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THE 1946 OUTBURST OF T CRB OBSERVED FROM STOCKHOLM OBSERVATORY

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T CrB is a recurrent nova with two confirmed bright eruptions, in 1866 and 1946. This article presents the observations of the 1946 event made at the Stockholm Observatory and throws light on observational methods and instruments used at the time.

Introduction

T Coronae Borealis is a bright and well-known recurrent nova that has attracted many observers following its behaviour during and after its outburst in 1866 May, when it rose to magnitude 2. It was the first nova to be studied spectroscopically; William Huggins found several bright emission lines, among them Hα, Hβ, and Hγ.[1,2] After the 1866 outburst it settled at about magnitude 10, with minor variations with an amplitude of about 0·3 mag and a period of half the orbital period of the white dwarf and the red giant M4 III star of 227·6 days. It has ever since been keenly followed by amateurs as well as professional astronomers. In 1946, a second eruption occurred. A 'high state' of activity in that object was observed prior to that outburst, in 1935; since 2015, the object once again has exhibited such a 'high state' of activity by brightening substantially, leading to predictions of an upcoming outburst.[3]

The Stockholm Observatory

Stockholm has had an astronomical observatory since 1753, when the Royal Academy of Science's observatory was constructed. The observatory marks a major milestone for science in 18th-Century Sweden in general, and for the Academy in particular, with modern instruments and astronomers such as Pehr Wilhelm Wargentin, an expert on the movements of the Jovian satellites (and also a pioneer in Swedish population statistics through his involvement in *Tabellverket* and *Tabellkommissionen* [*the earliest Swedish population statistics, introduced in 1749, and the commission responsible for them, respectively. —Ed.*]).[4]

As the years went by, the observatory's location became a problem: what had been an acceptable site for nightly observations gradually became unsuitable as the expanding city of Stockholm surrounded the observatory with skies increasingly filled with dust from coal. Also, come the 20th Century, its instruments were outdated. Change happened when the

Knut and Alice Wallenberg Foundation made a large donation in order to construct a new observatory on the condition that it be placed in Saltsjöbaden; funding for and the idea behind that idyllic villa suburb and exclusive seaside resort project, constructed from 1890 onwards, had come from K. A. Wallenberg, and now the project was to be crowned by a magnificent and advanced observatory.[5,6]

With funding from the Wallenberg donation, the new Stockholm Observatory was constructed, situated on a hill, 'Karlsbaderberget', rising some 60 metres above sea level in Saltsjöbaden, 15 kilometres from the centre of Stockholm. The new Stockholm observatory was inaugurated in 1931 June, with modern telescopes: a 1-m reflector and a 50/60-cm double refractor, both made by Grubb Parsons, a 40-cm wide-field astrograph by Carl Zeiss, and auxiliary instrumentation such as spectrographs and microphotometers for measuring photographic plates. The staff expanded compared to the old observatory, working under the director, Professor Bertil Lindblad. Astronomers (and also mechanics working with instrument maintenance) lived with their families on the hill, thus having a short walk between home and dome. The logic behind having staff living on the premises of the Observatory, which was a not uncommon feature of large observatories situated in non-urban areas during the early 20th Century, was the essence of speed. Astronomers could get to work at short notice, which was doubly important should an urgent and unpredicted phenomenon occur. The Royal Swedish Academy of Sciences now ran one of the most modern astronomical observatories in Europe.[7]

1946 February 10

News of the 1946 outburst reached the Saltsjöbaden astronomers on the evening of February 10, by way of a telegram from the Central Bureau of the International Astronomical Union, then located in Copenhagen and tasked with rapidly disseminating information about astronomical objects such as newly discovered comets and novae. The telegram stated that Armin Deutsch of the Yerkes observatory had discovered an eruption of T CrB on February 9 at 08^h30^m UT. When the telegram arrived in Saltsjöbaden the sky was overcast, but it cleared on the morning of February 11: at 08^h30^m UT, Bertil Lindblad and Yngve Öhman managed to observe the object *in daylight*, some two hours after sunrise, with the visual 50-cm tube of the double refractor.[8]

Now, an intense scrutiny of the recurrent nova began at the Stockholm Observatory. Spectra were taken using the Zeiss spectrograph mounted on the 1-m Grubb Parsons reflector, and perhaps most important for future studies of that object, the object's brightness was observed, with both photographic and visual photometry done by Gunnar Larsson-Leander. The photographic magnitudes were measured on plates using the observatory's Schilt photometer, and visual observations were made by the Argelander method. Larsson-Leander had started out as an amateur astronomer doing observations of variable stars before becoming a professional astronomer and was thus trained in both visual and photographic photometric methods. Because of the nova's brightness, it was initially observed visually using a pair of binoculars, and as it faded Larsson-Leander shifted to 9·5- and 10-cm refractors.[8]

2025–2026?

As this is written, on 2026 January 8, T CrB has not erupted, but some astronomers have discussed the possibility of a coming eruption. A very thorough examination of the available photometry by Schaefer, using 213 730 magnitudes observed from 1842 to 2022, leads to a prediction of $2025{\cdot}5 \pm 1{\cdot}3$ as the time when a new eruption will occur.[3]

If, and when, the next eruption occurs, it will not be announced by a telegram, as in 1946; news will spread fast over various channels on the internet to observers distributed all over the world, most (or all) of them not having their private homes on the grounds of a professional astronomical observatory. Remote observing, with telescopes operated *via*

computers, are abundant today. But given the brightness of T CrB in eruption, even an amateur astronomer using a pair of binoculars, just like Gunnar Larsson-Leander did, can contribute useful photometry in aid of unravelling the nature of T CrB.

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WHO NAMED THE STARS OF THE PLEIADES?

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The IAU recognizes official names for nine members of the Pleiades cluster. Those names come from ancient Greek mythology but were not allocated to specific stars until post-telescopic times when their positions could be accurately determined. Who first applied them?

Taurus is a grand constellation blessed with two of the finest naked-eye clusters in the sky, the Hyades [Ὑάδες in Greek] and Pleiades [Πλειάδες], named after two groups of nymphs from Greek mythology. The Hyades cluster is much the older of the pair, with an age of around 600 million years as against ≈ 100 million years for the Pleiades. Hence its stars have had longer to drift apart and are easier to see individually.

Ptolemy listed five individual members of the Hyades in his star catalogue in the *Almagest* compiled around AD 150, but in the case of the smaller and denser Pleiades he was less specific. Ptolemy's entry on the Pleiades referred to "the northern end of the advance side",