American Martyrs to Radiology

Wolfram Conrad Fuchs (1865–1908)

Percy Brown

As in the temperament of Louis Weigel, so in Wolfram Conrad Fuchs could be found the unusual combination of the idealism of the artistic and the exact realism of scientific aptitude. By inheritance, he had good reason for his possession of the one, from which, perhaps because of its affinity for full and complete expression, might have developed the other. He was a son of Julius and Wilhelmina Fuchs. His father was a musician of distinction in Berlin—an organist and pianist of extraordinary gift, who was later and elsewhere to become, as well a prominent critic attached to the Art Institute of Chicago and the Metropolitan Museum of Art in New York.

Just before the Franco-Prussian War, the Fuchs family emigrated to Chicago. The young Wolfram, then five years old, was sent forthwith to the city schools, where his early education was obtained. As thus his years of adolescence passed, he indicated mentally such distinct inclination toward the natural sciences, notably electricity and magnetism, that ultimately a generous and far-seeing parent sent him back to the University of Berlin to study electrical engineering. From this renowned seat of learning he obtained in 1889 the degree of Electrical Engineer. Young Fuchs, however, was true to his heritage, and before returning to the land of his father's adoption he entered the *École des Beaux Arts* in Paris. With an added degree in Art, he again made the journey to the United States, now the possessor of the best educational endowment that Europe could offer both in Science and Art. Not content with even this, the ambitious Fuchs matriculated for post-graduate work at the Massachusetts Institute of Technology at Boston, after which his proud father was prepared to acknowledge his fitness for the career of an electrical engineer.

Once more in Chicago, Fuchs engaged in private practice as consulting electrical engineer for three years. He then went to Schenectady, New York, as supervising engineer for the Edison works. Returning West, he was employed for a time as construction engineer for the Milwaukee State (electric) Railroad. Subsequently, in Chicago, his services were engaged for the building of the Cicero and Proviso electric line and for a generating plant for the town of Harlem, Illinois.

On a visit to Germany at the time of the discovery of Professor Röntgen, his naturally keen interest as an electrical engineer was aroused to its possibilities. He obtained all available knowledge relative to x-rays and returned to Chicago, where in the meantime had been set in motion a centripetal course of events that led ultimately to the primary focal spot of radiology in Chicago—the laboratory of Wolfram C. Fuchs. The episode was related some years ago by the late Dr. Jacques Holinger [1]:

> ...Dr. Friedrich Cort Harnisch, an ophthalmologist of Chicago, became interested in the x-ray soon after

Text and figure reprinted from *American Martyrs to Science Through the Roentgen Rays* by Percy Brown (1936). Courtesy of Charles C Thomas, Publisher, Springfield, IL.

Editor's note.—This is the fourth in a series of 12 biographies of American pioneers in radiology who, as a result of their work with X-rays, died of complications of radiation dermatitis between 1904 and 1935. The articles are taken from chapters in a monograph by Percy Brown, *American Martyrs to Science Through the Roentgen Rays*, published by Charles C Thomas Co. in 1936.

The articles are in honor of the centennial anniversary of the discovery of X-rays by Wilhelm C. Roentgen in 1895. The purpose of republishing them now is the same as it was in 1936, when Dr. Brown wrote the monograph. Dr. Brown explained in the preface, "Above all do I hope that these pages may serve to reveal to anyone who may read, the extraordinary valor of this illustrious group of devoted pioneers in the field of scientific endeavor that just forty years ago had its memorable inception. It is for our own good and particularly for the good of future new comers to the field of Radiology that they may realize what her splendid repute in the name of the humanities has cost her."

Percy Brown, born in 1875, was a prominent radiologist in Boston. He became the first radiologist at the Boston Children's Hospital, when a department of roentgenology was established there in 1903. He served as the 11th president of the American Roentgen Ray Society in 1911 and gave the fourth Caldwell lecture of that society in 1923. Dr. Brown ultimately joined the ranks of American martyrs to radiology himself, dying of X-ray-induced carcinoma in 1950 at the age of 75.

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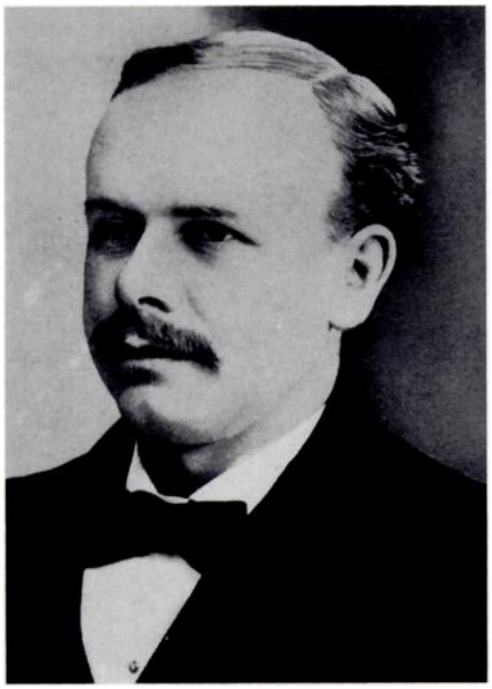

Wolfram C. Fuchs

the first publications appeared, and started to correspond with Professor Röntgen. Doctor Harnisch had a very extensive knowledge of electricity and photography, but little practical experience. None of the necessary apparatus was on the market and substitutes were impossible, so practically everything was lacking....There being no street current available in his vicinity, a battery of ordinary cells had to be built. No one knew at that time, or cared to know, anything about an electric spark that was able to jump a gap of three or four inches, and more was necessary. Doctor Harnisch studied up the matter. He ordered apparatus, especially Crookes tubes, from Europe. Some tubes were made here in Chicago by Mr. W. J. Boehm [a local glass-blower] in 1896. After a long search, Doctor Harnisch found an induction-coil at the McIntosh Battery Company in Chicago which gave him a spark of six inches. At the end of January or the beginning of February, 1896, he started experimenting. For an interrupter he tried the common magnet-and-anchor device. It did not work well and proved to be one of the most difficult problems. The interrupter question was not definitely solved until several years later. The magnet remained magnetic, the anchor stuck and therefore the spark was irregular. In consequence, dry plates could not be used, as they were too sensitive and always overexposed. Wet plates were made. Dr. [Peter J.] Latz up to that time had done the chemical work.

The financial resources were limited, as may be imagined. Dr. Harnisch had been in practice but a very short time. But still the work went on, and many good plates were made, the first successful one being of the hand of Mrs. Harnisch, showing the bones and the wedding ring clearly. The question of "reducing" the overexposed plates by means of ferrocyanide of potassium came up. This forced Doctor Latz to withdraw, since he was sensitive to cyanide on account of former poisoning from it.

About the end of April, 1896, the laboratory was moved downtown and an electrician put in charge. This arrangement simplified matters, as a street current could be used. Still, it was not satisfactory. In June, finally, Dr. O[tto] L. Schmidt, who had shown great interest in the work from the start, took over the whole laboratory and put it in the hands of a man of experience as a practical electrician and photographer [Mr. Fuchs]....By that time more about x-ray was known and suitable apparatus could be had....

The laboratory, established in the old Schiller Building, soon became known as the "Fuchs X-ray Laboratory." Fuchs's visit to Germany must have been fruitful, for "From the very first," writes his son (Fuchs AW, personal communication), "...[the laboratory] was a Mecca for physicians and manufacturers who wanted information regarding the machinery to use and the technic of radiography. He was, according to the men of his time, one of the outstanding radiographers. It seemed that, for a time, no one could obtain the pictures which he was able to make routinely. He was so wrapped up in his experimental work that he would often sleep in his laboratory night after night and week-ends."

The late Dr. Preston M. Hickey, in describing [2] a visit to Fuchs's laboratory, wrote:

...His work was done with an induction coil and a mechanical interrupter. [That Fuchs by no means limited himself to this form of primary-current interruption is shown by an illustration of an electrolytic interrupter of his own design.] On entering his laboratory, one was attracted, first of all, by the number of tubes which he had hanging on the wall. He pointed out to me that one particular tube was used for making x-rays of the hip, another for x-rays of the hand, and so on with each of the more important parts of the body. He in this way avoided the difficulties of attempting to adapt the vacuum of the tube to the particular type of penetration needed. As far as is known, he was the first one in America to make a successful roentgenogram of the hip-joint.

He showed me the first x-ray stereoscope that I had ever seen, which had been made for him by a carpenter. He aroused in me a fondness for stereoscopic work from which I have never recovered.

Mr. Fuchs was one of the first to really show gallstones on a roentgen plate, and I remember meeting Dr. Christian Fenger, who came into Mr. Fuchs's office to show the gallstones which he had just removed,the number of which corresponded to the number shown on the plate.

In spite of the fact that Mr. Fuchs was not a physi-

cian, he did a vast amount of useful roentgen-ray work, and the technical excellence of his plates was a great stimulus to those who had the opportunity of seeing them.

In the medical literature of his day many examples are recorded of the great technical skill of this thoroughgoing man who made of his work an art. One of the earliest [3] of these was the first case in which the "shadow" of a brain tumor was localized and clinically demonstrated by x-rays, and ultimately proven by necropsy. The tumor was found to be highly vascular, which probably accounted for the density of its shadow, but nevertheless the result of such an attempt at radiological diagnosis, in 1899, was clearly a triumph for this new and remarkable method. With proportionate results, the technical skill of Fuchs was the means by which the first radiographic record of aneurysm of the aorta was obtained in Chicago. Likewise, his demonstrations of the course of the ureter, made radiopaque by the introduction of fine wire of blended lead and antimony, were, in 1901, the first of these difficult uro-radiographic accomplishments in the United States [4].

It is recorded that Wolfram Fuchs was one of those operators having unusual experience with the roentgen-rays who were called to the aid of the dying President McKinley just after his assassination at Buffalo in 1901. Historical research seems to show that, though many were called no one was chosen, for the x-rays were never used in that memorable emergency. It is a satisfaction to note that the response was loyally prompt in every instance, but the condition of the illustrious patient, in the judgment of his medical attendants, did not permit the use of this method of localization.

After he became established in Chicago, the life of Wolfram Fuchs was one of unremitting service. He held in his skilful hands one of the greatest boons for human good, applied by means of his efficient apparatus-equipment. It remained for the medical community surrounding him to justify the Emersonian prediction and "make a beaten path to his door," which it did with dispatch, to reap the benefit of his aid in its problems. Among those who would engage in the same pursuit, he was known for the generosity of his help; he became, willingly, adviser to the ambitious, demonstrator to the desirous and exponent to the eager. The example of Fuchs fired the ardor of many a young man who had yielded to the fascinations of "a new kind of ray." While his hands could not be the hands of a healer, the knowledge derived from his clever technical manipulations made Aesculapian fingers more flexible. For him, as for many such men, this opportunity was a welcome privilege and for that privilege he paid as many such men have paid.

"His extensive experimentation," writes his son, "terminated in a severe roentgen-dermatitis, and as time went on the fingers and thumbs of his hands were amputated in an effort to stop the devastating effects of the x-rays. His affliction soon made it necessary for him to retire from his laboratory in 1905. Between 1905 and the time of his death in 1907, he made an effort to write a book based upon his knowledge of x-ray work, but it was never completed due to the terrific pain from his hands and his later inability to write." "After various plans of local treatment," wrote his surgeon [5] in 1908, "and a trip to Europe in search of remedial agents, he came to me for the first time with an enormous axillary involvement. This was indubitably squamous-cell carcinoma. The radical operation...failed to effect an arrest of the trouble. Recurrence took place very promptly and within three weeks again filled the axilla and involved the supraclavicular glands. Deeming it hopeless to subject him to further surgical interference, trypsin injections were given....After lingering for six weeks, he finally succumbed to multiple metastasis on April 21, 1907."

A review of the life of this true pioneer reveals clearly what may be accomplished by the unconscious impulsion of natural aptitude in the direction of a goal quite invisible at the moment of the development of the talent by educational influence. The artistic temperament of Wolfram Conrad Fuchs enabled him to appreciate the satisfaction of taking *infinite pains* in all matters, however small, that came to his hand. This, it has been said, is the mark of true genius, and fortunately for the medical community in which he ultimately found himself, he applied that genius at the psychological moment. During the very early years of the roentgen-rays, practical medicine and surgery in Chicago, as indeed everywhere, was in urgent need of properly qualified, high-minded individuals to demonstrate to clinicians the utter indispensableness of technical exactitude in diagnostic radiology, as the *sine qua non* of dependable diagnosis. In a most generous spirit Fuchs attempted to impart the essence of his technical skill to men of medical education, whereby these exceptional attributes of his might be combined with the pathologic training he naturally lacked. Thus was planted the seed that has resulted in the quality of the radiologic abundance that is now Chicago's.

Fuchs's singleness of purpose was proven by his martyrdom. His constant thought was to communicate to others that which he had learned for himself through arduous labor. The completion of his text-book, which only the torment of his bodily affliction forced him to renounce, would have been the satisfying culmination of his ambition.

Fuchs, Caldwell, Rollins—great technicians of American radiology at a day when the mists of uncertainty and discouragement clouded the vision toward the goal of attainment and the paths of advance were rugged—it is their spirit, and the spirit of such as they, that guides the humanitarian functions of the great roentgen laboratories of today.

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