

# The Invisible Light

## The Journal of The British Society for the History of Radiology



Number 29, February 2009

ISSN 1479-6945 (Print)

ISSN 1479-6953 (Online)

<http://www.bshr.org.uk>



## Contents

	Page
Editorial Notes	3
Recent Books	4
Interesting Web Sites	7
Atomic Toy Trains – From the Radium Era to the Nuclear Age	9
23rd CONGRESS OF THE BRITISH SOCIETY FOR THE HISTORY OF MEDICINE	25

## Editorial Notes

### UKRC 2008

Thank you to all who were involved in the BSHR presence at UKRC 2008 in both the history session and on the stand. We have had another successful year at UKRC. Copied to the right is the picture in radmagazine with nice images of Rosemary Klem and Margaret Boniface. Our thanks are due to those who helped on our stand.



1 Ethna Glean from the Royal College of Radiologists steps back into imaging history with Dr Adrian Thomas, Rosemary Klem and Margaret Boniface of the British Society for the History of Radiology.

### UKRC 2008

Birmingham – June 2-4, 2008

This year's UKRC congress held in Birmingham at the beginning of last month heralded a number of changes to improve and modernise the annual meeting.

According to Congress president Stephen Evans 'innovation' was the key word for UKRC 2008. The educational format was modernised with case-based interactive sessions including audience participation.

Innovation in service delivery focused on the changing shape of service delivery, with special symposia in conjunction with the Department of Health covering key topic areas.

Sunrise sessions were another innovation this year, together with satellite symposia organised by industry in a lecture theatre within the exhibition hall. Another new feature was "Education-on-their-stand", where individual exhibitors hosted bite-sized education opportunities on their stand.

Attempts to re-invigorate the Annual Dinner and Dance were seen as a big success, with almost all delegates who spoke to RAD Magazine praising the organisers for the evening of Magic and Illusion.

Next year UKRC will return to Manchester on June 8-10.

I am delighted to announce that the formal link with the Subcommittee of History of the Argentine Society of Radiology to promote the exchange of information and the participation of members of our two societies was signed in Buenos Aires on the 11<sup>th</sup> September 2008. The Argentine Society of Radiology is found at: <http://www.sar.org.ar>. We collaborated in the '54<sup>o</sup> Congreso Argentino de Radiología, Diagnóstico por imágenes y Terapia Radiante' held in Buenos Aires in September 2008. I gave the opening address of the congress on the subject "Godfrey Hounsfield and the Origins of Computed tomography." We also wrote a joint paper Radiología militar: los primeros 5 años (1895-1900) AMK Thomas, C Gotta, AE Buzzi & MV Suárez, Revisita Argentina de Radiología (2008) 72, 257-263. The statue of Wilhelm Röntgen on the front cover is from the facade of the School of Dentistry in Buenos Aires.

The submission date for the Belfast Congress of the British Society for the History of Medicine has been extended to the end of March, so do please consider submitting a paper.

I hope you like the paper on atomic toy trains as much as I do! Please keep sending me articles.

*Adrian*

Dr Adrian M K Thomas BSc FRCP FRCR FBIR  
February 2009

Consultant Radiologist  
Department of Nuclear Medicine  
Princess Royal University Hospital  
Farnborough Common  
Orpington  
Kent BR6 8ND, UK

tel: +44 (0)1689 863653  
fax: +44(0)1689 863320  
URL: <http://www.bshr.org.uk/>  
mobile : +44(0)7725895507 (NEW NUMBER)  
e-mail : [adrian.thomas@btinternet.com](mailto:adrian.thomas@btinternet.com)

## Recent Books

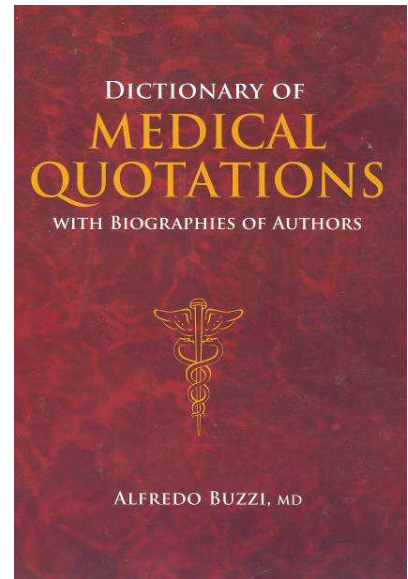
**Dictionary of Medical Quotations** (Hardcover) by Alfredo Buzzi (Author)  
Hardcover: 400 pages  
Publisher: Sapiens Publishing (1 Jan 2007)  
ISBN-10: 0955228204  
ISBN-13: 978-0955228209

This excellent book is very warmly recommended. I love these books of quotations and it's always a pleasure to see what quotations have been selected by the compiler. The book has been produced by Alfredo Buzzi Senior, the father of Alfredo Buzzi Junior (the noted radiological historian from Buenos Aires).

A sample of quotations includes: "Good intentions constitute no ground for the privilege of endangering human life" (by Oliver Wendell Holmes), "A hospital is a living organism, its work is never done" (by John Shaw Billings) and "But by the neglect of the study of the humanities, which has been to far general, the profession loses a very precious quality" (by Sir William Osler).

The quotations are arranged by topics with many illustrations of the contributors. Of particular value is the section of short biographies.

"Medicine is a science of uncertainty and an art of probability."  
Sir William Osler



## Review of Radium History Mosaic by Richard Mould

Nowotwory Journal of Oncology Supplement 4 Vol 57, 2007

It is not often that interesting items appear on my desk through the post. I am deluged mostly with request forms for more work. It was therefore a pleasant surprise to receive this book through the post. It is in fact a supplement of the Nowotwory Journal of Oncology. This is the premier cancer journal of Poland and has been going strong for over 80 years. This particular supplement has been edited by Richard Mould and is essentially a history of radium on which he is a World authority.

This volume is a unique history of radium. It consists of a series of vignettes which tells the scientific story of radium from the discovery of radio activity by Becquerel in 1896 to the replacement of radium by artificially produced radioactive isotopes. The book starts with the story of Becquerel and proceeds on to covering Marie Curie's laboratories and the dawn of radium therapy. Radium was discovered in pitchblende from North Bohemia in 1898 by the Curies. Radium was isolated in 1911 by Madame Curie and Debieme. The book contains interesting sections on uranium and radium experiments in the early part of the 20<sup>th</sup> century. There are chapters on radium tubes, radium needles and radium bombs. Of particular interest are the bibliographies of Marie and Pierre Curie and the radium books which were published in the first 50 years of the 20<sup>th</sup> century. The volume is profusely illustrated and beautifully laid out. It is exhaustively referenced (over 1200) a feature which will be a useful source for future scholars. Richard Mould has written the definitive history of radium. It is a labour of love based on his 40 years experience. His previous publications into the history of x-rays and radium in 1980 and a century of x-rays and radioactivity in medicine published in 1993 are outstanding contributions to the field. This volume continues in the high tradition of published scientific works produced by Richard Mould. The book is beautifully presented and is a delight to dip in and out of and should be of great interest to a wide variety of people including clinical historians, scientists, radiologists, radiotherapists and other members of the general public who have an interest in the work of Marie Curie and radioactivity.

Reviewed by Dr Arpan K Banerjee  
Consultant Radiologist  
Heart of England Foundation NHS Trust

### **MRI from Picture to Proton (Paperback)**

by Donald W. McRobbie (Author), Elizabeth A. Moore (Author), Martin J. Graves (Author), Martin R. Prince (Author)

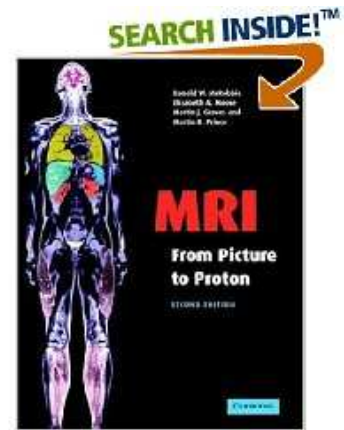
Publisher: Cambridge University Press; 2 edition (15 Feb 2007)

ISBN-10: 052168384X

ISBN-13: 978-0521683845

'Finally there is a book that deals with all aspects of MR practice and theory in a format that will encourage those who are new to this area that they are not out of their depth. All in all I feel this is one of the best written and comprehensive MR texts available for those new to MRI as well as those with years of MR experience under their belts. Authors who are clearly passionate about MR have written this book and they wish to share this passion with the rest of us ... the result is a book that I see being an essential piece of reference material to all MR practitioners.' The British Journal of Radiology

The above quotation from the BJR quoted in the blurb for this book on Amazon.co.uk shows what a well respected book this is from the technical and practical aspects. What is particularly pleasing to see is chapter 1 "MR: What's the attraction?" contains six pages on the history of MR in medical imaging including Raymond Damadian's "Apparatus and method for detecting cancer in tissue" (US patent 3789832) and a useful list of Nobel Laureates in MR.



### **The History of Medicine, Money and Politics: Riding the Rollercoaster of State Medicine (Paperback)**

By Paul Goddard

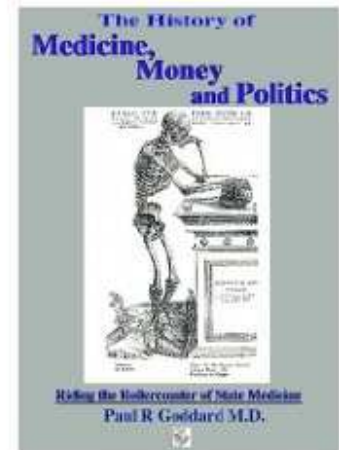
Publisher: Clinical Press Ltd (1 Jul 2008)

Language English

ISBN-10: 1854570501

ISBN-13: 978-1854570505

The Amazon blurb states that for "60 years of the UK's National Health Service and the NHS is treating more people than ever and the population is living longer, healthier lives." This book examines the history of State Medicine in the UK and looks at the problems facing the NHS and compares them with healthcare delivery in other developed nations. This book is a must-read for anyone working in the NHS. Dr. S. P. Cembrowicz in his Amazon review stated that he couldn't sleep after reading this book. Certainly the NHS that I work in today bears no relationship at all to the organisation that I joined in the 1970s. Perhaps after reading Paul Goddard's book I could recommend that you read "Welcome to Obamaland: I've Seen Your Future, and it Doesn't Work" by James Delingpole. You will probably *end up* being depressed but will certainly have a clearer appreciation of the last few decades.



### **Professor Pugwash: The Man Who Fought Nukes**

By Kit Hill

Paperback: 80 pages

Publisher: Ryelands Publishing (23 Sep 2008)

Language English

ISBN-10: 1906551049

ISBN-13: 978-1906551049

This year of 2008 marks the centenary of the birth of Joseph Rotblat. Joseph Rotblat was born in Poland and became a British citizen. He went to Liverpool University in 1939 to work with James Chadwick who had discovered the neutron. He then went with Chadwick's group to the USA in 1944 to work on the Manhattan Project to build the atomic bomb. After the war his work on nuclear fallout made a major contribution to the partial test ban treaty. He was a signatory of the Russell-Einstein manifesto and the general secretary of the Pugwash Conferences on Science and World Affairs ([www.pugwash.org](http://www.pugwash.org)) from its origin until 1973. In 1995, with the Pugwash Conferences, he received the Nobel Peace Prize for his efforts towards nuclear disarmament. He was president of the BIR in 1971-72 and was a firm supporter of our Institute until his death in 2005.

The Pugwash conferences recognise the responsibility of scientists for their discoveries and in particular the consequences of the use of nuclear weapons. The conferences brought scientists and decision-makers together to work across political and cultural divides on proposals for reducing the nuclear threat. Kit Hill was a colleague and friend of Joseph Rotblat and has written an excellent book entitled "Professor Pugwash: The Man Who Fought Nukes" (Ryeland's Publishing 2008). I would recommend we all should read this book which only costs £8.99.

### **Joan Gillchrest (1918-2008): A Life in Pictures**

by Gillian D. Mitchell (Author)

Hardcover: 136 pages

Publisher: Wren Gallery; First Edition edition (1 Sep 2008)

Language English

ISBN-10: 0955957400

ISBN-13: 978-0955957406

From the Inside Flap: "This is the life of an amazing artist told through her paintings. Joan Gillchrest is recognised as one of the foremost naïve artists of her time. Just as L. S. Lowry's work depicts the life and times of the working class people of Northern England Joan's distinctive paintings of people going about their business will be forever identified with the fisher folk of Cornwall's rugged Penwith Peninsula. Her work sits proudly alongside other great artists of the St. Ives School working from the nineteen sixties. She was essentially a very private person who shunned publicity and never quite understood the tremendous following for her work. She held strong views, didn't suffer fools gladly and using her own words "could be difficult." However for those fortunate to have known her she was warm, loving and generous. Her tremendous sense of humour, the concern and affection she felt for the people and places of Penwith will live forever through her paintings."

The interest to radiologists is that her father was the pioneer radiologist Sebastian Gilbert Scott from the (Royal) London Hospital and I knew her brother Michael Gilbert Scott who was a radiologist at Hillingdon Hospital. There is a reference to both Michael and Sebastian in the book which is thoroughly recommended.

### **Researches on Rare Earths, History and Technology**

By Fathi Habashi

Laval University, Quebec City, Canada

A selected collection of papers by the author and his co-workers on the history and extractive metallurgy of the rare earths to which an outline on the recovery of rare earths from different sources has been specially written. The position of rare earths in the Periodic Table is also discussed. Fully illustrated 125 pages in colour. The author is Professor Emeritus at Laval University in Quebec City, Canada.

ISBN 978-2-922686-15-9

Published November 2008 by:

Métallurgie Extractive Québec

800 rue Alain # 504, Quebec City

Canada G1X 4E7

Distributed by:

Laval University Bookstore Zone

Pavillon Maurice-Pollack, Cité

Universitaire, Québec City, Canada G1V

0B4. Tel.: (418) 656-2600, Fax: (418)

656-2665.

E-mail: [conseiller@zone.ul.ca](mailto:conseiller@zone.ul.ca)

\$ 25 + postage



## Interesting Web Sites

**The Radiology Unit of the Harvard University Surgical Unit**, (serving with the British Red Cross during the Great War)

<http://www.vlib.us/medical/xray/xray.htm>

Miss Gertrude Dunn, the head of the X-Ray Unit in No. 22 General Hospital was born in Victoria, Australia, was educated in England and studied Radiography at Stanford University in America. She became a member of the Harvard Surgical Unit, serving with the British Army on the Western front. Gratitude was expressed to Gertrude Dunn's grand-daughter, Nancy Gavin of Georgia, USA, who provided all the material for this Radiology section. It would be interesting to know more about the lady.

## Antique X-Ray Tubes and Accessories Dr. Hakim's Collection

Dr. Hakim writes: (I am) Happy to inform my friends of recent updates to my website "*Antique X-Ray Tubes and Accessories*".

Dr. Zahi Hakim: Address: <http://home.comcast.net/~znhakim> or [www.earlytubes.com](http://www.earlytubes.com)

Inquiries, comments and corrections are most welcome to [znhakim@cyberia.net.lb](mailto:znhakim@cyberia.net.lb)

Dr. Hakim has been actively involved in Radiology for over fifty years, and has succeeded in building a personal collection of antique x-ray tubes and accessories. He writes: "The collection started timidly some forty years ago with an early large bulb Coolidge tube donated by a friend, and grew very slowly to its present size by more donations and acquisitions from different sources, locally and from all over the world. I am happy to dedicate it, first of all, to the memory of all the pioneers in Radiology and all the martyrs of radiation, and to all those who brought the art of Radiology to where it stands. But, with the emerging alternate imaging technologies, the field of Radiology proper is shrinking. So I also dedicate this collection, as a legacy, not only to colleagues and x-ray technologists wherever they may be, but also, and particularly, to future generations of Radiologists, or "Medical Imagists", to whom, one day, the x-ray tube may become no more than a curiosity of the past."

## The Turn Of The Century Electrotherapy Museum

627 36TH ST · WPB, FL 33407 · USA

"Home of the earliest surviving Tesla Coils!"

Alfredo Buzzi writes: "Dear Adrian: You will find interesting things in here":

<http://www.electrotherapymuseum.com/Library/Library2008X-Rays.htm>

There is an online museum collection of "Turn Of The Century Electrotherapeutic Devices" dating from 1850 - 1930s and consisting of Static Electric Machines, Galvanic Batteries, Faradic Batteries, Oudin Resonators, Tesla Coils, Violet Rays, Diathermy Machines, Carbon Arc Lamps, Ultraviolet Ozone Apparatus and Quack Medical Devices. It also includes a Nikola Tesla Archive of Letters, Lectures, Articles, Patents, Construction Techniques, and a special tribute to Nikola Tesla's Nephew and Grand-Nephew.

I have mentioned this site before and it is warmly recommended.

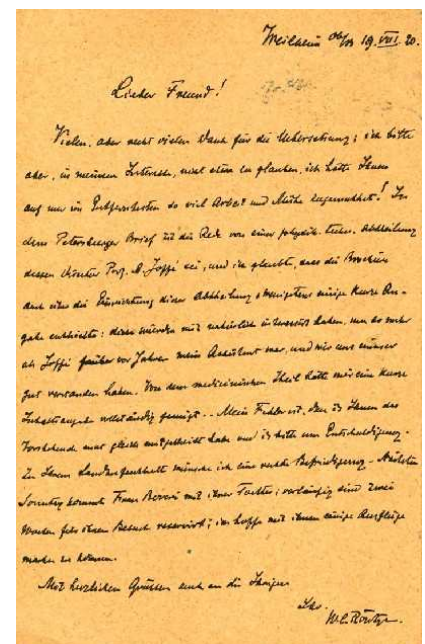


## Rontgen Letter on e-bay (NOBEL PH1901 Wilhelm Roentgen autographed letter signed)

<http://cgi.ebay.co.uk/> NOBEL PH1901 Wilhelm Roentgen autographed letter signed Item number: 370061409664

An interesting letter written by Röntgen was offered as a "Buy It Now" for US \$3,825.00 (approximately £2,067.34) by Markus Brandes Autographs.

Wilhelm C. Roentgen: (1845-1923) German physicist, discovered x-rays and their effects on a photographic plate in 1895, revolutionizing the fields of electromagnetic physics and medicine, awarded the first Nobel Prize in physics, in 1901



Autographed postcard signed, 1 page, Weilheim 19.VIII.1920. To Rudolf Cohen in Munich, he thank for the translation of a book about his previous assistant Abram Joffe. Joffe was in the meanwhile director of the physical.-techn.-X-Rax Staatsinstituts in St. Petersburg.

In German: "... ich bitte ... nicht etwa zu glauben, ich hätte Ihnen auch nur im Entferntesten so viel Arbeit und Mühe zugemuthet! In dem Petersburger Brief ist die Rede von einer physik. techn. Abtheilung dessen Director Prof. A. Joffé sei, und ich glaubte, dass die Broschüre auch über die Einrichtung dieser Abteilung wenigstens einige kurze Angaben enthielte: diese würden mich natürlich interessiert haben, um so mehr als Joffe vor Jahren mein Assistent war, und wir uns immer gut verstanden haben. Von dem medicinischen Theil hätte mir eine kurze Inhaltsangabe vollständig genügt ... Nächsten Sonntag kommt Frau Boveri" (the wife of biological Theodor Heinrich B.) „mit ihrer Tochter, vorläufig sind zwei Wochen für ihren Besuch reservirt, ich hoffe mit ihnen einige Ausflüge machen zu können ...".

Minor browning else in very fine condition and rare! The seller ended this listing early because the item is no longer available for sale. Buy it now price: US \$3,825.00

### **Press report - Students and lecturers 'exposed to radiation'**

Fred Dawson brought this to the attention of the srp-uk web group:

<http://www.ellesmereportstandard.co.uk/latest-north-west-news/Students-and-lecturers-exposed-to.4474571.jp>

"Residual radiation from experiments carried out at the University of Manchester a century ago may have contributed to the deaths of two lecturers, it has been claimed. The university said it took seriously a confidential report suggesting that hundreds of students and lecturers were exposed to radiation in its Rutherford Building over more than 50 years. The building was where Ernest Rutherford, the Nobel Prize winning chemist and pioneering nuclear physicist, carried out experiments using dangerous radioactive materials such as radon and polonium in 1908. Experiments continued in the building until 1947, but no decontamination measures were recorded until 1999, when an internal university investigation revealed radiation remained in four rooms, including room 2.62 - the one used by Rutherford. Contamination was discovered in the building as late as 2006 during refurbishment and the university called in specialist contractors to remove it. A spokesman for the university said there was no danger to current staff or students using the building, which now houses administrative offices, but an independent team would be set up to look at the 294-page report, which it received in June. The study was produced by Drs John Churcher, Don O'Boyle and Neil Todd, who worked in the building when it was home to the psychology department. They claim that the deaths of two of their colleagues - Dr Hugh Wagner and Dr John Clark - from cancer may have been linked to radiation in the building. Dr Wagner died last year aged 62 after working in room 2.62 for some years, while Dr Clark occupied the room directly below it, the report said. The university spokesman said: "The University sees merit in many of the recommendations contained in the report and accepts the case for a review independent of The University of Manchester."

Andrew Hancock from the UCLH Department of Medical Physics & Bioengineering wrote to the SRP group in response: "This sort of thing is not surprising. In 1895 when Sir William Ramsay was Professor of Chemistry at UCL he isolated helium from the radioactive rock cleveite (a form of uraninite). The actual cleveite sample that was used by Ramsay is now in the possession of the university's Geology dept., wrapped in lead sheet. In 1903 working with Soddy at UCL he also demonstrated that helium was a product of the emanations of radium. His laboratory note books from the time, housed in the UCL archive, especially the one where the experiment with radium is described are significantly contaminated with radium. I suppose the standard of contamination control back then was not as good as it is today." I gather that there were significant issues in the university in Paris in relation to the work of Pierre Curie with significant radiation contamination.



## Atomic Toy Trains – From the Radium Era to the Nuclear Age

Joel O. Lubenau, Jack W. Hornor



Fig. 1. An advertising flyer for the Kusan atomic train. In 1957, Kusan-Auburn, Inc., an American Plastics manufacturer, produced a 1/4 inch scale ("O") gauge electric train consisting of a diesel-electric locomotive equipped with a machine gun turret, a nuclear reactor car, an atomic cannon car, a car carrying an "Honest John" atomic weapon tipped missile, and a command car. Unlike Lionel trains, the Kusan operated on two-rail track. Kusan was unable to compete with The Lionel Corporation and ceased production of toy trains in 1960.

### The Beginning

In 1958, a model train having an atomic theme was produced in the U.S. (Figure 1). Believed to be the first of its kind the train marked the beginning of what has become a steady stream of similarly themed cars produced by U.S. model railway manufacturers (1). The products represent most of the nuclear fuel cycle including cars to transport uranium ore, uranium fuel, a nuclear reactor, reactor coolant, radioactive waste, and radioactive scrap metal (Figures 2 – 8), a security car (figure 9) and a passenger car fitted for decontamination work (Figure 10). Models of diesel-electric engines bearing an atom logo and (U.S.) "Atomic Energy Commission" markings provide "head-end" motive power for such trains (Figure 11). Following the accident at the Three Mile Island nuclear power plant in the U.S. a model train marking the event was made (Figure 12).

One U.S. model railway manufacturer, The Lionel Corporation, embarked on an ill-starred venture as a supplier of radiation detection equipment (Figures 13, 14) (2). The products were manufactured by a subsidiary, Lionel Electronic Laboratories, that was shuttered by Lionel following several years of operating losses and a hint of embezzlement of funds. The parent company has since restrained itself to producing model trains.

The authors, retired health physicists and long-time friends sharing an interest in trains, found the atomic themed model trains a way to combine our professional endeavours with that interest. But, while the models reflected nuclear industry activities of today (even if in sometimes fanciful ways) no model train products had been made relating to the industry's historical antecedent, the radium industry. Landa noted that the commercial production of radium and the resulting wide use of radium in medicine, research, and industry represented "The First Nuclear Industry" (3). We decided the historical role of radium should be recognized by a model railway freight box car.

### The Flannery Brothers, Marie Curie, and the Manhattan Project

The resulting product (Figure 15) commemorates the Standard Chemical Company (SCC). Two Pennsylvania brothers, Joseph and James Flannery, (Figures 16, 17) already successful entrepreneurs producing vanadium for vanadium alloy steel products, founded the company to produce radium (4, 5, 6, 7). The lack of available

radium to treat their sister's cancer provided the incentive. From 1913 to 1922, SCC and its sales subsidiary, Radium Chemical Company (RCC), produced and marketed over half of the world's supply then amounting to between 120 and 140 grams. In 1921, Marie Curie journeyed to the U.S. to receive from the Women of America a gift of a gram of radium, then costing US\$ 100,000, over US\$ 1 million today.<sup>1</sup> SCC produced the radium. President Harding presented the certificate of gift to Marie Curie at the White House (Figure 18). In planning her trip, Marie Curie requested her U.S. itinerary include visits to the Niagara Falls, the Grand Canyon, and the Pennsylvania plants that produced the radium. The visit took place on 27 June 1921 (Figures 19, 20).

SCC produced radium from carnotite, a uranium-vanadium bearing mineral, mined mainly from deposits in the Paradise Valley district of south-western Colorado. The ore was sacked and shipped via burro trains and horse drawn wagons to a concentrator in Paradise Valley (Figure 21).

From the concentrator it was shipped in sacks carried by wagons and later by trucks to the nearest railhead, in Placerville, Colorado, 65 miles away. There, ore sacks were loaded into railway box cars of the narrow gauge (3 feet or 914.4mm) Denver & Rio Grande RR boxcars. (Figure 22). These were taken to Salida, Colorado where the ore was transferred to standard gauge (4 feet and 8 ½ inches or 1435mm) box cars.

The standard gauge cars were hauled across the country to Canonsburg, Pennsylvania, 19 miles south of Pittsburgh. There the Pennsylvania Railroad (PRR) delivered the cars to SCC's mill where the radium was extracted from the ore (Figure 23).

The radium's journey did not end there. The radium salt produced by the mill was mixed with a barium salt that served as a chemical carrier. Separating the radium from the barium took place in SCC's laboratories in Pittsburgh. How did the radium-barium salt mixture get there? By a Pittsburgh Railways Company (PRC) interurban trolley! (Figure 24). The PRC interurban from Washington Pennsylvania to Pittsburgh passed by the SCC Canonsburg mill. SCC messengers carrying unshielded metal pails of the salt mixture boarded the PRC trolley. In Pittsburgh, they transferred to a city car that took them to the laboratories in the Vanadium Building (as it was then known) in the Oakland section of the city. One SCC employee, "Tommy" Thompson, routinely performed this duty. In 1920, when SCC produced 18.5 grams of radium, he received an estimated whole body dose from this activity of about 1 Sv.

SCC phased out radium production beginning in 1923 when cheaper radium ore mined from the Belgium Congo became available. But, its Canonsburg site had a second life during WWII. By that time, the Vitro Chemical Company had taken over the site producing uranium for the ceramic and glass industries (Figure 25). Vitro was brought into the Manhattan Project producing uranium from Belgian ore that had been brought to the U.S. and – from discarded SCC ore tailings that were still in Canonsburg!

Thus, the Canonsburg site has the distinction of having a role in the start of the first nuclear age, the radium era, and the start of the present nuclear age.

The Canonsburg mill site has been "remediated" by recovering the radioactive wastes associated with radium and uranium production and entombing the waste in a disposal cell on the site. The site is surrounded by a fence and posted (Figure 26), periodically inspected, and subject to environmental monitoring.

The Vanadium Building, later renamed the Flannery Building and today known as the Parkvale Building was successfully decontaminated and released in 2002 for unrestricted use. The University of Pittsburgh Medical Centre occupies the building (Figures 27, 28).

---

<sup>1</sup> The price of radium varied widely over the years. The US\$ 100,000 figure represented the bid price submitted by SCC for the contract to produce the gram of radium for Marie Curie. It was discounted from their then standard per gram price of US\$ 120,000. For more information on the fluctuation of the price of radium see reference (8).

## The SCC Radium Railway Box Car

Newbraugh Brothers Toys (NBT) is a small U.S. company specializing in custom made scale and toy train products. NBT's Chief Executive Officer, John Newbraugh, is a retired schoolteacher and 35 year member of the (toy) Train Collectors Association (TCA). In 1979, NBT produced the Three Mile Island (TMI) train sets. Pleasant Valley Process, run by Seymour Knight, a 31-year member of TCA, did the printing. NBT and PVP produced the radium railway box cars using O-gauge (1/48) scale PS-1 railway box car models made by Weaver Quality Craft Models, a Pennsylvania company whose products are widely valued by model railway enthusiasts for their quality. Production of the radium railway box cars was limited to thirty.

The artwork was designed by Lubenau. The radium pennant was an advertising device used by SCC and RCC in vignettes of the building where the companies' corporate offices and laboratories were located (Figures 27, 29, 30).

At the time that SCC operated, many railway freight cars were privately owned. These private freight cars were custom painted by their owners to advertise their products providing some of the most imaginative and colourful rail freight cars seen. The Pittsburgh food packaging company, H.J. Heinz, owned tank cars that were used to carry pickles! SCC did not operate a private fleet of railway carriages but used cars owned by the railroads to transport its radium ore. Had the SCC survived, the company may well have developed its own fleet of railway carriers. The Flannery brothers would have approved them appreciating their advertising value!

### Are there others?

We pose these questions to you, dear readers:

1. U.S. model railway manufacturers have been prolific producers of atomic themed model railway trains. What has been the experience in the U.K., the E.C., Russia, and elsewhere?
2. Have other model railway cars been produced that commemorate the beginnings of today's nuclear age, e.g., radium, x-rays, artificially produced radioisotopes?
3. Have model railway cars been produced commemorating the historical figures of the nuclear age, e.g., Henri Becquerel, Pierre and Marie Curie, Wilhelm Roentgen, Irene and Frederick Joliot-Curie?

Fig. 2. The nuclear fuel cycle begins with uranium ore. To transport uranium ore K-Line Electric Trains (now K-Line by Lionel) made this car. The top and sides are translucent and a bulb inside makes the car glow.







Fig. 3. Uranium fuel can be carried in these Lionel fuel canisters.

Fig. 4. Kusan's nuclear reactor car. Under the three red hemispheres were blinking bulbs that indicated the reactor was "hot."



Fig.5. Lionel produced "reactor coolant" tank cars in three popular colours – "plutonium purple," "biohazard blue," and "Geiger green." A fourth colour, black, was never popular.





Fig. 6. For the end of the fuel cycle, Lionel provided for waste disposal – solid waste could be shipped in canisters on this car. Blinking red lights inside the canisters illuminated the stencil cut-outs.

Fig. 7. Transportation for liquid radwaste was also available using tank cars made by Lionel.



Fig. 8. Radioactive scrap metal has become an increasing issue for metal recyclers and steel producers (see reference 9). MTH Electric Trains thoughtfully provided a scrap metal car to transport such scrap.





Fig. 9. Security for atomic trains is provided by this Lionel car fitted with a rotating searchlight and a pair of cannons. Similar cars have been made by K-Line and Ameritrains (formerly Marx Trains).

Fig. 10. Had a contamination accident? Ameritrains can deliver staff and equipment in their specialized car.



Fig. 11. Head-end power for atomic themed trains has been made by Kusan, Lionel, K-Line, MTH, Ameritrains and Ready Made Toys (RMT). All carry the atom logo and most are marked "Atomic Energy Commission." The most recent entry is this RMT two axle diesel electric locomotives marked for the Los Alamos National Laboratory in New Mexico.

Fig. 12. The TMI boxcar was produced by Newbraugh Brothers Toys (NBT). The printing was done by Pleasant Valley Process. About 1,000 TMI boxcars were made. In addition, NBT made TMI train sets consisting of a diesel electric locomotive, the box car and other cars all marked TMI. Only 100 train sets were made.



Fig. 13. Lionel Electronics Laboratories (LEL) was an ill-fated venture by The Lionel Corporation when it acquired Anton Electronics Laboratories a company that specialized in producing radiation detectors. Most of its sales were to the U.S. government. Its most successful product was the CDV-700 Geiger survey meter produced for the U.S. Office of Civil Defence. Very rugged and long-lasting, about 82,000 were made. Around 1965, Lionel closed LEL following recurring losses and possible mishandling of proceeds from sales.

Fig. 14. A less successful LEL product was this Model 455 laboratory bench monitor that incorporated an antiquated decade scaler.







Fig. 15. This radium car commemorates the Standard Chemical Company, the first company to successfully produce radium on a commercial scale and its sales subsidiary, Radium Chemical Company and highlights Canonsburg and Pittsburgh, Pennsylvania where its plants were located. The car was produced by NBT.

The artwork was designed by Joel Lubenau and printed by Pleasant Valley Process on boxcars produced by Weaver Quality Craft Models. The pennant labelled, "Radium," was an advertising device used by the Standard and Radium Chemical Companies (see figures 27, 29 & 30).

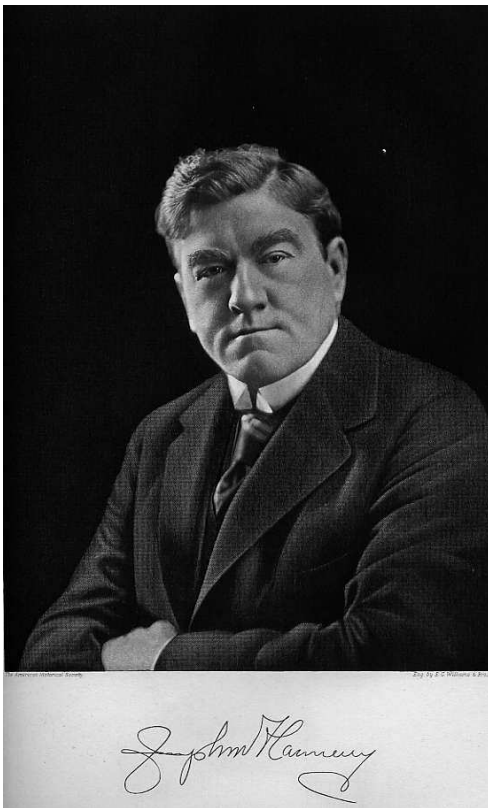


Fig. 16. Joseph M. Flannery, founder of the Standard Chemical Company.



Fig. 17. Older by 19 years, Joseph Flannery's brother James oversaw the financial operations of Standard Chemical Company.



Fig. 18. On May 20, 1921, Marie Curie was received at The White House by President Harding and presented with the keys to a cask containing a gram of radium, costing \$100,000, as a gift from the Women of America. A replica set of the radium was displayed at the White House. The radium itself was at the National Bureau of Standards (NBS, now the National Institute of Standards and technology) being calibrated using a radium standard that had been prepared by Marie Cure for the NBS.

Fig. 19. On May 27, 1921, Marie Curie travelled by automobile to Canonsburg, PA to see Standard Chemical Company's plant for milling Colorado carnotite ore to extract radium. From left to right are Louis Vogt, manager of the Canonsburg plant, James Gray, president of Standard Chemical Company, and Marie Curie. To the right of Marie Curie is Joseph Flannery, Jr. son of the company's founder.

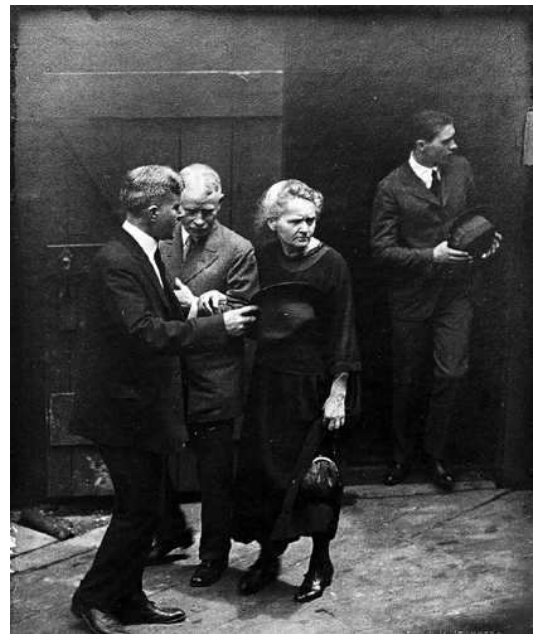


Fig. 20. Engaged in a serious conversation, from left to right are Louis Vogt, Marie Curie and James Gray.



Fig. 21. Standard Chemical Company's mines were in Paradox Valley, a remote area of south-western, Colorado. The mines were in the hills. Mining equipment was brought to the mines by burro trains. Carnotite ore was bagged at the mine face and shipped out the same way.



Fig. 22. Carnotite ore in bags stacked at the Placerville, Colorado station of the Rio Grande Southern (narrow gauge) Railroad. After loading into the boxcars, the cars were taken to Salida, Colorado and the sacks transferred to standard gauge boxcars for the remainder of the trip to Canonsburg, Pennsylvania.

Fig. 23. Standard Chemical Company's ore milling plant in Canonsburg, Pennsylvania, about 19 south of Pittsburgh. The mill complex is in the centre. To the right is a pottery factory. In the foreground is Chartiers Creek and beyond is the right-of-way of the Pittsburgh Railways Company (PRC) interurban trolley from Washington, Pennsylvania to Pittsburgh. Standard Chemical Company shipped radium-barium salts from its Canonsburg mill to its refining laboratories in Pittsburgh via the PRC trolleys!





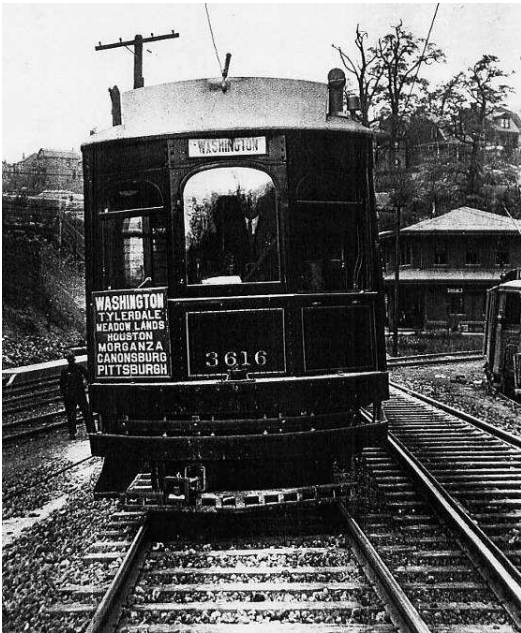


Fig. 24. A Pittsburgh Railway Company interurban trolley signed for the Washington-Pittsburgh route. Messengers carried the barium-radium salt mixture on the trolley in stoppered glass jars inside unshielded metal pails. For most of the time, the same messenger had this duty. In 1920, when SCC produced 18.5 of radium, his dose from this job was about 1 Sv!

Fig. 25. Vitro Chemical Company bought the Canonsburg site and built a uranium extraction mill. The uranium was sold to ceramic and glass manufacturers who used the uranium as a colouring agent. Vitro produced glass tiles under the trade-name, "Vitrolite." The yellow colouring of the Vitrolite tile came from the uranium.



Fig. 26. After a long, controversial remediation process, the Canonsburg site was sealed off. Radioactive waste materials were encapsulated in an engineered cell at the site that was then fenced off and posted. Federal and state authorities periodically inspect the site and take environmental samples.

Fig. 27. The radium was refined in the Vanadium Building in Pittsburgh. The picture is from a 1916 Radium Chemical Company product catalogue. The "radium" pennant flying over the roof was an advertising device added to illustrations of the building. The pennant was incorporated into the design of radium car.

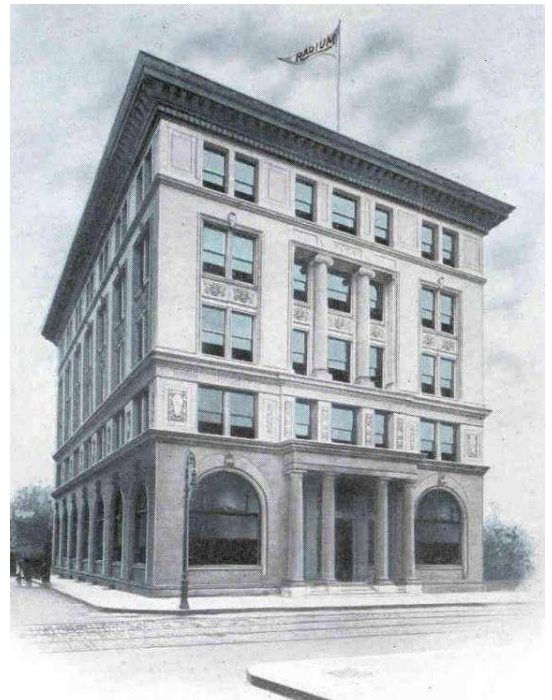


Fig. 28. Needless to say, the Vanadium Building, later known as the Flannery Building, was contaminated with radium. After many attempts, the building was successfully decontaminated and released for unrestricted use in 2002. Today named the Parkvale Building, it is occupied by the University of Pittsburgh Medical Centre.



Fig. 29. One purchased radium from Standard Chemical Company's marketing subsidiary, Radium Chemical Company. The vignette features the Vanadium Building with a pennant, labelled "Radium," flying over the roof.

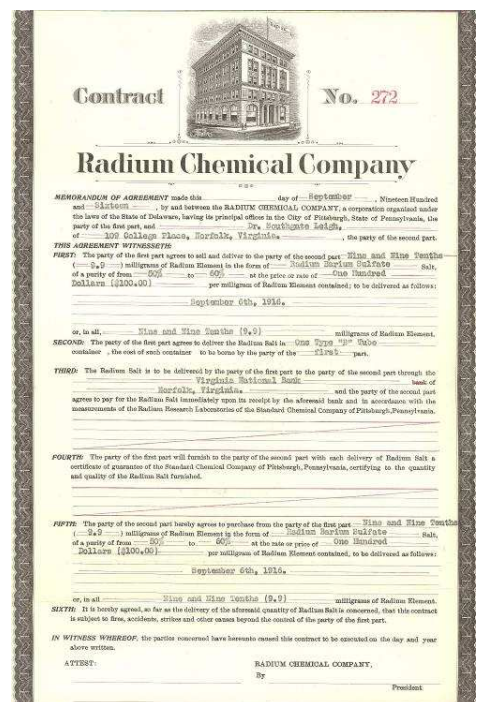






Fig. 30. Standard Chemical Company produced the radium and furnished calibration certificates for the radium sources. Again, the vignette features the Vanadium Building with a pennant, labelled "Radium," flying over the roof.

Fig. 31. Jack Hornor's Galt, Amador and Southern Pacific (G.A.S.P.) railroad includes a Marx and a Lionel nuclear reactor, the latter shown here together with a TMI water tower. Some of the cows near the reactor have three horns!



Fig. 32. The G.A.S.P. frequently hosts visitors such as these retired health physicists. Joel is second from the left and Jack is second from the right.





Fig. 33. The Marx nuclear reactor on Joel's AEC Terminal Railroad. It was sold by Marx as an operating toy steam engine but nicely labelled as an "atomic reactor."

Fig.34. The AECTR is a portable layout shown here on display during the Christmas season at the Penn State Children's Hospital at the Hershey Medical Centre, Hershey, Pennsylvania.



Note

The authors deeply appreciate John Newbraugh's encouraging us to have the radium car produced and Richard Mould's encouraging us to write about it.

## About the authors

Jack Hornor and Joel Lubenau are retired certified health physicists. Jack started as a reactor and instrument technician and engineer at Atomics International. At one point he was employed as a service consultant and field engineer for Anton Electronics Laboratories, later bought out by The Lionel Corporation. Jack became a licensed senior reactor operator and supervisor of the research reactor at the University of California at Los Angeles (UCLA) and later Radiation Safety Officer for the entire university. He joined the U.S. Nuclear Regulatory Commission (NRC) first as a reactor inspector and then as a health physicist. Jack operates the Galt, Amador & Southern Pacific (G.A.S.P.) O gauge railroad that includes nuclear reactors made by Louis Marx & Company and Lionel (figure 31). The G.A.S.P. was featured in *Classic Toy Trains* (10). He frequently hosts friends and fellow retirees (Figure 32) and holds open houses for local and national members of the Toy Train Operating Society (TTOS) and Train Collectors Association (TCA).

Joel originally worked in the steel industry and received a B.C.E. After a two year tour of duty as a Commissioned Officer in the U.S. Public Health Service he changed careers becoming a health physicist. He was employed by the Pennsylvania radiation control program, the Atomic Energy Commission, and the NRC. From 1992 to 1999 he was a technical and senior assistant to Commissioner Gaul de Planque and Chairman Greta Dicus. Joel operates the AEC Terminal Railroad ("We Glow With Pride"), a portable O gauge layout that includes a Marx nuclear reactor (Figure 34). The layout was featured in *Nuclear Times* (11) and displayed at the Penn State Children's Hospital in Hershey, PA (Figure 34).

## References

1. Lubenau, J. O. Hornor, J.W., "Atomic Toy Trains," *Train Collectors Quarterly* (July 1999).
2. Lubenau, J.O., Hornor, J.W., "Lionel Goes Nuclear," *Train Collectors Quarterly*, (January 2005).
3. Landa, E.R., "The First Nuclear Age," *Scientific American* 274:182-193 (November 1982).
4. Lubenau, J.O., "Standard Chemical Company, Marie Curie and Canonsburg," *Jefferson College Times* 38:1 (March 2005). [http://canonsburgboro.com/MarieCurie/MCurie\\$StdChemical.htm](http://canonsburgboro.com/MarieCurie/MCurie$StdChemical.htm).
5. Lubenau, J.O., "Radium City, U.S.A.," *Pennsylvania Heritage* 31:4 (Fall 2005).
6. Lubenau, J. O., Mould, R.F., "Historia medicinae: The Vanadium Window with special reference to Joseph & James Flannery's contribution to the American steel and radium industries," *Nowotwory, Journal of Oncology* (in press).
7. Lubenau, J.O. "The Vanadium Window," *Health Physics News* 34:10 (October 2006).
8. Lubenau, J.O., Mould, R.F., "Historia medicinae: The roller coaster price of radium," *Nowotwory, Journal of Oncology* (in press).
9. Lubenau, J.O., Yusko, J.G., "Radioactive Materials in Recycled Metals – An Update," *Health Physics* 74:293-299 (March 1998).
10. Carp, R., "Jack's layout adventure," *Classic Toy Trains* 16:2 (February 2002)
11. Lubenau, J., "The AEC Terminal RR," *Nuclear Times* (National Atomic Museum newsletter) (Fall 2004).

### **Atomic Toy Trains – From the Radium Era to the Nuclear Age: Photo Credits**

Joel O. Lubenau, Jack W. Hornor

31	Classic Toys Trains 16:2 (February 2002) re-printed with permission
29	David J. Allard, Elizabethtown, PA
23	James T. Herron, Canonsburg, PA
20	Historical Society of Western Pennsylvania Pittsburgh, PA
26	Lloyd Hampson, Ormond Beach, FL
32	Jack W. Hornor, Galt, CA
1-13, 15, 27, 28, 33, 34	Lubenau Collection
16	Lubenau Collection from History of Pittsburgh And Its Environs by George T. Fleming, The American Historical Society, 1922
17	Lubenau Collection from Western Pennsylvanians, Charles A. Rook, ed., James O.



- 19 Jones Company, 1923  
14, 21, 22 National Institute of Standards and Technology, Gaithersburg, MD  
24 Oak Ridge Associated Universities, Oak Ridge, TN  
18 Pennsylvania Trolley Museum, Washington, PA  
Radiological Society of North America from  
<http://radiology.rsnajis.org/cgi/content/figonly/223/2/299>  
30 Rose Marie Pratt, New York, NY from  
<http://www.dundeeac.uk/museum/medical/cancer.htm>  
25 John C. Villforth, Gaithersburg, MD

**A 1930s X-ray Department!**  
by Michael Reilly



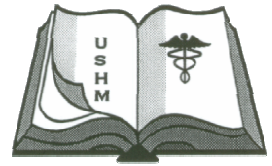
Michael Reilly was born in 1898 and designed posters for the Underground Group c. 1926. He was educated at the Central School of Arts and Crafts in Birmingham (1923-1926). The above image of an X-ray department from the 1930s is quite fun! It bears little relation to our modern frantic departments!

**CENTRE FOR THE HISTORY OF MEDICINE IN IRELAND**



Belfast

2-5 September 2009



The 23<sup>rd</sup> Conference of the British Society for the History of Medicine will be held in Belfast on the 2<sup>nd</sup> to 5<sup>th</sup> September 2009. The Ulster Society for the History of Medicine will be the hosts and they have the support and cooperation of the Centre for the History of Medicine in Ireland (CHOMI) based at the University of Ulster. CHOMI was set up in 2006 with a grant from the Wellcome Trust for the History of Medicine. It is a split site centre, with both University College Dublin and the University of Ulster at Jordanstown collaborating to enhance the profile of, and research into, Irish medical history.

With this in mind, the conference, as well as encouraging presentations from other aspects of the history of medicine, will showcase work in Irish history of medicine. The staff at CHOMI will be participating and will present the results of their recent research to the conference.

Those working on any aspects of Irish medical history are particularly encouraged to come forward with their suggestions for papers for 2009. The main themes of the conference will be:

- Irish medical history
- Exploration and medicine overseas
- Medical biography
- Medical specialties
- Epidemic diseases
- Miscellaneous

There will also be a section devoted to students researching the history of medicine.

Those with proposals for a paper should submit them, before 31<sup>st</sup> January 2009, in the form of an abstract of no more than 250 words outlining the main points and conclusions of the presentation with a few key references. Once your abstract is approved, you will be notified & participation in the Conference will then require the receipt of the completed registration form, & payment of the Conference fee.

Please also submit a brief biography which will appear in the book of abstracts. As a record of the conference photographs will be taken of those who present papers.

Please send completed forms to:

Professor Greta Jones, Centre for the History of Medicine, University of Ulster at Jordanstown, Shore Rd, Newtownabbey, County Antrim, Northern Ireland BT37 0QB

Abstracts can be submitted electronically to Professor Greta Jones at [michael.liffey@ucd.ie](mailto:michael.liffey@ucd.ie)

Title.....Full Name.....

Name of Institution (If applicable).....

Full Postal Address.....

.....

Email address.....Telephone no.....

Title of Abstract.....

Bookings for the Congress will open on 1 September 2008

**BSHM BELFAST 2-5TH SEPTEMBER 2009**

**AUTHOR(S)**

--

**TITLE (CAPITAL LETTERS)**

--

**ABSTRACT (LESS THAN 250 WORDS)**

--

**REFERENCES**

--

**PRESENTING AUTHOR**

<b>Name</b>		
<b>Address</b>		
<b>Tel.</b>	<b>Fax</b>	<b>E-mail</b>

**BRIEF BIOGRAPHICAL DETAILS**

--

Please send to Professor Greta Jones, Centre for the History of Medicine, University of Ulster at Jordanstown, Shore Rd, Newtownabbey, County Antrim, Northern Ireland BT37 OQB  
Abstracts can be submitted electronically to Professor Greta Jones at [michael.liffey@ucd.ie](mailto:michael.liffey@ucd.ie)