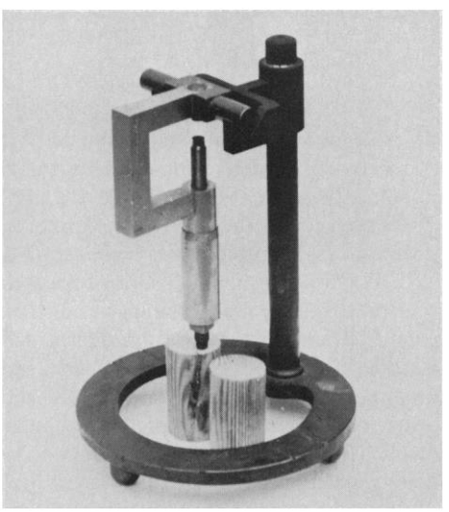
Instrument Makers

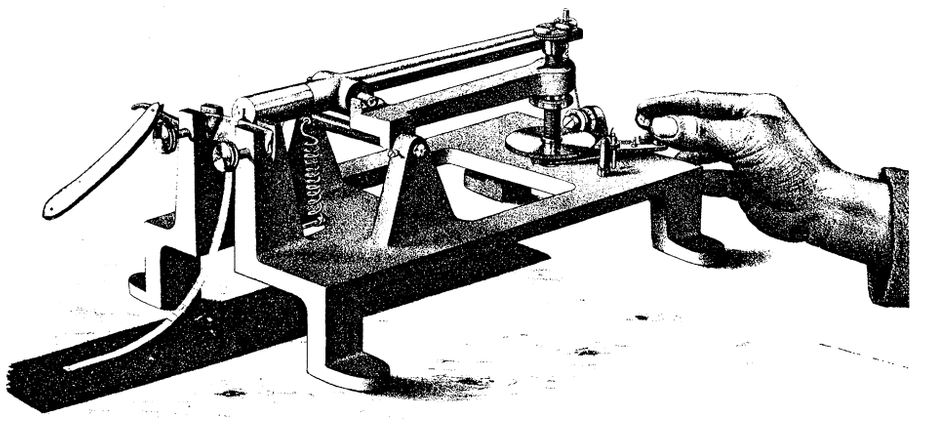
Horace Darwin's Shop. A History of the Cambridge Scientific Instrument Company, 1878–1968. M. J. G. CATTERMOLE and A. F. WOLFE. Hilger, Bristol, U.K., 1987 (U.S. distributor, Taylor and Francis, Philadelphia). xvi, 285 pp., illus. $77.

This chronicle by two former employees of the Cambridge Scientific Instrument Company records the company's story, mainly emphasizing the instruments themselves. An overall narrative in part 1 is followed in part 2 by more detailed discussions of the history and technical development of several of the company's most significant products.

Though Horace Darwin did not found the company, he guided it during its rise to prominence, from the early 1880s until his death in 1928. A mediocre finish in Cambridge University's mathematical tripos in 1874 effectively meant that Horace, one of Charles's sons, would not pursue a career involving high-level mathematics, unlike his brother George Howard, who did well in the tripos and became the professor of astronomy at Cambridge. Horace's talents lay toward engineering, especially the design of instruments, and, later, management of a firm of a few hundred employees. After serving an engineering apprenticeship and gaining recognition for his design of instruments, Horace bought into the recently established firm as joint proprietor in 1881. At that time it became known officially as the Cambridge Scientific Instrument Company, but among the Darwin family as "Horace's shop." He became sole proprietor a decade later.



Micrometer system devised by Horace Darwin for use with the "worm stone" at Down House, the Darwin family home. "To enable his father to study the rate at which stones on the surface of the ground were buried by the action of worms beneath them, Darwin devised [an] arrangement of a large flat stone, 460 mm in diameter, with a hole in the centre. Three metal V-grooves set into the stone radially about the central hole supported a vertical micrometer and the gradual sinking of the stone . . . was registered against metal rods, 2.63 m long, driven into the ground through the central hole. Experiments with the worm stone and micrometer (which may still be seen at Down House) were begun by Charles Darwin in 1877 and continued . . . until the stone was accidentally moved in 1896. Horace Darwin reported the results in a paper to the Royal Society in 1901." Here the metal stakes are represented by wooden cylinders. [From *Horace Darwin's Shop*; Cambridge University Library]



The "Darwin Rocker" microtome. In 1883–84 the Cambridge Scientific Instrument Company made about 20 automatic microtomes based on a design by Richard Threlfall. Threlfall's design, the first of its kind, was not commercially successful. "Within two years [Horace] Darwin had designed a better microtome. . . . The classical simplicity of the design can be seen in [this illustration,] which was printed in the 1885 sales leaflet. . . . In the years which have followed many other microtomes have been designed by many other manufacturers but surely none have enjoyed the reputation achieved by the 'Darwin Rocker.'" [From *Horace Darwin's Shop*]

The shop's early successes reflected the successes of late-Victorian Cambridge science, physiology and physics. The firm manufactured, for example, microtomes (including a version known as the "Darwin Rocker") for cutting thin slices of tissue, electrocardiographs based on the design of the Dutchman Willem Einthoven, thermometers and pyrometers using the design of the Cambridge graduate H. L. Callendar, and, just before the First World War, cloud chambers developed in the Cavendish Laboratory by C. T. R. Wilson. The company was a "controlled factory" during the war, with necessities of the time dictating its production: optical pyrometers previously imported from Germany, kathometers for detecting chlorine gas, and sound-ranging outfits for locating enemy artillery, for example. Darwin was knighted for the company's wartime efforts. Typically, it seems that throughout Darwin's reign the company refined and manufactured instruments that were initially created by others, with Darwin himself only occasionally involved in the actual process of design. The concluding chapter of part 1 sketches the firm's history after the war and after Darwin up to its takeover by the George Kent Board in 1968.

This is the story of a company obviously of some importance in the history of science, the history of medicine, and the history of Britain. The character and exact significance of its various roles, however, are not much explored in the book. Indeed, the book's major weakness is its paucity of generalization—not only on such topics as the history of scientific instrument makers, the connection between the professionalization of science and the manufacture of scientific instruments, or the mutual influence between scientific instruments and scientific theory, but even regarding the specific subjects of each chapter. The strength of the book is its information-packed narrative, constructed with knowledge and affection.

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Astronomical Spectroscopy

The Analysis of Starlight. One Hundred and Fifty Years of Astronomical Spectroscopy. J. B. HEARNSHAW. Cambridge University Press, New York, 1986. xvi, 531 pp., illus. $79.50.

The analysis of starlight by spectroscopic means has been a singularly powerful tool in astronomy during the past century. From it has come knowledge of the composition and structure of stellar atmospheres, motions of stars in the line of sight, the existence of pulsating stars, and countless other ingredients of what today is called observational astrophysics. Furthermore, more than any other observational technique, spectroscopy drew the attention and expertise of physicists to problems in astronomy, and from