COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4123

Konkoly Observatory
Budapest
13 December 1994
HU ISSN 0374 – 0676

KY Ara IS MISIDENTIFIED

KY Ara was discovered by E. Boyce (Shapley et al., 1939) and was classified as a possible dwarf nova. Finder charts appear in Tsesevitch & Kazanasmas (1971), Wyckoff and Wehinger (1978), and Duerbeck (1987), with the later two being based on the 1971 paper. This 1971 finder chart is based on examination of the original Harvard plates (Tsesevits & Kazanasmas, 1971).

Only one outburst has been seen, in early July 1937 (JD 2428715-721), and this was on four unidentified plates in the Harvard archival plate collection (Shapley et al., 1939). This single eruption was selected from a search through the GCVS as a candidate for being an event similar to those expected from gravitational lensing by a foreground MACHO star. Such events must be color-neutral, time symmetric, and unique. We looked into the case of KY Ara to see if the eruption could be a MACHO event.

Photometry of the star identified by Duerbeck (1987) was performed at the Cerro Tololo Inter-American Observatory on 25 July 1994. The brightness of this star was measured with various standard filters as U=16.88, B=16.82, V=16.21, R=15.82, and I=15.45 with uncertainties of roughly 0.02 magnitudes. These are the normal colors of a G0 main sequence star, not those of a dwarf nova.

Table 1

Plate	JD	Comments on brightness of KY Ara
A 19438	2428692	KY Ara invisible, G0 star visible
A 19446	2428694	KY Ara invisible, G0 star visible, poor plate
A 19456	2428696	KY Ara invisible, G0 star visible
MF 23368	2428699	KY Ara invisible, G0 star visible
MF 23383	2428701	KY Ara invisible, G0 star visible
MF 23387	2428703	KY Ara invisible, G0 star visible
A 19530	2428715	Discovery plate, B$\sim$15.8, KY Ara is to east of G0 star
B 62154	2428716	Poor plate limit, consistent with plate A 19530
A 19538	2428716	KY Ara slightly brighter than G0 star, B$\sim$16.5
MF 23447	2428719	Neither KY Ara nor G0 star visible
A 19546	2428719	KY Ara roughly equal to G0 star in brightness
A 19553	2428721	KY Ara roughly equal to G0 star in brightness
MF 23469	2428721	Neither KY Ara nor G0 visible, poor plate limit
MF 23481	2428722	KY Ara invisible, G0 star visible
A 19568	2428727	Neither KY Ara nor G0 star visible
A 19594	2428741	KY Ara invisible, G0 star visible
MF 23642	2428755	KY Ara invisible, G0 star visible

We then examined the original records and plates at Harvard. Table 1 summarizes the relevant plates. The discovery plate was A 19530, wich displayed a well-formed significant image of KY Ara. The other three plates with images of KY Ara are A 19538, A 19546, and A 19553, although the variable is close to the plate limit in all three cases. The existence of four good images at the same location over a six day period convinces us that KY Ara is indeed a true variable star.

KY Ara is identified in the original notes of E. Boyce as the following star of a double. Examination of plate A 19530 shows this to be true, with the preceding star being the G0 star mistakenly identified in later finder charts. The origin of this mistake arises from the chart of Tsesevich & Kazanasmas (1971) which correctly depicts the discovery plate, yet has the circle centered on the preceding star. Subsequent finder charts merely followed this first chart.

Terry Girard (Yale University) made PDS astrometric scans of plates A 19530, A 19538, and the ESO sky survey plate. These confirm that the preceding star is the G0 star. KY Ara is found to be roughly 1 magnitude brighter than the G0 star, or B$\sim$15.8, on the discovery plate. The position of KY Ara is $9\farcs5$ east and $4\farcs2$ south of the G0 star. With the position of the G0 star reported by Wyckoff and Wehinger, the 1950.0 coordinates for KY Ara are $18^{\rm h}4^{\rm m}9\fs5$ $-54°56'$ $50\farcs3$. Examination of the sky survey plates shows this position to be empty to below B magnitude 20. Examination of our CCD images from Cerro Tololo show the position to be empty to below B magnitude 21. Thus, the amplitude of KY Ara is greater than approximately 5 magnitudes.

The true nature of KY Ara is unclear. The amplitude, duration, and singularity of the 1937 event are consistent with the Boyce's suggestion of a dwarf nova (with a large amplitude and rare outbursts). Alternatively, since there is only one observed maximum, KY Ara could be a fast nova or even a large amplitude MACHO event.

Bradley E. SCHAEFER
Dorrit HOFFLEIT
Departments of Physics and
Astronomy
Yale University
New Haven, Connecticut 06520-8101
USA

References:

Duerbeck, H., 1987, *Space Sci. Rev.*, **45**, 1
Shapley, H., Boyce, E. H., and Boyd, C. D., 1939, *Harvard Annals*, **90**, 239
Tsesevich, V. P., and Kazanasmas, M. S., 1971, Atlas of Finding Charts of Variable Stars, (Moscow: Acad. Sci., USSR)
Wyckoff, S., and Wehinger, P. A., 1978, *Publ. Astron. Soc. Pacific*, **90**, 557