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Horace Darwin's Shop, A History of the Cambridge Instrument Company 1878 to 1968

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BOOK REVIEWS

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Horace Darwin's Shop, A History of the Cambridge Instrument Company 1878 to 1968. M. J. G. Cattermole and A. F. Wolfe. 285 pp. Adam Hilger, Bristol, 1987. (Distributed by Taylor and Francis, Philadelphia.) Price: \$77.00. (Reviewed by Thomas B. Greenslade, Jr.)

Apparatus manufacturers are largely taken for granted by many physicists, although their catalogs tempt us with new apparatus largely undreamed of only a decade ago, and familiar pieces of apparatus continually reappear in new forms, which give us additional features at a cost that may (in constant dollars) even decrease.

Cattermole and Wolfe's book deals with the development of the infrastructure that has made it possible for physics to exist in its modern form. They take us back to an earlier time when most research apparatus was not standardized, and faculty members (for most research was connected with universities) worked in close cooperation with instrument makers and manufacturers in developing and making their research instruments. The relatively simple nature of experimental physics at the time of the formal founding of the Cambridge Instrument Company in 1881 often required only a few instruments for an experimental investigation. We are reminded of the meager experimental resources available to first-class physicists only a little over 100 years ago.

There are two main themes to the book: (1) Horace Darwin and his associates at the Cambridge Instrument Company, and (2) the apparatus designed and made by the company. Horace Darwin (1851–1928) was the youngest surviving child of Charles Darwin. The Darwin family was well known in the sciences. The family tree in the Introduction shows the mathematician George H. Darwin, the botanist Francis Darwin (both brothers of Horace), and the physicist Sir Charles G. Darwin (Horace's nephew). A great many well-known physicists make short appearances in the book, including Rayleigh, Thomson, Kapitza, Poynting, Glazebrook, and Boys.

A family tree as complicated as that of any human family is provided for the Company itself, showing its mergers and dissolutions, as well as the companies that split off from it. Readers who have used British apparatus will recognize the name of W. G. Pye & Co. of Cambridge; Pye's father was a skilled mechanic who joined the firm at its inception

as works manager, and who left to form a family firm in 1898. The details of the operation of the company are best left to the specialist, but there are some wonderful insights into the way that instruments were made at the end of the 19th century. The individual craftsmen were expected to make the entire instrument, starting with metal stock. The company did not have a testing laboratory, but each instrument was checked and certified by its designer. Those who restore antique scientific instruments will want to look at the details of the lacquering process on p. 58.

The second half of the book deals with certain important instruments the firm produced. The company flourished at a time when the purely mechanical or optical instrument had given way to a hybrid electromechanical style; the company's trademark, a cam enclosed by the diamond shape of a Wheatstone bridge, illustrates this, as well as being a visual pun. Apart from the microtome, the instruments discussed have strong connections to physics, including seismographs, temperature measurement and control, portable galvanometers, alternating current waveform recorders, the electrocardiograph, and gas analyzers.

The final chapter on the cloud chamber gives details of C. T. R. Wilson's work at Cambridge on the production of artificial clouds by the rapid expansion of air in a closed chamber. Wilson's work was done at just the right time; he was able to show that exposing the expanding air to the newly discovered x rays, and the radiations from uranium, made the resulting clouds more dense. However, his research then went in a different direction, and it was not until 1910 that he came back to the idea of making the track of an ionizing particle visible using what we now call the cloud chamber. The Company started making cloud chambers from his design as early as 1913.

The relatively high cost of this book will probably cause it to be bought primarily by libraries. Its content and many references make it important reading for anyone who is trying to understand the origin of our present way of doing experimental physics.

Thomas B. Greenslade, Jr. has been a member of the Kenyon College physics department since 1964. He has research interests in the physics course of the 19th and early 20th centuries.

The Quantum Hall Effect. Edited by Richard E. Prange and Steven M. Girvin. 419 pp. Springer-Verlag, New York, 1987. Price: \$27.50 (cloth). (Reviewed by Robert Joynt.)

The search is always on for a way to plug the gaps in scientific communication. One of the most troublesome of these is how to educate a researcher about to begin work in a new field. It is terribly inefficient for that person to go to the original literature, which is, of necessity, too voluminous

and partly confused. If the subject is only starting its development, reading a couple of review articles may suffice, assuming that the articles already exist and are well done, which often is not the case. Still that is how one usually muddles along. The quantum Hall effect is considerably further along in its development. Quite a lot is known about it but much remains to be done—an adolescent rather than a mature subject. So here a book is clearly called for but this too raises problems. The author must be one of the main contributors to the field, must have a complete overview of