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NOTES

WZ SGR AND THE ASSOCIATION III SGR

The author's attention was first drawn to the association III Sgr by Schmidt's (1958) listing of it as being situated at $l^I = 339°$, $b^I = -2°$, having an angular size of about $1\frac{1}{2}°$, and a distance of 2.1 kpc. This is of interest because the 22-day classical cepheid WZ Sgr is located at $l^I = 340°$, $b^I = -3°$, and collation of various recent data leads to distances ranging from 1.5 to 3.3 kpc for it. Since there seemed a possibility that the cepheid was an association member, it was considered that further investigation of the association might give valuable data regarding the intrinsic colors and absolute magnitude of the cepheid.

Morgan, Whitford, and Code (1953) have determined MK spectral types for eight probable members of the association. A more extensive list of OB stars was compiled by listing all such stars in the HD catalogue contained in an area roughly $1^\circ.5 \times 1^\circ.5$, centered on the indicated position of the association. In a preliminary survey, twenty-nine of these stars were observed photoelectrically in three colors, using the 24-inch

TABLE 1

COMPARISON OF RESULTS WITH THOSE OF OTHER OBSERVERS

Star	V	$B-V$	E_{B-V}	V	$B-V$	E_{B-V}	Ref
167336	8 68	+0 51	0 83	8 71	+0 53	0 83	Hiltner (1956)
167659	7 38	+ 23	54	7 39	+ 22	53	Hiltner (1956)
166628 .	7 16	+ 55	86	7 17	+ 59	79	Hiltner (1956)
167771 .	6 51	+0 10	0 42	6 54	+0 12	0 44	Johnson and Hiltner (1956)

refractor of the Cape Observatory. While V and $(B - V)$ may be obtained from this instrumental system, $(U - B)$ may not. Instead, the Cape observers have established (*Cape Mimeogram*, No. 5, 1958; Fernie 1961) a standard refractor color index $(U - B)_C$: using this and $(B - V)$, one may construct a color-color plot and derive E_{B-V} in the usual way. That color excesses derived from this system are valid may be seen from Table 1, where comparison is made with results for four stars observed on the U, B, V system by Hiltner (1956) and Johnson and Hiltner (1956).

The observations and the derived color excesses are listed in Table 2. For greater accuracy, excesses for the stars of known spectral-luminosity class were found from the calibration of intrinsic $(B - V)$ given by Johnson (1958).

With the effects of interstellar absorption removed, a color-magnitude array was plotted, as shown in Figure 1. The stars indicated by Morgan, Whitford, and Code as being probable members of the association are represented by open circles in the diagram. While the general form of the diagram is roughly that to be expected, the scatter is too large to enable any over-all distance modulus to be determined within useful limits—a finding that has a precedent in a study of the association I Gem (Hardie, Seyfert, and Gulledge 1960). However, the individual distance moduli of the probable association members alone, based on a calibration of absolute visual magnitude by Johnson and Iriarte (1958), are listed in Table 3. The mean of these moduli is 11.5 ± 0.2 mag. ($r = 2.0 \pm 0.2$ kpc). The only available evidence regarding the possible membership of WZ Sgr in the association comes from radial velocities. Table 4 contains data extracted from the *General Catalogue of Stellar Radial Velocities* (Wilson 1953). While at first sight the interagreement of velocities among the various probable association

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TABLE 2

OBSERVATIONAL RESULTS

Star	V	$(B-V)$	$(U-B)_C$	E_{B-V}	MK
167771	6 51	0 10	1 20	0 41	O8
168021	6 43	27	1 27	0 49	B0 I*b*
167863	6 71	04	1 37	0 13	
CPD-19°6757	8 88	93	1 53	1 25	
168138	9 28	03	1 28	0 21	
167815	7 56	17	1 27	0 45	
167659	7 38	23	1 28	0 54	O8
167520	8 80	19	1 39	0 32	
167375	8 84	05	1 30	0 22	
167479	8 14	07	1 29	0 25	
167611	9 52	16	1 29	0 39	
167412	8 49	08	1 22	0 39	
167336	8 68	51	1 35	0 80	B0 II
167411	7 71	27	1 25	0 59	
167635	8 65	15	1 38	0 18	
167433	7 51	07	1 35	0 19	
167285	10 52	17	1 39	0 30	
167087	8 16	05	1 39	0 14	
166921	7 81	04	1 39	0 12	
166804	8 82	04	1 35	0 15	
166524	9 61	46	1 35	0 78	
166188	9 50	46	1 61	0 49	
166628	7 16	55	1 40	0 67	B3 I*a*
CPD-19°6592	8 23	49	1 34	0 81	
166922	10 93	39	1 63	0 39	
167247	8 99	17	1 38	0 30	
167088	8 54	03	1 20	0 34	
166965	8 71	27	1 30	0 45	B3 II
167224	8 07	0 09	1 29	0 27	B3 II

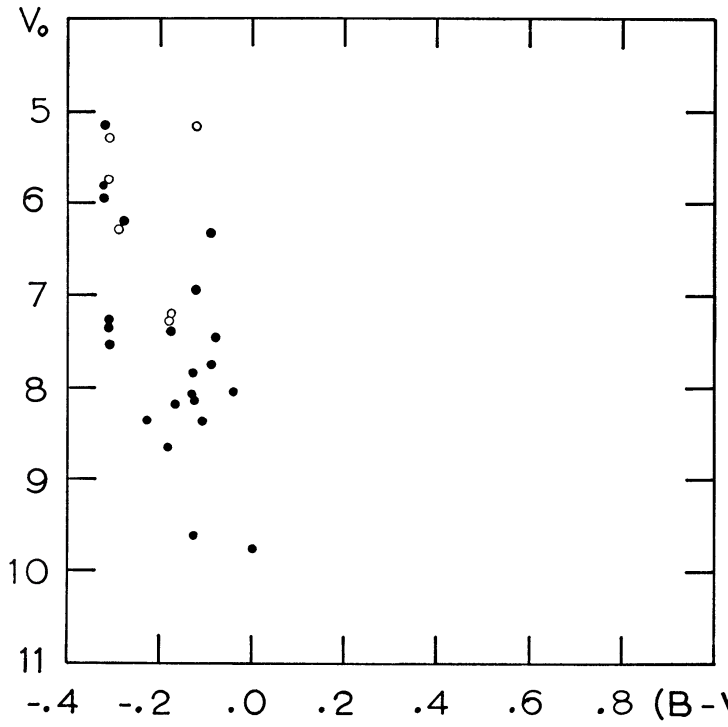

FIG. 1.—Intrinsic color-magnitude array for the observed stars. Open circles denote stars previously indicated as being "probable" association members.

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members does not seem very good, it must be borne in mind that radial velocities for these early-type stars never are really well determined. For example, in the case of HD 167771 the notes at the back of the radial-velocity catalogue list individual determinations ranging from +14 to −35 km/sec. The test is therefore not very sensitive, but we may conclude that the evidence is not against WZ Sgr being an association member and does, in fact, tend to favor this possibility. If WZ Sgr is, in fact, associated with these stars, then its absolute blue magnitude is about $\langle M^{\circ}_{B} \rangle = -4.5$, there being some doubt as to the precise reddening correction to be applied.

TABLE 3

DISTANCE MODULI OF PROBABLE MEMBERS

Star	$(m-M)_0$	Star	$(m-M)_0$
167771	10 5	166628	12 3
168021	11 5	167088	11 7
167659	11 0	166965	11.7
167336	12 0		

TABLE 4

RADIAL VELOCITIES OF PROBABLE MEMBERS AND WZ SGR

Star	R V (km/sec)	Star	R V. (km/sec)
167771	+9	167088	−10
168021	−1	166965	−13
167336	−3	WZ Sgr	−11
166628	+3		

Kraft (1961) has recently been concerned with distinguishing between two possible cases in the pulsational behavior of classical cepheids: Case I, in which the pulsation constant Q is independent of period, and Case II, in which Q is a linear function of period. If it is assumed that WZ Sgr is a member of III Sgr, then its derived absolute magnitude favors Kraft's Case I.

The color excesses listed in Table 2 show too large a variation for any useful conclusions to be drawn regarding the color excess of WZ Sgr.

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