“Doing My Best to Watch Phenomenal Stars”: Variable Star Astronomy in Thomas Hardy’s *Two on a Tower* (1882)

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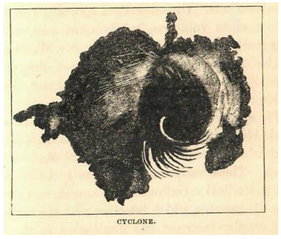
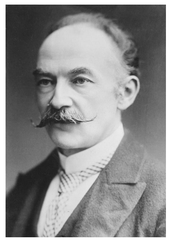
Introduction:

In H.G. Wells’ classic 1895 novella *The Time Machine* the traveler journeys millions of years into the future, to a dying earth where the weak light of the now shrunken red dwarf sun is insufficient to warm the planet despite its now much smaller distance from us (thanks to tidal effects) (Wells 2005, 84). Wells’ description reflects quite accurately the astronomical understanding of his day, when the source of the sun’s energy was erroneously thought to be caused by our star shrinking itself out of existence. Literary scholars (e.g., Beare 1996, 33) have incorrectly interpreted the evolution of Wells’ sun as reflecting the knowledge of the late 20th century and its expansion into a red *giant* rather than a red *dwarf*. In this way we see that not only does a careful exploration of novels, short stories, and other media afford us valuable insights into the scientific knowledge and public misconceptions of the time of the media’s creation (as well as the author’s personal scientific knowledge), but that the examination of such texts by astronomers is likely to result in a far different analysis than that by literary scholars.

Pop culture references to variable stars specifically provide a snapshot of our understanding of these objects and their familiarity to the general public at a given moment in time. For example, the 1901 nova outburst of GK Persei appears in H.P. Lovecraft’s 1919 short story “Beyond the Wall of Sleep,” the story quoting by name a description of the event from the then popular work Garrett P. Serviss’ *Astronomy with the Naked Eye* (1908). Edmond Hamilton’s 1934 novella *Thundering Worlds* explores the future adventures of humanity in search of a new star once our sun begins to die. One rejected candidate is about to go nova, while another is an eclipsing binary whose frequent eclipses by a dead companion are considered too problematic for a civilization reliant on solar energy.

Perhaps the most astronomically interesting fictional depiction of variable star astronomy has thus far largely escaped the notice of scholars beyond focused studies of its author, the 1882 Thomas Hardy romance *Two on a Tower*. The star-crossed love affair between Lady Vivette Constantine and younger astronomer Swithin St. Cleave begins in the titular observatory with an observation of solar activity, a cyclonic “maelstrom of fire” that serves as a fitting metaphor for their ill-fated relationship (T. Hardy 1993, 11). The astronomical detail in this lesser-known of the author’s works (the ninth of his published novels) – including observations of comets, planets, aurora, the sun, and the 1882 Transit of Venus – reflects both his personal love and knowledge of astronomy (Gossin 2007, 156) and experience with his family’s “big brass telescope” (F. Hardy 1962, 2).





Left: Diagram of a solar “cyclone” from Steele (1869).

Center: Thomas Hardy, Wikimedia

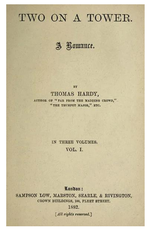
Right: Richard Proctor, Wikimedia

Hardy scholar and science historian Pamela Gossin (2007, 168-9) notes that Hardy was heavily influenced by the popular-level writings of English astronomer Richard Proctor, in particular adopting Proctor’s opinion that amateur astronomers should not merely repeatedly observe showpiece objects such as Saturn, but instead “Every observation not intended as a mere relaxation from real work should be intended to ascertain some as yet unknown fact” (Proctor 1872, 44). It is therefore not surprising that chief among Swithin’s astronomical observations is his work on variable stars, what he describes as “Tedious work…. Doing my best to watch phenomenal stars, as I may call them” (T. Hardy 1993, 31). At the time of this novel’s writing, there were only about 150 variable stars identified, and the reasons for their variations were the subject of speculation, as noted in popular level astronomy books of the period (e.g., Steele 1869, 268; Sharpless & Phillips 1882, 245-6).

Gossin (2007) has produced the most detailed survey of the astronomical references in *Two on a Tower* to date and tied them to astronomical papers of the time (especially Edward C. Pickering’s 1880 seminal paper on eclipsing binaries). However, a close reading by this variable star observer has yielded additional connections that have heretofore been missed.

Descriptions of Variable Star Astronomy Circa 1880:

Swithin observes variable stars every night, “while there is no moon … till about two in the morning” (T. Hardy 1993, 12). When Lady Constantine asks him to go to London on a personal errand, he initially begs off, explaining “I am preparing a work on variable stars. There is one of these which I have exceptionally observed for several months. And on this one my great theory is mainly based. It has been hitherto called irregular; but I have detected a periodicity in its so-called irregularities which, if proved, would add some very valuable facts to those known on this subject, one of the most interesting, perplexing, and suggestive, in the whole field of astronomy. Now to clinch my theory there should be a sudden variation this week – or at the latest next week – and I have to watch every night not to let it pass…” (T. Hardy 1993, 37). He relents as long as she promises to observe this particular star (unnamed in the novel) every clear night about nine, and if it is cloudy at 4 AM instead (T. Hardy 1993, 37). Swithin checks in (via letter), noting that “Watching the star through an opera-glass Sunday night I fancied some change had taken place, but I could not make myself sure. Your memoranda for that night I await with impatience. Please don’t neglect to write down, *at the moment*, all remarkable appearances, both as to colour and intensity; and be very exact as to time, which correct in the way I showed you” (T. Hardy 1993, 39). He is dismayed to learn that she had missed two nights, but nevertheless manages to make “an amazing discovery in connection with the variable stars!... It will excite the whole astronomical world, and the world outside but little less. I had long suspected the true secret of their variability; but it was by the merest chance on earth that I hit upon a proof of my guess…. It accounts for the occasional green tint of Castor, and every difficulty” (T. Hardy 1993, 65). Unfortunately, Swithin nearly dies from pneumonia when he throws himself to the ground and lays there for hours during a rainstorm upon reading that he had been scooped by “a pamphlet by an American astronomer, in which the author announced a conclusive discovery with regard to variable stars” (T. Hardy 1993, 69).


TWO ON A TOWER.

A Romance.

BY

THOMAS HARDY,

AUTHOR OF "FAR FROM THE MADDING CROWD," "THE RETURN OF THE NATIVE," ETC.

IN THREE VOLUMES.

VOL. I.

London:

SAMPSON LOW, MARSTON, SEARLE & RIVINGTON,

CROWN BUILDINGS, 188, FLEET STREET.

1882.

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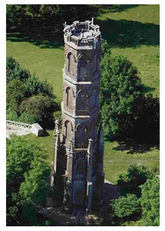
Left: Title page of novel

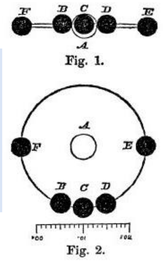
Right: Folly tower at Charborough House, Dorset, which is considered the inspiration for Swithin’s observatory tower. swanaageandwarehamvoice.co.uk



The description of variable star observing is fairly accurate. It is done with both telescopes and binoculars, and stars that are prone to sudden changes, especially irregularly, do need to be monitored on every clear night. Careful estimation of a star’s brightness and the time of observation are also required. While stars cannot appear green to the human eye, some observers describe Zubeneschamali in Libra as green, for example (McClure). There are numerous 19th century references to Castor appearing green (e.g., von Humbolt 1858, 131), although as Gossin correctly notes, John Herschel (1876, 621) came to attribute this to an optical effect due to “contrasted or complementary colors” in double stars. However, Gossin fails to note that the reference to a star changing color refers to variables such as Mira, which Herschel (1876, 598) noted became redder when it was near maximum, as well as discussion in the 19th century of stars that supposedly changed color over recorded history (Whittet 1999; Proctor 1872). Instead, she connects it to the behavior of an eclipsing binary made of different color stars.

Edward Pickering and *Two on a Tower*:

Modern editors of Hardy’s novel have taken as canon that the Harvard College Observatory Director Edward C. Pickering’s paper “Dimensions of the Fixed Stars, with Especial Reference to Binaries and Variable of the Algol Type,” presented to the American Academy of Arts and Sciences on May 25, 1880, and afterwards published in the *Proceedings*, is the real-world paper that scooped Swithin (e.g., Pinion 1975, 283; Gossin 2007, 177). As Dorrit Hoffleit (1972, 4) noted, while an eclipsing model had been suggested for Algol as early as 1783 (by John Goodricke), Pickering provided the first “positive proof” through his detailed calculations of the stars’ orbits.



Left: Edward C. Pickering, Wikimedia

Right: Diagram from Pickering (1880) showing the orbits of the main Algol system.

While Pickering’s paper is not the sole influence (see the previous discussion of star colors), Hardy scholars have made a reasonable assumption of its importance. However, there are additional facts that they have apparently missed which actually bolster their case. For example, Swithin makes it seem as though the star that he was most keenly observing has some irregularities that he seeks to explain theoretically. Similarly, Pickering (1880, 35) suggests in his paper that the well-known slight changes in the period of Algol’s primary eclipses (e.g., Von Humboldt 1858, 174) can be explained by the presence of a third object in the system, a possibility that is widely accepted today (GCVS Team 2005).

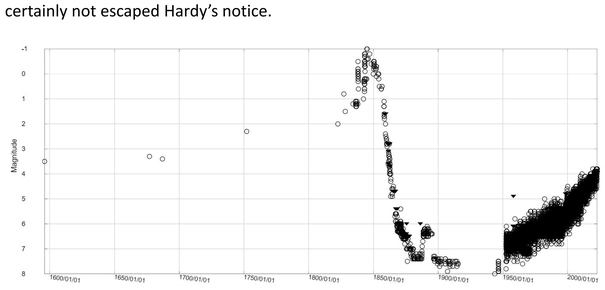
The question remains as to how likely is Hardy to have read this paper, or at the very least a detailed summary. Such summaries were published in at least two popular level periodicals, *The Observatory* (Anon 1881b) and *The Astronomical Register* (Anon 1881a), the second of which was a forerunner to the *Journal of the British Astronomical Association* (Johnson 1990, 62). The reference to a “pamphlet” in particular further suggests a direct connection. *The Astronomical Register* article is specifically a review of a 37-page version of the paper “reprinted” from the *Proceedings* and published by the University Press at Harvard: in other words, a pamphlet.

The Eta Carinae Connection:

There is one further astronomical connection to Swithin’s research that has apparently thus far escaped the notice of Hardy scholars. Not only is Swithin interested in the changes in color of his favorite variable star and its irregularities, but his treatise “A New Astronomical Discovery” accounts “for the nebulous mist that surrounds some of them [variables] at their weakest time” (T. Hardy 69). This strongly suggests a connection to one of the most enigmatic variables of the 19th century, Eta Carinae (then called Eta Argus), despite the fact that it is not visible from the latitude of England. Now known to be a massive luminous blue variable (LBV), the star had its so-called Great Eruption from 1837-56, becoming one of the brightest stars in the sky. It declined for about a decade and saw “a small brightening or plateau occurred in 1869-71” (Frew 2).

Popular-level astronomy books as well as popular journals that Hardy would have been familiar with contain numerous references to this star’s unusual activity in the 19th century. For example, Alexander Von Humboldt (1858, 135) noted that “The star η Argus, which has been rendered celebrated by Sir John Herschel’s observations… is undergoing a change in color as well as in intensity of light.” Indeed, John Herschel was particularly interested in the behavior of this star, writing in his *Outlines in Astronomy* (1876, 603-5) that “The alterations of brightness in the southern star η Argûs, which have been recorded, are very singular and surprising….. All at once in the beginning of 1838 it suddenly increased in lustre so as to surpass all the stars of the first magnitude except Sirius…. In May, 1863… it was only of the 6th magnitude…. ‘A strange field of speculation,’ it has been remarked, ‘is opened by this phenomenon.’” In a *MNRAS* article on the star and its “Surrounding Nebula” Herschel noted reports of changes in both the star and the so-called Keyhole Nebula associated with it in 1868, opining “There is no phenomenon in nebulous or sidereal astronomy that has yet turned up, presenting anything like the interest of this, or calculated to raise so many and such momentous points for inquiry and speculation” (Herschel 1868, 225). In response to this renewed activity, Herschel urged that “the attention of every astronomer in the southern hemisphere provided with instruments at all competent to show… the brighter portions of the nebula, should be directed in its delineation…” (Herschel 1868, 225).

Astronomers were slow to answer Herschel’s call, although there was a flurry of claims of activity in 1871-2 (e.g., Russell 1871; Abbott 1873) , along with an interesting pushback from some astronomers who felt the perceived activity was wishful thinking or an optical illusion. For example, Richard Proctor reportedly called these observations an “imaginary discovery” in a December 1871 article in *The English Mechanic* (cited in Abbott 1873). Given the volume of discussion, as well as Proctor’s role in it, the controversy would have certainly not escaped Hardy’s notice.



Far left: AAVSO light curve for Eta Carinae

Near left: John Herschel, Wikimedia

Near right: Part of Herschel’s description of Eta Carinae, *Outlines in Astronomy*

Far right: Herschel’s sketch of Eta Carinae and the Keyhole Nebula

(830.) The alterations of brightness in the southern star η Argûs, which have been recorded, are very singular and surprising. In the time of Halley (1677) it appeared as a star of the fourth magnitude. Lacaille, in 1751, observed it of the second. In the interval from 1811 to 1815, it was again of the fourth; and again from 1822 to 1826 of the second. On the 1st of February, 1827, it was noticed by Mr. Burchell to have increased to the first magnitude, and to equal α Crucis. Thence again it receded to the second; and so continued until the end of 1837. All at once in the beginning of 1838 it suddenly increased in lustre so as to surpass all the stars of the first magnitude except Sirius, Canopus, and α Centauri, which last star it nearly equalled.

Conclusion:

While the characterization by literary scholars and historians of science of Thomas Hardy’s usage of variable star astronomy in his novel *Two on a Tower* has been technically correct, it has been far from complete. The additional references from the novel to variable star astronomy in the 19th century provided in this poster demonstrate why astronomers have much to contribute to literary analysis.

References:

Abbott, F. 1873, *The Astronomical Register*, **11**, 221.

Anon. 1881, *The Astronomical Register*, **19**, 253.

Anon. 1881, *Observatory*, **4**, 116.

Beare, R. 1996, *Mythlore* **21**(3), 33.

Frew, D. J. 2004, *Journal of Astronomical Data*, **10**(6), 1.

Gossin, P. 2007, *Thomas Hardy’s Novel Universe,* Ashgate, Hants.

GCVS Team, 2005, International Variable Star Index, https://www.aavso.org/vsx/index.php?view=detail.top&oid=26202.

Hamilton, E. 1934, *Thundering Worlds*, http://fantasticworlds-jordan179.blogspot.com/2013/06/thundering-worlds-1934-by-edmo.html.

Hardy, F. E. 1962, *The Life of Thomas Hardy, 1840-1928*, Macmillan, London.

Hardy, T. 1993, *Two on a Tower*, ed. S. M. Ahmad. Oxford UP, Oxford.

Herschel, J.F.W. 1868, *MNRAS*, **28**, 225.

Herschel, J.F.W. 1876, *Outlines of Astronomy*, New Ed., D. Appleton & Co., New York.

Hoffleit, D. 1972, *J. Amer. Assoc. Var. Star Obs*. **1**, 3.

Johnson, P. 1990, *J. Brit. Astr. Assoc.,* **100**(2), 62.

Kim, D. 2012, *The Hardy Society Journal*, **8**(1), 62.

Lovecraft, H.P. 2009, “Beyond the Wall of Sleep,” https://www.hplovecraft.com/writings/texts/fiction/bws.aspx.

McClure, B., 2022, https://earthsky.org/brightest-stars/libras-zubeneschamali-the-only-green-star/.

Millgate, M. 2004, *Thomas Hardy: A Biography Revisited*, Oxford UP, Oxford.

Pickering, E. 1880, *Proc. Amer. Acad. Arts and Sci.* **16**, 1.

Pinion, F.B., ed. 1975, *Two on a Tower*, Macmillan, London.

Proctor, R. A. 1872, *Essays on Astronomy*, Longmans, Green, & Co., London.

Russell, H.C. 1871, *The Astronomical Register*, **9**, 193; 212; 251.

Serviss, G.P. 1908, *Astronomy with the Naked Eye*, Harper & Brothers, New York.

Sharpless, I., and G. M. Philips. 1882, *Astronomy for Schools and General Readers, 3rd ed.,* Lippincott, Philadelphia.

Smith, G. O. 1959, *Troubled Star*, Galaxy Publishing, New York.

Steele, J. D. 1869, *Fourteen Weeks in Descriptive Astronomy*, A.S. Barnes & Co., New York.

Von Humboldt, A. 1858, *Cosmos, Vol. III*, trans. E.C. Otté, Harper & Brothers, New York.

Whittet, D. C. B. 1999, *MNRAS*, **310**(2), 355.