X Muscae—A Large Amplitude Red Variable

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Abstract X Muscae is amongst the stars listed in the *General Catalogue of Variable Stars* as "not studied." Visual observations by the author during the five-year interval 1999 through 2003 indicate this is a large amplitude variable star, probably of the Mira type. A visual magnitude range of 12.2 to fainter than 15.0 is found with a mean cycle of 266 ± 7 days. A preliminary ephemeris for determining maximum brightness is JD 2452085 + 266 ± 7 E days.

1. Introduction

The fourth edition *General Catalogue of Variable Stars* (Kholopov 1985) includes X Muscae amongst the stars that have yet to be studied. The scant catalogue detail indicates a photographic magnitude range of 13.2 to 15.7 but no period, epoch of maximum brightness, or variability class is given.

X Mus is plotted on Chart 602 of the Variable Star Section of the Royal Astronomical Society of New Zealand (VSS RASNZ) (Bateson and Morel 1982), the finder chart for the nearby RCB type star Y Mus. Unfortunately, this chart is not of sufficient detail to clearly identify X Mus.

The GCVS indicates X Mus is identical with HV01256, AN1906.0142, and IRAS12597-6458 and has a spectral classification of M7. A positive visual identification was made by the author in 1999, and a CCD image then obtained by Colin Bembrick of Mt. Tarana Observatory, near Bathurst, NSW, Australia, has allowed for preparation of the preliminary chart reproduced here as Figure 1.

As no reliable magnitudes are available for this field, comparison stars have been indicated by letters and preliminary *Guide Star Catalog* magnitudes used (Space Telescope Science Institute 1992). Fainter comparisons have approximate visual magnitudes assigned by the author. These stars are indicated on Figure 1 and have been used in the preparation of this paper. It is recognized the GSC magnitudes are not necessarily accurate but are sufficient for the purposes of this paper.

2. Observations

Following positive identification, X Mus was closely followed in an effort to determine the nature of its variability. A total of 161 observations were obtained between 1999 June and 2003 September with the seasonal gaps evident in the data. The observations have been plotted as individual points on the light curve shown in Figure 2. From this curve it is apparent X Mus is a large amplitude, long period variable, probably of the Mira type.

A total of seven cycles is evident in the light curve and a mean period of 266.3 days, rounded to 266 ± 7 days, has been determined from the six observed maxima. Details of the individual cycles are given in Table 1, which also indicates the probable error in date of maximum based on completeness of the light curve.

Each observation has also been plotted according to phase relative to the well-observed maximum of JD 2452085 and the 266-day period. Figure 3 shows this phased light curve to which a sixth order polynomial trend line has been added. Here it can be clearly seen maximum are of two mean magnitudes, either 12.2 or 12.9.

Nothing can be said about the behavior of X Mus at minimum light as this falls below the limiting magnitude of the author's telescope.

X Mus is an easy star to locate with respect to the well-observed RCB star Y Mus and further regular observation will serve to refine the preliminary data given here.

3. Conclusion

The previously unstudied star X Mus is shown to be a large amplitude variable star of the Mira type. A visual magnitude range of 12.2 to fainter than 15.0 and mean period 266 days are found. Preliminary elements for determining the dates of maximum brightness are JD 2452085 + 266 ± 7 days.

4. Acknowledgements

Colin Bembrick of Mt. Tarana Observatory is thanked for providing the CCD image that allowed for preparation of an accurate chart. This research has made use of the SIMBAD database, operated by the CDS, Strasbourg, France.

References

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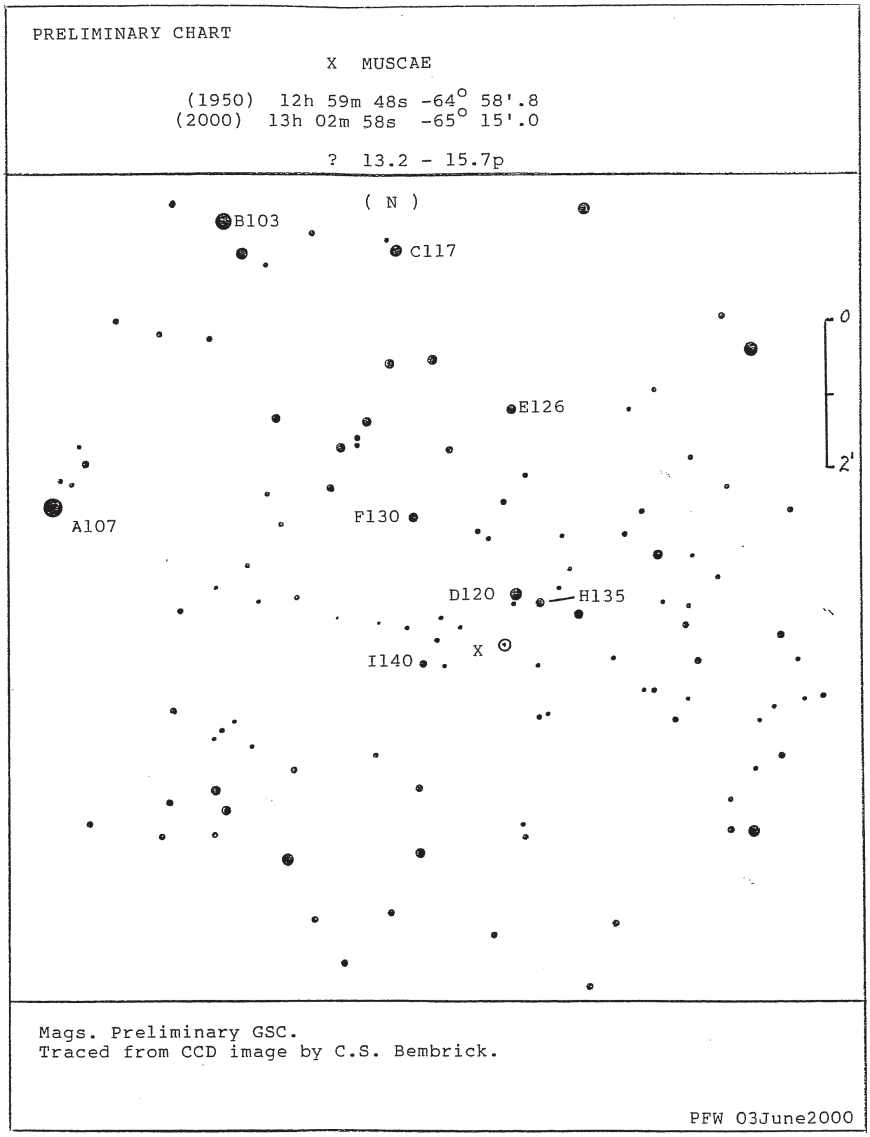

Figure 1. Chart of the X Mus field, plotted by the author on a chart adapted from the RASNZ finder chart for Y Mus.

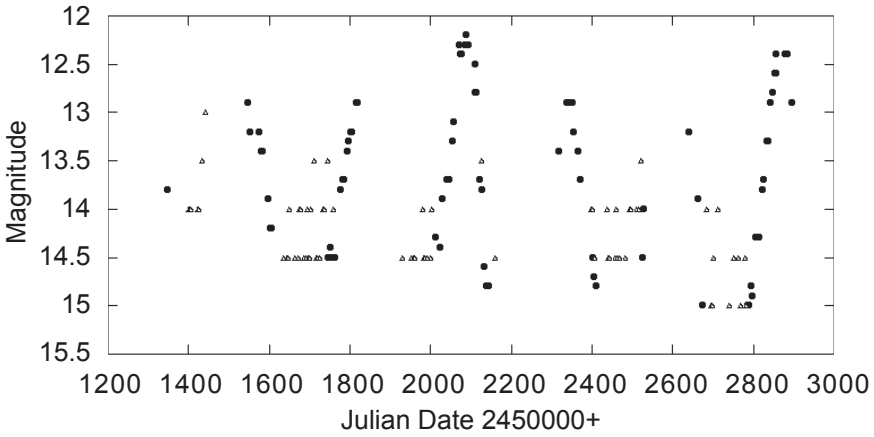

Figure 2. Author's visual light curve of X Mus. Circles represent positive observations; triangles are upper limits.

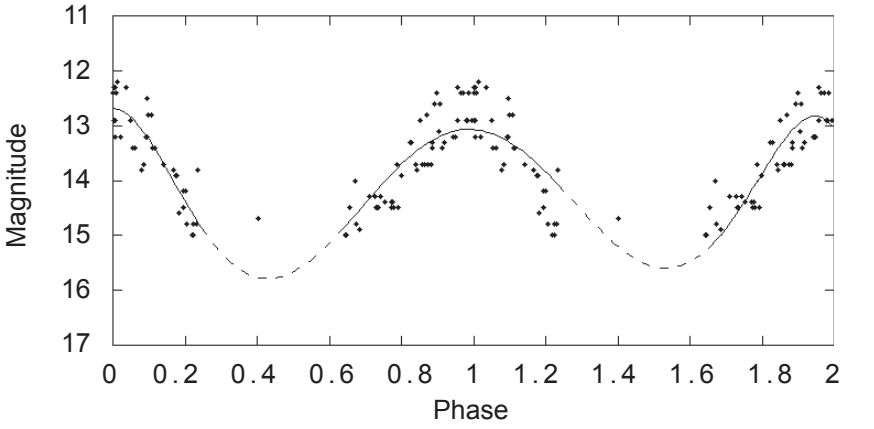

Figure 3. Phase diagram with polynomial fit for X Mus. Period = 266 ± 7 days.

Table 1. Details of observed maxima of X Muscae, 1999 through 2003.

Maximum JD JD 2400000+	*Error*	*Interval*	*Magnitude*
51286:	± 7	266:	12.8:
51552	± 5	268	12.9
51820	± 7	265	12.9
52085	± 3	264	12.2
52349	± 3	268	12.9
52617	± 3	267	12.8:
52884	± 5	—	12.4