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AN RR LYRAE STAR WITH A CHANGING PERIOD

The variable star discovered by Dr.Dorrit Hoffleit at $18^h\ 26^m\ 54^s$ and $-25°\ 15'.8$ (1900) was examined visually this summer, under the direction of Dr.Dorrit Hoffleit at the Maria Mitchell Observatory, on Harvard plates ranging in Julian Days from 2423948 to 2433858, and on Nantucket plates ranging in Julian Days from 2437824 to 2440417. The brightness of the star varied between 14.0 and 15.7 magnitude.

The variable is found to be of RR Lyrae, subclass b type with a period of $0^d.534829$ that operates from J.D. 2423948 to 2433858, and another period of $0^d.534869$ that operates from J.D.2437824 to 2440417. The later period P' is related to the earlier period P by the relation

$$1/P' = 1/P - 0.000139$$

There is an indication of an evolutionary change in the structure of the star between J.D.2433858 and 2437824, for which there are no plates available. According to the graph of the phase of maxima against the Julian Days (Figure 2) this change took place about 1955-1956.

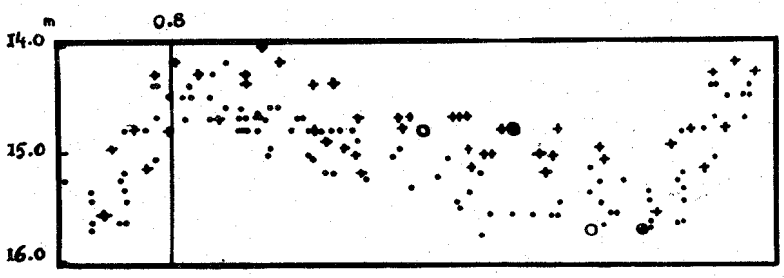

Figure 1:

The light curve obtained for the variable with brightness expressed in magnitudes as a function of phase of the period. Dots:Harvard observations; crosses: Nantucket observations; open circles: Lick observations using the period $0^d.534829$; open circles with crosses: Lick observations using the period $0^d.534869$.

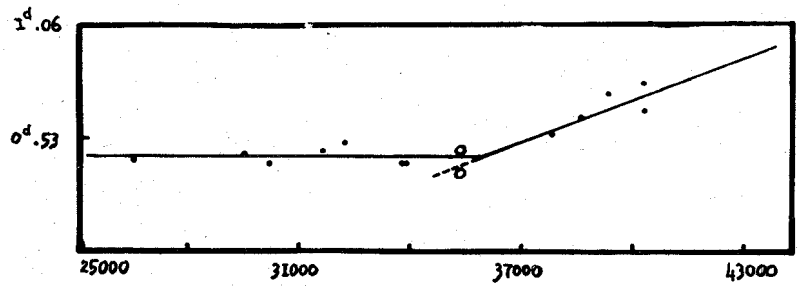

Figure 2:
The phases of maxima expressed in days as a function of Julian Days for the period $0^d.534829$. Dots: Harvard and Nantucket observations; open circles: Lick observations.

The Lick Observatory Atlas contains two charts of the variable. On one chart taken on July 5, 1954, the star appears to be of magnitude 14.9, and another taken on July 13, 1955 to be of magnitude 15.7. Both observations fit the light curve using both the early and the late periods; but the later period of $0^d.534869$ is better, confirming the occurrence of the change of the period around 1955.

Using the period $0^d.534829$, the maxima occur at phases as shown in Table I

TABLE I. Observed Maxima on Harvard Plates

J.D. 2400000 +	Phase	J.D. 2400000 +	Phase
26564.347	0.820	31638.315	0.898
28022.292	0.821	32293.519	0.968
29520.355	0.831	33836.398	0.774
30168.536	0.771	33858.326	0.774

Using the period $0^d.534869$ the maxima occur at phases as shown in Table II

TABLE II. Observed Maxima on Nantucket Plates

J.D. 2400000 +	Phase	J.D. 2400000 +	Phase
37824.756	0.769	39272.737	0.937
38612.639	0.808	40000 +	0.5 to 0.9

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Nantucket, Massachusetts
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