Chapter 7. Telescopes on Earth and in Space

Note. The main purpose of an astronomical telescope is to gather light (not to magnify). The light can either be gathered with a lens (a *refracting telescope*) or a mirror (a *reflecting telescope*).

Note. With a single lens, red and blue light do not focus at the same point (this is called *chromatic aberration*). This can be corrected by using several lenses together. A better solutions is to use mirrors:

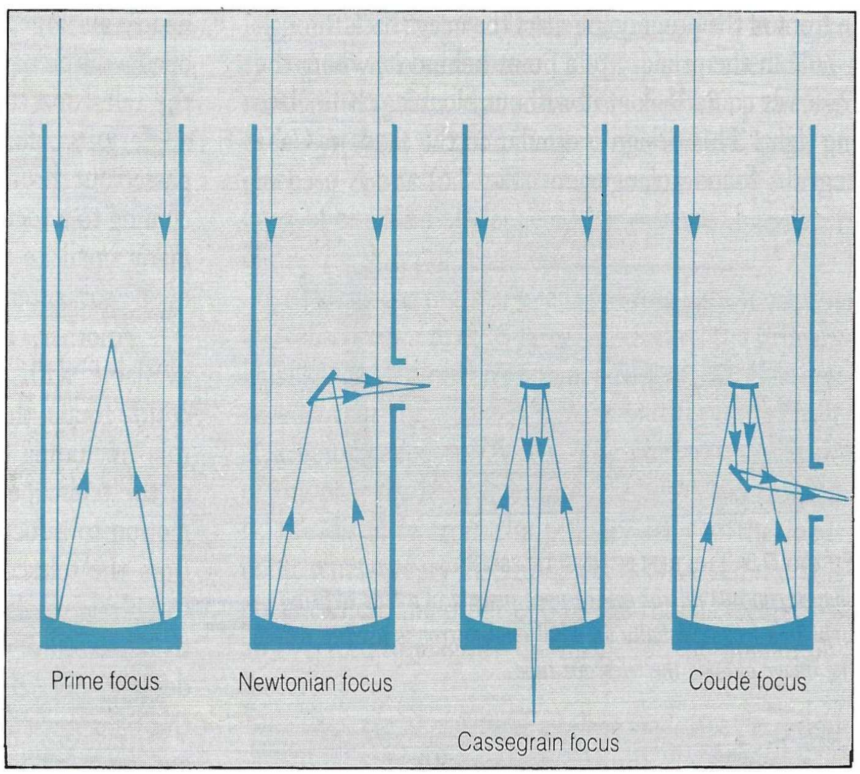

Figure 7.6 Page 126. Various Focal Arrangements for Reflecting Telescopes.

In each of these cases, a part of the mirror is blocked.

Note. Today, telescopes (professionally) are rarely used visually. A *spectrograph* (which spreads light out into a spectrum, like a prism), or a camera (electronic or film containing) is attached to the telescope. Other instruments include *photometers*, which measure the intensity of received light, and *photomultipliers* which "magnify" the amount of light received.

Note. The Earth's atmosphere absorbs radiation with a wavelength shorter than 3100 Å(including ultraviolet, X-ray, and γ ray). So to detect these, we must put our "telescope" above the atmosphere. Satellites have been launched to do just this:

Radiation	**Satellite**
Ultraviolet	Copernicus (1972–1980)
	IUE (1978–)
	Hubble Space Telescope (19??–)
X-ray	Einstein (1978–1981)
	Exosat (1982–1986)
γ ray	Gamma Ray Observatory ($\sim$ 1990)

Note. The longer wavelength radiation (radio waves) can be explored from the ground using "radio telescopes." The resolution of a telescope is determined by its diameter (or effective diameter). Radio telescopes can be linked together to produce very large effective diameters using *interferometry*.

Revised: 9/29/2019