in a supernova explosion when the core burnings occur explosively. This process is by no means fully understood but the following gives the general picture. Neutrinos remove significant fractions of the generated energy so that the pressure support is drastically weakened, then the core rapidly contracts, the temperature rises, reaction rates increase dramatically, and neutrinos are even more copiously emitted. The reactions may next become endothermic by iron burning, so refrigerating the core. Eventually, and very rapidly, the cooled core implodes, crashing in on itself, and the outer layers of the star are ejected outwards with the cataclysmic violence of a **supernova** explosion.

End products of stellar evolution

A supernova is an awe-inspiring phenomenon because the energy output is so incredibly vast: for about a week the light yield from its violence often outshines the entire light of its parent galaxy. When one remembers that the galaxy probably contains some 10^{11} stars, we realize the staggering enormity of a supernova explosion.

The outer layers flung off by the imploding core (which may or may not leave a supercondensed body behind), expand into the surrounding interstellar medium to become a supernova remnant. This remnant is very hot, has intense magnetic fields and may emit radio, optical and X-ray radiation due to **synchrotron emission** (a process by which very high-speed electrons, spiralling round in a magnetic field,

Above:
A supernova explosion observed in 1959 in the galaxy NGC 7331. The first photograph reveals no trace whatsoever of the pre-supernova event which is clearly visible in the second plate. The enormous power of the supernova process is well demonstrated as the eruption was that of a single star, yet it shines like a beacon in the spiral arms of the 5 Mpc distant galaxy.

The planetary nebula NGC 7293, the Helix. A spectacular sight in a telescope, this glowing shell of hydrogen gas is 0·5 parsecs in diameter. It is the entire expelled envelope of a star's late phase of evolution in which it is believed that red giants lose mass in violent outbursts, suffering a final collapsing metamorphosis into a white dwarf star in the process.