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CCD OBSERVATION OF THE MIS-CLASSIFIED DWARF NOVA LX And

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Kinman & Mahaffey (1982) discovered a variable star (RR V-3 in their paper), which was named LX And in Kholopov et al. (1985). Kinman & Mahaffey (1982) classified it as an RV Tauri variable of type *b* due to the long-period variations of the mean brightness. Their light curve of LX And provided the mean photographic magnitude of 15.11, the amplitude of brightness variation of $2\overset{m}{.}90$ and the period of 36.469 days.

In this paper, we report the CCD observations on the optical variability of LX And, suggesting that this star has been mis-classified. The CCD photometric observations were done using an unfiltered ST-7 camera attached to a 25-cm Schmidt–Cassegrain telescope at Kyoto University and V-filtered Mutoh CV-04 camera attached to a 20-cm Reflector telescope at Toyama Astronomical Observatory. The exposure time was 30 s and 60 s, respectively. The images were dark-subtracted, flat-fielded and analyzed with the Java^{TM}-based PSF photometry package developed by one of the authors (TK) and analyzed with Nishi-harima Images made by N. Tokimasa. We determined the magnitude of LX And using the comparison star GSC 2834.846 (Tycho $V = 11.30$, $B - V = 0.56$), whose constancy was confirmed with the check star GSC 2834.1222. The estimated R_c magnitude 11.02 was used to calculate unfiltered CCD magnitudes of LX And. The difference between the color of LX And and that of the comparison is so small that unfiltered CCD magnitudes will make a good approximation of R_c magnitude of the variable. We expect to obtain the V-magnitude nearly equal to R_c magnitude since the $V - R$ color index of dwarf novae is near 0.

Fig. 1 gives the light curve of LX And covering 1 year. The abscissa and ordinate denote time in heliocentric Julian Date and V-magnitude (Toyama: open circles) or unfiltered CCD magnitude (Kyoto: filled circles), respectively. In this light curve, seven brightenings are found, and their duration is much shorter than the quiescence length. These rapid brightenings of large amplitude (more than 3 mag) are not seen in the light curves of RVb-type variables but typical of dwarf novae.

Fig. 2 gives the light curve of LX And covering 2 months. The coordinate system is the same as that of Fig. 1. As shown in Fig. 2, we detected the rapid brightenings compared with the magnitude observed two days earlier, showing 3.35 ± 0.30 mag on HJD 2451484.33, 1.92 ± 0.07 mag on HJD 2451511.20, and 2.36 ± 0.08 mag on HJD 2451535.92. The peak of the outburst was between HJD 2451486.21 and 2451488.27 for the first outburst, between HJD 2451512.19 and 2451516.18 for the second one and between HJD 2451536.92 and

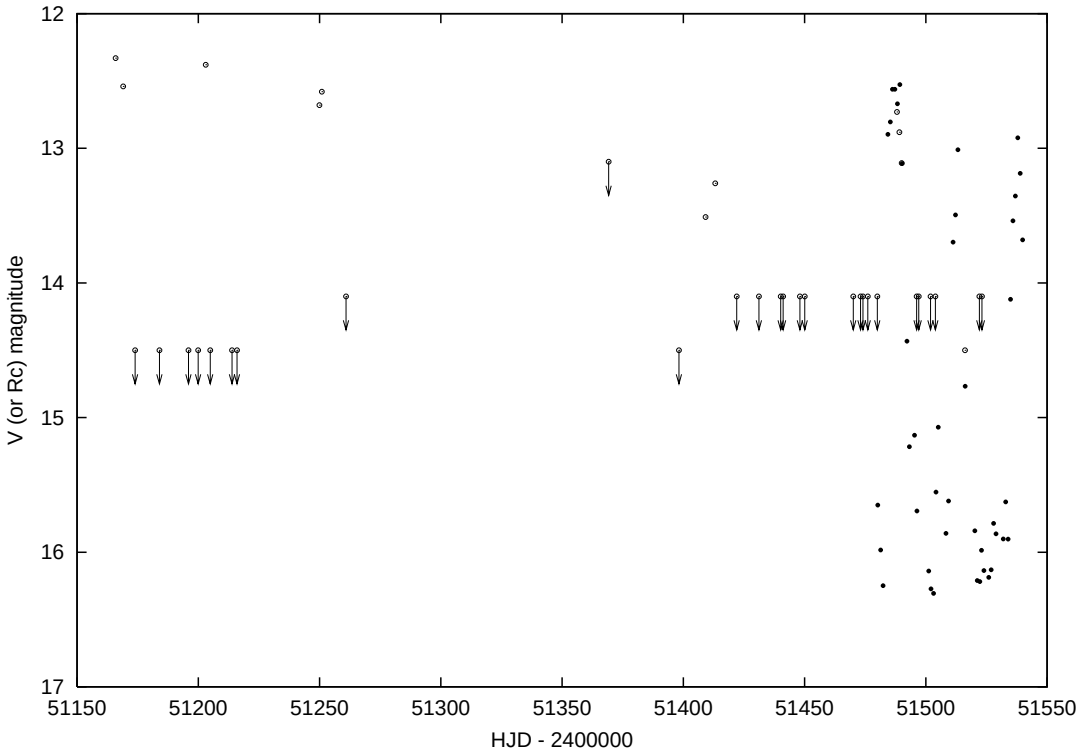

Figure 1. Light curve of LX And covering one year

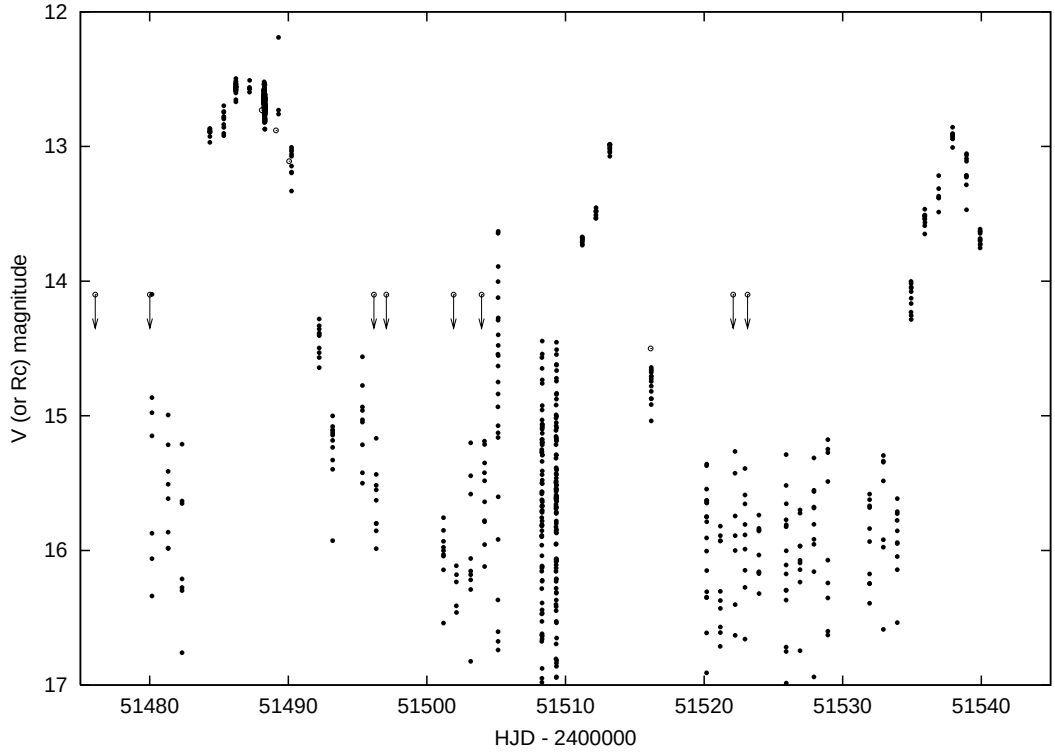

Figure 2. Light curve of LX And covering two months

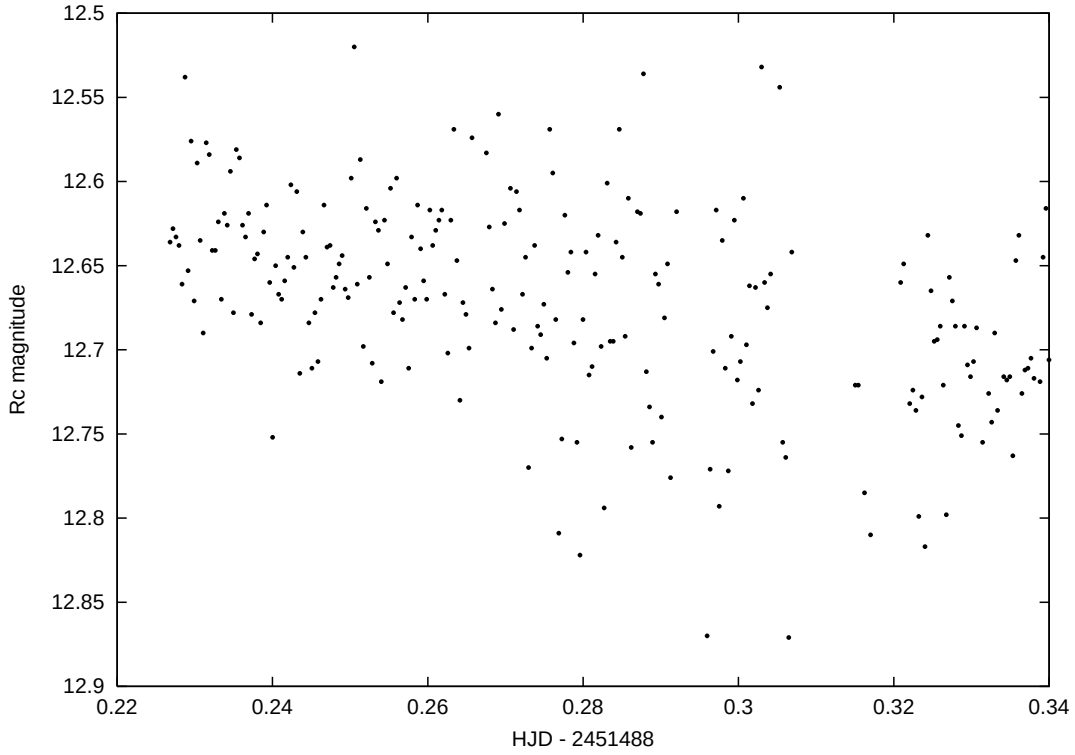

Figure 3. Light curve of LX And on HJD 2451488

2451538.92 for the third one, which indicates that the outburst period is between 21–30 days. The interval between the observed maxima is 26 and 25 days. After outbursts, the brightness returns to quiescence magnitude estimated as $R_c = 15.9 \pm 0.3$. Kinman & Mahaffey (1982) suggested a period of 36.469 days with considerable scatter in the light curve, however, considering their sparse observations and the variation of outburst intervals of dwarf novae, we can see a better periodicity assuming a period of about 26 days in their observations. Fig. 3 provides the light curve during the outburst on HJD 2451488. We could not detect any short time variation from this 2.7-hour observation.

As shown in Fig. 2, the outburst profiles of LX And are also reminiscent of the normal outburst of dwarf novae, and hence we conclude that LX And is a dwarf nova, not RVb-type variable. We will be able to understand the nature of LX And more clearly through spectroscopic observations.

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