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THE CATAclySMIC VARIABLE V358 LYRAE: REMOVING AMBIGUITIES

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The variable star V358 Lyr = S 9649 was discovered by Hoffmeister (1967). The discoverer gave the photographic range from 16^m to fainter than 18^m and considered the star a possible long-period variable. Galkina and Shugarov (1985) found no trace of the star on Moscow plates covering the time interval JD 2434112–2445264. Richter (1986) suggested a cataclysmic-star classification for V358 Lyr. He presented the observations of the variable given in Table 1 (in our presentation of this table, we restore the fractions of the Julian Days dropped by Richter, for clarity of the further discussion). Te₄ are sky patrol plates, GC are plates taken with the 40 cm astrograph ($F = 160$ cm).

Table 1. Observations of V358 Lyr from Richter (1986)

Plate	1965	JD	m_{pg}
Te ₄ 4601	Jun 25	2438937.483	[14.5
Te ₄ 4609	Jun 29	8941.483	13.27
GC 1387	Aug 4	8977.480	16.42
GC 1388	Aug 19	8992.399	17.31
GC 1389	Aug 23	8996.412	[18.5

Richter (1986) did not find any trace of the star to 21^m on Palomar prints, concluded that “the question whether V358 Lyr is a classical nova or a WZ Sagittae type object remains open”, but argued for the latter possibility. There is nothing red near the position of V358 Lyr, and thus its being a member of the cataclysmic-variable class is quite plausible.

We found all the plates studied by Richter in the plate stacks of Sonneberg Observatory. Moreover, the plate collection contains several additional plates relevant to the problem, taken with the other Sonneberg 40 cm astrograph, GB ($F = 200$ cm). We generally confirm the results of Table 1. Figure 1 reproduces the field of the star from Hoffmeister’s discovery plate, GC 1387, with the variable marked by Hoffmeister. Its coordinates, measured by us with respect of reference stars from the 2MASS catalog, are:

$$18^{\text{h}}59^{\text{m}}32^{\text{s}}.95 \quad + \quad 42^{\circ}24'12''.2 \quad \text{J2000.0, \quad ep. 1965.591.}$$

These coordinates are accurate to $\sim 0''.5$. However, the object's position in Te₄ 4609, measured with respect of Tyc2 and GSC stars and accurate to $\sim 2''$,

$$18^{\text{h}}59^{\text{m}}33^{\text{s}}.5 \quad + \quad 42^{\circ}24'21'' \quad \text{J2000.0,}$$

differs by $14''$, outside estimated errors. Moreover, the region of V358 Lyr in Te₄ 4609, shown in Fig. 2, contains at least two more star-like objects missing on DSS images. The plate GB 1911 (JD 2438941.506), with a much better plate limit than for Te₄ 4609, whose exposure time partially overlaps the exposure of Te₄ 4609, shows nothing in the position of V358 Lyr. In our opinion, the image in Te₄ 4609 is a plate defect rather than the variable.

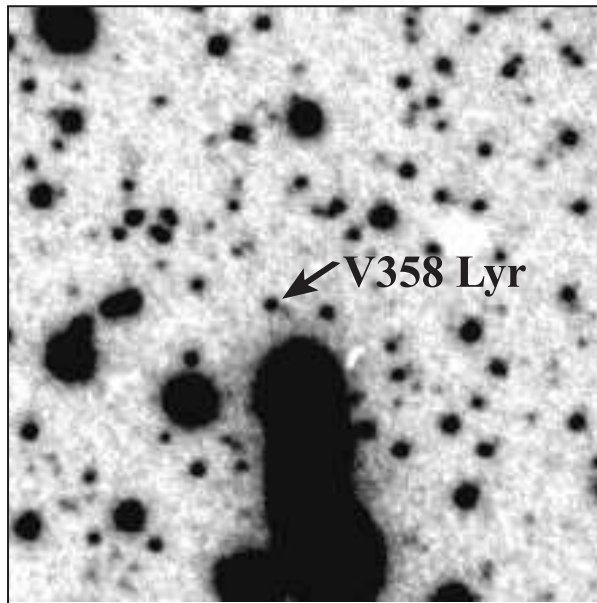


Figure 1. The $10' \times 10'$ field around V358 Lyr on the discovery plate, GC 1387. North is on top, east is to the left. The thick bar below V358 Lyr is the ink mark left by C. Hoffmeister.

We are left with the observations presented in Table 2, replacing the table from Richter (1986).

Table 1. The corrected list of Sonneberg observations for V358 Lyr

Plate	1965	JD	m_{pg}
Te ₄ 4601	Jun 25	2438937.483	[14.5
GB 1905	Jun 25	8937.503	[17
GB 1908	Jun 28	8940.505	[17
GB 1911	Jun 29	8941.506	[17
GC 1387	Aug 4	8977.480	16.42
GC 1388	Aug 19	8992.399	17.31
GC 1389	Aug 23	8996.412	[18.5

The Moscow plate collection now contains 89 additional plates, not studied by Galkina and Shugarov (1985), covering JD 2445525–2450366. Nothing brighter than 17^{m} can be seen in the position of V358 Lyr.

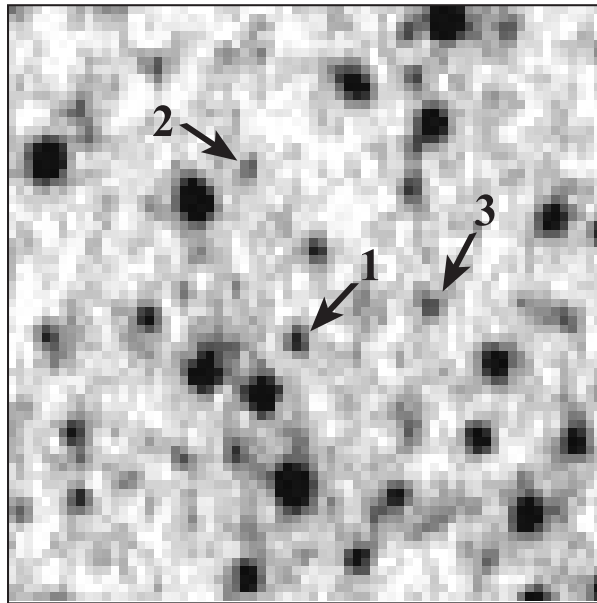


Figure 2. The $20' \times 20'$ field around V358 Lyr on the patrol plate Te₄ 4609. The three probable plate defects are marked with numbers 1, 2, 3. No. 1 was identified with V358 Lyr by G. Richter.

We conclude that V358 Lyr is most probably a faint cataclysmic variable with extremely rare outbursts. Richter (1986) argued that the magnitude 13^m3 in maximum made the star, were it a Nova, unbelievably far from the galactic plane. It is even more so with the corrected magnitude in maximum, 16^m4 . It should be remembered, however, that we know nothing about the star's behavior in July, 1965.

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