## "NOVA" PQ And - FURTHER OUTBURSTS

PQ And was discovered by McAdam (1988) on photographs taken on 1988 March 21. Further observations by several authors (IAU Circ. Nos. 4570, 4577, 4579, 4620, 4628 and 4629) show a novalike decline from $10^m.0$ (March 21) to $18^m.8$ (July 9), see Fig. 1. Spectral data are very poor: According to Wade (1988) the post eruption spectrum resembles WZ Sge.

Therefore and because Hurst (1988a) suspected a second eruption in 1976 Oct. 19 (which, however, he revised soon after, 1988b), the object was examined on 1725 Sonneberg plates taken between 1928 and 1989. The plate limit is mostly between $13^m$ and $14^m$. The magnitudes were determined by linking the comparison stars (Fig. 2) to the photoelectric sequence by Johnson (1954) of the nearby cluster M34:

| star | B |
|------|-------|
| r | 10.87 |
| a | 11.50 |
| b | 13.00 |
| c | 14.05 |
| d | 14.50 |

Neither the 1988 eruption nor that particular 1976 eruption could be checked, for lack of plates; but it turned out that additional outbursts took place in 1938 and 1967 (see Table I). Of course, these data are too poor to get any reliable estimation of the true cycle length of eruptions by statistical methods described by Wenzel and Richter (1986). Formal application of their formula leads to the following results:

Taking the plate limit to be $14^m.0$ (fainter magnitudes are mostly only marginally visible and are easily overlooked), we have:

Number of plates N = 1725

Number of plates with brightenings $]14^m.0$   n = 6

Time interval  t = 62 a

Effective time interval  T = 46.5 a
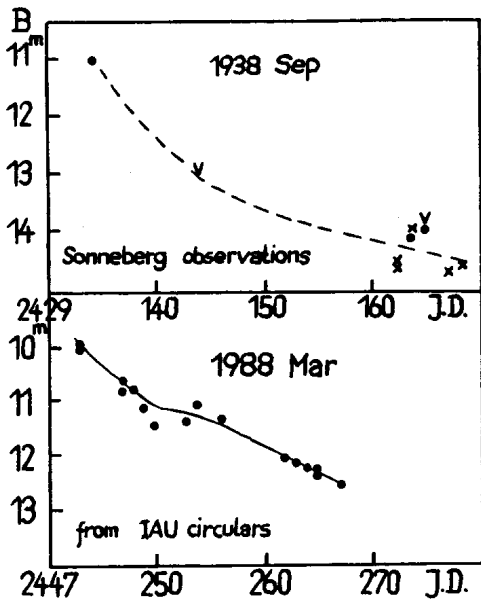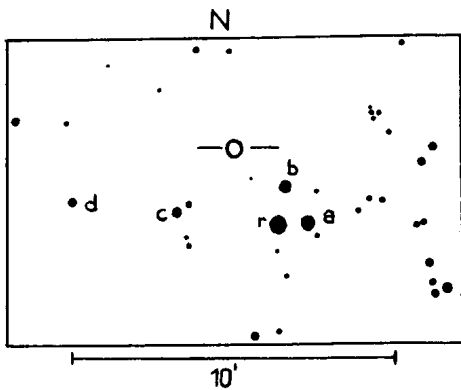
Duration of outbursts  ( $]14^m.0$)   L = 30 d

Figure 1



Figure 2

Poisson parameter $\lambda = 2.82$

    With these data we obtain the following estimations:

$C_1 = \lambda T/n = 21.9$ a

$C_2 = LN/n = 23.6$ a

In reality, the mean cycle length C will be probably smaller, between about 10 a and 20 a.

    According to the A-log C relationship of Richter (1986) the cycle length is about 12 years, if the amplitude is 8.8 mag.

Table I

| date | JD 2429.. | B | date | JD 2439.. | B |
|---|---|---|---|---|---|
| 1938 Aug. 6 | 117.54 | [13$^m$.5 | 1967 Mar. 7 | 557.28 | 10$^m$.8 |
| 23 | 134.55 | 11.0 | 7 | 557.31 | 10.9 |
| Sep. 2 | 144.46 | [13 | Apr. 2 | 583.32 | [14.5 |
| 20 | 162.57 | 14.4: | | | |
| 20 | 162.60 | 14.5:: | | | |
| 21 | 163.53 | 14.0 | | | |
| 21 | 163.55 | 13.9:: | | | |
| 23 | 165.53 | 13.9 | | | |
| 23 | 165.55 | [13.9 | | | |
| 25 | 167.56 | 14.8:: | | | |
| 26 | 168.55 | 14.7:: | | | |

To sum up it can be said that PQ And, which has an amplitude of nearly 9 mag, is either a recurrent nova or a long cyclic U Geminorum star, the latter being more probable because its spectrum resembles that of WZ Sge as already mentioned.

G.A. RICHTER

Zentralinstitut für Astrophysik
Sternwarte Sonneberg
0-6400 Sonneberg
Germany

References:

Hurst, G.M.: 1988a, IAU Circ. No. 4577.
Hurst, G.M.: 1988b, IAU Circ. No. 4579.
Johnson, H.L.: 1954, Astrophys.J. 119, 185.
McAdam, D.: 1988, IAU Circ. No. 4570.
Richter, G.A.: 1986, Astron.Nachr. 307, 221.
Wade, R.A.: 1988, IAU Circ. No. 4629.
Wenzel, W., Richter, G.A.: 1986, Astron.Nachr. 307, 209.