ephemeral literature. Colonel Fuller is captivated by her charms, contrasting her favorably with her brothers, who appeared to him "gross, ill-mannered, and in their straw hats and trouser belts more or less offensive to the eye."

The question obtrudes—How will it all end? It would be unfair to the authors to reveal their conclusions. Both recognize that something will happen some day when America is disillusioned about the power of money and the booster's curve approaches horizontally, its tangent vanishing like the Cheshire cat. The fate of Rome is not reserved for America, for the simple reason that there are no barbarians to rush in and submerge the American counting house and lobster palace "in one red burial blent." Authors who attempt to foretell the future of America in a hundred years are on safer ground than men of science who predict the position of an unknown planet or the properties of an undiscovered element. Their work should be encouraged, for the national tendencies which they explore have their bearing on our daily life. Possibly the jazz music wafted across the Atlantic sounds a clarion bugle-call if we would listen and interpret.—Review in *Nature* signed T. Ll. H.

SCIENTIFIC BOOKS

A Pioneer in Public Health—William Thompson Sedgwick. Yale University Press, 1924. $2.00.

FROM his temple, the laboratory, Sedgwick the lover of mankind looked upon communities with the clinical sense of a physician, studied their factors of disability with the precision of the biologist, planned like an engineer for the specific remedies required, and with statesmanship undertook to influence a nation by the education of wise and courageous leaders in the science and art of safe and happy congregate existence.

If the authors of this tribute to a master have not all in equal degree repeated and extended the accomplishments of their teacher, colleague and friend, it would be difficult to find three men in this country in whose lives and work the ambitions, the services, the ideals of Professor Sedgwick have been more nearly duplicated. The names of Whipple, Jordan and Winslow are, as it were, parts of the great educational and inspirational entity which it symbolized for students of public health in the name of Sedgwick.

Rarely is there revealed in the story of men who play large rôles in public affairs that precious, intelligent, loyal and wholly sympathetic sharing in work and plans by the wife which was so beautiful and essential in the Sedgwick home. Mrs. Sedgwick shared abundantly in that "larger perception of what a fundamental scientific philosophy of life may mean to the individual and to the community of which he forms a part."

The authors lead us quickly into the threshold of the story, with no delay for juvenalia. We follow the eager and exulting progress through Yale and Johns Hopkins. How adequate and fortunate is the epitome of the first twenty-eight years of this Sir Galahad of sanitation.

> Sedgwick found his career as a biologist and a teacher in 1880. He won his wife in 1881. A call to the Massachusetts Institute of Technology, the institution to which he and Mrs. Sedgwick devoted their lives with rare ardor, came in 1883. The stage was set and the actors were prepared, for the development of a new and beneficent influence of science upon the life of men.

We see among scientists and perhaps most strikingly among the biologists and with particular distinction in those who undertook to lead in the unknown world of bacteriology, the earliest break from the formal self-satisfaction of the Victorian era.

To accept all disease and premature death as a natural fate due to quite impersonal environmental causes, predetermined and unquestioned, became an inconceivable philosophy to those who shared in the discovery of the biological relations of man to his fellow men *via* the ubiquitous bacterium. Persons not premises, beings not things, functions not forms became the obvious answer of science to the do-nothingism of the sixties and seventies in public health.

Sedgwick through critical studies, by education to an ever-widening audience, through book, lecture, article, personal conference, by public leadership and action, persistent and resistless, carried a great body of opinion through the sterile era of sanitation by enforcement, by law, by authority, to the period of general popular understanding of the biological basis of human relationships and on into the application of conscious individual and community hygiene.

No important or stirring episode of Sedgwick's progress from laboratory to locality, from local power to national influence, from national authority to international recognition is omitted, and the reader closes the chapters with a feeling of content that there was such a life history, completed and successful, honorable and honored, to confuse the cynics and embarrass the pessimists. His publications in themselves as listed through the forty-three years of enthusiastic and joyful labor will for a long time serve as a safe record for future health historians, who must condense the accomplishments of a generation into a brief chapter of some yet unpublished history of our times.

How widely the communities, the sciences, the educational institutions of this country are still his debtors is to be found by those who read the list of Sedgwick's "boys," a fine quiver full of crusaders devoted in their various ways to passing on the three gifts which we know he bestowed upon his pupils—"a vision of the subject in hand in its relation to the revolving universe, a rigorously honest method of thinking and working so that the truth may be adhered to and if possible advanced, and an enthusiasm for service which will prove better even than the desire for fame as the compelling motive to make men 'scorn delights and live laboriously.'"

HAVEN EMERSON

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A FOCUSSING X-RAY SPECTROGRAPH FOR LOW TEMPERATURES

FOR the investigation of crystal structure at low temperatures, especially when liquid hydrogen or liquid helium is used, it is essential to make the time of exposure as short as possible. To do this by the ordinary powder method a small camera is used, which naturally decreases the accuracy of measurement. Moreover, certain corrections have to be made to account for the width of the lines (*e.g.*, thickness of the specimen, absorption in the substance, etc.).

It is possible to overcome these difficulties by using the focussing principle by Seeman and Bohlin.[1] By this method the time of exposure is very considerably shortened and the dispersion increased. Since one edge of the lines always remains sharp, none of the above corrections need be made. The essential point of this method is that slit, crystal layer and film are arranged on the circumference of the same circle and a divergent beam illuminates a broad sheet of crystals. Each ray, which fulfills the diffraction equation $n\lambda = 2d \sin \vartheta$ for any particular crystal plane, is then focussed at the same point on the film.

An experimental arrangement using this principle at liquid air and liquid hydrogen temperatures is shown in Fig. 1.

A divergent beam of X-rays enters through a wedge-shaped lead slit L S in the brass cylinder, which forms the wall of the camera and strikes a crystal layer deposited on the bottom of a Dewar flask (made of Pyrex glass or metal) D, which fits with a ground joint into the camera. The bottom of the Dewar flask D is ground to the same cylindrical

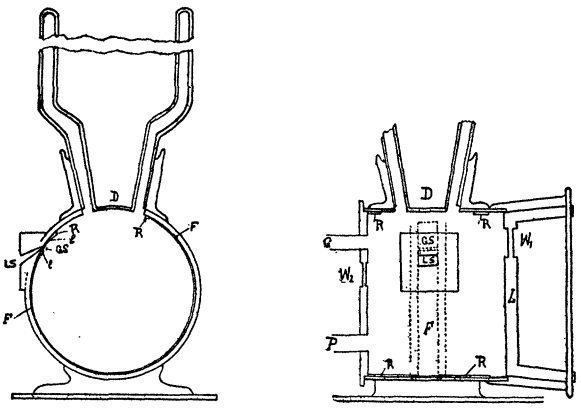

FIG. 1

curvature as the wall of the camera. The film F is pressed to the wall of the camera by a ring R. The brass ring R, which fits snugly into the brass cylinder of the camera, has a slot 1 cm wide for the exposure of the film. On the same ring a gold slit G S, 0.04 mm wide, with precisely ground edges, is mounted coincident with the inner edge of the lead slit L S. The gold slit G S is placed on the same circumference as the exposed side of the film. Both sides of the gold slit G S are screened with lead (1) to avoid scattering from the slit.

The open end of the camera is closed by a lid L and the lead slit L S is made vacuum tight with aluminium foil, .05 mm thick. The entire camera is evacuated through the tube P, and gas can be admitted through the tube G. The formation of crystals can be controlled by observation through a glass window in the lid W1 and illumination of the crystalline deposit secured through the window W2.

Our experiments have shown that the theoretical expectations are fulfilled. With a Shearer tube (copper or iron target), intense and sharp patterns could be obtained in 300 to 600 milliampere minutes varying with the material investigated and according to the filters with which the film was covered.

Chlorine and bromine have been investigated. The results will be published elsewhere. Investigations of other substances are now being conducted.

Thanks are due to the International Education Board, who made the investigation possible through a travelling fellowship and the necessary financial assistance for the construction of the apparatuses used, and to the department of physics of the University of Toronto for the use of laboratory facilities.

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[1] H. Seeman, Ann. d. Physik, 59, 455 (1919); H. Bohlin, *ibid.*, 61, 421 (1920).