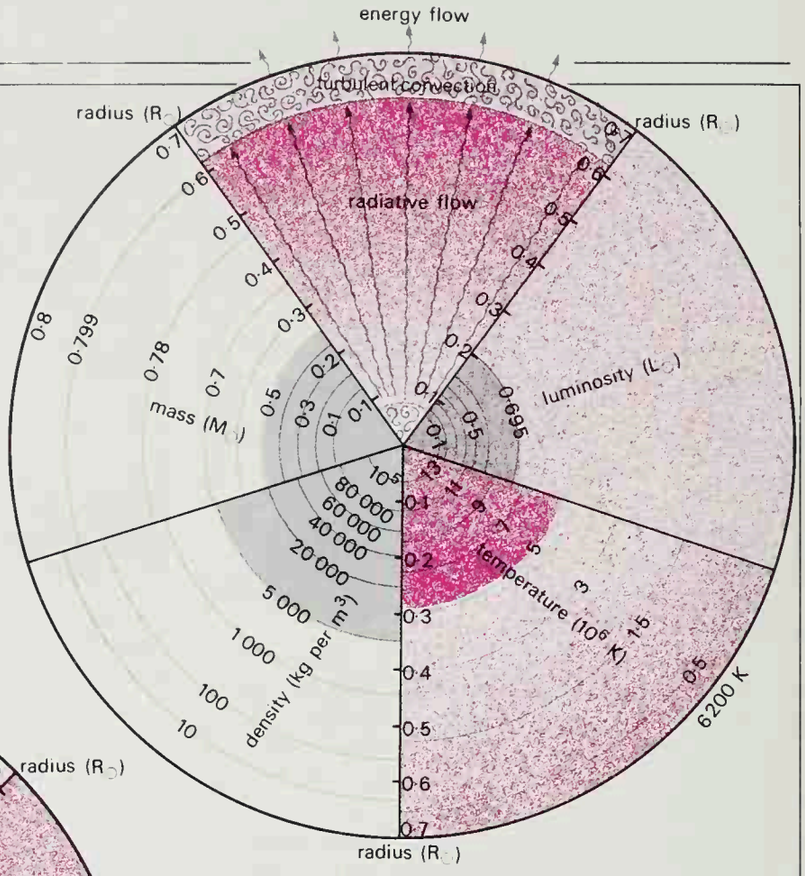

Fig. 3·16 Sector diagram of a main sequence star showing how different properties vary with distance from the centre. This particular model is for a Population II star of mass about 0·8 $M_\odot$. Notice that the luminosity stems directly from the energy produced by the hydrogen fusion reactions in the core, occupying about half the stellar mass. In the diagram, the central shaded sectors represent core conditions. All models of stellar conditions and evolution are sensitive to the initial chemical composition.

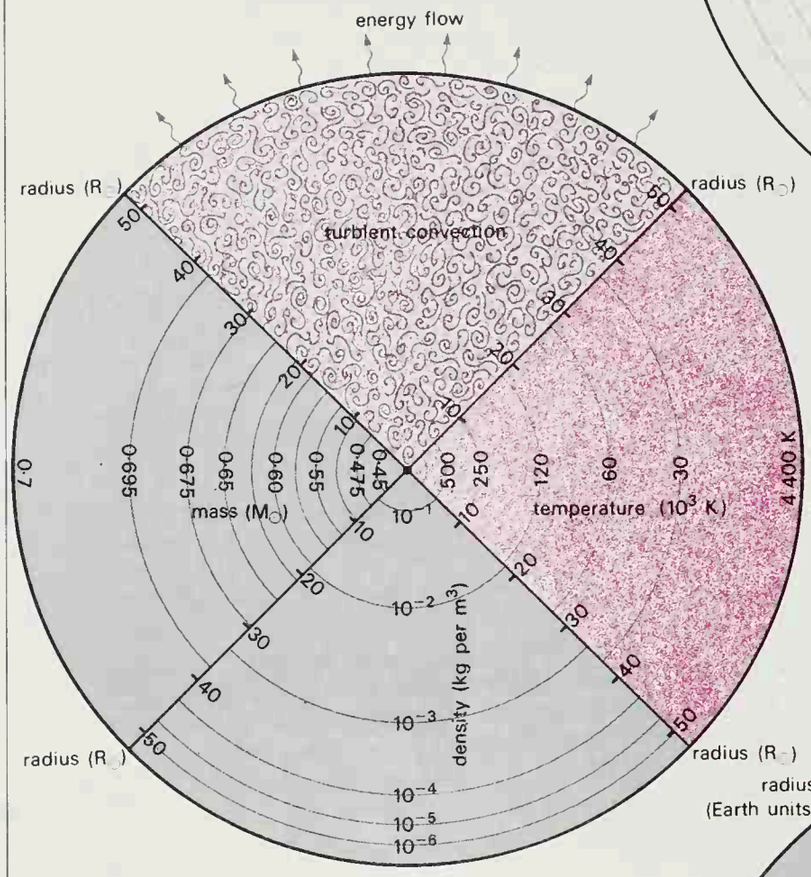

Fig. 3·17 Sector diagram of a red giant star of 0·7 solar masses. Dramatic changes have taken place as the surface temperature has dropped by some 1 500 K making the star change from a yellow to a red colour; however the radius has expanded by an enormous factor to over 50 solar radii and these have combined to increase the whole star's luminosity to nearly 1 000 times that of the Sun. Most of the volume of the star is composed of a low density gas; the entire energy source and the major fraction of the mass are contained within a tiny core shown as a dot at the centre of the diagram.

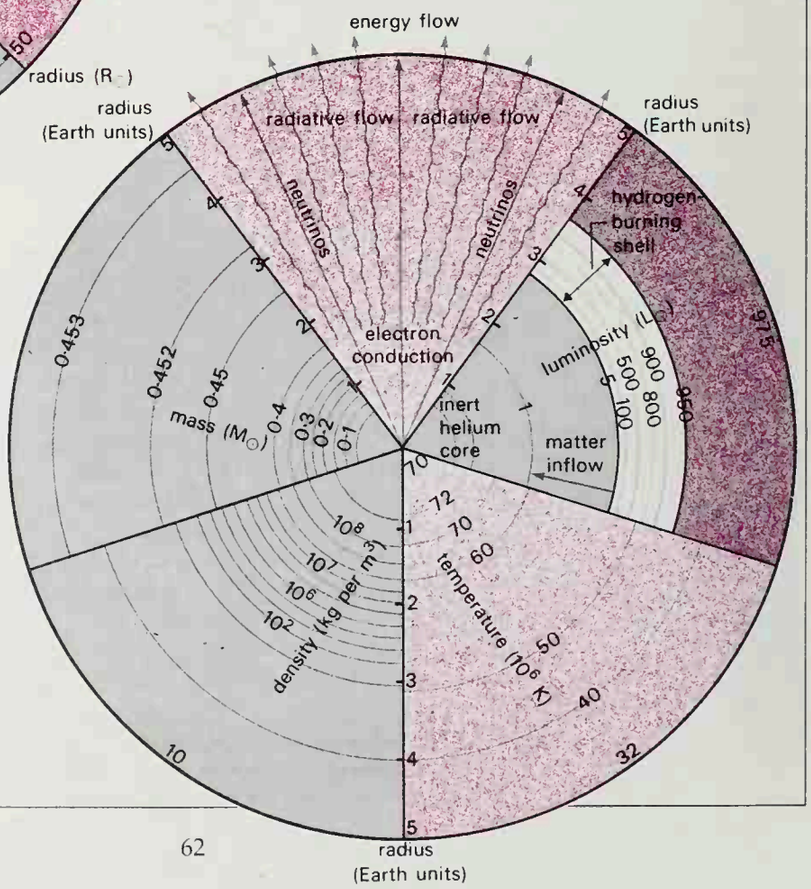

Fig. 3·18 Sector diagram for the red giant core of the figure above. The star's energy comes from a mere 3 000 km thick shell of hydrogen-burning material. The inert core is cooled by neutrinos removing energy, but eventually the core will heat up sufficiently to begin helium burning in a helium flash, and the star will progress to further stages of evolution, and eventually become a white dwarf.