In talking of the popular exposition of science it thus seems easy to confuse the part with the whole, to suppose that the present vast outpouring of popular scientific material represents all aspects of scientific activity. The point is not merely of academic interest; it is of considerable practical importance also. For better or for worse, scientists have a great, and still rapidly increasing, influence on world affairs; one can see no limit to the material achievements of science. Not surprisingly, there are grave misgivings about this, for it is only too apparent that evil as well as good can spring from scientific progress. That the great majority of scientists are interested in applying their work only to beneficial ends may be well known in scientific circles, but it would be complacent to suppose that all the world is convinced of this. Nothing could be more damaging to good relations between scientists and the public than a suspicion that they are deliberately hiding knowledge of their activities by describing them in language so esoteric and obscure as to be incomprehensible to any but their fellow experts. It would be far more useful, and less productive of disillusionment, to teach that science is in reality a strict discipline demanding patient application. If he really wants to understand science, and not merely its more obvious results and applications, the layman must be prepared to study it seriously. How this is to be achieved, however, in an age in which there are so many interests to occupy hours of leisure, entails argument far too controversial and complex to be embarked upon here. It does seem, however, that the time has come for more general introduction of science into primary education.

In the years to come, the world will inevitably turn more and more to science to solve the grave practical problems which beset it. The response will certainly be wholehearted, but one would have to be very optimistic to believe that there will be no disappointments. These will be all the greater if it is believed that science is really a relatively simple matter, for it could make failure seem the result of indifference or preoccupation with more sinister research, rather than of the intrinsic difficulty of the problems themselves. A limit to the extent to which science can help the world is set by the number of people who are able and willing to give the time and trouble necessary to acquire scientific knowledge appropriate to their purposes. This applies, of course, not merely to science but to all learning: superficial knowledge will never be an effective substitute for real understanding. It is rather easy to forget that it is not on science but on scientists that we depend for the solution of some of our pressing problems.

Edmund T. Whittaker, Mathematician and Historian

It is not easy to convey to those who did not know Edmund Taylor Whittaker the particular quality of the man that most impressed itself on his friends. One knew, of course, of the exceptional breadth of his scientific knowledge and the profundity of the mathematical problems to whose solution he had made such distinctive contributions, but, in his presence, these receded into the background without sacrificing the hue that they imparted to everything he said. He wore his great learning lightly like a flower. The simile indeed is singularly apt. I have happy memories of a visit to his Edinburgh home during which he showed to me and explained the peculiarities of more varieties of delphiniums than I knew existed. And when he turned to matters of philosophy or physical theory, one was hardly conscious of any significant change in the conversation. He had a way of speaking of the most abstruse developments in science as though they were things of the everyday, commonsense world that quite naturally fell out as they did. You wondered why you had ever thought them difficult.

Scarcely less striking than the depth and scope of his knowledge was his readiness to share it. When one needed to know whether a particular mathematical problem had been solved and, if so, where the solution was to be found, it tended to become a habit to write to Whittaker, and the reply was invariably prompt, full, and illuminated by comments of his own. He was equally familiar with the oldest and newest work on the subject, and it was a matter for wonder how he could keep abreast of the world-wide developments that were taking place in the extensive fields of his interests. In this respect, he was probably unique. By his death, an unparalleled spring of knowledge has been sealed up.

Whittaker grew up in such an age as he would probably have chosen had the choice been offered him. He received his introduction to mathematical physics at the culmination of the Newtonian epoch, when, in the words of Kelvin, only two clouds obscured the beauty and clearness of dynamical theory. Those clouds grew into the principle of relativity and the quantum theory, which were to fill the sky and leave the Newtonian firmament a memory as irrecoverable as the crystalline sphere of Ptolemaic astronomy. Whittaker was not only a spectator of this process but a participator in it and, in his last years, was almost the only survivor who could claim this distinction. He felt that this laid on him an obligation to make available the facts from his own knowledge as well as from the already published records.

He had already, in 1910, written a masterly history of ether and electric theory up to the end of the 19th century, and, by the time of his retirement from the chair of mathematics at Edinburgh University, the need for a revision of this valuable work created the occasion, and his newly acquired leisure the opportunity, for a new work that would not only review the field of the old but would also show how the subject developed into relativity and quantum physics and would carry the story forward to the year 1950. The first volume of this undertaking, which appeared in 1951, was a revised and amplified edition of the older work. The second, which was to have been the final one, came out in 1953, but the amount of material was so great that it had to be restricted to the years 1900 to 1926, and the work of the remaining years was reserved for a third volume. This, alas, we fear was never completed, but it is greatly to be hoped that enough was accomplished to make publication possible in due time. It is a work of the greatest value, not only to the historian but to all who seek a clear understanding of one of the most remarkable adventures in the history of thought.

Of Whittaker's original contributions to pure and applied mathematics, it is impossible to speak both briefly and intelligibly, and perhaps this is fortunate since, fundamentally important as they are, it was the catholicity of his mental activity that one finds most memorable in him. He could not regard mathematics or physics as self-contained, specialized regions of knowledge. To him each was but one field of application of principles having universal scope, and those principles seemed to him to find an embodiment in the Roman Catholic church. He was received into that church in 1930. His essentially modern scientific outlook, however, made it impossible for him to accept the Neo-Thomist philosophy, and in a little book entitled *Space and Spirit,* published in 1946, he examined the philosophy of Aquinas in the light of modern knowledge.

Whittaker received some of the highest honors that the world of science can bestow. His greatest memorial, however, will be his influence on those who were privileged to know and learn from him.

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Harry J. Deuel, Jr., Student of Nutrition

Harry Deuel was born in St. Paul, Minnesota, 15 October 1897, the son of Harry James Deuel and Myrtle Lillian Deuel. After graduation from Carleton College he served for 3 years as a junior chemist in the office of home economics of the U.S. Department of Agriculture. Here it was that his long-sustained interest in nutrition had its early beginnings. As a candidate for the Ph.D. degree, which he received in 1923, he entered Yale University and came under the inspiring influence of Lafayette B. Mendel and of a laboratory actively engaged in nutrition research. After 5 years in the department of physiology at Cornell University Medical School and 1 year at the University of Maryland, he moved in 1929 to the University of Southern California as professor of biochemistry. Twenty years later, he was made dean of the graduate school. In 1946 he was elected to the board of directors of Annual Reviews, Inc., and assumed the presidency of the board in 1953.

Deuel's contributions in research, although they touched on many problems, were sharply centered in nutrition. A few of his earliest papers, published with Arthur L. Holmes, were on the digestibility of fat, a subject to which he returned in 1946. The digestion, utilization, and metabolism of carbohydrates first engaged his interest in 1919 and received his continuing attention for 30 years. He was equally, if not even more, interested in lipide metabolism and in such borderland problems as ketosis, in which he and his associates published intensively between 1932 and 1945.

While at Cornell University, he came under the influence of Graham Lusk and participated in a number of studies on animal calorimetry, especially in relation to protein metabolism. Although relatively few of his publications pertained to the latter, the particular study in which he found the greatest satisfaction fell in this area: "A study of the nitrogen minimum." For 63 days he maintained himself on a diet which, although adequate in total calories, was virtually free of protein. Nitrogen intake and nitrogen loss were determined. This study gave excellent confirmation to the numerical value assigned to one of the fundamental base lines in protein metabolism, the level of irreducible wear and tear of the body proteins—the unavoidable metabolic waste arising from cell activity.

The B vitamins, vitamin A, and the carotenoids were of consuming interest to Deuel and, in turn, led him into various investigations that were of a practical turn and impinged upon problems of great importance to the food industry. His work on the digestibility of various fats, on the nutritional equivalence of vitamin-fortified margarine and butter, and his testimony before a committee of Congress, contributed greatly to the eventual endorsement by public authorities of β-carotene-enriched margarine as a butter substitute. These studies led also to inquiries into other food additives, especially into some that were under consideration for use by the margarine industry. It was largely his work on isopropyl and stearyl citrates, proposed for prevention of the flavor reversion of refined soybean oil, that caused the U.S. Food and Drug Administration to permit the inclusion of these citrates in margarine.

Deuel's proof that the intermediary metabolism of sorbic acid is identical with that of caproic acid, and that it is of lower toxicity than benzoate, laid a solid foundation for the introduction of sorbic acid as a fungistatic agent by the food industry, especially in the packaging of cheese. As a tribute to the value of his work to the dairy industry, he received the Borden award of the American Institute of Nutrition in 1949. An enduring monument to a lifetime of devoted work may easily prove to be his authoritative and comprehensive two-volume publication, *The Lipides.* He was struggling to finish the third and final volume at the time of his death.

By his many friends, Harry Deuel will be remembered for the warmth of his friendship, his generosity of character, and his boundlessly enthusiastic and optimistic outlook. To his students and associates he had a very strong sense of loyalty. His interest in the many medical students and graduates who came under his influence was quite unusual. For many years he and Mrs. Deuel made it a practice to entertain at dinner the entire first year class of medical students. This was done in small groups throughout the year and was supplemented by similar activities, such as picnics and dinners, for the graduate students. In a large university, such social contacts of students with members of the faculty tend to be few indeed, although it may be pointed out that personal associations of this sort prove to be among the most treasured memories of a student.

In December 1954, with the onset of osteogenic sarcoma, he was obliged to undergo a hemipelvectomy. With characteristic optimism and remarkable fortitude, he endeavored to carry on as usual. Under a Fulbright fellowship he journeyed to England and the continent for a year of lecturing and further study, but, overcome by the advance of the disease, terminated his fellowship several weeks earlier than he had planned and returned to his home. He died on 17 April, a few hours after being elected to the presidency of the American Institute of Nutrition.

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