THE $WR/WR_{progenitor}$ NUMBER RATIO: THEORY AND OBSERVATIONS.

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SUMMARY. A direct comparison between the observed $WR/WR_{progenitor}$ number ratio within 2.5 kpc from the sun and the predicted value (using evolutionary computations of single stars of Maeder and Meynet, 1987, *A.&A.* **182**, 243) reveals a discrepancy of at least a factor of two. In a previous study (Vanbeveren, 1990, *A.&A.* in press) I proposed a solution based on the incompleteness of the observed OB type star sample within 2.5 kpc from the sun. In this summary, I propose a theoretical explanation for the discrepancy. The theoretically predicted $WR/WR_{progenitor}$ number ratio critically depends on the adopted $\dot{M}$ formalism in evolutionary computations during the red supergiant phase (RSG) of a massive star, especially in the mass range 20-40 $M_\odot$. Since any $\dot{M}$ formalism predicts the mass loss rate with an uncertainty of at least a factor of two, I have tried to look for solutions for the $WR/WR_{progenitor}$ problem by using different values of $\dot{M}$ during the RSG (in the mass range 20-40 $M_\odot$); the $\dot{M}$ values and formalism that were adopted were always choosen within the observational uncertainty (i.e. within a factor of two when compared to the formalism used by Maeder and Meynet, 1987).

The results.

When we allow for a ~40 % increase of the RSG $\dot{M}$ values in the mass range 20-40 $M_\odot$ when compared to the values used by Maeder and Meynet (1987), it can be concluded that

a. independent from whether a WR star is a single star or whether it is a member of a close binary, theoretical evolution predicts that WR stars originate from stars with initial ZAMS mass larger than 20 $M_\odot$ although the bulk descends from the M>25-30 $M_\odot$ range corresponding to observations.

b.the theoretically predicted $WR/WR_{progenitor}$ number ratio corresponds to the observed value within 2.5 kpc from the sun.

General conclusion: accounting for the uncertainty of the stellar wind mass loss rate in massive red supergiants and for the possible incompleteness of the OB type star sample within 2.5 kpc from the sun, the theoretically predicted $WR/WR_{progenitor}$ number ratio corresponds to the observed value.

K. A. van der Hucht and B. Hidayat (eds.),
Wolf-Rayet Stars and Interrelations with Other Massive Stars in Galaxies, 553.