

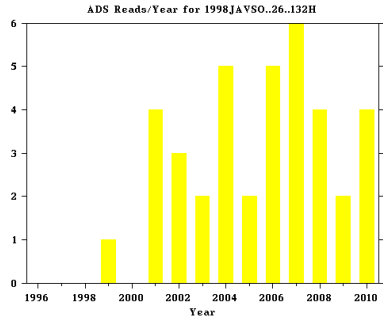


Revisiting the Un-named Fleming Variables

Kristine Larsen, Department of Physics and Earth Sciences, Central Connecticut State University



In a presentation at the 1997 AAVSO Annual Meeting, Dorrit Hoffleit brought attention to fourteen of the nearly 300 variables directly discovered by Williamina Fleming or discovered under her direction at the HCO. These fourteen stars had not been given permanent designations in the General Catalog of Variable Stars (GCVS) at the time of her talk (and its subsequent article in JAAVSO Volume 26). In the intervening thirteen years since her original presentation, a number of these stars have been further observed, both by AAVSO members and automated optical and infrared telescopes (such as IRAS, 2MASS and Hipparcos) and their variability confirmed at visible and/or infrared wavelengths. This poster revisits these fourteen stars and summarizes our current knowledge about them and their status as observed variable stars.



As of September 29, 2010, there were only 38 reads of Hoffleit's JAAVSO article through the ADS database. Several of these hits (in various years) belong to this poster's author. Note that there was initially very little interest in this paper (and by extension, in these stars) by those who do not directly subscribe to JAAVSO. [Graph taken directly from ADS website <http://adsabs.harvard.edu/>]

AAVSO member Raymond Berg presented a paper at the 1999 AAVSO Annual Meeting in which he detailed his "limited study" of three of these stars. He found no variability in NSV 840, NSV 1214, or NSV 3379 in 21 observations over the course of a month (Berg 2000).

A review of the SIMBAD, ADS, AAVSO, and International Variable Star Index (IVSI) databases yielded the information summarized in the remainder of this poster, especially the table appearing below.

NSV	Constellation	Name in GCVS	Mag range (in Hoffleit's paper)	Mag range (current)	Original spectral class (cited by Hoffleit)	Hoffleit paper spectral class	Current spectral class	Original variable type (cited by Hoffleit)	Current variable type	# AAVSO observations (10/26/97 - 9/9/10)	Period(s)
756	Hydrus	CI Hyi	9.6-10.5	8.52-9.09 Hp	Mc5d	M5/7 III	M6 III	I	SRB	1	
840	Hydrus	CL Hyi	7.8-8.8	6.48-7.15 Hp	Mc5d	M6/7	M6/7		SRB	10	66.4, 71.9, 75.8, 94.1, 100.1 d
1214	Reticulum	WX Ret	8.0-8.9	8.0-9.5 V	Md	M6/7 III	M6/7 III		SRA	9	265 d
3379	Puppis		8.0-8.6	8.0-8.6 p	Md7	M6 III	M6 III			14	
5173	Centaurus	V905 Cen	9.5-10.4	10.49-10.68 Hp	Na	C	C		LB	0	
6135	Centaurus	V1163 Cen	9.8-10.4	9.0-9.2 V	Np	S5	S	I	SRB	10	46.2 d
6200	Centaurus	V1172 Cen	10.5-11.3	8.4-8.7 V	Md	S	S; K-M	LB	LB	0	
6507	Centaurus		9.8-10.8	7.3-7.8 V	N	C	C	LB	SRB	25	314 d
7645	Norma		9.6-10.8	9.6-10.1 p	Md	K1/2 III	K1/2 III	LB	LB	191	
8476	Ara		11.5-12.5	11.5 (1.0) p	N	C	C; N3	LB	LB	Not in program	
11738	Telescopium		11.2-?	11.2-? P	Mc	M4/7	M5/6; M4		Misc	0	
11792	Aquila		10.8-13.2	10.8-13.2 p	Na	R8	R8			Not in program	
11913	Sagitta	V367 Sge	12.2-14.5	11.7-12.4 V	Md	Mc	M	I	DCep-FU	3	4.84188 d
12993	Telescopium		13-13.7	13-13.7 p	N	C	C; NB		Misc	0	

[SR = semiregular late-type giant; LB = slow irregular variable; DCep = classical Cepheid]

As the above table details, the majority of these stars are currently in the AAVSO program and more than half now have a GCVS designation. However, many of these stars continue to be largely ignored by AAVSO observers, in most cases probably due to their southerly declination. A number of interesting discoveries have been made about several of these stars, as described below.

•**CI Hyi and CL Hyi:** Both are among the 2027 stars with the largest Hipparcos photometric amplitudes (Adelman 2001)

•**NSV 3379:** Variable in infrared; is an AGB star with an oxygen-rich circumstellar shell (Goebel et al. 1994; Winters et al. 2003)

•**V1172 Cen:** peculiar spectrum with emission lines.

•**NSV 7645:** AAVSO archive has 191 observations from 1 observer (JA) since the time of Hoffleit's initial presentation.

•**NSV 11738:** Also identified with ASAS J190742-4834.5 in IVSI with magnitude range 9.31 (0.8) V and period 145.163376 d.

•**NSV 11913:** Identification in SIMBAD database with V367 Sge is recent (2010). IVSI designation of name occurred in 2008. Classified as a Cepheid in 2004 (Wils and Greaves, 2004). In her presentation, Hoffleit suggested this star might be identified with W Sge, which is only 5.4' North, but the 8.8-14.4 V magnitude range and 278.26d period demonstrate these are two very different objects.

•**NSV 12993:** Also identified with ASAS J202016-4949.0 in IVSI with magnitude range 10.88 (0.51) V and period 161.209329 d.

As this survey of databases demonstrates, these neglected stars have achieved some level of recognition in the years since Hoffleit's initial presentation, but there remains much to be learned about them. As she noted in her presentation, "The published amplitudes and/or spectral classes suggest that they are favorable candidates for more extensive investigations." It is hoped that this presentation will spark a second wave of interest in these neglected variables.

References:

Adelman, S.J. (2001) "Stars with the Largest Hipparcos Amplitudes." *Baltic Astronomy* 10: 589-93.
 Berg, Raymond (2000) "In Search of the Southern Cross." *JAAVSO* 28: 159.
 Goebel, J.H. et al. (1994) "A 7 Micron Dust Emission Feature in Oxygen-rich Circumstellar Shells." *ApJ* 400: 317-22.
 Hoffleit, Dorrit (1998) "Un-named Fleming Variables." *JAAVSO* 26: 132-3.
 Wills, Patrick, and Greaves, John (2004) "New Northern Cepheids." *IAU Information Bulletin on Variable Stars* No. 5512.
 Winters, J.M. et al. (2003) "Mass-loss from Dusty, Low Outflow-velocity AGB Stars. I. Wind Structure and Mass-loss Rates." *A&A* 409: 715-35.

This poster is dedicated to the memory of Dorrit Hoffleit.

