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NOTE ON CROSS-IDENTIFICATION OF FLARE STARS IN THE PLEIADES

During analysis and supplementation of the machine-readable version of the Tonantzintla catalogue (TC) of Pleiades flare stars (Haro et al., 1982, Tsvetkov et al., 1987) a number of inconsistencies has been found which will be discussed in the following.

I. We have noticed multiple designations of the same stars in the General Catalogue of Variable Stars (GCVS) (Kholopov, 1985) as well as in the New Catalogue of Suspected Variables (NCSV) (Kholopov, 1982) to which we would like to draw attention. We also used the 67th, 68th and 69th Name List of Variable Stars (Kholopov et al., 1985, 1987, 1989), for updates of GCVS designations.

Table 1 lists all flare stars for which two different designations are given in the GCVS, and those for which designations are given in both the GCVS and the NCSV (in the case of LO Tau even two numbers in the NCSV). As communicated in the notes to the NCSV, such coincidences have been suspected for most of the stars listed in Table 1. They could, however, not be verified, because identification charts are often lacking in the publications announcing the discoveries of flare stars.

**Table 1.** Pleiades flare stars with multiple designations in the GCVS and the NCSV

TC No.	GCVS No.	Author Design. in Name Lists of Variable Stars	Name List of Variable Stars (No.)	NCSV No.	Author Designation in NCSV
80	LO Tau	T3	57	-	-
80	-	-	-	01231	A112
80	-	-	-	01290	K25
150	V 438 Tau	B179	58	-	-
150	-	-	-	01256	K7
263	V 539 Tau	T6b	59	-	-
263	-	-	-	01298	B424
298	V 336 Tau	T83	57	-	-
298	-	-	-	01308	K3
400	V 337 Tau	T164	57	-	-
400	-	-	-	01370	A128
412	V 464 Tau	B211	58	-	-
412	-	-	-	01378	K4
451	V 565 Tau	B233	59	-	-
451	V 715 Tau	A94	62	-	-
509	V 692 Tau	A113	60	-	-
509	-	-	-	01420	B423

II. Some Pleiades flare stars in the Tonantzintla catalogue (included only in the NCSV) have shown only one flare of small amplitude which does not satisfy the criterion  $\Delta m > 5\sigma(m)$  (Tsvetkov et al., 1988) so that there is reasonable doubt that they belong to the class of UV Cet stars. They are listed in Table 2.

**Table 2.** Pleiades flare stars with single low amplitude flares, included only in the NCSV

TC No.	Author Designation	NCSV No.	min Pg	$\Delta m$ Pg
1	A110	01202	16 <sup>m</sup> 3	0 <sup>m</sup> 3
99	A111	01235	15.8	0.4
120	A109	01242	16.2	0.3
293	B229	01314	17.0	0.5

III. Four flare stars from the TC, which have relatively large amplitudes and are identified on accompanying finding charts, have apparently neither GCVS nor NCSV designations. There are no well-founded reasons why these stars should not be included in the GCVS as UV Cet type stars. They are listed in Table 3. For the star TC87, which has shown two flares, the amplitude is given according to the original paper, because of a mistake in the TC.

**Table 3.** Pleiades flare stars included neither in the GCVS nor in the NCSV

TC No.	Author Designation	min U/Pg	$\Delta m$ U/Pg
61	T69b	15 <sup>m</sup> 8U	1 <sup>m</sup> 5U
87	K*2	16.6U	1.6U
200	AB526	15.2	0.8
261	K*4	>20.0U	>3.2U

IV. Several stars are listed in the GCVS or NCSV with UV Cet identification, which are not included in the TC. They are given in Tables 4 and 5. For most of them, the GCVS lists the minimum brightness according to the photographic UB<sub>V</sub> photometry of Chavushian and Gharibjanian (1975). The maximum brightness is taken from the original papers. This procedure leads in some cases to larger amplitudes than those given in the original papers. We are inclined to think that this is caused by uncertainties in the determination of stellar magnitudes both at minimum and maximum brightness and is not due to an underlying type of variability. This effect may also apply to some of the remaining stars which are listed in the GCVS as UV Cet stars in the Pleiades region. In order to avoid systematic errors in amplitudes, the stellar magnitudes at minimum and the flare amplitudes were taken from the original papers, and are given in Table 4. The  $5\sigma$  criterion was applied to the magnitudes of the stars in this table; 6 stars were found which did not satisfy the criterion. This result, and also the fact that they are not included in the TC, sheds doubts on the reality of their variability.

**Table 4.** Stars listed as UV Cet stars in the GCVS, but not in the TC

GCVS No.	Author Designation	H II	min Pg/U	$\Delta m$ Pg/U	Notes
LL Tau	B128		17 <sup>m</sup> 0	>1 <sup>m</sup> 0	1
V 354 Tau	J&M	2082	15.31	0.88	2
V 385 Tau	B124		15.0	0.5	3,4
V 393 Tau	T59		15.5	0.7 U	1,3
V 394 Tau	B126		14.7	1.2	4
V 447 Tau	B206	1038	16.8	0.5	3
V 487 Tau	B261		17.7	0.7	3
V 496 Tau	B262		17.1	0.7	3
V 521 Tau	T22b	628	16.0 U	0.8 U	
V 525 Tau	B263		17.7	0.8	3
V 527 Tau	T4b	979	17.8 U	1.1 U	
V 529 Tau	T24b	1009	17.5 U	1.0 U	
V 560 Tau	B295	3065	14.2	0.8	
V 735 Tau	K**1		18.5 U	1.8 U	1
V 736 Tau	K**2		17.2 U	1.7 U	1
V 755 Tau	K**4		19.3 U	4.3 U	1
V 792 Tau	K#1		20.5 U	7.1 U	1
V 964 Tau	K*K		>18 U	>2.6 U	5
V 965 Tau	K*N		>18 U	>2.7 U	5
V 967 Tau	K*Q		>18 U	>3.0 U	5
V 968 Tau	K*O		16.2 U	2.9 U	5
V 970 Tau	K*I		>18 U	>3.2 U	5
V 972 Tau	K*E		17.5 U	1.9 U	5
V 973 Tau	K*P		>18 U	>2.9 U	5
V 974 Tau	K*G		>18 U	>2.6 U	5
V 975 Tau	K*H		>18 U	>2.6 U	5
V 976 Tau	K*J		>18 U	>2.2 U	5
V 977 Tau	K*B		>18 U	>1.8 U	5
V 978 Tau	K*L		>18 U	>3.0 U	5
V 979 Tau	K*D		>18 U	>2.1 U	5
V 980 Tau	K*A		17.5 U	2.5 U	5
V 981 Tau	K*C		17.8 U	1.6 U	5
V 982 Tau	K*M		>18 U	>2.7 U	5
V 983 Tau	K*F		>18 U	>3.9 U	5

**Table 5.** Stars listed as probable UV Cet stars in the NCVS but not in the TC

NCSV No.	Author Designation	H II	min V/Pg/U	$\Delta m$ V/Pg/U	Notes
01238	T37b		17 <sup>m</sup> 2 U	0 <sup>m</sup> 6 U	1,3
01281		799	13.71 V	0.15 V	2
01300		1403	14.9	0.3	3
01320	P1		15.3 V	0.5 V	1,3
01329			>18.5	>3.7	1,6
01336			>18.5	>3.3	1,6
01350	B345		17.2	1.2	
01358	J&M	2407	13.6	0.8	2
01375			>18.5	>3.5	1,6

Notes to Tables 4 and 5:

- 1 Identification charts were not published.
- 2 Possible flare found during one photoelectric observation.
- 3 The amplitude of the flare does not fulfill the criterion  $\Delta m > 5\sigma(m)$ .
- 4 According to Ambartsumian et al. (1972) Haro was not convinced that B124 and B126 are flare stars.
- 5 UV type stars in the Pleiades region from the 69th Name List of Variable Stars. As a rule they all need more precise determination of the magnitude at minimum and of the amplitude.
- 6 Only one image is visible on the patrol plate and no star is found on the Palomar Observatory Sky Survey prints.

V. We conclude that at least 8 of the more than 500 reported flare stars in the Pleiades region need unification of their designations in the GCVS and the NCSV. Four Pleiades flare stars should be included in the GCVS. 47 stars merit better observations to confirm their membership in the UV Cet class of variables, for 11 of them identification charts are needed.

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