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A new list of effective temperatures of chemically peculiar stars. III

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Abstract. Our system of effective temperatures (paper II) is analysed by way of comparison with the Hipparcos data and the correctness of the methods of their determination is verified. With the aid of these temperatures absolute bolometric magnitudes of more than 220 CP stars have been estimated from the parameters of multicolour β and c_1 photometry. The mean discrepancy between the Hipparcos and our data proves to be equal to $\pm 0\overset{m}{.}4$. The difference is due not only to measurement errors, but also to the effect the blanketing by spectral lines of excess elements has on the parameters β and c_1. It has been found that the error of relative radii R/R_{ZAMS} used as the criterion of age is on the average ± 0.2. The lists of the values of T_e, M_b and R/R_{ZAMS} derived from the Hipparcos and colour data are presented.

Key words: stars: chemically peculiar — stars: fundamental parameters

1. Introduction

Glagolevskij (1994, paper II) presented the effective temperatures for over 600 chemically peculiar stars, which were estimated from photometric parameters with the use of the calibration checked by the data on the total fluxes of the emitted energy (Shallis-Blackwell method). Gomez et al. (1998) present absolute magnitudes M_v of many CP stars obtained from the Hipparcos parallaxes, so it has come to be possible to analyse our list of temperatures and to test our approaches:

- methods of our temperature estimations;
- methods of evaluation of absolute stellar magnitudes which were used in a number of papers;
- procedure and accuracy of our estimates of the relative radii R/R_{ZAMS} that we use in statistical investigations as the age parameter.

2. Temperature

Data on temperature are needed in a lot of investigations, therefore the methods of temperature measurements are permanently given much attention. The temperatures given in our list (Glagolevskij, 1994) were determined from the parameters Q in the UBV system and X in the multicolour system up to the temperatures $T_e > 9500$ K. Hauck and North (1993) suggested using the parameters (B2 – G) in the range of $T_e < 9500$ K. These parameters only slightly depend on the interstellar reddening at distances at which CP stars are generally investigated. To control the system of our temperatures, we computed the absolute bolometric stellar magnitudes of the stars being studied and compared them to the data from Gomez et al. (1998). The calibration curves for determining the effective temperatures on our list were controlled, as it was said above, by the data derived from the total flux of energy emitted by a star. The total flux is independent of spectral anomalies and is defined by the effective temperature only. A checked and supplemented list of these temperatures is given in Table 2.

3. Absolute stellar magnitudes

To estimate absolute magnitudes M_v for B stars, we used the β parameters. In this case $c_1 = (u - \nu) - (\nu - b)$ is generally taken as a temperature parameter which characterizes the height of the Balmer jump. However, application of c_1 to CP stars has the following disadvantages: 1) it strongly depends on the atmospheric conditions of observations and interstellar extinction and 2) the Balmer discontinuities of CP stars are anomalous (Glagolevskij, Topilskaya, 1987). For this reason, instead of c_1 we preferred to use the effective temperatures of CP stars calibrated in terms of the total flux by the method of Shallis-Blackwell (Blackwell & Shallis, 1977). The calibration of the parameter c_1 by temperature is presented in the book by Straizis (1977). Thus, by applying the procedure of Crawford (1978, 1979) for estimation of

M_v, we used the transition $T_e \to \beta(ZAMS)$ instead of $c_1 \to \beta(ZAMS)$. It will further be seen that this approach is justified.

The parameter β cannot be a criterion of luminosity for cool A stars. In this range of temperatures the parameter c_1 is usually used as such a criterion, while β is employed as the temperature parameter. The parameter β is still sensitive to luminosity up to $T_e = 8250$ K and cannot be used as the temperature criterion (the scatter of points in β is greater). For this reason, we used the parameter β to estimate M_v in the range of temperatures up to 8250 K. The absolute magnitudes for $T_e < 8250$ K are obtained from Crawford's calibrations for A stars by the c_1 parameter.

The transition from M_v to M_b was implemented with the aid of bolometric corrections from the paper by Straizis, Kuriliene (1981). The results are presented in Table 2. The first column gives the HD number of the star, the second column presents the effective temperatures from Glagolevskij (1994), in the third column is listed the absolute bolometric stellar magnitude $M_b(G)$ derived from M_v (Gomez et al., 1998), in the fourth column is given M_b^* also derived from our temperatures and β and c_1 parameters. The rest of the columns will be described below.

M_b^* that we derived from the parameter β (for stars with $T_e > 8250$ K) are, on the average, in good agreement with $M_b(G)$ which were obtained from the Hipparcos data (Gomez et al., 1998); this can be seen from Fig. 1. The regression is described by the formula

$$M_b^* = (0.99 \pm 0.04) \cdot M_b(G) - (0.07 \pm 0.08).$$

This suggests that our system of temperatures and the procedure of estimation of M_b^* with the use of β have no noticeable errors. The average discrepancy is $\Delta M_b = M_b^* - M_b(G) = \pm 0\overset{m}{.}4$, although in some cases the differences may reach 1^m and above. The differences increase with decreasing temperature. The great differences may be related to the particularities of energy distribution in the spectra of the stars due to the strong blanketing by the spectral lines of excess chemical elements rather than to individual errors in T_e and β. There is no doubt that the values of $M_b(G)$ are also affected by the blanketing because the used catalogue values of m_v are also distorted by the blanketing (this problem requires a particular study). The scatter of points in Fig. 1 grows with decreasing temperatures probably because the blanketing effect becomes more pronounced.

We checked which errors in T_e yield the average scatter $\Delta M_b = 0\overset{m}{.}4$. It turned out that this is about 1000 K within $T_e \sim 10000$ K and over 1000 K at higher temperatures. It is shown by Glagolevskij (1994) that such errors are improbable in temperature estimations, the scatter of M_b^* values is therefore due to other reasons. The influence of errors in β is considerable. To change M_b by $0\overset{m}{.}4$, β has to be changed by 0.02 – 0.03. Although the intrinsic accuracy of measuring the parameter β is better, the differencies in physical conditions must strongly affect the value of β especially when chemical anomalies are greater. When using the parameters M_b, it should be taken into account that the Hipparcos trigonometric parallaxes have an average error of 15 %, which causes an error of $0\overset{m}{.}3$ in M_b. The errors of determination of $M_b(G)$ and M_b^* have thus the same order of magnitude and they can be used with the same reliability.

As it is known (Glagolevskij, Topilskaya, 1987), the degree of chemical anomalies defines the anomaly of the Balmer discontinuities D/D_0 (the ratio of the Balmer jumps of CP stars to the jumps of normal stars). Therefore, one could expect that there is a relation between ΔM_b and D/D_0. Fig. 2 (left) shows a smoothed relationship (by the method of running average over 5 points) which confirms our assumption. In the same way, one could expect a relationship between ΔM_b and the intensity of the depression Δa at 5200 Å. It turned out that such a relation also exists, which can be seen from Fig. 2 (right). The figure shows that if there are no chemical composition anomalies ($D/D_0 = 1, \Delta a = 0$), the magnitude ΔM_b has a maximum negative value, while with a maximum anomaly — a maximum positive value. It follows from the presented relations that the temperature scale corresponds to CP stars with medium chemical anomalies. In order to decrease the scatter of points in Fig. 1, corrections of the β values should be taken into account in M_b^*. The procedure of introduction of correction has not been developed yet. To do this only on the basis of the given relations is inefficient because D/D_0 and Δa are variable. They strongly depend on the character of chemical anomalies and their distribution over the surface of the star, which are difficult to take into account. The mean values of the parameters $D/D_0, \Delta a$ are known for a limited number of objects. If it were possible to provide for the corrections, one could use the calibrations for normal stars to determine effective temperatures.

The data for plotting the relationships in Fig. 2 (left) and Fig. 2 (right) were taken from the papers by Glagolevskij & Topilskaya (1987), Lebedev (1986), Maitzen & Vogt (1983), Maitzen et al. (1998).

Now we will consider the absolute magnitudes for stars with $T_e < 8250$ K. The parameter c_1 is sensitive to luminosity in this range of temperatures. As has already been suggested, effective temperatures were estimated from the parameter $(B2 - G)$. The relation between our $M_v(T_e)$ and $M_v(G)$ is presented in Fig. 3 (left). It is well seen that the magnitudes of $M_v(T_e)$ are fainter, on the average, by $0\overset{m}{.}67$. Let us see what the result will be if β is used as the temperature parameter, as it is the case in the standard procedure. The result of comparison is shown in Fig. 3

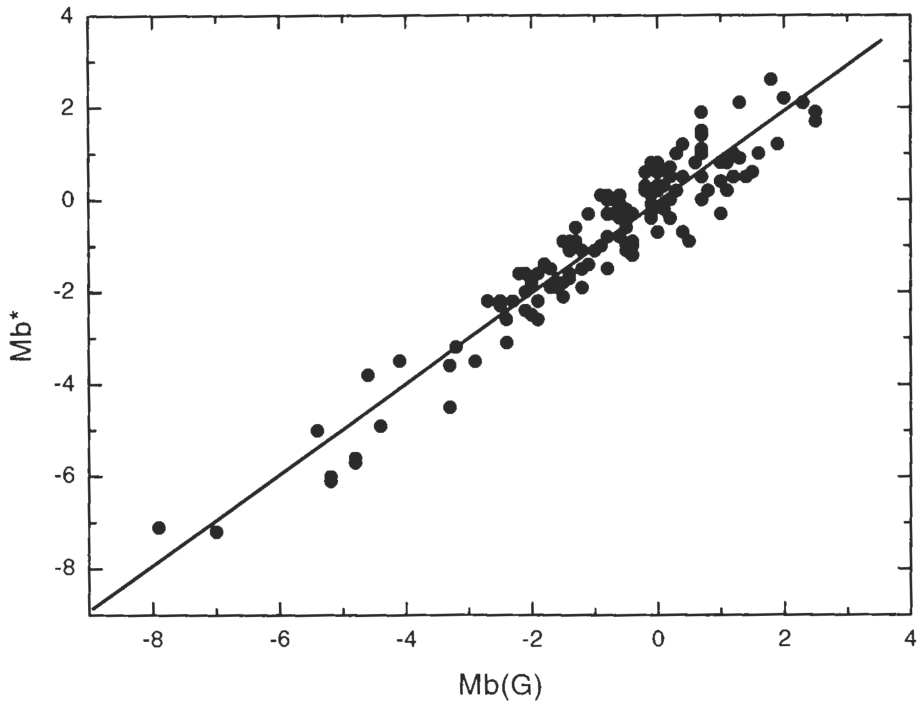

Figure 1: *Comparison of our estimates of absolute bolometric stellar magnitudes M_b^* (from the parameters β and c_1) with $M_b(G)$ obtained from the Hipparcos data.*

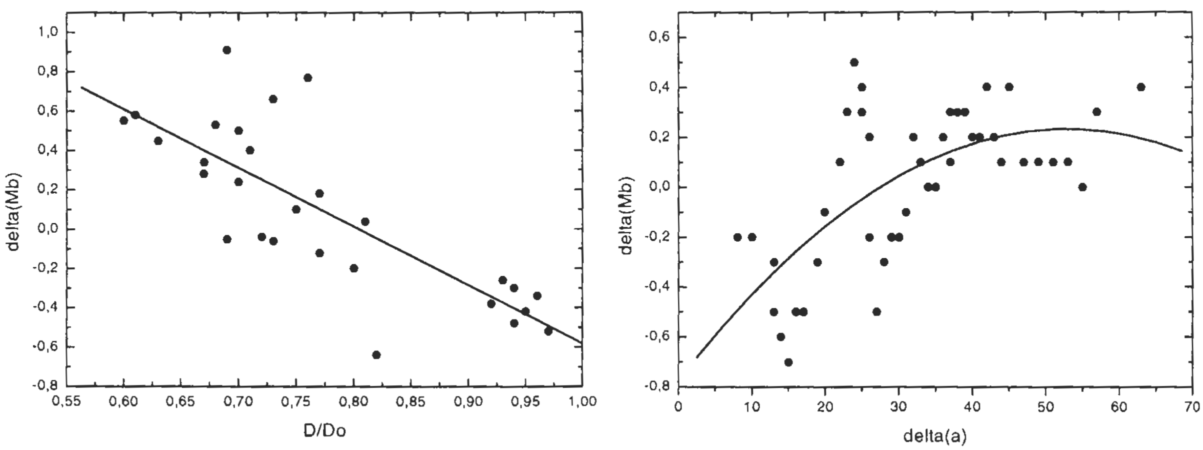

Figure 2: *Left panel — relationship between ΔM_b^* and the degree of change of the Balmer discontinuity. Right panel — relationship between $\Delta(M_b^*) = M_b^* - M_b(G)$ and depression intensity Δa (in decimal units of stellar magnitude).*

(right). The differencies proved to be twice as large, $M_v(c_1) > M_v(G)$, on the average, by $1^m.5$. It is obvious that not only c_1, but also β are anomalous. This example illustrates that because of the anomaly of the Balmer jumps, the use of the parameter c_1 in estimation of the luminosity causes large errors. The estimates show that for $M_v(c_1)$ to be equal to $M_v(G)$, the parameter c_1 should be increased, on the average, by 0.1.

We took the effective temperatures T_e(mod) obtained by the model atmospheres method (Ryabchikova et al., 1998) which are but little affected by chemical anomalies. In Table 1 are listed T_e(mod) and our T_e^* derived from $(B2 - G)$ for

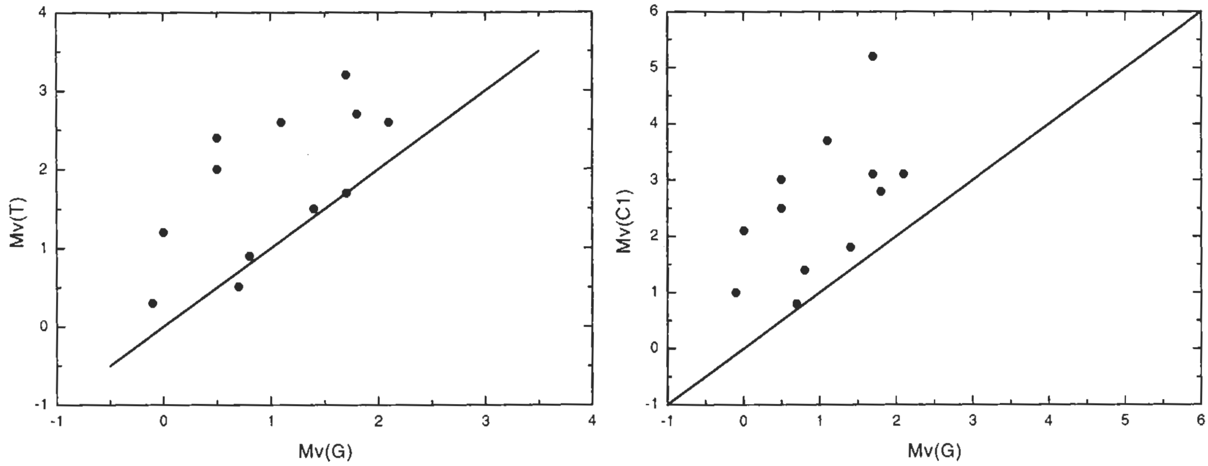

Figure 3: *Left panel — comparison of absolute stellar magnitudes $M_v(T)$ computed from $T_e(B2-G)$ and the parameter c_1 with Hipparcos estimates of $M_v(G)$. Right panel — the same, but the parameter β is used as the temperature parameter.*

Table 1:

HD	T_e(mod)	T_e^*	M_v(mod)	$M_v(G)$
24712	7250	7200	3.1	-
110066	9000	8750	1.5	-
128898	7900	7650	3.0	2.1
137909	8000	7400	3.5	1.1
137949	7250	7000	4.2	1.7
196502	8900	8700	1.5	-
201601	7700	7600	3.0	2.3
203932	7450	7300	3.4	2.4

some stars. It can be seen for several stars that the model temperatures are, on the average, by 230 K higher than our estimates, which makes only 3%. Thus, we have an additional justification that our system of temperatures is correct. The last columns of Table 1 present absolute magnitudes computed from T_e(mod) and c_1; these are also systematically different from $M_b(G)$.

The difference between $M_v(c_1)$ and $M_v(G)$ is probably related to the anomalies of the values of the Balmer discontinuities. However, it is not unlikely that in the region of low temperatures the Hipparcos absolute magnitudes also have systematic errors resulting from the effect the blanketing has on stellar magnitudes m_v. In Table 2 a correction $0^m_.7$ is introduced in the magnitude M_b^* for stars with $T_e < 8250$ K.

4. Parameters R/R_{ZAMS}

In our studies we often use the parameter R/R_{ZAMS} (hereafter R/R_z) as a characteristic of the star age. R is the radius of the star at the present time, and R_z is its radius on the initial main sequence (ZAMS). Preliminary estimates show that the mean error of the R/R_z parameters is 0.2. Using the Hipparcos data, one can evaluate the mean accuracy of these values with higher reliability. The star radius is determined by the well-known formula

$$\lg R = 8.46 - 2\lg T_e - 0.2M_b^*.$$

We take the values of M_b^* from Table 2, while R_z are defined from M_b by means of moving the star along the evolution tracks until they intersect the ZAMS.

Proceeding from the data of Table 2, obtain that the mean discrepancy $R/R_z(G) - R/R_z(\beta) = \pm 0.17$ for stars with $T_e > 8250$ K (see Fig. 3 (left)). Thus, our preliminary estimate of the mean accuracy of R/R_z is confirmed. So far it is difficult to say what the error in the values of R/R_z in stars with $T_e < 8250$ K will be.

5. Conclusions

The effective temperatures of chemically peculiar stars of Table 2, on the average, correspond to the values derived from the total fluxes of their radiation. The methods of their determination throughout the range of temperatures do not cause any systematic errors.

The absolute bolometric stellar magnitudes defined for hot stars from the parameters β agree, on the average, with the data derived from the Hipparcos parallaxes. Individual discrepancies largely depend on the degree of chemical anomalies, but not only on measurement errors. The mean difference is $M_b(G) - M_b(\beta, c_1) \approx 0^m_.4$.

If it had been managed to correct the parameters β and c_1 for the effect of blanketing by spectral lines, then the standard methods of evaluation of effective temperatures for normal stars could have been used. It should be provided for that the visual stellar magnitudes m_v which were used by Gomez et al. (1998) to derive M_v are also likely to be subjected to the influence of blanketing effect and variability, especially for the coolest stars. This influence should be studied in detail in the future.

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Table 2: *The catalogue of parameters of CP stars*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	(*)	Type
315	12800:	-0.7	-	1.3	-	Si
1048	9600	0.7	-	1.4	-	Si
2453	8450	0.7	1.0	1.5	1.6	SrCrEu
3580	14200	-1.0	-	1.1	-	Si
3980	10200	1.2	1.0	1.0	1.1	SrCrEu
4778	9200	1.1	0.2	1.3	1.9	SrCrEu
5601	10400	-0.6	-	1.9	-	Si
5737	13500	-2.9	-3.5	2.2	2.7	He-w
5797	9400	0.0	-	1.9	-	SrCrEu
6164	10050	-0.4	-0.9	1.7	2.2	Si
6783	11900:	-0.5	-	1.3	-	Si
8783	8300	0.7	-	1.9	-	SrCrEu
8441	9100	-0.1	-0.3	2.1	2.3	SrCrEu
8855	12900	-0.8	-	1.2	-	Si
9996	10000	-	0.4	-	1.4	SrCrEu
10221	10730	-0.6	-0.4	1.8	1.6	Si+
11503	10000	-	0.7	-	1.3	Si+
10783	10200	-0.1	-0.1	1.7	1.7	Si+
11187	10700	-0.5	-0.6	1.8	1.8	Si+
12288	8600	0.6	0.8	1.9	1.7	SrCrEu
12767	13000	-1.5	-0.9	1.9	1.2	Si
14392	11800	-	-0.3	-	1.3	Si
14437	10800:	-	0.0	-	1.3	SrCrEu
15089	8400	-	0.8	-	1.8	SrCrEu
15144	8350	1.9	1.2	1.1	1.5	SrCrEu
16504	9800	-0.3	-	1.9	-	Si
18078	9050	-0.7	-0.3	2.8	2.4	SrCrEu
18296	10950	-	-2.2	-	2.9	Si+
19400	12900	-1.5	-1.8	1.6	1.7	He-w
19712	10100	0.5	-	1.3	-	SrCrEu
19653	9500	0.3	-	1.6	-	SrCrEu
19805	9800	+0.8	-	1.2	-	He-w

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
19832	12390	-	-0.8	-	1.4	Si
21590	12750	-0.6	-0.8	1.2	1.3	Si
21728	11200:	-1.2	-	1.9	-	Si
21699	16100:	-2.4	-	1.3	-	He-w
22374	8350	0.7	0.0	1.9	2.6	SrCrEu
22470	13450	-0.9	-1.0	1.1	1.2	He-w
22401	10100	0.3	-	1.5	-	SrCrEu
22920	14400	-2.4	-	1.8	-	He-w
23408	12300	-2.0	-	2.1	-	He-w
24155	13800	-0.6	-	1.0	-	Si
24712	7200	2.5	1.9	1.1	1.4	SrCrEu
25267	12150	-	-0.5	1.2	-	Si
25354	9000	1.0	-0.3	1.4	2.4	SrCrEu
25823	13000	-	-1.3	-	1.5	Si
27463	9600	1.3	-	1.1	-	SrCrEu
27309	11820	-0.4	-1.0	1.3	1.6	Si+
28843	14530	-1.1	-1.4	1.1	1.2	He-w
29009	12700	-2.1	-	2.0	-	Si
29305	11450	-0.5	-0.3	1.4	1.3	Si
30466	10900	-0.4	-0.3	1.6	1.6	Si
30849	10000	0.9	-	1.2	-	SrCrEu
30466	10900	-0.4	-	1.6	-	Si
30584	10900	-1.3	-	2.1	-	SrCrEu
32549	10250	-	-0.6	-	1.2	Si
32633	12750	-0.4	-1.2	1.1	1.4	Si+
32650	11650	-	-0.6	-	1.4	Si
34452	14110	-	-1.7	-	1.4	Si
34719	12200	-	-0.8	-	1.4	Si
34736	12800	-1.7	-	1.7	-	Si
34889	11800	-0.2	-	1.2	-	Si
35298	15200	-	-1.6	-	1.1	He-w
35353	10500	1.7	-	1.0	-	SrCrEu
35456	14000	-1.4	-1.7	1.3	1.4	He-w
35502	15920	-	-1.8	-	1.0	He-w
35479	12300	-1.0	-	1.4	-	Si
35708	20000	-	-	-	1.1**	He-r
35730	17150	-2.4	-2.6	1.1	1.2	He-w
35912	18400	-	-3.1	-	1.2**	He-r
36046	14800	-1.1	-1.4	1.0	1.1	He-w
36313	12350	-	-0.2	-	1.1	Si
36429	16550	-1.9	-2.6	1.0	1.3	He-w
36430	18450	-	-2.8	-	1.1**	He-r
36526	15770	-	-1.8	-	1.1	He-w
36540	15850	-1.9	-1.6	1.1	1.0	He-w
36549	11800	-0.8	-0.3	1.5	1.3	He-w
36629	20350	-	-	-	-	He-w
36668	12500	-1.2	-1.1	1.5	1.4	He-w
36916	14750	-2.0	-1.8	1.4	1.3	He-w

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
36982	23600	-	-	-	1.0**	He-r
37017	20100	-4.1	-3.5	1.4	2.0**	He-r
37043	32500	-5.2	-	0.7	-	He-w
37058	19200	-	-	-	-	He-w
37140	15150	-	-1.6	-	1.1	Si+
37151	12150	-0.8	0.0	1.4	1.1	He-w
37210	12520	-	0.2	-	1.0	Si
37470	11920	-0.6	0.1	1.3	1.0	Si
37479	22450	-	-6.4	-	1.9**	He-r
37642	14600	-1.7	-1.9	1.2	1.4	He-w
37776	23350	-4.4	-4.9	1.1	1.2	He-r
264111	21600	-	-	-	1.6**	He-r
37808	13300	-0.8	-	1.1	-	Si
37752	16000	-2.0	-	1.2	-	He-w
38104	9050	-	0.1	-	1.9	SrCrEu
39082	9900	0.9	-	1.1	-	SrCrEu
39317	9780	-	0.8	-	1.1	Si+
40312	10100	-1.4	-1.1	2.5	2.3	Si
40394	9900	-1.7	-	0.9	-	Si+
41269	10700	-1.7	-	0.8	-	Si
42616	8400	0.7	0.5	1.9	2.1	SrCrEu
43819	10850	-	-1.2	-	2.1	Si
44953	16200	-2.3	-2.2	1.2	1.2	He-w
45439	12600	-0.5	-	1.2	-	Si
45583	12900	-1.2	-	1.4	-	Si
45530	10900	-1.4	-	2.1	-	Si
46462	14000	-1.1	-	1.1	-	Si
47152	9400	-	0.5	-	1.6	SrCrEu
47756	12600	-2.5	-	2.4	-	Si+
47777	21000	-	-	-	-	He-r?
49333	16600	-1.9	-	1.0	-	He-w
49606	13800	-	-1.9	-	1.5	He-w
49976	9200	1.0	0.8	1.3	1.4	SrCrEu
50169	9050	0.4	-	1.8	-	SrCrEu
50204	10200	-	-0.5	-	1.9	Si
51418	9500	-	-0.4	-	2.2	SrCrEu?
51688	13050	-1.6	-1.8	1.7	1.7	He-w
53116	13500:	-1.1	-	1.2	-	SrCrEu
54118	10200	0.0	0.3	1.6	1.3	Si
53854	11500	-1.3	-	1.9	-	Si
55395	12600	-1.1	-	1.4	-	Si
55579	9750	-	0.3	-	1.6	SrCrEu
55719	8950	0.2	0.5	1.9	1.8	SrCrEu
55755	10500	-0.9	-	2.0	-	Si
55852	10100	1.3	-	1.0	-	SrCrEu
56022	9600	-	0.8	-	1.3	Si
56455	12825	-0.8	-0.8	1.3	1.3	Si
56273	12400	-1.3	-	1.6	-	Si

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	(*)	Type
56306	12500	-1.1	-	1.5	-	Si
57219	16350	-	-3.3	-	1.9	He-r
58260	19700	-5.2	-6.1	2.2	2.2**	He-r
60344	21900:	-4.8	-5.7	1.4	1.6**	He-r
61641	18000:	-	-3.4	-	1.5	He-w
61966	12300	-1.0	-	1.4	-	Si
62140	10000	-	0.4	-	1.4	SrCrEu
62714	12800	-1.0	-	1.4	-	He-r
62535	11100	-1.3	-	2.0	-	Si
62640	14700	-1.9	-	1.2	-	Si
62510	9400	0.3	1.0	1.7	1.3	Si
62140	10100	2.1	-	0.7	-	SrCrEu
63401	13800	-1.5	-	1.3	-	Si
64486	10250	-	0.0	-	1.6	Si
64740	23850	-4.8	-5.6	1.2	1.3**	He-r
64901	13000	-1.2	-	1.4	-	Si
65339	10000	-	-1.1.	-	1.3	SrCrEu
66522	19550	-	-	-	1.4**	He-r
66624	12500:	-1.3	-	1.6	-	Si
64486	10100	-0.5	-	1.9	-	Si
68351	9600	-	-1.2	-	1.9	Si+
71066	11000	-0.5	-	1.6	-	Si+
71866	8650	-	0.2	-	2.3	SrCrEu
70340	9700	0.8	-	1.3	-	SrCrEu
72055	12500	-0.7	-	1.3	-	Si
71866	9800	0.8	0.2	1.2	-	SrCrEu
72976	13700	-1.7	-	1.5	-	Si
72968	9600	-	0.7	-	1.3	SrCrEu
74168	13100	-1.2	-	1.3	-	Si
74196	13300	-1.3	-	1.4	-	He-w
74521	10600	-	-1.2	-	2.2	SrCrEu
74535	13900	-1.1	-	1.1	-	Si
75989	11200	-1.9	-	2.4	-	Si
77350	9675	-	-0.4	-	2.1	Si
77653	12770	-1.1	-0.3	1.3	1.0	Si
78568	12700	-1.3	-	1.5	-	Si
79158	12800	-	-1.6	-	1.6	He-w
79447	16150	-	-3.3	-	1.8	He-r
79606	13300	-0.7	-	1.1	-	Si
80282	13000	-1.3	-	1.5	-	Si
81009	9950	1.4	0.5	1.0	1.4	SrCrEu
81289	10600	0.1	-	1.4	-	SrCrEu
81847	12400	-0.3	-	1.2	-	Si
83368	10100	2.1	-	0.7	-	SrCrEu
83625	12000	-0.7	-	1.4	-	Si
84046	12400:	-1.0	-	1.5	-	He-w
84656	15200:	-1.5	-	1.1	-	Si
87405	12400	-1.7	-	1.9	-	Si

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
88158	13300:	-1.8	-	1.6	-	Si
88385	10000	-0.6	-	1.3	-	SrCrEu
88603	13800:	-2.0	-	1.6	-	Si
89192	9600	-1.0	-	2.5	-	SrCrEu
89069	9600:	0.4	-	1.5	-	SrCrEu
89822	9850	-	0.0	-	1.7	Si+
90044	9775	0.2	0.0	1.6	1.7	Si+
90264	13770	-1.8	-1.4	1.5	1.3	He-w
90569	9700	0.3	0.2	1.5	1.6	SrCrEu
90763	9150	-	0.6	-	1.6	SrCrEu
91239	10000	0.4	-	1.3	-	SrCrEu
92385	10900	0.0	-	1.3	-	Si
92664	14500	-1.6	-	2.0	-	Si
92938	14800	-	-	-	-	He-r
93030	29600	-	-	-	-	He-r
94660	10650	-	-0.1	-	1.6	Si+
96707	9600	-	-	-	-	SrCrEu
96446	23300	-5.2	-6.0	1.5	1.7**	He-r
98088	7850	0.7	1.9	1.9	1.2	SrCrEu
99992	25600:	-	-5.5	1.2	-	He-w
101065	6000	-	-	-	-	
101724	14500	-1.4	-	2.0	-	Si
103192	11100	-1.2	-	2.0	-	Si
103498	9000	-0.1	0.1	2.2	1.9	SrCrEu
104810	12900	-1.6	-	1.6	-	Si
107612	8950	1.1	0.9	1.3	1.5	SrCrEu
108662	9900	0.6	-	1.3	-	SrCrEu
108945	8950	-	-	-	-	SrCrEu
109030	9100	1.1	-	1.3	-	SrCrEu
109026	15490	-2.7	-2.2	1.5	1.3	He-w
110066	8750	-	1.6	-	1.1	SrCrEu
111133	9750	-	-0.1	-	1.8	SrCrEu
112185	9800	-	0.4	-	1.5	SrCrEu
112413	11180	-0.2	0.3	1.4	1.1	SrCrEu
112381	10000	1.4	-	1.0	-	Si+
115708	7500	2.0	2.2	1.3	1.2	SrCrEu
117057	13400	-1.5	-	1.5	-	Si
117025	9800	1.0	-	1.1	-	SrCrEu
118022	9050	-	0.5	-	1.7	SrCrEu
118242	11700	-1.3	-	1.9	-	Si
119213	9800	1.6	-	0.9	-	SrCrEu
118816	11800	-1.6	-	2.0	-	Si
120198	9725	-	-0.1	-	1.9	SrCrEu
120640	19150	-	-4.2	-	1.3**	He-r
120709	16700	-1.5	-2.1	0.9	1.1	He-w
122532	11800	-	-1.6:	-	2.0	Si
124224	12460	-0.5	-0.2	1.2	1.1	Si
125248	9400	-	0.7	-	1.3	SrCrEu

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
125823	19530	-3.2	-3.2	1.1	1.1	He-w
126515	9200	1.0	-	1.3	-	SrCrEu
127304	9750	-	0.8	-	1.3	Si?
128898	7650	2.3	2.1	1.1	1.1	SrCrEu
130158	9650	-1.3	-0.9	2.8	2.6	Si
130557	9900	0.3	-	1.9	-	Si+
130559	8900	1.2	0.5	1.3	1.8	SrCrEu
130841	8250	-	0.8	-	1.9	SrCrEu
131120	18300	-2.4	-3.1	1.0	1.2	He-w
132058	22800:	-	-5.5	-	1.8	He-r?
133029	10520	0.0	0.2	1.5	1.3	Si+
133518	19450	-3.3	-4.5	1.1	1.4**	He-r
133652	13300:	0.5	-0.9	0.8	1.2	Si
133811	10700	-1.2	-	2.2	-	Si
133880	11300	-	-0.8	-	1.7	Si
134759	10300	-	-	-	-	Si
134793	8300	0.7	1.1	1.9	1.6	SrCrEu
134759	11600	-1.1	-	1.8	-	Si
135038	13300	-	-2.2	-	1.9	He-w
135297	9600	-0.1	-	1.9	-	SrCrEu
135382	8900	-	-0.7	-	2.8	SrCrEu
135485	15600:	-	-1.9	-	1.1	He-r?
136347	11400	-0.5	-	1.4	-	Si
137909	7400	1.3	2.1	1.8	1.2	SrCrEu
137949	7000	1.8	2.6	1.5	1.1	SrCrEu
137509	14400	-1.6	-	1.2	-	He-w
138519	13500	-1.8	-	1.7	-	Si
139525	12000	-2.0	-	2.1	-	Si
140160	9150	-	0.7	-	1.6	SrCrEu
140728	9850	-	0.3	-	1.5	Si+
141556	9900	-	0.1	-	1.6	SrCrEu
142096	17000	-	-1.9	-	1.0	He-w?
142301	16500	-1.9	-2.2	1.0	1.1	He-w
142884	14900	-0.8	-1.5	0.9	1.1	He-w
142990	17800	-	-2.6	-	1.1	He-w
143699	15160	-2.5	-2.3	1.5	1.5	He-w
144334	15400	-1.7	-1.5	1.1	1.0	He-w
144231	12000:	-1.6	-	2.0	-	Si
144661	15000	-	-1.7	-	1.2	He-w
144844	12300	-	0.4	-	0.9	He-w
145102	10900	-0.7	-	1.8	-	Si
145501	14600	-	-1.0	-	1.0	He-w
146001	13380	-1.3	-0.6	1.3	1.1	He-w
147010	13000	-0.1	-0.4	1.0	1.0	Si+
147173	9000	-0.6	-	2.7	-	Si
147550	9400	-	0.2	-	1.7	Si
148112	9250	0.1	-0.1	1.9	2.0	SrCrEu
148330	9550	-	0.5	-	1.6	Si+

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	(*)	Type
147890	11500	-1.3	-	1.9	-	Si
148898	8400	0.7	1.4	1.9	1.3	SrCrEu
149228	13600	-0.9	-	1.1	-	Si
149257	24400:	-	-	-	1.7:**	He-r
149363	30200	-	-	-	1.7:**	He-r
149822	10100	0.2	-0.4	1.4	1.9	Si+
149911	7900	0.1	-0.2	2.8	3.0	SrCrEu
220147	10300	0.5	-	1.3	-	SrCrEu
150035	7300	1.0	-	2.1	-	SrCrEu
150486	10900:	-0.1	-	1.4	-	Si
150500	14800	-2.2	-	1.5	-	Si
150549	12800	-2.4	-	2.2	-	Si
151199	8800	-	1.0	-	1.5	SrCrEu
151346	14650	-	-1.8	-	1.3	He-w
151525	9350	-0.8	0.1	2.6	1.8	SrCrEu
151346	14700	-0.9	-	1.0	-	He-w
152107	8700	1.1	0.8	1.4	1.7	SrCrEu
151771	10900	-1.7	-	2.4	-	Si
151965	14800	-1.7	-	1.2	-	Si
152308	7500	-	0.2	-	2.9	SrCrEu
152366	11800	-1.4	-	1.8	-	Si
152564	12600	-1.8	-	1.9	-	Si
153882	8900	0.1	0.3	2.1	2.0	SrCrEu
154645	9800	0.3	-	1.6	-	SrCrEu
154856	12600:	-1.2	-	1.5	-	Si
156853	12200:	-1.7	-	1.8	-	Si
157063	11900	-1.8	-	2.1	-	Si
157644	11100	-1.6	-	2.2	-	Si
157779	9700	-	0.0	-	1.7	Si
158175	11900	-1.5	-	1.8	-	Si
159545	11300:	-1.2	-	1.9	-	Si
159846	12200	-1.1	-	1.5	-	Si
161841	13800	-2.1	-	1.7	-	Si
162651	9700	-0.5	-	2.2	-	Si
162374	17300	-2.9	-	1.3	-	He-w
162725	9700	-1.3	-	2.8	-	Si
164258	8100	-	0.0	-	2.8	SrCrEu
164429	10300	-	0.1	-	1.5	Si+
164769	22000:	-	-	-	1.7*	He-r
165207	20900	-	-1.8	-	0.6	He-r
166968	12700	-0.9	-	1.3	-	Si
168733	13600	-	-2.2	-	1.8	SrCrEu
168785	22100	-	-6.3	-	1.8**	He-r
169467	16100	-	-2.6	-	1.6**	He-r
170000	11250	-0.9	0.1	1.8	1.2	Si
170397	9400	-	0.0	-	1.9	Si
170973	10700	-	-0.7	-	1.9	Si+
168856	13000	-1.0	-	1.3	-	Si

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
171247	11600	-2.6	-	2.8	-	Si
171263	11800:	-0.8	-	1.5	-	Si
171279	8400	1.0	0.4	1.6	2.1	SrCrEu
171586	8600	1.2	-	1.4	-	SrCrEu
171782	11000:	-0.5	-	1.6	-	Si+
173650	8950	-	-0.7	-	2.7	Si+
175132	10700	-1.9	-	2.7	-	Si
175156	14600:	-5.4	-5.0	-	-	He-r
175191	18400	-	-	-	1.3**	He-r
175362	17000	-2.0	-2.5	1.0	1.2	He-w
175744	12800	-1.6	-1.9	1.6	1.8	Si
176232	7600	1.6	1.0	1.6	1.9	SrCrEu
176582	18100	-2.5	-2.3	1.0	1.0	He-w
177003	18700:	-	-2.9	-	1.1	He-r
177410	13750	-1.0	-1.1	1.1	1.1	Si
177517	10970	-	-1.1	-	2.0	Si
179527	11000	-2.1	-2.0	2.6	2.5	Si
179761	12350	-	-0.7	-	1.4	Si?
172690	11400	-0.4	-	1.2	-	Si+
182381	10000	-1.1	-	2.5	-	Si
182568	19200	-	-3.2	-	1.2	He-w
183056	12600	-	-1.5	-	1.7	Si
183339	13900	-	-1.7	-	1.4	He-w
183421	12700:	-1.7	-	1.8	-	Si
184905	10800	0.0	-0.7	2.0	1.8	Si+
184927	20600:	-3.3	-3.6	1.0	1.1	He-r
184961	10800	-0.6	-0.1	1.6	1.5	SrCrEu
186205	20100:	-4.6	-3.8	1.7	1.7**	He-r
187074	12600:	-1.9	-	1.9	-	Si
187474	10350	-	0.1	-	1.5	Si+
332701	12300	-1.2	-	1.6	-	Si
186117	9300	0.1	-	1.9:	-	SrCrEu
188041	10000	-	0.7	-	1.2	SrCrEu
188042	8500	-	-	-	-	
189160	13100	-	-1.2	-	1.3	Si+
190068	9600	-0.2	0.6	2.0	1.5	Si+
191742	7800	0.2	0.7	2.8	2.1	SrCrEu
191980	16300:	-2.1	-	1.1	-	He-w
191984	9500	0.4	0.5	1.5	1.6	SrCrEu
191796	9500	0.0	-	1.9	-	SrCrEu
192913	10600	-1.2	-1.9	2.2	2.8	Si+
192678	9300	-	0.6	-	1.6	SrCrEu
193344	9900	-1.2	-	2.5	-	Si+
193722	11600	-1.9	-	2.3	-	Si
193924	17200:	-	-3.4	-	1.6	He-r
196178	13600	-1.4	-1.6	1.3	1.5	Si
196502	8700	-	0.0	-	2.5	SrCrEu
198513	15600:	-2.1	-1.6	1.3	1.0	He-w

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
199728	12000	-0.5	-1.1	1.3	1.6	Si
200177	10100	1.1	0.9	1.0	1.1	SrCrEu
200311	13500	-1.2	-1.5	1.3	1.4	Si+
200369	9800	-0.2	-	1.9	-	SrCrEu
201174	9700	0.3	-	1.6	-	SrCrEu
201601	7600	2.5	1.7	1.0	1.4	SrCrEu
202627	9600	-	0.8	-	1.3	Ap
202671	14100	-2.1	-2.4	1.6	1.8	He-w
203006	10200	1.5	0.6	0.9	1.2	SrCrEu
203585	10500	-0.1	-	1.5	-	Si
203932	7300	-	-	-	-	SrCrEu
204131	9300	-0.2	0.2	2.1	1.7	Si+
204411	10200	-	0.7	-	1.2	Si
205087	10800	-	0.0	1.4	-	Si+
205795	9600:	0.0	0.8	1.8	1.3	SrCrEu
206088	9800	-	-1.0	-	2.4	SrCrEu
206742	9700	-0.1	0.8	1.8	1.3	Si
206653	12600	-0.8	-	1.3	-	Si
207188	12500	-0.3	-	1.0	-	Si
207538	34000:	-7.0	-7.2	-	1.2	He-r
207840	12000	-	-0.6	-	1.4	Si?
208266	24300	-7.0	-	2.4:	2.1**	He-r
209339	29500:	-7.9	-7.1:	2.1	1.8	He-r
209515	9750	-0.7	0.0	2.3	1.7	SrCrEu
210071	12900	-	-0.5	-	1.1	Si
212454	14400	-2.5	-2.2	1.7	1.6	He-w
213232	8300	0.7	1.5	1.9	1.2	SrCrEu
213918	15900	-1.4	-0.9	1.0	0.8	Si+
215038	13800	-0.5	-1.0	1.0	1.1	Si
215441	15900	-2.2	-1.6	1.2	1.0	Si
216533	8500	0.4	1.2	1.9	1.4	SrCrEu
217833	15500	-	-2.3	-	1.4	He-w
217919	22800:	-3.4	-	0.8	-	He-w
219749	11000	-	-0.6	-	1.7	Si
219855	11100	-0.2	-	1.2	-	SrCrEu
220147	10300	0.5	-	1.3	-	SrCrEu
220825	9700	1.3	0.9	1.0	1.2	SrCrEu
221006	13100	-0.7	-	1.2	-	Si
221394	9300	-	0.7	-	1.5	SrCrEu
221568	10600	-0.3	-	1.6	-	SrCrEu
221760	8700	0.0	0.6	2.3	1.7	SrCrEu
222853	9600	0.5	-	1.5	-	SrCrEu
223358	9600	-0.5	-	1.5	-	SrCrEu
223640	12300	-	-0.5	-	1.3	Si
224166	12300	-1.23	-	1.5	-	Si
224801	11800	-	0.8	-	0.9	Si+
224926	13400	-	-1.8	-	1.6	He-w
224926	13350	-1.4	-	1.4	-	He-w

Table 2: *The catalogue of parameters of CP stars (continued)*

Star HD	T_e	$M_b(G)$	M_b^*	R/R_z G	R/R_z (*)	Type
BD-13 4383	20000:	-	-	-	2.0**	He-r
CD-43 14300	20000:	-	-	-	-	He-r
CPD-69 2698	27500:	-	-3.3	-	1.4**	He-r

Notes:

*) —from Leushin et al., 2000

: — the temperatures determined with one criterion X or Q

$M_b(G)$ — M_v acquired from Gomez et al., 1988, bollomeric correction from Straizis, Kuriliene, 1981.

$M_b*, R/R*$ — our determinations by β or c_1.