

Denning on Novae

Introduction

William F. Denning (1848 – 1931) is most often remembered today for his planetary observations, the study of meteor showers, and the discovery of several periodic comets. Denning was indeed one of the foremost amateur astronomers of his day, and at the height of his career he was awarded (in 1898) the Gold Medal of the Royal Astronomical Society. He was also a prominent member of the British Astronomical Association, and at various times held Directorships of the Cometary and Meteor sections.

Denning dedicated the majority of his observing time to the study of bodies within the solar system. Interestingly, however, the one group of stellar objects that he singles out as being worthy of special study were the novae, or as they were commonly known then temporary stars. Most of what we know of Denning's ideas on these objects can be found in his book [1] *Telescopic Work for Starlight Evenings*, which was published in 1891.

The Temporary Stars

When Denning was writing on novae in 1891 no distinction was made between the supernova and nova phenomena, and the mechanisms underlying nova production was completely unknown. Denning's interest in novae was not primarily concerned with the understanding of their nature, however, but with their discovery. Indeed, it was the quest of discovery that motivated much of Denning's work. In concluding his comments on temporary stars in *Telescopic Work for Starlight Evenings* Denning noted that he had "frequently, while watching for meteors, reviewed the different constellations in the hope of picking up a new object, but has never succeeded in doing so." It was to be nearly thirty years after writing those words that Denning finally succeeded in his wishes.

In a remarkable two-year period, 1918 to 1920, Denning was party to the discovery of two novae. While his priority of discovery for the nova of June 1918 in Aquila (V603 Aql) was not to be established, Denning is accredited with the first sighting of the August 1920 nova in Cygnus (V476 Cyg).

On this latter nova Denning commented in a letter to the journal *Nature*, that he had set out to begin a meteor watch but had immediately noticed a new, magnitude 3.5, star in Cygnus [2]. To recognize 'immediately' such an interloper in the crowded star fields of Cygnus offers impressive testament to Denning's detailed knowledge of the sky.

When he discovered Nova Cygni, Denning was 72 years old. While still an influential astronomer at this time, Denning had long since become a staunch recluse. Indeed, from the early 1900s onwards his main contact with astronomers outside of Bristol was through an extensive and detailed correspondence. Some insight as to the personal impact that his discovery had can be gained from a letter Denning wrote to his niece (Christine Graveley) on September 26th, 1920. In this note he explained that "the new star brought me about 100 letters extra, and the event seems to be regarded as a very important one in the astronomical world" [3].

Denning's Observations

As an observer with an intimate knowledge of the heavens, Denning made one interesting observation on the distribution of novae. He noted in particular that "it is remarkable that nearly all the temporary stars have appeared in the region of the Milky Way" [4]. Denning drew his conclusion from a small and not very complete sample of nova sightings (see Table 1 below). Duerbeck [5] lists eight nova that were 'reported in the literature' prior to 1891. Denning, however, restricted his list to the "better attested instances", and indeed, most of Denning's omissions are consistent with Duerbeck who also lists them as either poorly covered or unconfirmed events.

In support of his assertion that novae appear near to the Milky Way, the most fortunate entries in Denning's list are those for 1860 and 1885. The first of these occurred in the globular cluster M80, while the second occurred in the Andromeda Galaxy, M31. Denning actually observed the temporary star in M31, and in an interview to *Tit Bits* magazine he commented that it was one of the most wonderful sights that he had ever seen [6].

The novae that Denning considered in his list are, in modern terms, a collection of recurrent novae and supernovae. It is now well known that the supernovae belong to the disc population of stars within the Galaxy, and hence will be observed (if at all) in, or near the Milky Way as Denning suggested. The recurrent novae, however, are more widely dispersed and Denning's claim follows fortuitously from the small sample he used.

Closing Comments

Denning did not feel obliged to offer an explanation for his observations that the temporary stars appeared in or near the Milky Way. This is consistent with his purely observational approach to astronomy. It should be noticed, however, that no theoretical framework was in place during the 1890s from which Denning's comment could be placed in any sort of perspective. A clear understanding of the form of our Galaxy, and indeed the existence of individual galaxies was not fully developed before the second decade of this century.

Denning's observations concerning the distribution of temporary stars, while making sense in the present day, was seemingly ignored by astronomers of his time as a possibly noteworthy but not very relevant coincidence.

References

- [1]. Denning, W. F. 1891. *Telescopic Work for Starlight Evenings*, Taylor and Francis, London.
- [2]. Details on the light curve of nova Cygni are given by Luyten, W. J. 1920, *Mon. Not. R. astron. Soc.* **80**, 61.
- [3]. I am very grateful to Maurice Brain, of the Bristol Astronomical Society, for access to his collection of letters written by Denning.
- [4]. See ref. 1. p. 312.
- [5]. Duerbeck, H. W. 1987. *A Reference Catalogue and Atlas of Galactic Novae*. D. Reidel Publishing, Holland.
- [6] *Tit Bits* magazine, 1895, August 31, p. 386.
- [7]. Lovi, G., Tirion, W. 1989. *Men, Monsters and the Modern Universe*. Willmann-Bell, Inc., Richmond, Virginia.

Table 1

Year	Constellation	System	Type	d (deg.)	Comments
1572	Cassiopeia	--	SN	0	Tycho's supernova
1604	Ophiuchus	--	SN	20	Kepler's supernova
1670	Vulpecula	CK Vul	N	0	
1848	Ophiuchus	V841 Oph	N	20	
1860	Scorpius	T Sco	N	0	Nova in M80
1866	Cornona Borealis	T CrB	RN	45	Last outburst in 1946
1876	Cygnus	Q Cyg	N	0	
1885	Andromeda	--	SN	15	Supernova in M31

Table 1 key: The nova types are from Duerbeck [5]: N = nova with a poorly known light curve and speed class, RN = recurrent nova, SN = supernova. Column 5 is the approximate distance in degrees, of the nova from the Milky Way (estimated from Lovi and Tirion [7]).