Robert Hooke: Tercentennial Studies edited by Michael Cooper and Michael Hunter

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Several years ago Lisa Jardine, biographer of Hooke and Wren, was making a documentary film on the Great Fire of London. While waiting early one morning outside the Monument, as the crew set up the cameras, she was ushered in out of the freezing cold by the attendant. To pass the time, the attendant asked if she had ever seen the basement, and pulling away the carpet and lifting a trapdoor, he revealed an underground chamber which, she quickly realized, had in fact been a purpose-built laboratory in which Hooke and Wren performed experiments. Even more interesting, when several iron trapdoors in the 200-foot column were opened, it also allowed a clear view from the basement past the hinged lid at the top of the column. The column was, as well as a monument to the Great Fire, a zenith telescope with lenses at the ground and upper platform levels, designed to track minute shifts in the position of a fixed star and prove the rotation of the earth [Jardine 2002].

Long telescopes were important to Hooke. His nemesis, Newton, whom he accused of having stolen from him the account of orbital motion as being due to a rectilinear motion and an accelerating force towards the centre, had made a reputation for himself early on when he showed that white light is heterogeneous, and that the colored light-rays from which it is composed are refracted at slightly different angles through a refracting surface such as a lens or a prism. As a result, Newton argued, a telescope using just refracting lenses will always suffer from the problem of chromatic aberration, and this led him to devise a reflecting telescope, which overcame this problem. This is often treated as a decisive triumph in textbooks; but in fact reflecting telescopes had problems of their own, namely, faint images

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and tarnishing of the mirror, and problems of chromatic aberration could be overcome in refracting telescopes if they were long enough. Someone like Hooke, intimately versed in lenses grinding, fine-tuned astronomical observation, and precision instrument construction, realized this. Indeed, Hooke's 60 foot telescope was sufficiently emblematic to appear with Boyle's air-pump (initially designed by Greatorex but radically improved by Hooke) in the frontispiece to Sprat's *The History of the Royal Society* of 1667.

The common portrait of Hooke as irredeemably misanthropic has been questioned in recent years (notably by Feingold in this collection), and some of his misfortunes appear to have been due to political machinations for which he cannot be held responsible, e.g., on Oldenburg's part (as Jardine argues in this collection). Nevertheless, there is no doubt that he was a difficult person, and his long disputes with Huygens (senior and junior) and Newton did his reputation immense damage. But during his lifetime, especially during his later years, he did command significant respect in the Royal Society; and in the last 25 years, his immense contribution to early modern natural philosophy—a contribution which puts him on a par with Galileo, Descartes, Huygens, and Newton—has begun to be recognized. There have been some hurdles to recognition. First, as Ellen Tan Drake notes in her essay in this collection, many of his contributions have been credited to others. Boyle's Law is actually due to Hooke; the discovery of the periodicity of comets was discovered by Hooke when Halley, to whom this discovery is usually attributed, was only six years old; his theory of combustion is credited to Mayhew; 'Newton's Rings' were actually observed and described first by Hooke; his geological work is at least as fundamental as, and in some respects more sophisticated than, that of Steno, to whom the origins of the discipline are usually traced; the Monument and the dome of St Paul's were both designed not by Wren but by Hooke; and so on. These misattributions are now widely recognized. More contentious is the question of centripetal force, which Nauenberg and Gal deal with in this collection. However, it is certainly clear that Newton's radical move to grasping the natural-philosophical significance of seeing orbits in terms of a combination of inertial and accelerated motions which yield elliptical orbits, and not in terms of bodies being held in a natural balance of forces, was prompted by his exchange with Hooke.

An issue raised in both Nauenberg's and Gal's chapters bear directly on the second respect in which there are hurdles to recognition of Hooke's achievement. This is the question of the extent to which one can see science, or natural philosophy as it was then, as, at bottom, a story of a conceptual development in which experimentation and instrumentation play an auxiliary role. Such a view, epitomized in a historian like Koyré and an unstated assumption in virtually all philosophy of science, is tackled head on in Joseph's essay on various natural-philosophical topics treated by Hooke, from studies of springs, air pressure, and the formation and nature of glass drops to combustion and fluid mechanics. Here we are forced to take seriously not just the ingenuity of individual experiments but the very fact that they are constitutive of the Hookean program in natural philosophy in many respects. Joseph, a mechanical engineer, challenges us to take the formative role that technology and instrumentation play in scientific discovery seriously, and Hooke provides excellent material in this respect.

This collection is a successor to an earlier one [Hunter and Schaffer 1989], which was really a pathbreaker. In the intervening 16 years there has been an upsurge in writing about Hooke. Indeed, in the last three years alone there have been two biographies [Inwood 2002, Jardine 2003] a general account of his work [Bennett *et alii* 2003], two monographs on his mechanics [Gal 2002, Chapman 2005] one monograph on his architecture [Cooper 2003], and a collection of essays [Kent and Chapman 2005]. The comprehensive bibliography in the present collection indicates that this sudden interest has been matched in papers and theses. That Hooke is someone who is far more interesting and important than has been evident until recently is clearly established in this collection, and one comes away from it keen to read more.

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