OBSERVATIONS OF KU CYGNI, 1926-1975

by

MARYJANE TAYLOR
Maria Mitchell Observatory
Nantucket, Massachusetts

Abstract

New photographic estimates on Nantucket patrol plates indicate that the period of this eclipsing binary has been constant from 1926 to 1975 and indicate variability at maximum light.

* * * * *

Ku Cygni, an eclipsing binary of Algol type, was discovered to be variable by Parenago in 1938. Kanda in 1939 published a period of $11^{d}.323$, but this was found by Gaposchkin and Huruhata (1940) to be approximately three times too large. Popper (1964) cites the length of primary eclipse as $2^{d}.98$, with a fairly flat total phase of approximately forty-four hours duration. Other investigators of the star include Ustinov and Odinskaya, and Tsesevich.

I rediscovered KU Cygni while using the Rodman blink microscope at Maria Mitchell Observatory during the summer of 1975. I then located the variable on 1,145 Nantucket patrol plates, covering the period JD 2424684 (June, 1926) through JD 2442639 (August, 1975).

I estimated the magnitudes of KU Cygni using the photographic magnitude sequence published by Wright (1938) for the variable star SW Cygni. The same sequence was used by Gaposchkin and Huruhata and by Popper. Stars "b" or "c", on the chart of Gaposchkin and Huruhata (1940), were used when KU Cygni was outside of eclipse, while stars "e", "g", or "h" were used to determine the brightness during the eclipse. Magnitudes used for these stars are listed in Table I.

TABLE I

Star	magnitude (pg)	Star	magnitude (pg)
b	11.20	g	13.43
c	11.60	h	13.80
e	12.92		

Phases were calculated with the ephemeris JD 2433884.84 + $38^{d}.4393E$ (Popper 1964) which measures phase from primary minimum. Magnitudes outside eclipse were averaged on a daily basis as were their respective phases, while those values in the range ±2 days from the time of minimum were listed individually, and a light curve was constructed (Figure 1). From Figure 1 it is seen that KU Cygni varies in photographic magnitude from an average of about $11^{m}.3$ at maximum to approximately $13^{m}.8$ at minimum, which agrees reasonably well with values published in the General Catalog of Variable Stars (1969).

Although no actual timings of minima were made, I found that observations during minimum phases were in good agreement with previously published light curves and with each other. This

indicates that little, if any, change in period has occurred during the past 50 years. A possible secondary minimum was also noted at phase $\sim 0^{p}.58$. This phenomenon may in reality be an intrinsic variation of the system during times of maximum light. Considerable variation while the star is at maximum has been noted by most other observers of KU Cygni.

In light of this, Figure 2 was constructed by selecting four partially covered cycles at random, from the years 1932, 1940, 1965, and 1972, and plotting their light curves (outside of eclipse) on an elongated scale. The resulting variation appears to be somewhat regular. To my knowledge, this phenomenon remains unexplained.

The author is extremely grateful for the use of the facilities and resources of the Maria Mitchell Observatory, as well as the advice and counsel of its Director, Dr. Dorrit Hoffleit.

REFERENCES

Gaposchkin, S. and Huruhata, M. 1940, Bulletin of Harvard Col. Obs. 914, 11.

Kukarkin, B. V. et al. 1969, General Catalog of Variable Stars, Moscow.

Popper, D. M. 1964, Ap. J., 139, 145.

Wright, F. W. 1936, Annals of the Astronomical Observatory of Harvard, 89, 171.

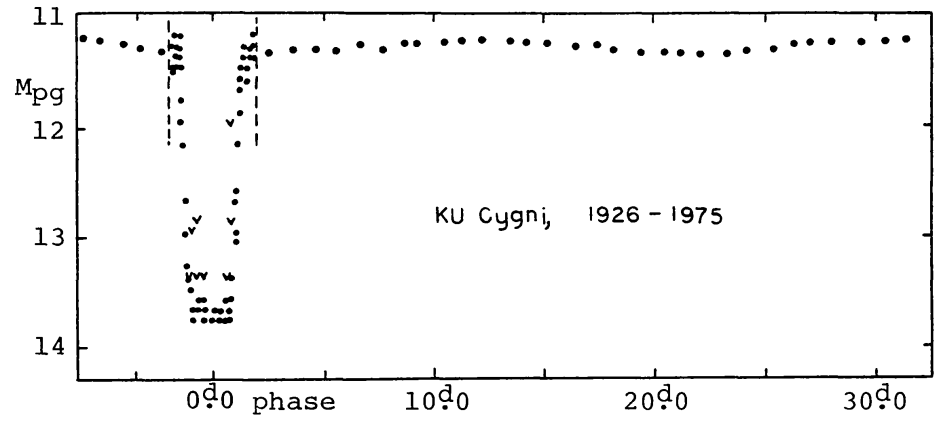

Figure 1. The light curve of KU Cygni, 1926 - 1975. Points between the dashed lines represent individual estimates, while all others are one-day means.

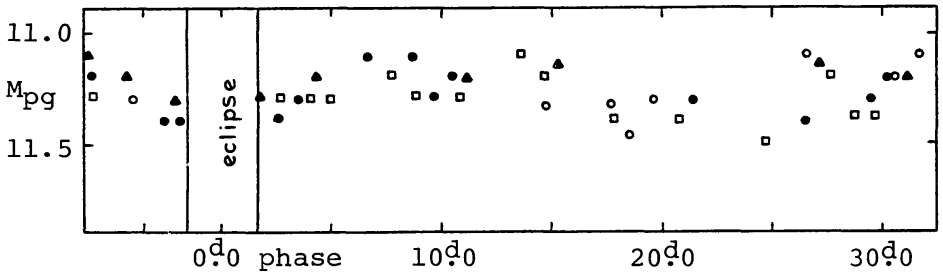

Figure 2. Variation during maximum light. Filled circles: July/August, 1932; squares: August/September, 1940; open circles: July/August, 1965; filled triangles: August/September, 1972.