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THREE NEW RED VARIABLES

A continuing nova patrol by Kaiser (MacRobert 1988) has resulted in the discovery of five variables with maxima brighter than 10.0 m_v . For convenient reference, information on all five stars is summarized in Table I. Observations of DHK 4 have already been reported by Kaiser et al. (1988) and by Kaiser (1988). DHK 3 will be discussed separately (Williams 1989). This report presents charts (Figure 1) and information for the remaining three.

TABLE I.

Var. Designation	RA (1950)	Dec (1950)	Range	Type	Period
DHK 1 = LD 103	01 ^h 57 ^m 58 ^s	+58°03'40"	10.0 - 13.8 v	M	360 ^d
DHK 2	00 36 53	+37 55 32	10.7 - 11.4 b	SR	375 ^d
DHK 3	05 24 17.0	+23 03 55	10.5 - 13.0 b	Insb	Irr.
DHK 4 = NSV 03005	06 28 47.7	+17 07 08	8.2 - 10.0 v	EA/GS	1258 ^d .56
DHK 5	03 44 56.8	+50 41 32	9.8 - 10.7 b	SR	60 ^d

DHK 1 = LD 103

DHK 1 is an independent discovery of a variable reported by Dahlmark (1986). The star is extremely red. In visual light the maxima are as bright as 10^m0, but the star is invisible on blue plates reaching to 13^m5. The amplitude indicates Mira type. Photographic and visual observations by Kaiser and Baldwin, 1987-1989, and inspection of 23 Harvard red plates, 1967-1980, by Williams result in the preliminary elements:

$$JD_{\max} = 2447220 + 360^d E$$

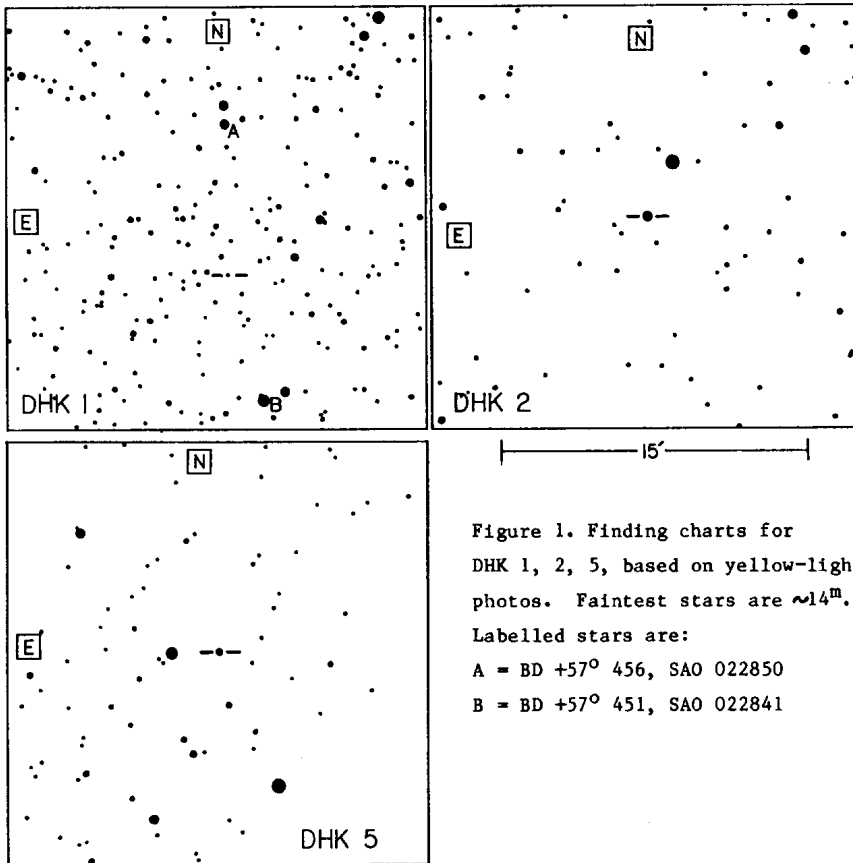


Figure 1. Finding charts for
 DHK 1, 2, 5, based on yellow-light
 photos. Faintest stars are $\sim 14^m$.
 Labelled stars are:
 A = BD +57° 456, SAO 022850
 B = BD +57° 451, SAO 022841

The variable is faint on the Palomar Observatory Sky Survey blue print, which shows a close companion of similar brightness. Observations are needed to determine which of these two stars is the variable. The finding chart in Figure 1 is less compressed and more legible than the chart in Dahlmark (1986).

DHK 2 = BD +37° 112

Observations by Kaiser on 120 Harvard blue plates, 1898-1915, indicate that DHK 2 is a variable of type SR with an amplitude of $0^m.7$. This

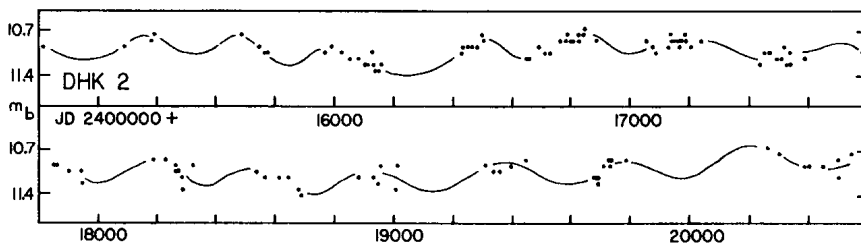
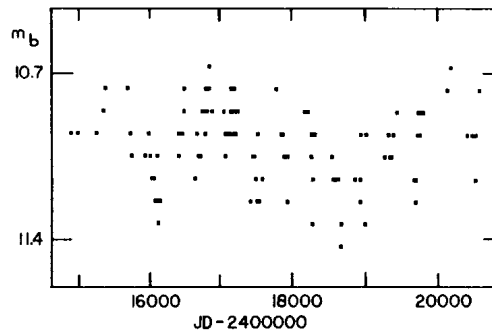


Figure 2. The semiregular variation of DHK 2, mean cycle length 375 days.

Figure 3. A compressed light curve of the same data, showing variation of the mean magnitude.



variable appears to be multi-periodic. Recent visual observations by Baldwin suggest that variations may occur in cycles as short as 70 - 100 days. The plates are not frequent enough to define individual cycles of this period, but do show a variation with a mean cycle length of 375 days (Figure 2). A compressed plot of the same data (Figure 3) shows variation of the mean magnitude with a possible 3300-day period and $0^m.3$ amplitude.

DHK 5 = BD +50° 829 = SAO 024237 = HD 232842 = IRC +50..106

The HD spectral type is M4, while Nassau and Blanco (1954) give M6 and Lahulla (1987) gives M5. Lahulla also measured the star at +8.51 V. New photoelectric measures by Williams from JD 2447447 - 569 (Figure 4) show the star varying from 8.82 - 9.01 V with a cycle length of 60 days.

Observations by Kaiser on 108 Harvard blue plates, 1969-1988, show that the variable can reach a full amplitude in blue of $0^m.9$. The plates

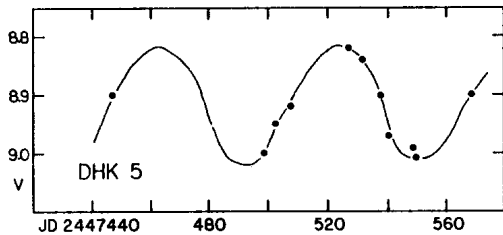


Figure 4. Photoelectric V measures of DHK 5, showing two cycles of 60-day length.

are not frequent enough to define individual 60-day cycles but do suggest that especially bright maxima recur at intervals of about 700 days.

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DANIEL H. KAISER	DAVID B. WILLIAMS	MARVIN E. BALDWIN
2631 Washington Street	9270-A Racquetball Way	Route 1
Columbus, IN 47201	Indianapolis, IN 46260	Butlerville, IN 47223
USA	USA	USA

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