

The Ratio of the Numbers of Carbon Stars to M Stars in Galaxies

Yu. L. Frantsman

Radioastrophysical Observatory, Latvian Academy of Sciences, Riga

Simulated populations of the AGB stars were calculated with different assumptions about mass loss, initial chemical composition and dredge-up efficiency. The early-AGB (E-AGB) phase was taken into account. The numbers of carbon and oxygen stars per 10^6 generated stars and the ratio (N_C/N_M) of these numbers were obtained. It is possible to match theoretically obtained N_C/N_M with the observations only if the luminosity of observed stars $M_{bol} < -3.5$; otherwise it is necessary to take into account the E-AGB phase. The data in the Table are for all AGB stars in the Galaxy and for stars with $M_{bol} < -1.80$ in the LMC.

Table

Object	\dot{M} law	N_C	N_M	N_C/N_M
Solar neighborhood	$\alpha = 3.0$	1	650	0.002
	I	6	664	0.009
	II	8	661	0.01
LMC ($m-M$) ₀ = 18.6	$\alpha = 3.0$	11	424	0.03
	II	31	426	0.07

Here α is a coefficient in Reimers' mass-loss law;

I: $\alpha = \alpha_0 + \alpha_1 \exp(M_c)$, where (M_c) is the mass of the C-O core, and α_0

and α_1 are chosen such that $\alpha = 0.33$ if $M_c = 0.5 M_\odot$ while $\alpha = 10$ if

$M_c = 1.0 M_\odot$; II: $\alpha = 1$ if $\log(L/L_\odot) \leq 4.1$, $\alpha = 10$ if $\log(L/L_\odot) > 4.1$.