



THIS illustration shows the telescope and instruments of Johannes Hevelius (1611–1687) rising above the rooftops of Danzig; it is taken from his *Machina coelestis* of 1673 (by permission of Harvard College Library). Hevelius was a wealthy man and established

the best equipped observatory in Europe in 1641. The observatory included his famous tubeless telescope (which had a focal length of 150 feet) but was destroyed by fire in 1679; undaunted Hevelius built and equipped another.

placed it well beyond the Moon in the celestial regions. He also described the appearance of the comet in some detail.

Theoretical work

The most important contribution to theoretical astronomy published in Britain before 1650 was contained in William Gilbert's great work *De magnete* (London, 1600). This was chiefly concerned with the phenomena of experimental and terrestrial magnetism but he concluded his treatise with some speculations on its possible cosmological significance, suggesting, in particular, that the planets are kept in their courses by magnetic forces. He made no attempt to work out this idea in detail and its main importance lies in the fact that it stimulated Kepler to devise his own 'quasi-magnetic' theory of planetary motions. Although this theory was incorrect it played a major role in guiding him to the discovery of his first two laws of planetary motion. Gilbert also argued vigorously and cogently in favour of a diurnal rotation of the Earth, and his arguments undoubtedly converted many of his fellow scientists to this view. On the question of an annual orbital motion round the Sun he never committed himself one way or the other. Partly on this account, many scientists in the early seventeenth century accepted a 'semi-Copernican' view in which the Earth remained at the centre of the Universe but rotated on its own axis. But by 1640 English astronomers were coming

round more and more to the full Copernican theory which was defended in print by John Wilkins in *A discourse concerning a new planet* (London, 1640); by Henry More in *Psychathanasia* (Cambridge, 1642); and by Thomas White in *De Mundo* (Paris, 1642).

Overall progress

If we are to judge the English contributions to astronomy before 1650 solely by published work, the total sum is relatively modest: some accurate observations on the nova of 1572 and the comet of 1618; Wright's table of solar declinations; Briggs's improved logarithms; Gilbert's speculations on the possible significance of magnetism in planetary theory. These almost complete the list and they can hardly be compared with the achievements of Italy, Germany or France during the same period. There are, however, two other considerations which redress the balance to some extent. The first is that there was probably a more widespread interest in, and a greater receptivity towards the new astronomy, and especially towards the idea of a moving Earth, in Britain than in most other countries. Several writers supported either a full or a semi-Copernican theory; others referred to it sympathetically; few actively opposed it. English support undoubtedly strengthened the cause of Copernicanism elsewhere at this time.

The second balancing factor is that there were, in fact,