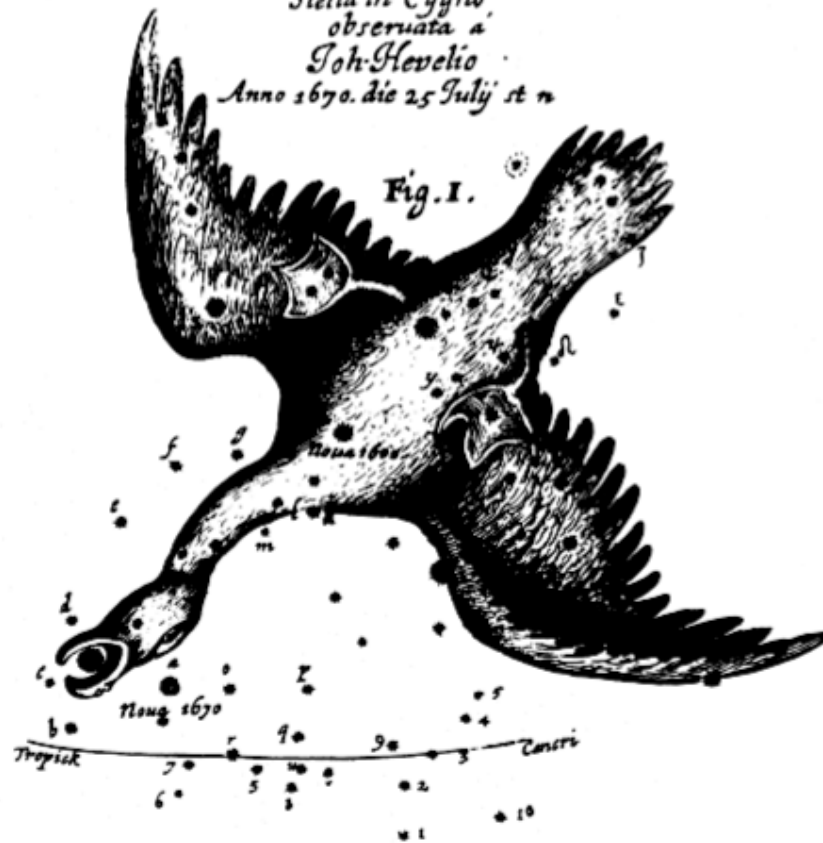


CKVul

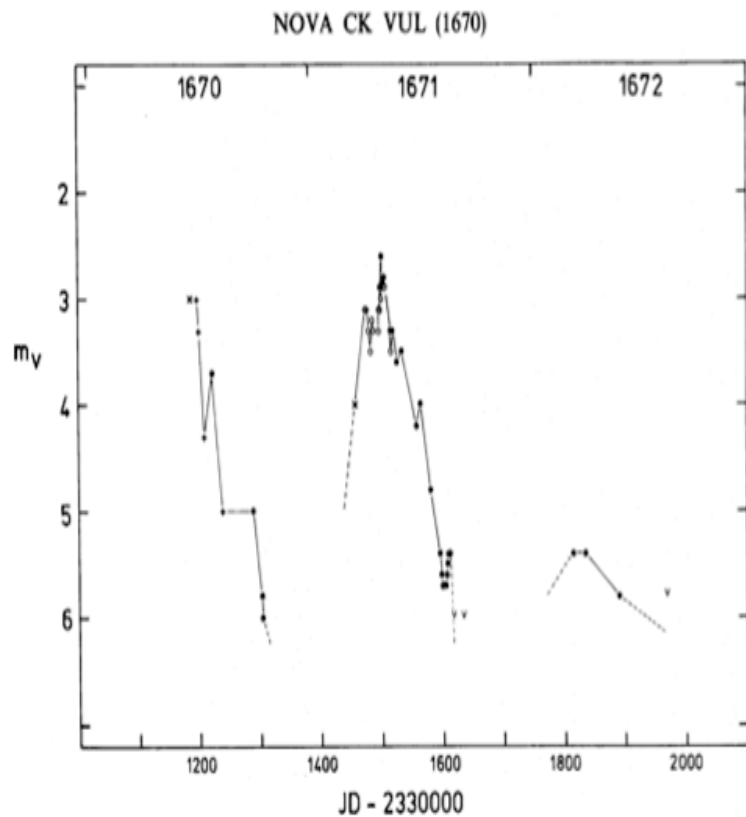
Trans. N^o. 65

Stella in Cygno
observata a
Joh. Hevelio
Anno 1670. die 25 Julij et n

Fig. I.



Visual Light Curve



- Discovered 1670AD
- Slow nova with large oscillations around maximum
- Distance of 550 pc
- Very faint counterpart $M_R \sim 10.4$ now suggests $>M3V$ star, short orbital period ($\sim 3h$) and negligible accretion rate ($< 10^{-11.5} M_{\text{sun}}/\text{yr}$)

Radio

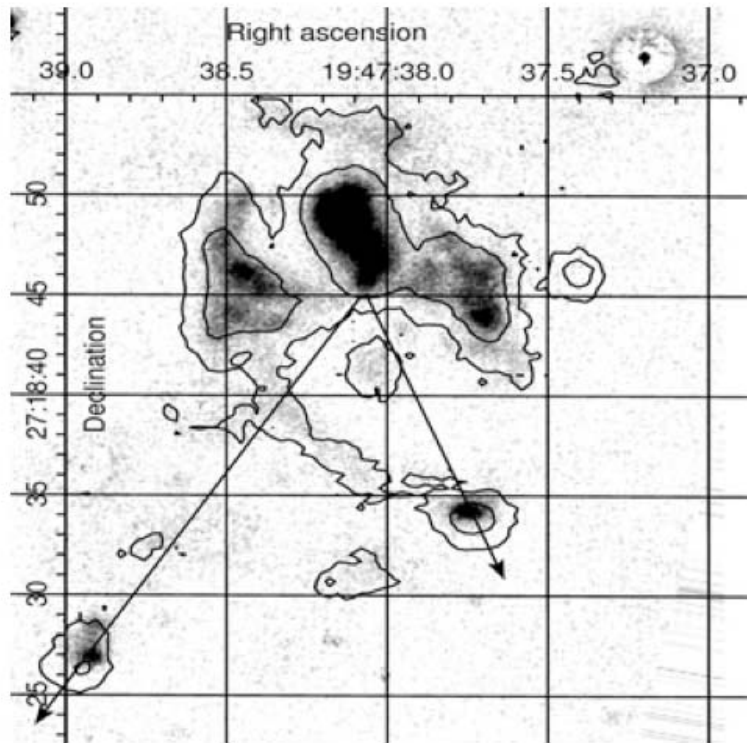


Figure 5. The WHT H α from 1991 (grey-scale) together with the 2004 INT H α image (contours at 3 and 10 σ). Two compact components show significant proper motion. The arrows link the radio sources to these components: the direction is consistent with the observed proper motion.

- Radio counterpart localized to 1''
- Radial velocity : 350 km/s
- Proper motion : 37 mas/yr and 59 mas/yr for two knots

Compact Source and Extended Nebula

- Compact resolved central source
 - free-free emission (brightness temperature too low for synchrotron emission)
 - Assuming H-rich, $M_i \sim 4 \times 10^{-7} M_{\text{sun}}$, $n_e \sim 5 \times 10^5 \text{ cm}^{-3}$
 - Lack of H-alpha counterpart could suggest H-poor
 - Lack of ROSAT X-ray counterpart
 - Not expanding ($< 1 \text{ km/s}$)
 - IRAS images : Area of low dust emission suggests that in the past million years, there have been episodes of high mass loss
- Extended Nebula
 - Detected mostly in ionized lines and dust
 - Radius $30''$, $n = 100 \text{ cm}^{-3}$
 - $M \sim 2 \times 10^{-2} M_{\text{sun}}$

What is CKVul?

- Not a supernova (bipolar symmetry, lack of x-ray, line ratios unlike remnants)
- Not a merger : need an ionizing source, remnant is not a bloated, cool star
- A light nova? Less massive WDs accrete at lower rates but eject massive shells. Eg: 0.65 Msun WD gives $M_{ej} \sim 10^{-4}$. While this is three order of mag greater than typical M_{ej} , it is still two order of mag below CKVul
- A thermal pulse? V605, V4334 (Sakurai) due to He ignition on WD cooling track. But, no double-loop in the HR diagram, no explanation of the compact radio source and missing planetary nebula, H-rich