

## Leopold Freund (1868–1943) & priority for X-ray therapy for benign disease

Richard F. Mould

The Viennese dermatologist Leopold Freund (1868–1943) is accepted as having priority for the therapeutic use of X-rays for non-malignant disease. This brief article includes the medical history of Freund's 1896 patient.

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### Introduction

The world's first textbook on radiotherapy (*The Therapeutics of the Röntgen Rays* [1]), written by Eduard Schiff (1849–1913) a Viennese dermatologist, was published in 1901 and states the claim for the priority of the first therapeutic use of X-rays as due to Leopold Freund. He also describes the case history. Figure 1 shows Freund towards the end of his life.

### Eduard Schiff's textbook 1901

The contents of the four sections to the 1901 textbook [1] by Schiff (1849–1913) are as follows: I. *Hypertrichosis* II. *Lupus* III. *Lupus Erythematosus* IV. *Eczema, Psoriasis, Elephantiasis, Lepra, Malignant Growths, Acne Rosacea, Varicose Ulcers, Acne Vulgaris*. It is on the first page of section I that Schiff refers to Freund. "To Freund must be accorded the priority for the use of X-rays in dermatology, since he was the first to produce an artificial alopecia in a case of hirsutes."

The patient was a girl of age 5-years under the care of Schiff who describes the case history as follows [1]. "It was a *naevus pigmentosus pilosus*, extending over the whole of the back, which was thickly covered with hair. It was a very unfavourable one, for it had been long treated by the usual methods without results. Freund undertook an experiment with the X-rays, and this treatment I watched carefully during its entire course.



Figure 1. Leopold Freund

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He began by exposing the back to the X-rays for a period of two hours each day. To our astonishment, after 12 days the hair began to fall out in thick tufts, and in a few days more the exposed part became perfectly bare. This was the first case of a true scientific cure carried out by the Röntgen rays. Unfortunately, in consequence of too long exposures, a violent dermatitis was set up over a well-defined area. This healed very slowly."

Schiff continues by noting that the accident warned against prolonged exposures and that in future he would give more numerous but less intense exposures. Using a current in the primary circuit of at most 2 ampères with a potential of 12 volts and a distance of tube to skin surface of 6–8 inches with each exposure lasting 10 minutes, Schiff reported satisfactory results. Schiff also reported [2] a collaborative work with Freund in May 1898 of the epilation treatment of seven cases.

### Leopold Freund's textbook 1904

Freund in 1904 published his textbook *Elements of General Radio-Therapy for Practitioners* [3] extending over more than 500 pages divided into 68 subsections. This text includes work on both X-rays and radium and is divided into five sections: I. Elements of Electricity, II. Treatment with High-Frequency Currents, III. Treatment with X-rays, IV. Becquerel Rays, V. Treatment with Heat and Light Rays. The subsections in section III are 26. Cathode and Roentgen Rays, 27. Vacuum Tubes, 28. Some Practical Hints on the Installation and Employment of X-ray Apparatus, 29. The Development of the Therapeutic Employment of Roentgen Rays, 30. Method of Treatment with X-rays, 31. Indications (Diseases of the Hairs & Hairy Regions. Ulcerations and Skin Diseases. Acute and Chronic Exudative Dermatoses and Granulations Formations. 32. Physical Effects of the X-rays. 33. The Active Agent of this Method. 34. X-ray Dermatitis).

### Case history

Schiff [1] only gives a very brief summary of the patient's case history whereas Fuchs & Hofbauer [4] reported in 1966 in *Strahlentherapie* [4] on this unique case of X-ray therapy with a 70-year follow-up. "Röntgen had discovered X-rays on 8 November 1895 and the birth of X-ray therapy was one year later in November 1896. By a rare chance we are able to report on the late results of X-ray therapy applied 70 years ago since this irradiated patient has been in our care for the last 10 years. She was born in 1892 with a *naevus pigmentosus piliferus* which covered the whole surface of the back and was largely symmetrical. Her intelligence was normal. Her parents brought the child to the I Öffentliche Kinderkrankeninstitut where at that time Freund worked in the dermatological department. Because of the failure of every other therapy which had been attempted, Freund made an attempt with X-rays."

Freund later said of his thoughts at the time: "In June 1896 I read in a Vienna newspaper the joke news that an American engineer who was intensively engaged in X-ray examinations

lost his hair because of business. This notice interested me very much."

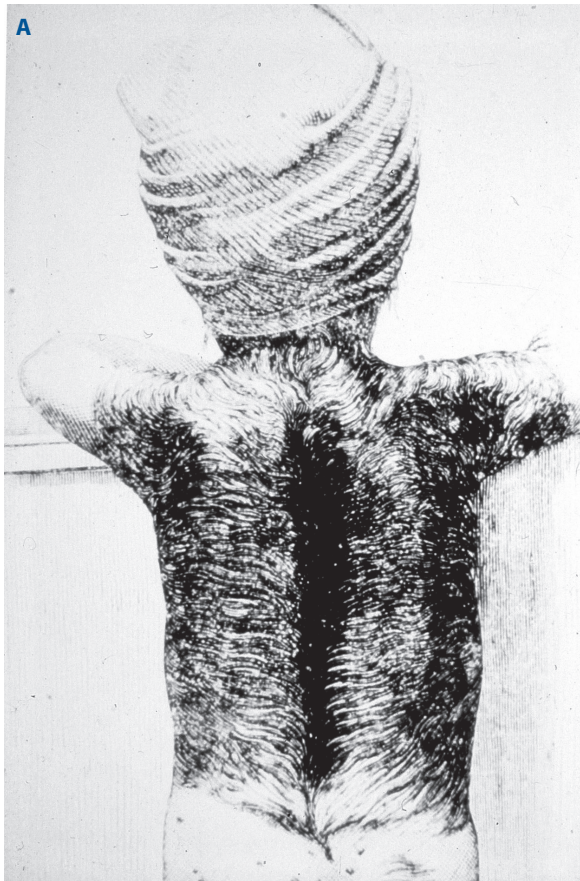
The irradiations began on 24 November in the Graphischen Lehr- und Versuchsanstalt in Vienna, where already at that time X-ray apparatus was at his disposal. Each irradiation treatment lasted 2 hours and the first series was given on the neck; the cranial part of the 36 cm long hairy *naevus*. The first loosening of the hairs was noticed after the 10<sup>th</sup> treatment. Some days later the irradiated skin was epilated but did not show any alarming alterations. Shortly thereafter a second series of treatments was given, which covered the lower part of the *naevus*: the skin and the lumbar spine. To decide the questions as to whether the electric field of the high voltage generator also produced biological effects, this treatment field was protected by an aluminium plate which was positioned in the path of the X-rays: but at the same time, the number of treatments was increased to take into account the loss of radiation dose due to the plate. This explains the considerable overdose in the lumbar region. Some days after the last radiation treatment the hairs were lost but in the following weeks an extended ulcer developed in the region of the lumbar X-ray field.

This ulcer persisted for about 6 years and was cured in 1902 but developed a scar. It healed after the application of sea water. In 1930 another ulcer developed in the region of the old ulceration scar and this was managed with elutions of *Zinnkraut* (this is a plant which was used in popular medicine) and other ineffective agents.

Another ulcer developed in 1944, a total of 48 years after the initial X-ray treatment. This was cured after treatment in a waterbed. Freund gave a last presentation mentioning this patient, in January 1937, at the Society of Physicians in Vienna but did not mention whether she was alive or dead. It was therefore a big surprise to us when in 1956 an elderly woman entered our Institute and declared herself to be the child who had been irradiated 60 years earlier by Freund.

"She was 64-years old at the time and presented because of osteoporosis of the vertebral column. Examination showed kyphosis of the thoracic spine with curvature in the lumbar region. The entire skin of the back was hairless and covered by small hyperkeratotic changes. In the lumbar region a scar was found and the skin surrounding the scar showed atrophy. No damage was found to inner organs beneath the skin and we assumed therefore that the radiation was of a very soft quality. Because of the historic interest in this patient she was asked to attend for follow-up at the age of 75 years and apart from back pain was found to be in good health. The X-ray ulcer is cured. The osteoporosis is not thought to be radiation related but due to an ageing process. She told us that menarche occurred at the age of 13-years and that her only son is now 48-years old and in good health, as is her 13-year old grandson."

Freund published two papers [5, 6] relating to the patient and included an artist's drawing of the patient in 1896 (Fig. 2: A & B). 70-year follow-up photographs are shown in figures 2:



**Figure 2.** The first patient to be treated using X-rays, November 1896; **A & B.** Artist drawing showing the back before and after treatment [5]; **C & D.** Photographs in 1956 showing the back and a lateral view showing kyphosis [7]

C & D. Kärcher [7] and Kogelnik [8] have also published details of the case history.

### Family

Leopold's father was Jakob Freund (1815–1897) born Miskowitz and his mother was Marie Sprinzels (1836–1914). Both parents died in Vienna. His only full brother was Heinrich Freund (1863–1942) who because he was Jewish was deported in 1942 to Riga, Latvia. His only full sister was Josefa Freund (1865–?).

### Education & qualifications 1895–1914

Leopold Freund, who was born on 5 April 1868 in Miskowitz – Bohemia then part of the Austro-Hungarian empire. Studied medicine in Vienna and received his doctorate in 1895, and a decade later, 1904, was awarded his habilitation. Then in 1914 he was awarded a professorship in the University of Vienna.

### Nobel Prize runner-up 1906

Leopold Freund is sometimes considered to be the founder of radiotherapy and in 1906 was a runner-up for the Nobel Prize for physiology or medicine [9].

### Sunlight and cancer 1930s

Throughout his professional life Freund was interested in the influence of sunlight on human skin and the treatment of occupational diseases [10] although he also published on cancer in *Acta Radiologica* of 1931 with special reference to fractionation [11].

### Belgium 1938–1943

Freund was Jewish and therefore at risk when Nazi Germany annexed Austria such that he was forced to flee to Belgium a few weeks before World War II started. His name is recorded in the Austrian State Archives relating to the Federal Ministry of Finance (BMF), Property Transaction Office (VVST), Property Registration (VA): Directory of the Property of Jews According to the Status of April 27, 1938 of Hofrat Univ. Prof. Leopold Freund, Doctor, Vienna I., Graben No. 12 [born on April 5, 1858; married to Stefanie Freund, born Abeles]. Vienna, July 14, 1938. The records state that the prosecutor "reports against the Jew Professor Dr. med. Leopold Freund, Vienna district I, Am Graben

12 for the offense against § 5 (1) of the order of the Prime Minister Göring of 25 April 1938 concerning the registration of the Jewish assets. 5,500 RM were found in cash, and that Freund had previously concealed this money despite express questioning for existing cash. Freund was in custody from 25–28. November 1938." The Graben is a famous street in Vienna at one end of which is Vienna's cathedral, Saint Stefandom. To live at a Graben address Freund must have been wealthy.

### Death 1943

Leopold Freund died on 7 January 1943 in Brussels.

**Conflict of interest:** none declared

**Richard F. Mould**

4, Town End Meadow

Cartmel

Grange-over-Sands

Cumbria LA11 6QG

United Kingdom

e-mail: manorroadsouthport@yahoo.co.uk

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