by *TIME* magazine. The original campus, perched atop Mars Hill at an elevation of 2200 m, has a commanding view of the region and welcomes some 80,000 visitors a year. In addition to a fine museum and visitor centre, numerous exhibits, and a gift shop, guests can tour the attractively landscaped campus during the day. They can see the telescope and photographic plates used to discover Pluto, and look through the venerable 120-year-old 24-inch Clark refractor used by Percival Lowell to study Mars and the other planets. Weather permitting, visitors can also enjoy observing with the Clark and many other telescopes at night (Figure 1).