

In the Ptolemaic model, Venus lies between the Earth and the Sun and hence it must always be lit from behind, so could only show crescent phases whilst its angular size would not alter greatly. In contrast, in the Copernican model Venus orbits the Sun. When on the nearside of the Sun, it would show crescent phases whilst, when on its far side but still visible, it would show almost full phases. As its distance from us would change significantly, its angular size (the angle subtended by the planet as seen from the Earth) would likewise show a large change.

Figure 1.3 shows a set of drawings of Venus made by Galileo with his simple refracting telescope. They are shown in parallel with a set of modern photographs which illustrate not only that Galileo showed the phases, but that he also drew the changing angular size correctly. These drawings showed precisely what the Copernican model predicts: almost full phases when Venus is on the far side of the Sun and a small angular size coupled with thin crescent phases, having a significantly larger angular size, when it is closest to the Earth.

Galileo's observations, made with the simplest possible astronomical instrument, were able to show which of the two competing models of the Solar System was correct. In just the same way, but using vastly more sophisticated instruments, astronomers have been able to choose between competing theories of the Universe – a story that will be told in Chapter 9.