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FOUR VARIABLES IN CYGNUS

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Abstract

The published period (199 days) for V461 Cyg has been confirmed, while the period of V462 Cyg proves to be 371 days and is changing. A variable star discovered on Nantucket plates in 1975 is found to have a period of 107.6 days with a photographic amplitude of about 2.5 mag. V381 Cyg was examined on nearly 1000 plates. The published approximate period of 4.88 days could not be confirmed. No new period has yet been determined, but it cannot be greater than about 3 days.

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The star V462 Cyg ($12^m.4$ - $16^m.4$pg), with a stated period of 199.2 days, was designated in the General Catalog of Variable Stars as one whose period needed checking. From estimates made on Nantucket plates of the Cygnus region, a graph of magnitude versus Julian Day was plotted. Although a period of 370.8 days appeared to fit the data fairly well, there was a large amount of scatter, especially on the ascending branch of the curve. An O - C diagram (Figure 1), graphing each epoch number, E, against the difference between observed and computed dates of maximum, showed that a systematic correction to the phase was needed. A sinusoidal correction provided the necessary modification. The observed maxima are satisfactorily represented by:

$$JD(max) = 2439650 + 371E + 50\sin(7^\circ.2E).$$

It was noticed in the General Catalog that V461 Cyg ($12^m.2$-$13^m.8$pg) also was assigned a period of 199 days. It is therefore possible that the two stars were confused at some point. A study of V461 Cyg shows that the period of variation is in fact on the order of 199 days, although there is a large amount of scatter. In Figure 2A the observed range in brightness within successive 500-day intervals is plotted against JD. A beat period on the order of 7000 days seems likely, but more extensive observations are required.

A variable star (Figure 3), discovered by Patricia Guida at Nantucket in 1975, at approximately $19^h\ 31^m.3\ +45^\circ\ 05'.4$ (1900), was initially designated as an irregular variable. I found that it has a range in brightness from $12^m.7$ to below $15^m.0$ pg. A period of 107.6 days appears to fit the observations. There are several times, however, when the star lacks any significant variation in brightness. In Figure 2B this effect is masked because variations from high amplitude to low amplitude sometimes occur within the same 500-day interval. Figure 4 gives three selected 600-day runs of observations, the top strip (A) showing relatively high amplitude, the middle strip a change from a high maximum at the beginning to negligible variation at the time of the next expected maximum, and the bottom strip (C) a change from high to intermediate amplitude. After stages of little magnitude variation, the observed maxima again fit the initial ephemeris:

$$JD(max) = 2426920 + 107.6E.$$

A fourth star, V381 Cyg ($13^m.8$ - $15^m.4$pg) was examined on nearly 1000 plates. The published period of 4.88 days could not be confirmed. No new period has yet been determined, but it cannot be greater than about 3 days.

While searching for variable stars with the Rodman blink comparator, I rediscovered S4951 in Kukarkin's Catalog of Suspected Variable Stars, and also found four possible new variable stars in Cygnus.

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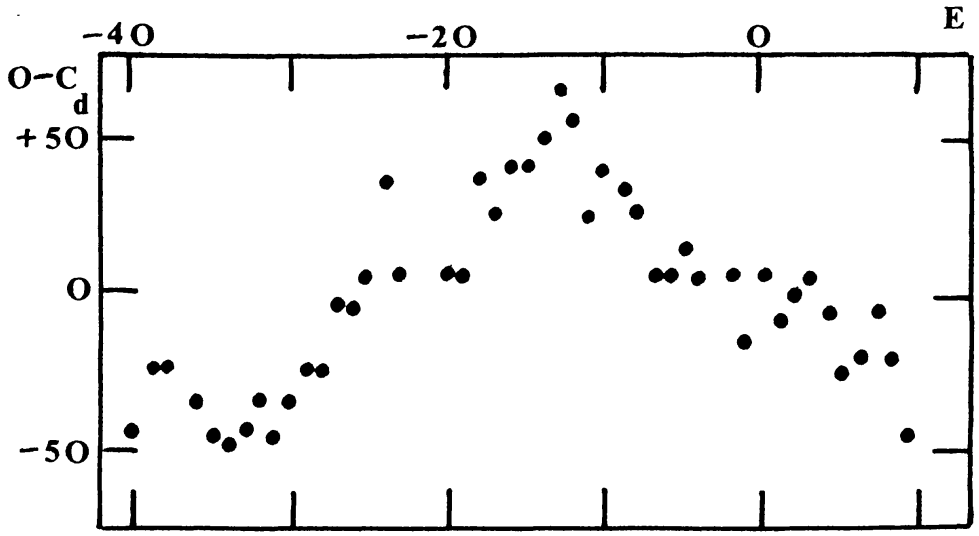

Figure 1. O - C diagram for a constant period of 371 days for V462 Cygni plotted against number of epochs, E, since JD 2439650.

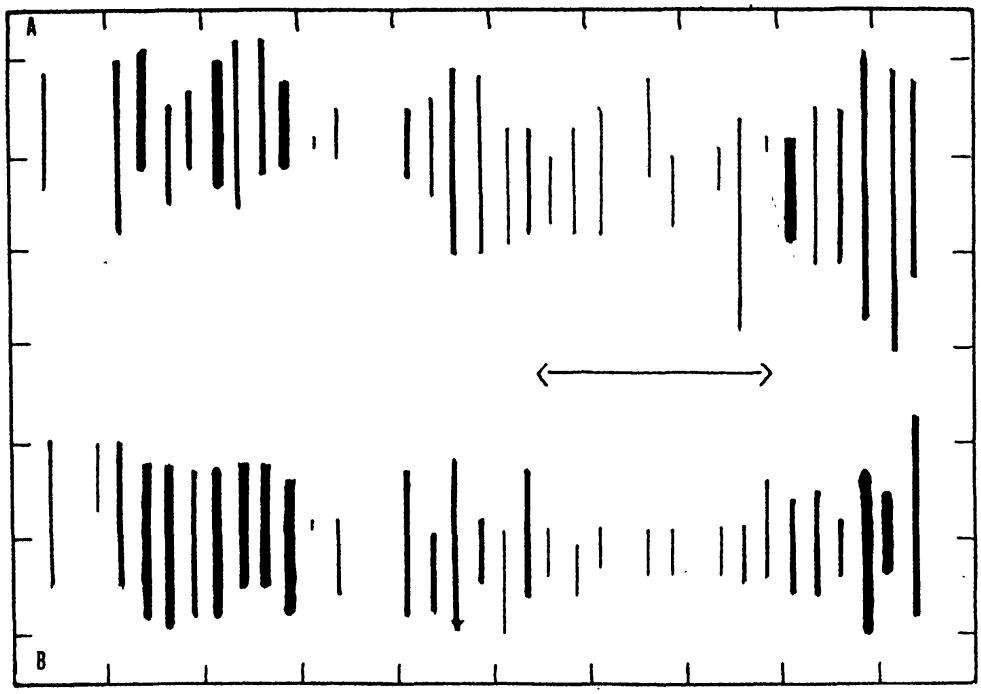

Figure 2. The span from observed maximum to minimum for V461 Cygni (A) and the new variable (B) in successive 500-day intervals, showing relative variation in both amplitude and maximum and minimum magnitude as a function of time. Widths of the lines indicate numbers of observations within each 500-day interval: less than 10, 10 - 25, 25 - 50, and over 50. Abscissa markers at 2000 day intervals from JD 2424000 to 2444000. Ordinate markers at approximately one magnitude intervals. The short horizontal line between graphs A and B indicates the interval of relatively sparse data where complete cycles of variation may not always be represented by the available observations.

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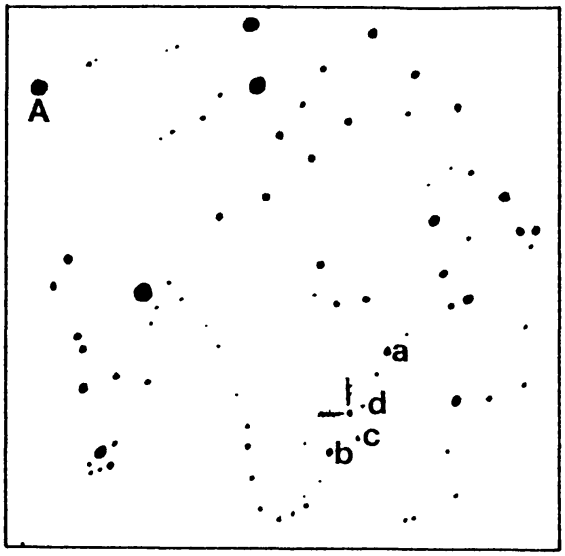

Figure 3. Finder chart for the new semiregular variable. Approximately 30' x 30', North at top. Bright star A is BD =45°2928. The adopted photographic magnitudes of the comparison stars are a = 12.5, b = 13.4, c = 14.0, and d = 15.0.

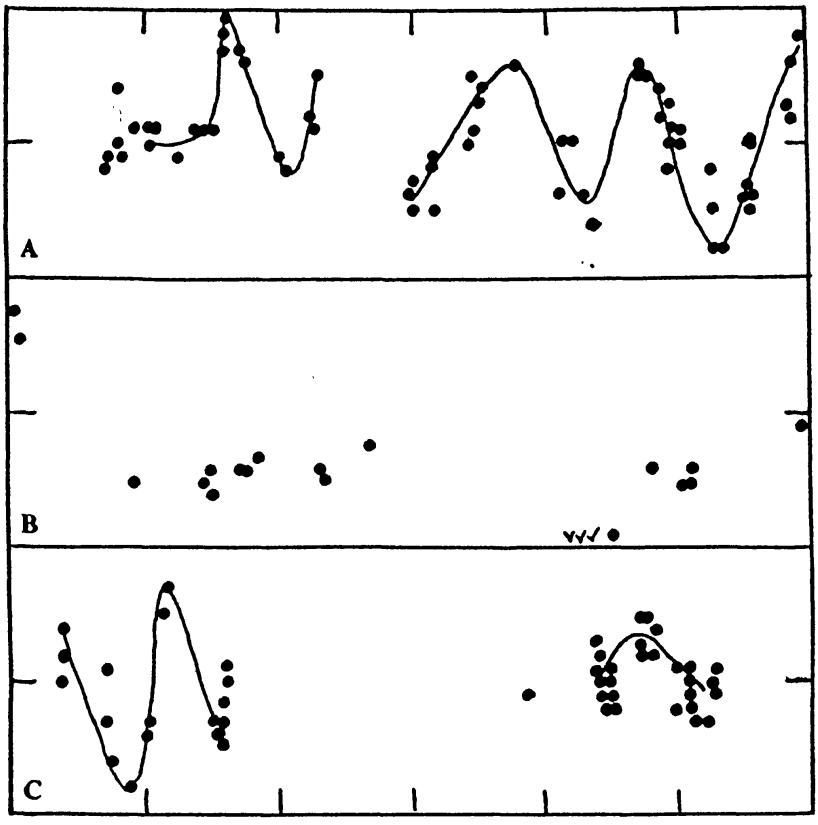

Figure 4. Three 600-day runs of observations for the new variable, showing extreme changes in amplitude and shape of light curve. Top (A), JD 2426100-700, middle (B), 2433000-600, and bottom (C) 2441800-2400.

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