

Rayleigh archives at AFCRL

Students of the third and fourth Lords Rayleigh will find their papers at Air Force Cambridge Research Laboratories. Out of family attics and bookstore basements John Howard, chief scientist at AFCRL and editor of *Applied Optics*, has assembled practically all that exist of their original documents. And many exist. Of John William Strutt, third lord, holder of the Cavendish Chair and master of all physics, the collection has almost all the originals of published papers as he wrote them. Some are on the backs of earlier papers that had been returned to him from the journals. In addition there are many pages of computations, notes on foghorn and lighthouse design, original notebooks, lecture notes and correspondence. Of the fourth lord, Robert Strutt, known for his work on airglow, the green spectral line of the aurora, thermal diffusion, radioactivity and the age of the earth, there are notebooks, papers, and original notes and data on the airglow.

At an early-summer meeting the collection was dedicated before 50 Rayleigh scholars invited to AFCRL for the purpose. Howard, who acted as master of ceremonies, explained the origin of the archives, their contents and the efforts he is making to organize them. Then, in what he called "Quaker- or town-meeting style," he asked others to add their comments.

The archives were originally born of interest in Robert Strutt's airglow work. An airglow-and-aurora-physics group at AFCRL had information on geographical variations but wanted to study variations in time. Wouldn't it be good to see Strutt's data!

The thought led by way of the British consulate, the London attaché of the Office of Naval Research and three British libraries to a son of the fourth lord. He recalled a box of 33 handwritten notebooks that had been thrown in when the Rayleigh library had been auctioned some years ago to deliver it out of developing mildew into the reach of persons

who would use it. The box was still in the basement of the London book dealer who had bought it at auction. Acquired by AFCRL, opened and catalogued, it turned out 22 notebooks of Robert and 11 more of his father.

Other material for the collection came from the attic of Terling, the Strutt family estate occupied successively by the two physicists and now by a son of the second. At the dedication meeting Charles R. Strutt, another son of Robert, explained that he had objected when his father had proposed to throw away "grandfather's" papers. Thus they were still in three metal boxes upstairs when Howard visited Terling and inquired whether anything else might remain of Rayleigh papers. These boxes became the bulk of the present archives, including not only original papers, notes and computations by John William but also his correspondence with such persons as Albert Michelson, E. W. Morley, Max Planck and R. W. Wood.

At the dedication meeting Charles Strutt expressed his pleasure that the Rayleigh archives had been assembled and his lack of regret that they were not in England. The assembling, he said, honored his own long held but not yet implemented intention to produce a record of his father's career. And although it would seem appropriate for Rayleigh papers to be in England, English institutions "didn't show the slightest interest." The papers "should be where they are most appreciated," he said.

Ordering and cataloging the archives have offered unusual challenges and clues for Howard in his role as curator. Perhaps the first challenge has been to unfold (sometimes with the help of a clothes iron in the kitchen at home) papers that have been stored for 50 to 100 years and then to microfilm them. Among the clues have been various ways to tell time. For example, John William rarely wasted paper. Thus what is written on the back of an article returned from the publisher is likely to be part of his next calculation. Other dates can be determined from writing material and

paper fasteners. Ink, used by John William until about 1890, gave way to indelible pencil. Papers were fastened first by pins, later by bent-over fasteners, then by clips and finally by staples.

And the cataloging has brought rewards. Students of the airglow now have Robert's original measurements in place of the "monthly mean averages" that he published. Howard has been able to correlate most of the original manuscripts with collections of John William's published works and expects to reassemble three or four of the early papers that now appear on the backs of later ones. Complete copies of the collection are being established at the Niels Bohr Library, American Institute of Physics, and at the Lyon Playfair Library for the History of Science at Imperial College, London. Copies of portions on airglow will be deposited at the Bureau of Standards Library at Boulder and in Belfast, Northern Ireland.

Other commentators at the dedication meeting referred to the work of the Lords Rayleigh and its continuing influence on today's physics. Victor Twersky (Sylvania Laboratories, Mountain View, Calif.) pointed out that about 400 of John William's 440 published papers were on scattering and that much of his significant accomplishment is not in his collected works. Even after Maxwell, said Twersky, "half of Rayleigh's work was done without Maxwell's equations. He just didn't feel at home with them."

R. Bruce Lindsay (Brown) called John William's *Theory of Sound* the "great bible of acoustics." When John William made his suggestion that anomalous absorption of sound energy might be explained by transfer into internal degrees of freedom of the molecules, he anticipated work of Einstein, Herzfeld, Knudsen and Case.

Charles Strutt concluded his talk at the meeting by inviting physicists to come to Terling. It is 40 minutes in the train from London and the laboratory has been preserved largely as it was when in use. □