

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4350

Konkoly Observatory
Budapest
3 June 1996

HU ISSN 0374 - 0676

DISCOVERY OF THE NEW RR LYRAE STAR GSC 2576_466

During pointing tests of our telescope it was noticed that the star GSC 2576_466, at a position of $RA_{J2000}=16^h00^m04^s$, $Dec_{J2000}=34^\circ58'21''$, $V=14.5$ (Jenkner et al. 1990) had changed in brightness.

The automated 0.5-m. telescope, Cousins R filter and CCD camera of the Climenhaga Observatory of the University of Victoria (Robb and Honkanen, 1992) were used to make photometric observations of this star. The frames were bias subtracted and flat fielded in the usual manner using IRAF¹. The magnitudes were found from aperture photometry using the PHOT package. The x y pixel coordinates of each star for photometry were found from inspection of a few frames and these positions were used as starting points for the Gaussian centering option which precisely centered the 6 arc second aperture on each star for each frame.

From the Hubble Space Telescope Guide Star Catalog (Jenkner et al., 1990) the coordinates (J2000) and magnitudes of the stars observed are given Table 1. GSC 2576_186 was chosen as the comparison star and all differential magnitudes are given in the sense other star minus comparison star. The standard deviation of the difference between the brightest check star and the comparison star during a night ranged from 0^m006 to 0^m017 . For each check star the mean and standard deviation of the seven nightly mean differential R magnitudes are given in Table 1. The standard deviations give us estimate of the precision of the differential variable star minus comparison star measurements. Due to the small field of view first order differential extinction effects were negligible and no corrections have been made for them. No corrections have been made for the colour difference between the stars to transform the R magnitude to a standard system.

Photometric observations were made 25 March 1996 to 29 May 1996 UT. Brightness variations were evident both during a night and from night to night. On the longest night the whole ascending branch was observed and when combined with the slope of the descending branch we find that the period must be longer than 0^d42 . Two times of maximum light were found by the method of Kwee and van Woerden (1956) to be 2450172.9838 and 2450212.9543. This method is not appropriate for asymmetrical extrema unless the range of data searched is the same for all nights. In this case the range was 0.019 days. The uncertainty in the times of maximum is estimated to be ± 0.0014 days. The times of maximum light place strong limits on what the period could be since an integer number of cycles must occur in the interval. Plots of the light curve at all allowed periods from 0^d4 to 0^d6 days were inspected. The only plot to give a reasonable light curve was the one with the ephemeris:

$$\begin{aligned} \text{HJD of Maxima} = & 2450168.8310 + 0.519097 \times E \\ & \pm .0018 \pm 0.000024 \end{aligned}$$

¹ IRAF is distributed by National Optical Astronomy Observatories, which is operated by the Association of Universities for Research in Astronomy, Inc., under contract to the National Science Foundation

Table 1. Stars Observed

GSC Number	Right Ascension J2000	Declination J2000	GSC Mag.	Differential R Magnitude
2576_466	16 ^h 00 ^m 04 ^s	34°58'21"	14.5	-
2576_186	16 ^h 00 ^m 13 ^s	34°56'11"	11.5	-
2579_1696	16 ^h 00 ^m 07 ^s	35°00'18"	13.1	1.785 ± .006
2579_1928	16 ^h 00 ^m 13 ^s	35°00'54"	13.6	2.312 ± .016
2576_368	16 ^h 00 ^m 29 ^s	34°58'33"	13.6	2.259 ± .007
2576_369	16 ^h 00 ^m 25 ^s	34°56'15"	14.1	2.869 ± .004

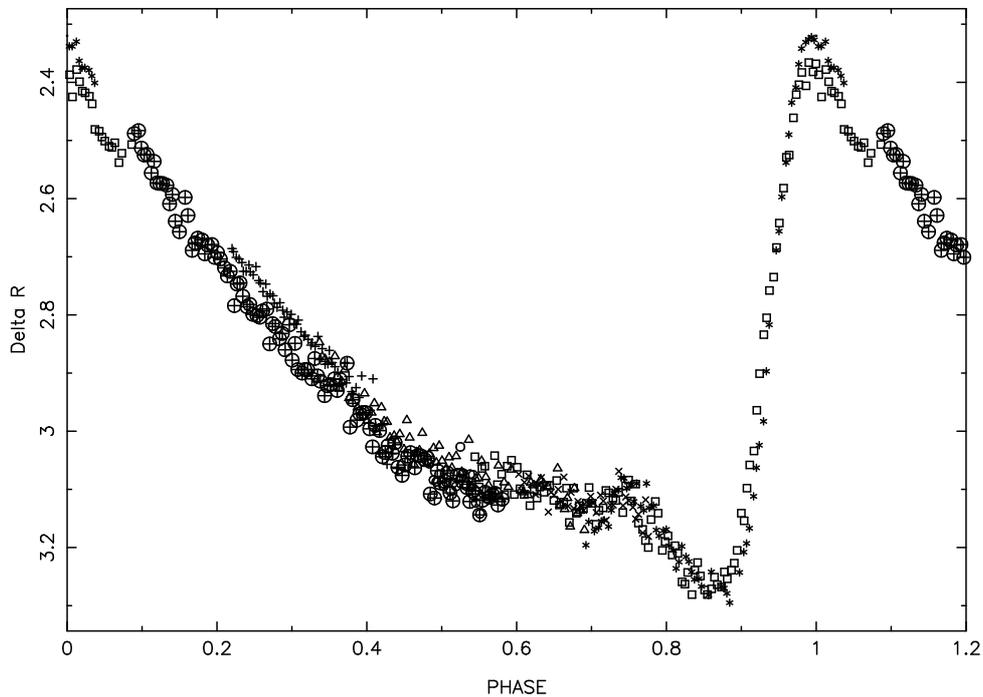


Figure 1. Differential R data light curve of GSC 2576_466

A plot of the 511 differential R magnitudes phased at this period is shown in Figure 1 with different symbols for each of the different nights. Despite some nights of poor quality, the standard deviations in Table 1 show that the expected errors from night to night are far smaller than the differences seen in the light curve. Note that the height of the maximum is not the same, while the minima are the same brightness.

A spectrum of GSC 2576_466 was obtained using the Dominion Astrophysical Observatory 1.8-m. telescope and 21(3/2)1 spectrograph on 28 March 1996 UT with a dispersion of approximately 120 Angstroms per mm. In Figure 2 this spectrum is shown below a spectrum of RR Lyrae taken with the same instrument configuration. The similarity is obvious. From the spectrum and the shape of the light curve we conclude that this star is an RR Lyrae of sub-type ab.

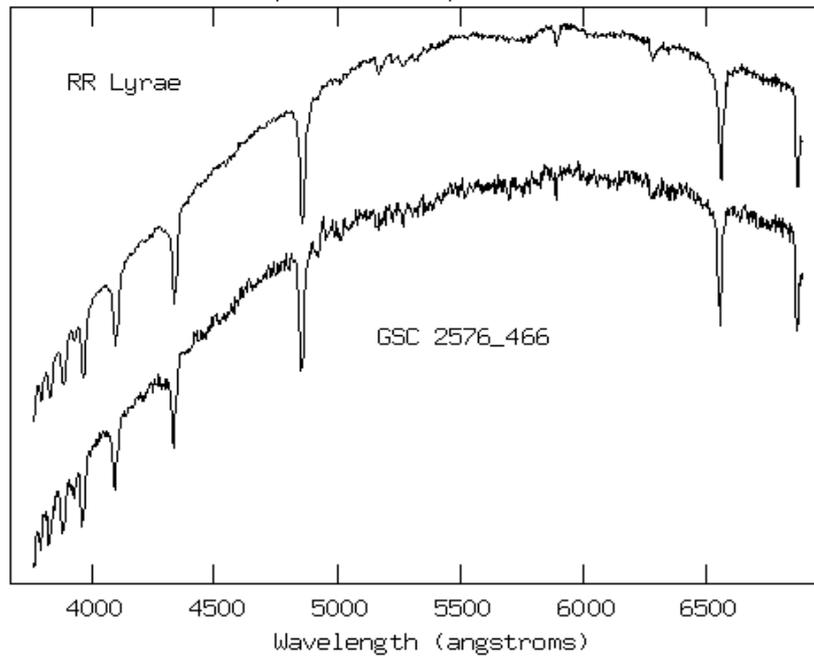


Figure 2. Spectrum of GSC 2576_466 below and RR Lyrae above

M. D. GLADDERS
 R. M. ROBB
 Visiting Astronomers at the
 Dominion Astrophysical Observatory
 and the
 Climenhaga Observatory
 Dept. of Physics and Astronomy
 University of Victoria
 Victoria, BC, CANADA, V8W 3P6
 Internet: gladders@cita.utoronto.ca
 Internet: robb@uvphys.phys.uvic.ca

References:

- Jenkner, H., Lasker, B., Sturch, C. McLean, B., Shara, M., Russell, J., 1990, *AJ*, **99**, 2082
 Kwee, K. K. and Van Woerden, H., 1956, *Bull. Astr. Inst. Neth.*, **12**, 327
 Robb, R. M. and Honkanen, N. N., 1992, in *A.S.P. Conf. Ser.*, **38**, Automated Telescopes for Photometry and Imaging, ed. Adelman, Dukes and Adelman, 105