lockstep with oxygen, as expected for primary elements. The fact that the nitrogen abundance gradient is not much steeper suggests that much of the nitrogen may also be of primary origin. A further puzzle arises in the fact that several isotopic ratios ($^{18}O/^{17}O$, $C/^{13}C$, $S/^{34}S$, $N/^{15}N$, etc.), measured at millimeter wavelengths, are constant to a high degree over the plane of

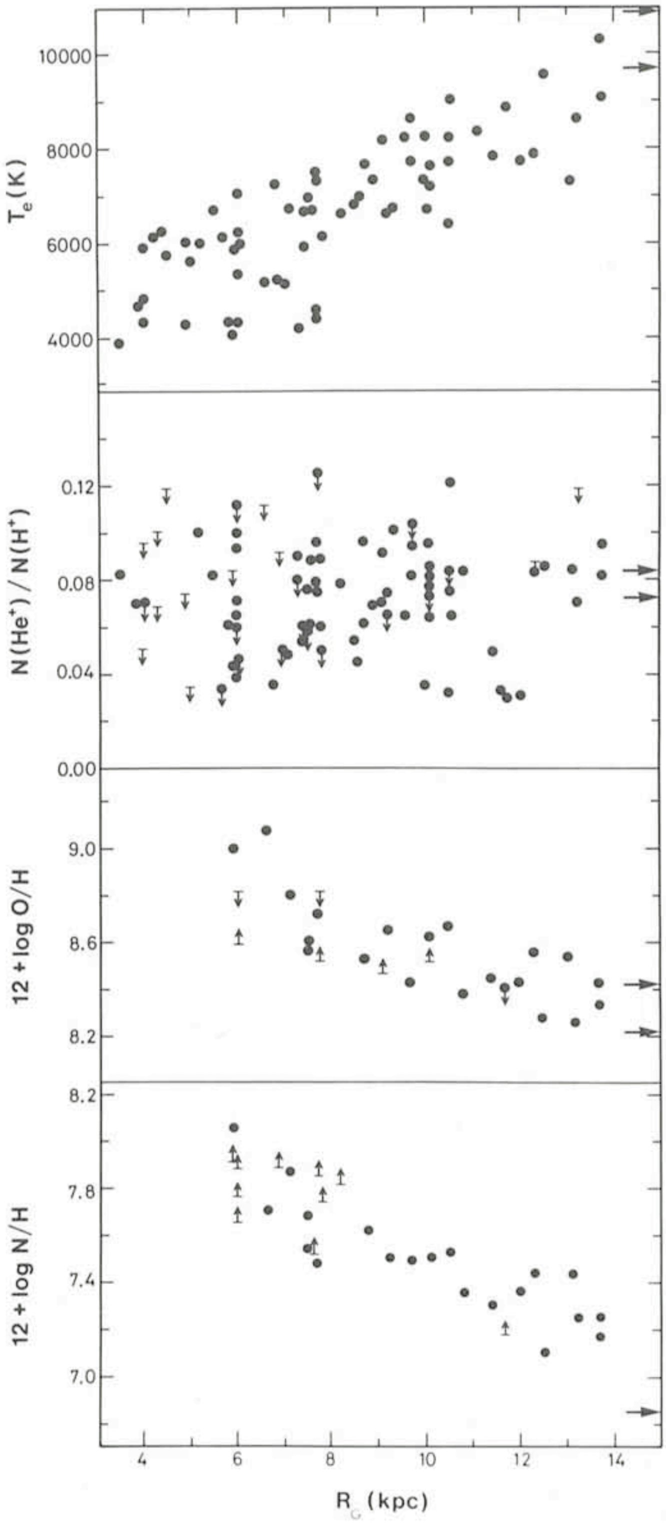

Fig. 3: *Variations of electron temperature and preliminary abundance ratios He^+/H^+, O/H, and N/H, as a function of distance from the galactic centre. Arrows to the right indicate values for the LMC (30 Doradus) and SMC (N66).*

the galaxy, in apparent contradiction to the marked gradients in O/H, S/H, etc. (Wannier, 1980, *Ann. Rev. Astron. Astrophys.* **18,** 399). These facts seem to call for a revision of our ideas about nucleosynthesis.

It is thought that the disk of our galaxy formed gradually, with infall of primordial gas extending over a long period. The main evidence for this is the shortage of old stars in the disk with low abundances. These infall models share the prediction that the abundance gradient should flatten off in the inner regions of the disk (Tinsley and Larson, 1978, *Astrophys. J.* **221,** 554; Chiosi, 1980, *Astron. Astrophys.* **83,** 206). There is no evidence for this in Fig. 3, but there are a number of ways out of this dilemma, such as postulating infall of metal-enriched gas from stars in the galactic bulge. There are clearly many free parameters in such models, but an increasing array of observational data will hopefully provide the constraints necessary to ultimately distinguish the actual evolutionary scenario.

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