In 1612 Galileo – who as yet had published nothing on the subject – received from Germany a copy of another tract on sunspots whose author proved to be the German Jesuit, Christoph Scheiner (1573–1650). Scheiner, who had first observed sunspots in March 1611, believed that the spots were satellites of the Sun, rather than being on the body of the Sun itself. The resulting dispute – which was enlivened by the underlying controversy over priority – led Galileo to write his Letters on Sunspots, in which, like Fabricius, he argued that the spots were on the rotating Sun. By this time he had realized the significance of spots being on the Sun itself: in received thinking the Sun was the symbol of perfection, and a Sun that was ‘spotty and impure’ represented another blow to the traditional cosmos.

The second of Galileo’s new discoveries concerned Saturn. The planet, it seemed, had mysterious appendages, which subsequently disappeared and then reappeared; these would puzzle observers until the Dutch physicist Christiaan Huygens (1629–95) hit upon the extraordinary explanation in the winter of 1655/56, long after Galileo’s death: the planet was ‘surrounded by a thin flat ring which does not touch him anywhere’.

The third discovery was of more immediate importance. Venus, he found, went through a complete sequence of Moon-like phases, appearing at times with a circular disc like the full moon, and at others having a thin crescent like the new moon. This was totally incompatible with the Ptolemaic geometry for Venus. Ptolemy’s model (see page 47) implied that Venus was always in between the Earth and the Sun. As a result, the hemisphere of Venus illuminated by the Sun was always facing away from the observer on Earth, who therefore would never see the planet with the circular disc of a full moon.