COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1603

Konkoly Observatory
Budapest
1979 May 14

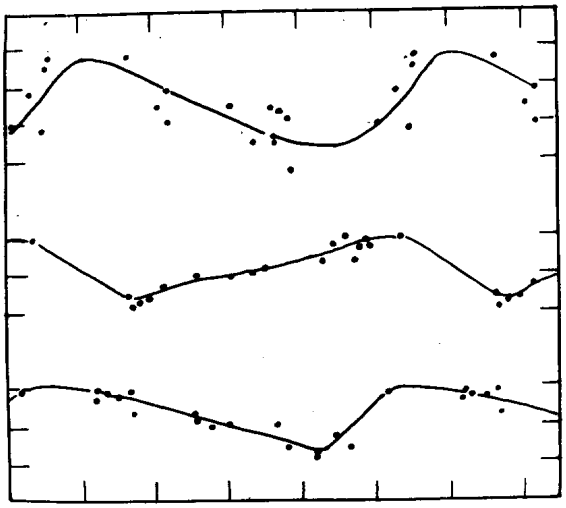
# VX PUPPIS - A PUZZLE

About a dozen cepheids with periods between 1.5 and 6.3 days are known to have beat periods such that the ratio of secondary to primary period is close to 0.7 (e.g., Faulkner 1977). In most of the cases for which both light curves have been published, the secondary appears normal, in the sense that ascending light is steeper than descending. Stobie's (1970) curves for the secondary period of VX Puppis, to the contrary, show a markedly steeper descent. The periods given are $P_1=3^d.01172$ and $P_2=2^d.1370$, the latter having been found by first assuming a ratio close to 0.7. The curve, however, looks spurious, and on the basis of the same 17 sparse published observations used by Stobie (Mitchell 1964) I was able to obtain another period, $P_3= 1^d.8706$ for which the light curve is normal. The two periods are related by

$$1/P_3 = 1/\text{Sid.Day} - 1/P_2 \ .$$

The visual light curves are shown in the Figure, where the upper plot shows the original observations represented by $P_1$. The second and third strips show how well the deviations of the observations from the smooth curve are represented by $P_2$ and $P_3$, respectively. An additional 12 later photoelectric observations by Takase (1969) roughly substantiate these periods.

From an observational standpoint one would intuitively favor $P_3$ over $P_2$; however, the ratio of $P_3/P_1$ is only 0.621 whereas theory (Stobie 1969) favors 0.7. That the primary period might be spurious as well is not likely. C.H. Payne-Gaposchkin (1952) published a period of $3^d.01209072$ based on 624 Harvard plates spanning about half a century. She made no mention of a secondary or beat period. Since the amplitudes Stobie found for the primary and secondary are comparable, the Harvard material should reveal beat phenomena. The GCVS does indicate that Russian astronomers have found an indication of a $10^d$ beat period. This is not obviously



Light curves for VX Pup. Upper, Observations represented by $P_1=3^d.01172$. Middle, Residuals from the smooth curve above fitted to $P_2=2^d.1349$. Lower, Residuals represented by $P_3=1^d.8706$. Markers at intervals of 0.2 period and 0.2 mag.

consistent with the periods given here. If the beat period were $15^d$ we would have very closely, $3P_1 = 7P_2 = 8P_3 = 15.0$, with no clear choice between $P_2$ and $P_3$.

Obviously this interesting star merits further investigation in order to resolve a possible conflict between observation and theory.

DORRIT HOFFLEIT

Department of Astronomy
Yale University
New Haven, Conn. 06520
U.S.A.

References:
Faulkner, D.J. 1977, Ap.J. 216, 49
Mitchell, R.I.,Iriarte, B.I., Steinmetz, D. and Johnson,H.L. 1964, Tonantzintla-Tacubaya Bull. 3, 153
Payne-Gaposchkin, C.H. 1952, Ann.Harvard Coll.Obs.115, No.18
Stobie, R.S.,1969, M.N.R.A.S. 144, 511
Stobie,R.S., 1970, Observatory, 90, 20
Takase, B., 1969, Tokyo Ast.Bull. No. 191