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LET'S FORGET DO Dra

A 16th magnitude cataclysmic variable has recently been identified as the optical counterpart of a HEAO-1 and HEAO-2 X-ray source (Patterson et al. 1982). Because the X-ray and optical positions agree to within the 1' accuracy of the X-ray position, and because the X-ray flux and spectrum are about what is expected from cataclysmic variables, there is essentially no doubt that the star is the X-ray source. Hazen (1985) and Wenzel (1983) have searched plate collections and found brightenings to  $m \approx 12$  which are probably dwarf nova eruptions.

What is perhaps less clear, at first glance, is that this star is extremely likely to be the variable star noted by Tsesevich (1934) and catalogued as "YY Dra" in all editions of the General Catalogue of Variable Stars. In particular, Wenzel (1983) has expressed doubt on this point, prompting the assignment of a new variable star name (DO Dra) to the dwarf nova. This seems quite ill-advised, because, as we shall see, the confusion probably arises from fairly routine errors in position and photometric classification.

The positional data are shown in Figure 1 and Table I. The lower circle and various diagonal lines show the X-ray positions, and (I leave out the detailed arguments, but they can be found in Patterson et al. (1987)) are all consistent with the position of the dwarf nova, star D. The upper circle, drawn with an arbitrary 40" error radius, shows Tsesevich's stated position for YY Dra. The other constraint on the problem comes from Tsesevich's analysis of the brightness variations; he suggested an Algol-type binary varying from  $m = 12.9$  to  $>14.5$  with a period of 4.21123 days. But we have scanned over 500 plates in the Harvard plate collection, and have found no Algol-type light variations for any star in the field (covering typically about 20' by 20'). Wenzel (1983) reports the same result from 700 additional archival plates. We can envision only two solutions: either the reported position of YY Dra is grossly in error, and the star is now lost; or the reported position is in error by 53", and YY Dra is identical to the dwarf nova. We strongly favor the second hypothesis, for these reasons:

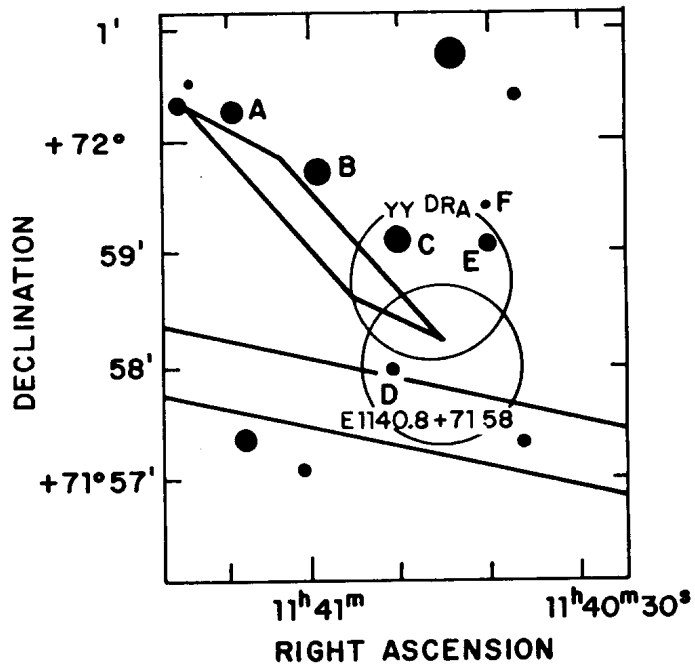


Figure 1

TABLE 1. Measured positions (1950.0)

star D ( $\pm 1.5''$ )	$11^{\text{h}}40^{\text{m}}48^{\text{s}}.83$	$71^{\circ}57'59''$
HEAO-2 X-ray ( $\pm 1'$ ) (E1140.8+7158)	$11^{\text{h}}40^{\text{m}}44^{\text{s}}.7$	$71^{\circ}58'3''$
GCVS "YY Dra"	$11^{\text{h}}40^{\text{m}}45^{\text{s}}$	$71^{\circ}58'48''$

(1) At these high galactic latitudes, the incidence of variable stars is about  $0.03/\text{deg}^2$ , so the probability that an erroneous position would accidentally fall within  $1'$  of a true variable star is  $\sim 10^{-5}$ .

(2) A 13th magnitude Algol binary at high latitude is intrinsically somewhat suspicious. For a typical  $M_V$  in the range  $-1$  to  $+3$ , one obtains distances of 1-6 kpc -- placing the star well out in the galactic halo, where binaries of any kind seem to be quite rare (Batten 1973). Inspection of the entire Variable Star Catalogue reveals only 3 Algol-type ("EA") stars with  $m > 12.5$  in the  $10^4 \text{ deg}^2$  at the galactic poles ( $b > 45^\circ$ ).

(3) A positional error of  $53''$  is not unusual. The accurate coordinates of 23 cataclysmic variables measured by Lopez (1985) showed an rms offset of  $41''$ , compared to the GCVS positions.

(4) It is not difficult to imagine how a sparse set of photographic magnitudes, for a star never observed before or since, could have produced a spurious period and light curve. There are hundreds of precedents.

Thus we have substantial confidence that the star we now recognize as a dwarf nova is YY Dra, the star observed by Tsesevich. The point may seem somewhat academic, but is made here in the interests of accuracy and reasonable nomenclature. Variable stars are commonly re-classified, but that does not warrant re-naming them.

Let's consign the name of DO Dra to a richly deserved oblivion.

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