Reading Guide for November 17

from Gribbin and Gribbin, *From Here to Infinity*

Chapter 6. Stars

pp.136–138. This introduction gives an idea of what we see when we look at the stars.

- What key information about individual stars do astronomers try to learn?
- How can astronomers determine a star's mass?
- How far from us is the nearest large star cluster?

Fig. 84. If you look at this photograph closely, you will see that six of the stars in the Pleiades cluster are much brighter than the others. In fact, I personally have only been able to see those six without assistance from binoculars. How the Pleiades became known as the "seven sisters" is a mystery to me.

pp. 138–141. *Red Giants and White Dwarfs*. This introduces us to the different types of stars. The **Hertzsprung-Russell diagram** (H-R diagram) provides a convenient scheme to classify them.

Fig. 85. The vertical axis of this graph should really be absolute luminosity, not mass. The white dwarfs are not necessarily that much lighter than the Sun, but they are much dimmer.

- Where do most stars appear when plotted on the H-R diagram?
- In terms of mass, how does the Sun compare with other stars?
- What is the mass and temperature of the most massive **main sequence** stars?
- What is the mass and temperature of the least massive main sequence stars?
- Where on the H-R diagram are **red giant** stars plotted?
- Where on the H-R diagram are **white dwarf** stars plotted?

When the book describes stars moving around the H-R diagram, it means that their luminosities and temperatures change with time, so that their positions on the H-R diagram change with time. In fact, where a star plots on an H-R diagram tells us what sort of processes are occurring in the star's interior.

The pace of a star's development depends on its mass.

- Which complete their lives more quickly: lighter stars or more massive stars?

- Why?

p. 144–146. *Making Stars*. This section describes the very latest thinking of how stars form, though the basic process has been known for some time.

- Why do **pre-stellar cores** collapse?
- Why do pre-stellar cores become hotter as they collapse?
- What makes the growing core temporarily stop collapsing?
- What new source of energy does a star tap when it becomes large enough?
- What happens to halt the accretion process?

This section refers to **nuclear fusion**, but does not explain what it is. In fusion, two atomic nuclei smash together and stick, forming one larger nucleus. When the nucleus formed is around the size of iron or less, the fusion process releases energy.

from Neil de Grasse Tyson, *Universe Down to Earth*

This reading is reproduced in your course pack, pp. 131–140. Questions about this reading are also in your course pack, p. 141.