PUBLIC WORKS PROJECTS

In state and national planning much emphasis has been given to public works which might relieve unemployment. This is an immediate phase, and it is also a major concern of long-term planning. As all manner of public works are appropriate for consideration, many items which directly concern farming and country life have place: the requirements of the population in the matter of highways, including farm-to-market roads, bridges, canals, parks, forests, fishing and hunting preserves, irrigation and drainage works, stream and flood control and water conservation are examples. There is involved consideration not only of what is required, but where and how it should be provided, its relation to all other pertinent state developments, and an effort to indicate the relative urgency of the many proposed public works.

MISCELLANEOUS ITEMS AFFECTING THE RURAL POPULATION

While state and national planning, having as its central objective the conservation and wisest utilization of the natural resources of the nation, places major emphasis on such questions as have just been enumerated, in many states much attention is given to other matters which are essential elements in arriving at reliable judgments. As examples of these may be cited the bearing of land values, taxation and tax delinquency on the actual and the potential use of various types and areas of land. In some states planning with respect to the social resources and needs are a definite and coordinate part of the program. Here one finds attention being given to housing and living conditions, both urban and rural; problems of health and sanitation; the facilities and requirements for mental hygiene, social welfare and education, especially public-school facilities; governmental reorganization for the various units of government; landscaping and beautification of public properties. Such matters may be of quite as great concern to the rural as to the urban dwellers.

While the limits of this discussion have necessitated treatment only in somewhat broad categories, it will be obvious that before even tentative plans can be formulated in any major segment of the field, extensive and varied bodies of detailed facts must be assembled and analyzed. Much of the basic factual material is available, but it requires to be brought together, integrated or correlated and interpreted. The planning agencies, however, have found it necessary to fill many gaps in essential knowledge by conducting or inspiring additional surveys and investigations.

THE POTENTIALITIES OF THE PLANNING MOVEMENT

While forty-two states have created planning boards to cooperate with the National Resources Board and their programs contain many common elements, it is inevitable that there will be much variation not only in the scope of the work and the extent of collaboration among the responsible state departments and agencies, but also in the vigor and competence with which the work is pressed. The values for agriculture, as for other interests of the respective commonwealths, will correspondingly show great variations. None the less a great new light has shone upon the possibilities and significance of agricultural planning, and facts of compelling importance are being marshalled. If the present planning movement survives, and if in even modest degree it approximates its potentialities, farming and rural life in America stand to gain in many ways vital to rural social and economic progress.

The whole movement has not only yielded vast bodies of knowledge and correlations of survey and research findings hitherto unavailable in such revealing form, but more significantly it has fostered comprehensive thinking about the land and water resources of the nation, the facts which influence agricultural prosperity and attractiveness in this country, and the place of agriculture and the amenities of rural life in any proposals for state and national development. For the first time large numbers in the population have come to see the unity of national life and the interdependence of the elements in our social economy. It should be less easy in future for certain kinds of public undertakings of questionable value or likely to serve special interests at the expense of more general interests to make headway. It should be possible to proceed with public enterprises with more confidence because of the wider horizon which the planning studies afford.

OBITUARY

OTTO FOLIN

OTTO FOLIN, who died in Boston on October 25, 1934, was a widely known biochemist. He achieved distinction by important contributions in the field of metabolism, by the inspiration and guidance he gave to many students and associates in his laboratory at the Harvard Medical School and by his skill and resourcefulness in designing numerous analytical methods which proved widely useful both in biochemical research and as valuable aids in medical practise. He will be missed by numerous colleagues and friends, who from personal contact as well as from acquaintance with his work came to regard him with admiration and affection.

Folin's career shows how a foreign-born young man with ability and determination but without either connections or financial resources found in America the means for education and the opportunity for high accomplishment in academic life. His professional work is a reminder of the paramount importance of technique and methods in the progress of science.

Otto (Knut Olof) Folin was born on April 4, 1867, in the village of Asheda in southern Sweden. His father, Nils Magnus Folin, was a tanner. His mother, Eva (Olson) Folin, a woman of ability and courage, was highly regarded over a large district which she served as the official midwife. When fifteen years old Otto joined the wave of Swedish immigration to America and went to live with his brother Axel in Stillwater, a lumber town in Minnesota. Working on farms and in a small hotel to support himself, he graduated six years later from the Stillwater High School. In 1888 he went to Minneapolis, found means of livelihood and successfully completed the undergraduate course at the University of Minnesota, receiving the B.S. degree in 1892. In the autumn of that year he entered the University of Chicago, which was just opening, as a graduate student in organic chemistry. Here, under the guidance of Stieglitz, he completed in 1896 a dissertation on Urethanes and was granted the Ph.D. degree in 1898. Deciding upon a career in physiological chemistry, he managed to go abroad and spent a year with Kossel in Marburg, another with Hammarsten in Upsala and a shorter period with Salkowski in Berlin.

Returning to America in 1898 with several papers published in *Hoppe-Seyler's Zeitschrift,* Folin received his degree at the University of Chicago, but failed at first to find an opening in physiological chemistry, a subject then not widely appreciated in this country. The next year, however, he was appointed assistant professor of analytical chemistry at West Virginia University. With this opening into academic life, he married in September, 1899, Laura Churchill Grant, of St. Paul. He remained at West Virginia only one year, but gave there a course in physiological chemistry which so aroused the interest of his students that several of them (including the writer) decided to attempt careers in the subject.

In 1900 Dr. Edward Cowles, superintendent of the McLean Hospital for the Insane at Waverley, Massachusetts, invited Folin to establish there a research laboratory for the study of chemical problems related to mental disease. This was probably the first laboratory for biochemical research to be established by a hospital in this country. Folin soon concluded that the most hopeful approach to the problem was a careful and detailed study of metabolism, of normal as well as abnormal subjects, for which the facilities of the hospital were admirably suited. The work led to little of value to psychiatry, but paved the way for important advances in the field of nutrition and especially in other branches of clinical medicine. The value of its results to the McLean Hospital is indicated by the continuance of that laboratory.

Folin's first object was to determine accurately the quantities of the main constituents of the urine as an index and measure of the chemical reactions within the body which produce them. Most of the urinary constituents were then known qualitatively, but methods for their determination were in many cases so laborious or complicated that no approximately complete analysis of a single urine specimen had been accomplished, and complete consecutive daily analyses during a metabolism experiment were impossible. He, therefore, undertook the task of simplifying procedures for quantitative analysis of urine.

Among the methods Folin then devised was a *colorimetric* process for creatinin and creatin, notable not only because it is still the only one available for these substances but for the reason that it introduced the *colorimeter* into biochemistry and demonstrated the practical value of color comparison as the basis for analysis of small amounts of material. This instrument found wide application by Folin and by many others.

The use of his new methods for quantitative analysis in experiments with human subjects taking diets of known composition yielded results reported in a classic paper on "Laws Governing the Composition of Normal Urine" (1905). His interpretation of these data led to a "theory of protein metabolism" which emphasized the plural nature of the process and greatly altered the views widely held at that time concerning the immediate fate of food protein in the animal body. He was led to believe that food protein after digestion in the gastro-intestinal tract was absorbed, not as then supposed in the form of protein resynthesized during absorption, but directly as small amino-acid fragments.

The papers above cited together with his other work marked Folin as one of the leading biochemists of that period and led to his appointment in 1907 to the first chair of biological chemistry in the Harvard Medical School. There for twenty-seven years he was an inspiring teacher and with numerous assistants continued the line of investigations started at McLean.

The next step was to look within the body for the products of food protein after its digestion in the intestines. Here again methods were lacking, there being at the time apparently no reaction sufficiently sensitive to measure with accuracy the small amounts of nitrogenous materials admixed with the abundant protein of blood and tissues. The simple direct way

in which Folin (with W. Denis) surmounted this difficulty is characteristic of nearly all his work and accounts for the practicability of his methods, a quality which permits their daily use in many laboratories throughout the world. Proteins and colloidal materials were precipitated without heat, the filtrate was submitted to a micro Kjeldahl digestion and the ammonia formed was determined colorimetrically by use of Nessler's reagent. This simple but skilful combination of well-known reactions into a practical method supplied the means of proving that amino-acids are absorbed directly from the intestine (a fact established simultaneously also by other investigators) and, what is perhaps of greater importance, provided a tool for the quick and accurate measurement of retention within the body of nitrogenous waste products as a result of failing kidney function.

Following his demonstration of its clinical significance, Folin's method for the determination of blood non-protein-nitrogen was immediately adopted by a number of investigators of medical problems. Its practical value as an aid in diagnosis becoming established, facilities and personnel for the performance of this and related methods were soon established in many hospitals. About the same time Folin—and others also—introduced practical methods of chemical analysis for other constituents of blood of clinical significance (creatinin, urea, uric acid and sugar). Out of these modern techniques, the earliest now only about twenty years old, supplemented by constant improvements and innovations, there has developed the present somewhat elaborate system of clinical biochemistry, practised in some degree in almost every hospital in America and rapidly spreading to other parts of the world. Although there is the suspicion, which Folin shared, that this novelty of blood chemistry is sometimes overdone, exploited or poorly performed, it represents an important advance in medicine and surgery. Any surgeon will testify, for example, to the aid given by a knowledge of a patient's blood "N.P.N." in deciding the risk of operation or in guiding preoperative care. In medical, pediatric and obstetric practise also, the information obtained by this and other methods of blood chemistry is for some conditions now regarded as almost indispensable. In this development many besides Folin have had important part, but to him is due the credit for its inauguration as well as for some of the best methods in constant use at present.

Although his methods and their practical value constitute, perhaps, Folin's principal service, it would be unjust to leave the impression that his contributions to the concepts of biochemistry are of less importance. His revision of our ideas concerning protein metabolism was fundamental and no less valuable because similar conclusions were reached simultaneously by others.

Folin took an active interest in the American Society of Biological Chemists, which he helped to found in 1906, and of which he was vice-president (1908) and its third president (1909). He regularly attended its meetings and took part in its programs as well as those of the Physiological and Pharmacological Societies, of which also he was a member.

Folin's early work appeared in *Hoppe-Seyler's Zeitschrift,* in which both his first (1897) and his last (October, 1934) papers were published, and in the *American Journal of Physiology.* After the establishment of the *Journal of Biological Chemistry* in 1905, most of his papers were sent to it. A member of its first group of collaborators, he became chairman of the editorial committee in 1920, when that journal became the property of the society. He remained until his death active and influential in the relations of the journal and the society. For many years Folin has been a member of the National Board of Medical Examiners, in charge of its examinations in biochemistry.

Among the honors bestowed upon Folin were: membership in the National Academy of Sciences; honorary membership in the Medical Society of Sweden; the honorary degree of Sc.D. conferred by Washington University (1915) and by the University of Chicago (1916); honorary M.D. by the University of Lund (1918); and the Scheele medal of the Stockholm Chemical Society (1930).

On the personal side Folin had admirable and lovable traits. Quiet and shy in manner, he did not seek wide acquaintance with people, but devoted his energy to work in his laboratory, to his departmental colleagues, to a few close friends, with whom he loved to play golf, and to his family. He possessed a quaint humor and a sane, quiet perspective toward life and work which impressed all who knew him as the qualities of a modest kindly gentleman. He was very fond of the mountains of New Hampshire, where he spent the summer months at his cottage on the slope of Kearsarge Mountain. There at its foot he is buried.

Dr. Folin is survived by his widow, their son, Grant Folin, now in business in Detroit, and a daughter, Teresa Folin, a physician now at the Children's Hospital of the University of Chicago.

PHILIP A. SHAFFER

TRIBUTE TO PROFESSOR FOLIN[1]

MY part in this afternoon's program is to speak of Dr. Folin from a dual point of view, that of an

[1] Remarks at a memorial meeting in the Harvard Medical School on November 23, 1934, at which time Professor Folin's portrait was presented.