THE DISTRIBUTION OF M SUPERGIANTS WITH LARGE INFRARED EXCESS AND WR STARS IN THE GALAXY

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Summary. From the $m_{12} - m_{25}$ *vs.* spectral type diagram (see for example: Habing, 1987, Figure 5), it can be seen that there are no early M giant stars with $m_{12} - m_{25} > 0.7$. On the other hand all early M stars with $m_{12} - m_{25} > 0.7$ are M supergiants. These early type M supergiants have typically infrared excesses at 12 μm in the range of 20 to 170 times higher than their photosperic fluxes.

The color distinction between early M giants and M supergiants was applied to identify early M giant stars from the Catalogue of Spectral Classifications for Stars of the Catalogue of the Caltech-Two-Micron Survey by Bidelman (1980). The search was confined to $l = 345° - 300°$, through the galactic centre direction. Only good data were used, *i.e.* for objects with flux quality 3 in the scale of IRAS (1984). There are 182 stars classified as M supergiants according to the above mentioned criteria, 58 of which are known spectroscopically as M supergiants. The surface distribution of the M supergiants found is compared to the surface distribution of Wolf Rayet (WR) stars listed in van der Hucht *et al.* (1988). The distribution shows four clumpings of M supergiants, at ($0° < l < 30°, -2° < b < +2°$), ($60° < l < 90°$, $-1° < b < +3°$), ($100° < l < 120°$, $-2° < b < +2°$) and ($120° < l < 150°, -5° < b < +0°$). The first three are found in the direction of high concentrations of WR stars.

In order to know whether there is a spatial coincidence between these two types of stars, the distance estimates of M supergiants were calculated. The distance estimation was facilitated by the calibration of the absolute magnitude of M supergiants at 12 μm which was assumed to be a liniar function of $m_{12} - m_{25}$ (Raharto, 1990) and the interstellar extinction at 12 μm was negligible.

Then the distributions of the two types of stars within 3 kpc from the Sun were compared. Two apparent clumpings of M supergiants coincide with the WR space distribution given by van der Hucht *et al.* (1988). The clumpings of M supergiants at ($100° < l < 120°, -2° < b < +2°$) and ($120° < l < 150°, -5° < b < +0°$), however, do not coincide with any of the WR concentrations. It has been known that this direction is devoid of WR stars (Roberts, 1962). The clumping of M supergiants in this direction may indicate that the IMF in different spiral arms of the Galaxy may not the same.

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