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DOCTOR WILLIAM H. WELCH.[1] 1850-1934

By Dr. SIMON FLEXNER

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No greater honor could be paid a pupil of Doctor Welch than the invitation extended to me to take part in these exercises in memory of Doctor Welch. The honor is, however, attended on my part by a feeling of uncertainty and even embarrassment in speaking of Doctor Welch's many-sided nature before an audience made up of his close friends and colleagues. Doctor Welch spent fifty years in your midst; he reached the full development of his extraordinary powers among you; and he became the leading citizen of Maryland, guiding and participating in the beneficent undertakings which have taken place in the state during much of that time.

Doctor Welch's merits could not long remain concealed. Modest beyond most men in his opinion of himself, he soon became a national and then an international figure, exercised an amazing influence in raising the standards and proficiency of higher education; and, having happily been granted length of life beyond the ordinary, he was fêted and celebrated on at least three memorable occasions: in Baltimore on his sixtieth and seventieth birthdays, and in Washington on his eightieth birthday.

The last occasion was unique in the history of tributes paid to a scientist. I need not remind you

[1] An address delivered at the memorial meeting to Doctor Welch held at the University Club, Baltimore, on May 22, 1934. Doctor Welch was born at Norfolk, Connecticut, on April 8, 1850, and died in the Johns Hopkins Hospital, Baltimore, on April 30, 1934. A biographical sketch of Doctor Welch, by the author, is included in "Papers and Addresses," published on his 70th birthday, in 1920. It may be consulted for a fuller and more systematic account of the main incidents of Doctor Welch's professional life. The sketch was reprinted in SCIENCE, 1920, Vol. lii, 417. A brief summary is also available in "American Men of Science," 5th edition, 1933.

that the President of the United States took part in it, nor that coincident celebrations were held in many important centers of science in this country, Europe and even Asia. The addresses of the President and of Doctor Welch were carried by radio throughout the world; and not only in many cities in the United States, but in England, France, Germany, in Peiping and Tokyo, their voices were heard by many hundreds of friends and admirers to whom Doctor Welch's utterances came as the words of a great seer in medical science.

Doctor Welch's half century of eventful scientific life at Johns Hopkins University may be divided into three main periods: the first covered thirty years, during which he was professor of pathology. The other two periods covered ten years each, during the first of which he was director of the School of Hygiene and Public Health, and during the second, director of the Institute of the History of Medicine. In all three of these significant undertakings he was a pioneer, both creating the opportunities and showing the way in which they could best be used.

Before Doctor Welch became professor of pathology in 1884, that subject was in a rudimentary state in this country. Within amazingly few years it had become the strong corner stone of modern medicine in the United States, which was so soon to bring scientific achievement to attract the attention, and arouse the wonder, of Europe. In one of Doctor Welch's notable early addresses I have chanced upon a paragraph of which there is time to give only a brief abstract. Asked by a distinguished German professor of physiology what became of the young men from America who worked in the medical laboratories and who after their return were no more heard of, Doctor Welch replied that encouragement, facilities for scientific work and careers were so limited that the impetus to a continuation of the work was almost wholly lacking. The reply of the professor was: "When America does wake up to the necessity of these things, then let Europe look to its laurels." I think I could make a shrewd guess as to the identity of the German physiologist; and I can readily understand that with two such able, recent pupils as Doctors Welch and Mall, the question was a natural one. It becomes historically important, therefore, to recall that the Johns Hopkins University provided the encouragement and facilities which Doctor Welch applied in that early, pregnant period, and also that the success with which pathology was being cultivated in Baltimore soon excited emulation in the leading medical colleges in the United States, so that careers of some magnitude became slowly available.

The great forward step in medical education contemplated in Baltimore with the launching of the Johns Hopkins University and Hospital was taken at historically a most opportune moment. It is to be recalled that Doctor Welch was appointed professor at the university in 1884, and actually was in residence in 1885. Now the years from 1880 to 1890 are referred to by Doctor Welch as being "perhaps the most wonderful decade in the history of medicine." There had been a revolution in medical thought, brought about through the discovery of the agents causing infectious diseases; and those living to-day can hardly realize the enthusiasm and youthful spirit which were stirred by these discoveries, not only among medical men but among the public. Listerism and aseptic surgery soon followed: medical teaching responded to the spirit and necessities of the time, and hence first pathology and then general medicine could not long be delayed in the essential, forward movement.

Doctor Welch, far more than any one else, was responsible for bringing the new pathology to the United States. Within a few years he found notable coadjutors in the first professors of the clinical branches appointed to the hospital—Doctors Osler, Halsted and Kelly. Both before and after the opening of the medical school, scientific medical work went on apace. The Johns Hopkins Hospital and Medical School became world famous almost at once, and Doctor Welch was recognized the world over as the great architect of that remarkable enterprise.

The eminent position so quickly attained by Doctor Welch brought too soon, and doubtless inevitably, a heavy penalty. The thirty years of Doctor Welch's professorate of pathology may be divided into two periods of equal length. Between 1885 and 1900, Doctor Welch was not only the inspiring director of the pathological laboratory, but was himself also the gifted scientific investigator. Before the turn of the century, his attendance at the laboratory had begun to be impaired by the heavy demands made on his time by other institutions seeking his aid in the upward struggle towards better education and research which had then become active in the United States. Doctor Welch's nature was so gracious and his interest so strong that he could not fail to heed these demands; hence, by the time the new century was ushered in, his personally active laboratory career was brought to an end. He remained the life of the laboratory still, influencing successive groups of students, stimulating his colleagues, but for work with his own hands there was no opportunity. There was, however, a compensation, and I believe consolation. Doctor Welch possessed the rare art of making others strong, and it is to be hoped that a realization of this talent may have contributed correspondingly to his enduring happiness, for no one took greater pride in his pupils and their achievements than did Doctor Welch.

There were also other forces at work, of a highly significant nature, to separate Doctor Welch from the

practical work of the laboratory which was so close to his heart. In 1901, the Rockefeller Institute for Medical Research was founded; soon the Carnegie Institution of Washington was endowed; in rapid succession came the board for the suppression of hookworm disease, and many other similar establishments, through which scientific medicine and the fundamental sciences were to be so signally promoted in the United States. Doctor Welch became immediately a main reliance for counsel in all these enterprises. No one could appreciate more than Doctor Welch did the potential value of such institutions to the growth of science in America.

It is an interesting speculation whether, with his encyclopedic knowledge of the history of science, he connected the rise of the independent institutions of scientific research in the late nineteenth and the early twentieth centuries with the founding of the learned societies in Italy, England and France during the seventeenth century. A parallel could be drawn between those two historical events. In both instances, the demands of scientific growth and exploration had outgrown the provisions in the universities. A broader base of operations was demanded; the encroachments upon the time of teachers by enlarging routine duties had become menacing; the requirements in elaborate and expensive apparatus had often exceeded the ability of the universities to supply the need. Hence there arose outside the universities associations of ingenious men which sought to conquer these obstacles. In the later period, the growth of material wealth was such that philanthropists took the place of the free associations of scientists and governments, and independent institutes of research grew apace. No one contributed to this development more than did Doctor Welch, by whom the serious inroads made on his free time were always met graciously; and no one contributed as much in stimulating suggestion as he with his extraordinarily broad and varied scientific knowledge was able to do.

In the Harvey Lecture delivered in 1916, Doctor Welch pointed out that the Rockefeller Institute could not have justified its establishment twenty-five years earlier, because improvements in medical education had to precede the founding of such an institution; and the same may be said with regard to the relation existing between the universities and the corresponding research units in other sciences.

It must remain a question of pure conjecture whether the diversion of Doctor Welch from the laboratory to the wider, general educational influence was a benefit or a misfortune. That Doctor Welch had a gift for scientific investigation and discovery is patent from his work in Germany and during the early Johns Hopkins period.

An effect of his wider influence was the creation of careers for scientifically trained men, the lack of which had kept the United States backward while Europe was advancing rapidly. It is difficult to see how a greater and more important service could have been rendered in this educationally still undeveloped country. And there was no one else who could have accomplished in this respect what Doctor Welch achieved. He fortunately possessed an almost uncanny instinct in selecting permanent assistants who were to arise and come to fill responsible professorships in other institutions. Just as his method of setting gifted young men to work on research problems defied discovery, so his method of picking the "winners" among the young men crowding his laboratory remains a mystery. I have recently questioned him on this point, but without real success. What I discerned was that those who were to seek opportunities elsewhere learned this from him in so considerate and gentle a way that no pain seems ever to have been caused; and I suspect the successful operation was carried through without the victims being actually aware of its intent.

The second main period in Doctor Welch's varied career consisted of the creation of the School of Hygiene and Public Health. The use of the word "creation" is intentional, because up to that time no comprehensive school of the kind existed. Even in England, where "public health" had received the greatest attention, the provisions for teaching and research were fragmentary and haphazard. However, the subject was one to which Doctor Welch had given not a little thought. The claims of and opportunities for preventive work in medicine, in teaching, practise and research aspects had already occupied his mind and been the objects of some of his impressive addresses. The manner in which he projected the new school reproduced remarkably the fundamental theses on the basis of which the Johns Hopkins Medical School itself was founded. One has merely to reread the early addresses published in the third volume of Doctor Welch's collected works, and especially the first address, the title of which is, "On Some of the Humane Aspects of Medical Science," delivered at the tenth anniversary of the Johns Hopkins University in 1886; and also the address given at Yale University in 1888, "Some of the Advantages of the Union of Medical School and University"—in order to discover how wide and deep was Doctor Welch's thinking on preventive medicine already at that time.

And here I will ask your indulgence for a moment for a digression which seems to me chronologically significant. Besides the early emphasis on hygiene as a rewarding field of scientific exploration, there is a reference in this period to the importance of "the study of the history of medicine, a subject which notwithstanding its interest and value is much neglected.

Nothing is more liberalizing and conducive to medical culture than to follow the evolution of medical knowledge." May we not, therefore, in the words of Alfred de Musset say that Doctor Welch's dream of youth came to be realized in mature years? For he produced in Baltimore in the seventh decade of his life a School of Hygiene which has become the model for the world, and in his eighth decade an Institute of the History of Medicine which already has no peer in the world.

Although this is neither the time nor the occasion for a detailed account of Doctor Welch's technical productions or his general addresses and papers which reveal the extraordinary breadth and depth of his learning, yet before an assemblage at the University Club, of which he was president for so many years, a brief reference to them may be permissible. Doctor Welch gave so much the impression of leisure that the number and nature of his published works may easily excite surprise. And this would be even more the case if it were known how great was the meticulous care and how exhaustive were the efforts put into the experimental and investigative parts of his life work. Problems would be studied for months, even years, before any publication whatever of the results was made; and among his papers are articles which entailed profound and prolonged thought, or literary or historical research of wide scope.

It may be doubted whether before Doctor Welch's time any one claimed for pathology as he did that it is in itself a science, "independent of any practical or useful application whatever, and as legitimate and worthy an object of pursuit as any of the natural sciences." This pronouncement, made in 1889, was established beyond peradventure in 1897, when, as president of the Congress of American Physicians and Surgeons, he spoke on "Adaptation in Pathological Processes." This essay remains to-day a most enlightening treatise on the general biological significance and implications of the manner in which the living body reacts to injury and disease. The range of the observations cited, the interpretation of the processes described, are astonishing and bewildering almost in their fundamental significance. And alongside this classical paper is to be placed the address recently reprinted so delightfully as the first publication of the Welch Bibliophilic Society on, "The Interdependence of Medicine with Other Sciences of Nature." In a visit to Doctor Welch a few weeks before his death, I spoke with him of this lovely, small volume, and he was uncertain whether the address on adaptation might not have been better chosen. Both addresses are so intrinsically interesting and valuable, yet so different, that I can imagine even his choice changing from day to day. In the reprinted address one will find an account of the historical development and interrelation of the medical and other sciences, which exhibits the broadest knowledge and deepest culture; and ignorant as I am of the literature on the history of medicine, I venture to question whether a more fascinatingly readable and informing essay on the rise and counter influences of scientific discovery has ever been written. It must have been a sympathetic labor of love to Doctor Welch merely to compile the data, since medicine as a discipline for the pursuit of science shines out so dazzlingly. For does he not record that, "I have collected, without pretense to exhaustiveness, the names of over a hundred physicians or men trained for the practise of medicine or pharmacy who have made contributions to physics sufficiently notable to secure them a place in the history and records of this science."

Not a few of those of you here present to-night must have seen the film picture made of Doctor Welch within two years of his death, and some of you may recall one of the opening paragraphs of that precious record, in which Doctor Welch says, "Success is so largely dependent on opportunity, and opportunity upon chance, that I count myself fortunate in both regards—fortunate that in my student and early graduate days my special interests should have turned to those subjects, pathology and bacteriology, which were destined to play so important a part in the transformation of the science and art of medicine; and fortunate that in the pursuit of these studies I came under the influence of such masters. . . ."

I need not recall more of this perfect valedictory; there is no word of it which one could wish changed or spare to-day. And it is some consolation for the inestimable loss we have all suffered that this film, which reproduces in a lifelike manner the imposing figure of Doctor Welch and even reproduces acceptably the delightful quality of his voice, is preserved for posterity.

I have occasionally heard Doctor Welch speak on the question often raised, of whether one would relive a long life. His answer consisted of a quotation from Lord Haldane's biography, which expressed his own sentiments. Lord Haldane writes: "A distinguished living statesman and man of the world once asked me whether, even with the aid of such knowledge as experience had brought, I should like to begin life anew. My answer was in the negative. For, I added, we are apt greatly to underrate the part which accident and good luck have really played in the shaping of our careers and in giving us such success as we have had." "And," Doctor Welch would add, "I could not hope again to find the friends, associates, pupils, who have played so large and significant a part in my life and contributed so much to my success and happiness."

And yet, in the last paragraph of Doctor Welch's

film address he says, "Among the many thoughts which occur to one who has lived through the last sixty years of marvelous progress in preventive and curative medicine, one which comes to me forcibly at this moment is that, while the general direction of advancement may be foreseen, the particular lines opened by new discoveries are quite unpredictable, as may be illustrated in the fields of biophysics, biochemistry, immunity and virus diseases. I wish that I could return after another half century and see what is disclosed when the curtain has been lifted from mysteries which now lie hidden in these fields. It is certain that the prospect will surpass all that we can conceive or imagine, and that the power of man over disease will be greatly increased."

Here, it will be noted, Doctor Welch was expressing the insatiable interest and curiosity about disease which was the main passion of his life, and was in no way thinking of himself in any social relation to life whatsoever.

Doctor Welch's hospital year was turned by him, through the extraordinary dignity and impersonality of his demeanor, into a kind of apotheosis of his life. We may all be immeasurably grateful that he was spared prolonged suffering; the discomforts of his illness he bore with uncomplaining fortitude. His brilliant and powerful mental faculties were undimmed until just before the end, so that parts of each day, almost, could be given over to visits from friends and colleagues, which to them were occasions and unfailing and unforgetable delight. Doctor Welch's mind roamed widely over historical, literary, scientific and personal events; and not the least loss of perspicuity or memory or interest was ever detectable. He remained the omnivorous reader of long-established habit, and his interest in current biographies was never livelier than during this year. These books stimulated his memory, added to his already prodigious stores and provided exciting topics of conversation in which the rich resources of his seventy years of reading never appeared to better advantage. There must have been hours of weariness or discomfort or sleeplessness; these he beguiled with mystery stories of which, like his eminent fellow student of German university days, Paul Ehrlich, there could never be a surfeit. In this last period he continued to manifest a keen interest in the educational and philanthropic enterprises in which his wise counsel had been so great a boon; but what appeared most remarkable and touching was his undiminished personal affection for those to whom he was increasingly near and dear.

EXILES IN BRITISH SANCTUARY[1]

By LORD RUTHERFORD OF NELSON

IN the conviction that the universities form a kingdom of their own, whose intellectual autonomy must be preserved, my distinguished colleagues formed the Academic Assistance Council one year ago and the Royal Society provided accommodation for the council's offices. The occasion was the displacement of our fellow scientists and scholars from their university positions in Germany; but the problem with which the council is faced is wider and deeper than that presented by the need for assisting these German teachers. Its ambition is to defend the principle of academic freedom and to help those scholars and scientists of any nationality who on grounds of religion, race or political opinion are prevented from continuing their work in their own country.

The series of political revolutions in Europe since the great war has created a large body of wandering scholars; many, for instance, among the Russian and Italian *emigrés* have unfortunately through the absence of organized assistance by their university colleagues lost the means of continuing their scientific careers. But there are many whose talent and experience could still be effectively used, and their number has been tragically swollen during the past year by the expulsion from academic positions in Germany of persons possessing pacifist or internationalist convictions or lacking that strangest of qualifications for the life of scholarship, "Aryan" genealogies.

To incorporate the services of these wandering scholars in the other universities of the civilized world is more difficult to-day than in the Middle Ages when the "communities of learners" were less hampered by administrative formalities, restrictive endowments and incipient nationalist tendencies. Medieval scholars could migrate to other districts and the "universitas" moved with them; the same catholicity of spirit has been fortified by the present crisis in both our ancient and our modern universities.

The universities of Great Britain have responded generously to the council's suggestion of inviting the displaced scholars to work as research guests; hospitality has thus been extended in this country to 178 of our university colleagues. The multicellular London University has received 67; Cambridge University has not only given hospitality to 31, but its individual colleges have contributed over £1,000 to the council's funds: Oxford University has welcomed 17 guests;

[1] The London *Times*.