The Invisible Light

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Contents

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The RHHCT Web Site

The RHHCT web site is to be found at:

www.rhhct.org.uk

I am always interested in material for the web site, particularly related to radiotherapy and physics. There is also a hero's section. If you have a radiological hero then consider writing a short piece for inclusion with a photograph.

Editorial notes

I have never been to a real auction before and found it hard to resist an auction at to include the piece by Arpan Banerjee that first appeared in that excellent publication.

Adrian Thomas

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Chairman's Report

AJP Taylor once said "History is about what comes next", emphasising the all vibrant (in the British Journal is

Professor Ian Isherwood CBE
Chairman RHHCT

Honorary Secretary's Report

I have taken over as Honorary Secretary of the RHHCT and my first duty is to thank Angela Newing for all of her hard work as the outgoing Honorary Secretary. Her work was invaluable and she will be difficult to follow.

The RHHCT remains active and involved in promoting the history of medial radiology in all of its aspects. A current concern is the recording of obituaries. Neither
If you are interested in the history of radiology and want to get involved with the RHHCT then please do not hesitate to contact me.

Adrian Thomas
Honorary Secretary

Book Reviews

A History of Radiotherapy at the Royal London Hospital 1896-1996
Dr H F Hope-Stone
(Copies are available for £12.00 from the Royal London Hospital Archives and Museum, Newark Street, London E1 2AA. Cheques should be made payable to The Royal London Special Trustees, including £1.55 p&p)

Chernobyl Record The Definitive History of the Chernobyl Catastrophe
By R F Mould, Institute of Physics Publishing 2000, ISBN 0-7503-0670-X

Richard Mould's latest book, Chernobyl Record is a detailed account of the events leading up to and following the Chernobyl catastrophe, which occurred on 26th April 1986. The author

has been involved with Chernobyl since the first International Atomic Energy Agency (IAEA) post-accident meeting in 1986.

The book covers all aspects of the catastrophe from the events leading up to the accident, the explosion, radionuclide releases, and the immediate and subsequent human and environmental impacts up to the present day. The author uses comparisons with Hiroshima and Nagasaki, atmospheric weapons testing, Three Mile Island and the recent Tokaimura incident in Japan amongst others, where appropriate which is useful in putting the scale of this tragedy in perspective.

The Chernobyl nuclear power plant is located on the Ukraine/Belarus border and is 15 km from the town of Chernobyl, the nearest town being Pripyat, 3 km away where 45,000 power plant workers and their families lived. The power plant contained 4 reactors numbered 1-4, number 4 was completed in 1983 and it was this reactor which exploded.

The accident was a result of an experiment being carried out to test whether in the event of a power failure the turbine generator could continue to power some of the cooling pumps while free-wheeling to a standstill after its steam supply had been cut off. The programme for the experiment which was already of poor quality, was further compromised by the staff deviating from the plan as they were under pressure and behind schedule and various safety systems had been disabled or degraded in order to complete the experiment. Preparation for the experiment began on 25th April and continued into the 26th and this resulted in the reactor becoming unstable and difficult to control. Despite this, the experiment began at 01.23:04 am on the 26th April, 36 seconds later after a steep power rise the shift foreman ordered a full emergency shutdown. This requires the automatically operated reactor control rods to fully insert into the reactor, which can take up to 20 seconds. However it was too late and 8 seconds later the reactor exploded.

The explosion destroyed the reactor core and demolished the surrounding walls and ceilings. The upper part of the biological shield, weighing 2000 tonnes was blown upwards and came to rest in a near vertical position. Fires were started in more than 30 locations due to fragments of the core, which were at a high temperature falling onto the roofs of the adjacent buildings.

Extinguishing the fires was the top priority, this involved both firemen, who worked mainly on the roof of the turbine hall and later helicopter pilots who were involved in dumping materials such as boron compounds, clay and sand into the reactor hall. Initially six firemen on duty at the plant arrived immediately after the accident and began fighting the fires on the roof. Of these, all six died. The book quotes from an interview with Sergeant Ivan Shavrei who was on backup duty and interviewed for a special issue of Izvestia.

"Alexsandr Petrovskii and I went up onto the roof of the machine room; on the way we met the kids from the Specialized Military Fire Brigade No. 6; they were in a bad way. We helped them to the fire ladder, then made our way towards the centre of the fire where we were to the end, until we had extinguished the fire on the roof. After finishing the job we went back down, where the ambulance picked us up. We too, were in a bad way."

Subsequent interviews with other firemen indicate that they received no proper advice on radiation protection procedures and did not have adequate protective clothing, resulting in radioactive particles coming into contact with the skin.

Of the 444 workers at the plant, 300 were admitted to hospitals and 134 patients were diagnosed with acute radiation syndrome with radiation doses between 1 and 16 Gray (Gy). Of these 29 died, 6 of these being firemen, and the remainder included power plant operators, engineers, technicians and other power plant workers.

Following the explosion and subsequent fire, radionuclides were released from the reactor over a ten day period, about a quarter of which was released on the first day. These releases consisted of two components, those released as dust and those forming aerosols or gases. In total it is estimated that 8 EBq (exabequerel, = $8x10^{18}$ Bq) of the 30 Ebq core inventory was released. Releases included ^{131}Iodine, ^{137}Caesium and various isotopes of plutonium. The radioactive plume spread across Europe and was first detected outside the Soviet Union at Forsmark nuclear power station in Sweden on 28th April. The plume reached Great Britain on 2nd May and by 6th May it was detected in Canada and the USA.

Following the accident the Soviet Authorities set up exclusion zones around the plant and ordered the evacuation of all people within 30 km of the plant. In total 116,00 people were evacuated, including the whole population of Pripyat, numbering almost 50,000. The evacuation was mostly completed by the end of May. The exclusion zone was based on levels of contamination, levels exceeding 1480 Bq/m2 were considered unfit for human habitation. In these areas there were hotspots of activity of up to 370,000 kBq/m^2 (10,000 Ci/km^2) for ^{137}Cs and 185,000 kBq/m^2 for ^{90}Sr.

The book examines in detail the subsequent impact on both the populations at risk from psychological illnesses, non malignant diseases and conditions, and cancer and the environmental impact of the disaster and the follow up to the present day. After the accident there was a large increase in the number of thyroid cancers in children. Between 1974 and 1985 only 8 cases were reported in Belarus, compared to 574 between 1986 and 1997. The predicted number of excess solid cancers in the population of the contaminated territories is 4600. However this would be difficult to detect when the background number of cancers is 800,000.

Richard Mould's book is both a detailed reference book and moving account of the events surrounding this tragedy, especially with the inclusion of many of the interviews and stories of those involved. An enormous amount of research must have gone into writing this book. The book not only includes details of the accident and its immediate aftermath, but also the subsequent and ongoing assessments of the effects of the accident on the environment and human populations, up to the present day. Overall an excellent book, highly recommended.

Philip Hollaway

Book Notes

Defining Features – Scientific and Medical Portraits 1660-2000.
Ludmilla Jordanova. Reaktion Books (2000) ISBN 1-86189-059-1 £14.95
This book accompanied the exhibition of the same name held in the Studio Gallery at the National Portrait Gallery in London (www.npg.org.uk). Ludmilla Jordanova is Professor of Visual Arts at the University of East Anglia, Norwich. She looks at the relationships between art, science, medicine and technology by looking at portraits of scientists and doctors. There are many reproductions. I enjoyed the book and it made me think about how I look at portraits. There is reproduced in the book a stunning drawing that I had not seen before of Marie Curie by Paul Renouard from 1911 (the year she received her second Nobel Prize). The book is recommended.

The Woman Who Knew Too Much. Alice Stewart and the secrets of radiation.
Gayle Greene. The University of Michigan Press (1999) ISBN 0-472-11107-8 (£19.95)
This book tells the story of the remarkable woman Alice Stewart. Her initial work was working out the link between prenatal radiography and childhood leukaemia. She showed that fetal exposure to X-rays doubled the risk of cancer. In later years she has been involved with

showing the dangers of the U.S. nuclear weapons industry and has supported the anti-nuclear movement. I had my copy from the Amazon web site (www.amazon.co.uk) and my copy arrived in a couple of days.

The matter of Motion and Galvani's Frogs.
B. Innes Williams.
This book will be of interest to any involved in the history of medical electricity. It is devoted to the work of Luigi Galvani of Bologna and the twitching of the legs of dissected frogs. The background, contemporary and subsequent explanations are described. The book is available at £25 from Mrs Tracy Tillotson, The Wellcome trust, 183 Euston Road, London NW1 2BE

Recent Historical Articles

Reflections: This is a most interesting series in Radiology. The article can be found on-line on the Radiology site, which is a link from the RSNA site (www.rsna.org).

Genitourinary Imaging: The Past 40 Years.
Stanford M. Goldman & Carl M. Sandler. Radiology 2000; 215:313-324
This is a paper on the more recent history of genito-urinary imaging from the 1960s onwards and has many nice images including retroperitoneal pneumograms and pelvic pneumograms (gynaecography).

Obstetric US Imaging: The Past 40 Years.
Barry B Goldberg. Radiology 2000; 215:622-629
A very good paper on the story of ultrasound in obstetrics. Many good illustrations.

Gastrointestinal Radiology in the United States: An Overview of the Past 50 Years.
Henry I Goldberg and Alexander R Margulis. Radiology 2000; 216:1-7
A helpful review of recent developments.

Commentary: The Spanish-American War and Military Radiology.
Vincent J. Cirillo. AJR 2000; 1233-1239
A most interesting article on military radiology and the Spanish-American War of 1898 with much background detail. Many photographs are reproduced. Well worth reading. It can be found on www.ajronline.org.

Radiology History Exhibit: Musculoskeletal Eponyms: Who Are those Guys?
Tim B Hunter, Leonard F Peltier & Pamela J Lund
Radiographics 2000; 20:819-836
An overview of orthopaedic eponyms. Each fracture is described with a short biographical sketch appended. Worth reading and can again be found at the RSNA web site.

My Hero: Marie Curie
Carenza Lewis BBC History Vol. 1, No 3 (July 2000) p 98
This is a brief article in a popular history magazine. There are several articles of a medical interest in this issue with Roy Porter on Quacks and Trevor Fishlock on the bonesetters of Anglesey. At only £2.95 each month the magazine is an interesting read.

The Four Radiographic Elements: electricity, vacuum, glass, silver.
Dr Jean Guy. Historical Medical Equipment Society. Bulletin No 8 (July 2000)
This is an interesting paper given by Jean Guy to the Historical Medical Equipment Society on the materials used in early radiology. An interesting account. If you want a photocopy please let me know and I will send you one. Consider joining the HMEC. Their secretary is Dr Marios Kyriasis, 14 The Avenue, Cliftonville, Northampton NN1 5BT

Antoine Béclère (1856-1939) À la mémoire d'Antoinette Béclère, gardienne admirable de l'œuvre de son père.

G Pallardy and JP Mabille J Radiol 1999;80:600-606
A good article (in French) about the great French pioneer in Radiology.

History of the RSNA.
RSNA News June 2000.
Starting in the June 2000 number of the RSNA News there appears the first of a 5 part series on 'The History of the Radiological Society of North America'.

Imaging in medicine through the 20th century.
G du Boulay. J R Coll Physicians Lond 2000;34:357-62
A strong bias towards neuro-radiology as one might expect from the author who is an emeritus professor of Radiology at the Institute of Neurology, London. It is fascinating to learn that his first consultant chief was the x-ray pioneer Dr Russell Reynolds who worked with X-rays as a schoolboy in 1897.

RADIOGRAPHERS AND REPORTING - THE EARLY YEARS.

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Introduction

The early history of reporting is the story of conflict surrounding the development of radiology and radiography. The boundary dispute between radiographers and radiologists in the formative years of the two professions split the Society of Radiographers and ended with radiographers foregoing their right to issue reports, albeit reluctantly. This paper will review those early developments.

The Beginning

Following the discovery of X-rays by Röntgen in 1895, innovation and diffusion of the new technology advanced rapidly. Mr. A.A.C. Swinton, an electrical engineer, based in London produced a radiograph of his hand in January 1896 using an exposure time of 20 minutes and in the space of one week the exposure time had been reduced to 4 minutes [1]. In March 1896, Swinton reported the opening of his x-ray laboratory which was to be made available to medical men who wanted the x-ray process applied to their patients [2].

Among those to develop an interest in x-ray work were medical practitioners who were known as medical radiographers before the title radiologist was adopted. The lay or non medical radiographers included individuals from many diverse occupational groups. Notable among these were electrical engineers but photographers, pharmacists and hospital porters were among those known to have been active in radiography [1]. Henry Coombs [3] recounting the early days in a BBC television programme 'X Rays: The Early Years' part of the Yesterday's Witness series, recalled radiography being undertaken by a hospital carpenter and gardener.

There was no distinct boundary that divided the work of medical and non-medical radiographers and in the first part of the twentieth century hospital authorities employed 'lay' radiographers to take and comment on x-ray plates. Indeed the terms 'radiographer' and 'radiologist' were often used interchangeably as late as 1930 [4]. To avoid confusion, the terms radiologist and radiographer will be used in their modern context except where a direct quotation is used.

Ownership of X-ray work

The radiologists were keen to establish consultant posts in their new discipline and it was the drive to establish radiology as a medical speciality which was to shape the relationship between radiologists and radiographers. The first signs of conflict appeared in the early 1900s and by 1903 the British Medical Journal (BMJ) was stating claims for the medical proprietorship of X-rays [5].

> "There is no reason for professional prejudices against the practice of radiology by lay-men, so long as they confine themselves to the mere mechanical act of producing a picture and abstain from assuming scientific knowledge of their bearing of their radiographs on diagnosis or prognosis."
>
> Anon. BMJ 1903:831.

In France, the medical fraternity was staking similar claims. The *Académie de Medécine* established a special commission to consider whether or not to invite the public authorities to take action against individuals for illegal practice of medicine if X Rays were used for diagnostic or therapeutic purposes by individuals not qualified in medicine. The BMJ reported these events in its 'Special Correspondence' section in 1905 [6].

> "...The Roentgen rays have given undeniable therapeutic results but they may provoke various accidents, especially grave dermatitis, eschars, and, in the female, sterility. This last action might constitute a real social danger."
>
> Anon. BMJ 1905:1296.

In Great Britain, radiologists were becoming increasingly vocal about their lack of recognition. Writing in the BMJ, a correspondent using the *nom de plume* 'Radiologist' [7] was unhappy that his reports and diagnoses were resented by some physicians and surgeons who looked upon the radiologist as some sort of superior bottle washer and someone to supply a skiagram from which they would draw their own conclusions. 'Radiologist' considered that his expert knowledge in the interpretation of a skiagram was probably greater than that required to interpret the appearances seen by "opthalmoscopic examination of the fundus oculi." Despite the disappointment of 'Radiologist" there were some who saw the situation in much the same way as the French radiologists as was evident from in the preface of the book " A Manual of Practical X-ray Work," by Drs Arthur and Muir [8] who were to testify.

> "Three things are necessary to give radiology that position of reliability in professional work which it is surely, ...namely,
>
> good apparatus,
>
> intelligent and skilled use of such apparatus,
>
> and
>
> sound general medical training and experience to interpret and control the results so obtained.
>
> The two former conditions are possible enough to operators outside the medical profession; the third is of its nature impossible to such persons, and the three cannot be efficiently separated.
>
> For a non-professional operator to offer a medical opinion on a radiogram is sheer impertinence"
>
> Arthur and Muir (1909) v-vi.

The BMJ [9] expressed strong support for Arthur and Muir and claimed that there would be strong sympathy for their view that "only men of sound medical experience should be allowed to control the tube and interpret its results."

A correspondent to the BMJ using the *nom de plume* 'X rays' was calling for a united front be to shown by all medical practitioners. He was troubled by the situation where medical practitioners sent their patients to large chemists or instrument makers to have their "x-ray photographs made" rather than sending them to medical men engaged by hospitals [10]. The correspondent conceded that the lay x-ray workers were usually expert photographers and their prints were triumphs of photographic art but in the form of prints were valueless except in the case of gross fractures. He claimed that the art of the photograph was more important to the photographer than the information it contained. He had seen prints that had been

touched up and on one occasion the roughened edges of an arthritic hip joint had been removed giving the appearance of a normal joint.

Despite the unrest of radiologists, x-ray work continued to be undertaken by both medical and non-medical personnel alike but the attitude of some radiologists was hardening. Kempster [11] was unhappy that a general hospital in London had appointed a layman to the position of radiographer (radiologist) and that he had been doing the work for the past three years. Kempster's view was that the use of X rays be entrusted to none but specially trained registered medical practitioners.

Resistance to radiographers undertaking x-ray examinations was to lessen following the First World War. This was probably due to the fact that there were many people trained in x-ray techniques who would seek to use their newly acquired skills in civilian life. Rather than trying to prevent this, the British Medical Association [12] attempted to control the situation and made its position clear.

> "While there is a mechanical side to radiography in which the lay assistant can be extremely useful to the medical radiographers it is highly undesirable that lay persons, however, skilled in this in technique, should be encouraged to set up by themselves and pose as experts in the interpretation of skiagrams. .....
>
> At the present time the army employs a very large number of x-ray assistants; and many .... have attained much skill in the taking and development of radiograms. A good many of them have acquired more self confidence in diagnosis than is good for them or for the general public. .....
>
> The Committee recommended that the practice of medical radiography by lay persons, except under the direct instruction of medical practitioners, ought not to be encouraged"
>
> Supplement to The BMJ 1917:707

There were some who objected vehemently to this new position. Among these was 'J.H.E.' [13] who remained in tune with the French position of 1905:

> "I would go much further and would suggest that the practice of radiography by laymen be made a penal offence, and that laws be passed which will render it impossible for the practice of radiography to be carried out by other than skilled and trained medical experts."
>
> J.H.E, BMJ 1917:706

Despite the extreme view of J.H.E. the arguments for the complete exclusion of the lay-radiographer declined and as Larkin [14] commented, the radiologist could no longer base his expertise on the actual physical craft of x-ray production. However, there remained two

outstanding matters to be resolved from the radiologists point of view: 1. to prevent radiographers reporting and 2. to gain universal recognition of radiology as a discipline in its own right. As far as the latter was concerned, even towards the end of war, radiology, had not secured the position it sought for itself. Thurstan Holland [15], a leading radiologist was complaining of the absence of radiology from the undergraduate medical curriculum in an address at Liverpool University:

> "The time is rapidly approaching when this subject [the teaching of radiology] will have to be added to the curriculum, when the unfortunate student, already said to be overburdened with lectures, classes, and subjects , will have perforce to imbibe a certain amount of knowledge of x-ray diagnosis and treatment before he goes up for his final examination."

He was also keen to dispel the view that some people held about radiology.

> "There is a prevalent idea abroad that a radiologist is a mere photographer, and that any medical man can interpret radiographs. Never was there a greater mistake. The techniques of plate taking can be easily acquired by anyone; the more experienced one has become in the interpretation of radiographic findings the more conservative one becomes, and the more guarded in expressing dogmatic opinions."
>
> C. Thurstan Holland British Medical Journal (BMJ) 1917: 288

The Society of Radiographers - the end in sight!

Despite the difficulties experienced by radiologists they were beginning to organise and consolidate their position. Hernaman-Johnson [16], a leading radiologist and someone who was active in setting out the differences between radiologists and radiographers was most concerned about the latter setting themselves up as independent practitioners. His solution was threefold:

> "To organise and educate the various classes of lay helpers.
> To see that their status, remuneration and prospects are such as to make them contented.
> To educate the public as to why such people are at one and the same invaluable as helpers, and extraordinary dangerous when they seek to practise independently."
>
> Hernaman-Johnson, Archives of Radiology and Electrotherapy 1919:186

There must have been the assumption that radiologists had the right to organise other occupational groups but there was also a resignation that the plot had gone astray as Hernaman-Johnson also revealed in his paper:

> "We should welcome lay assistance, and seek to organise and guide it. It is too late in the day to make a mystery of taking plates but the interpretation is ours for ever."
>
> Hernaman-Johnson Archives of Radiology and Electrotherapy 1919: 187

Hernaman-Johnson could be described as the archetypal trade unionist or craft guild member whose destiny depended upon maintaining the 'mystery' of the trade and its protection by excluding all outsiders. Whether there is support for this view or not the control that Hernaman-Johnson sought was to come about within the next decade.

Hernaman-Johnson was the Secretary of the British Association of Radiology and Physiotherapy and it was that association that approached the Institute of Electrical Engineers on the subject of controlling the work of lay-radiographers. The result was the establishment of the Society of Radiographers in 1920. The make up of the first Council of the Society of Radiographers was reported in the *Archives of Radiology and Electrotherapy* [16] comprised 5 medical representatives from the British Association of Radiology and Physiotherapy, 6 electrical engineers and 6 radiographers from the London area.

One of the first tasks that the new Society set itself was draw up Articles of Association and apply to the Board of Trade for incorporation. The proposed articles were sent to the Board of Trade who in turn consulted other bodies including the General Medical Council (GMC). The GMC had no jurisdiction over radiographers but was concerned that medical practitioners, whom it did regulate, would receive reports and diagnoses from non-medically qualified personnel. The main concern was Article 23 and their advice was that it should be changed if incorporation was to be granted [4]. The Article, drawn up by Hernaman-Johnson stated that patients could only be accepted by non-medical members for radiographic, radioscopic or therapeutic work under the direction of a medical practitioner. The GMC's insistence was to insert two words, *'and supervision'* so that radiographic work was not only under the direction of medical practitioners but under their supervision as well. The GMC also requested that they be notified of any future changes to the Articles.

The terms radiologist and radiographer continued to be used interchangeably but The Society of Radiographers certainly through its medical members considered it had the 'legitimacy' to promote the difference between the medical and non medical radiographer. The Society's actions were reported in the Archives of Radiology and Electrotherapy [17].

> Formerly it was usual to refer to those medical practitioners who undertook X-ray work and allied work as "Radiographers" and to their non-medical assistants as "Lay Radiographers." Both terms are unfortunate, the former as giving a totally inadequate view of the knowledge required by a medical man who undertakes this class of work, while the second gives the impression of being invidious in its conception and dyslogistic in its application. It is now agreed by all concerned that the medical officers should be known as Radiologists and the qualified non-medical workers as radiographers."
>
> Anon. Archives of Radiology and Electrotherapy 1921

In 1923, the incoming President of the Society, Dr. Stanley Melville, was determined to consolidate the medical position. Society minutes refer to Melville's presidential address [18].

> "Dr. Melville asked the members, one and all to do their utmost to strengthen the Society, the interest of which, he had so, much at heart. He laid great stress on the importance that the radiographer should not in any way undertake the duties of a radiologist and so being discredited in the Society."
>
> Society of Radiographers (SoR) 1923

In the same year as Melville's address, the activities of Mr E. J. Barber, MSR of Finsbury Park, London came to the attention of the Council [19]. Exception was taken to a letter that Barber had written setting out his fees and services offered. Mr. Barber tried to appease the Society.

> "Dear Mr Secretary,
>
> I very much regret having transgressed the unwritten law in my letter of October last, I certainly do not wish to endanger the reputation of the Society in any way and as I am writing to ask you if the following advertisement, if inserted in Ask's Dental Magazine would be in order.
>
> Radiographs for profession only are taken by EWD Barber MSR, 7 Station Road, Finsbury Park, London, NW4. Tel Hornsey 2044. Particulars after the fees etc., may be obtained on application to Mr Barber.
>
> Yours faithfully
>
> Edw. J. Barber"

The offending letter set out Mr. Barber's fees had been circulated to medical practitioners to advertise his services.

"A finger, ten shillings and sixpence;

arm, leg, and head once side only, one guinea.

Leg (femur) - £1 . 11 shillings.

Pelvis, chest, kidneys, bladder, hip joint - two guineas.

Teeth one exposure - 10/6d; complete upper or lower, one guinea.

Barium meal complete, four guineas."

The letter concluded with the following paragraph.

> "You will notice that these fees are as low as hospital charges but I offer more facilities than a hospital, for example, I deliver films accompanied by reports next day and also patients may make appointments to suit their own convenience."

What was it that had caused the offence? On a copy of the offending letter that had come into the Society's possession someone had underlined the phrase 'accompanied by reports next day'.

Mr Barber's letter was written on the 3rd of January 1924, a week later, on the 10th, the Council of the Society considered a motion to the effect that if any member, other than a medical member, gave a report or diagnosis on any radiographic examination the member will be liable to dismissal from the Society [20]. The motion was not acceptable to the non-medical members and it was left to a Mr Blake, to propose an amendment to the effect that no member would provide a report except to a medical practitioner concerned with the case. The amendment was a concession in that information would no longer be given to patients but there was no intention to forego sending the findings of an examination to medical practitioners. On the other hand Blake's amendment was unacceptable to the medical members who considered that only a medical qualification gave competence to report.

The amendment was not carried and the meeting was adjourned. However, the medical position was strengthened when a resolution was made by the Council in April [21]:

> "The membership of the Society of Radiographers does not imply that the member is in possession of the necessary medical knowledge or training for the giving of diagnostic reports and that the responsibility for the diagnosis must rest with the medical man in charge of the case."
>
> SoR 1924

Following the stalemate on Blake's amendment the President received a letter from seven members of the Society who asked that a general meeting be called to put forward a motion that would forbid non-medically qualified members accepting patients for radiographic and radioscopic work except under the direction or supervision of a qualified medical practitioner.

Neither should any non-medical member make a report or diagnosis on any radiograph or screen examination. To do so would be deemed improper conduct and anyone found guilty of the charge would be dismissed from the Society.

The general meeting was called for May but it became clear that insufficient members would support the motion and one member thought that if a resolution was carried many members would resign. Mr AA Campbell Swinton, one of the founder members of the Society, proposed an amendment that seemed to offer a solution to the radiologists' problem. He proposed that it would not be a breach of the Society's Articles for a member to report provided that prior to the date of incorporation of the Society in 1920 the member was giving reports or diagnoses at the request of a qualified medical practitioner [22]. In support of the amendment there was a strong argument put forward that radiographers worked without radiologists and in many parts of the country where a radiologist only visited infrequently patients would be put at risk. One member who spoke at the meeting said he had 27 years experience of reporting but a radiologist member held the view it was never intended for radiographers to report otherwise provision would have been made in the syllabus in which there was none. However, by now, the pressure on the radiographers was beginning to tell. One of the radiographer members of council, Mr Blackall said that after much thought and reflection, the welfare of the Society as a whole must be considered before individuals and it was an unwritten law recognised by the members of the Society not to give reports. This must have been the same unwritten law mentioned by Mr Barber in his response to the Society when his practice was challenged. However, not all present were prepared capitulate and the existence of the 'unwritten law' was disputed by Mr Blake, who informed Council that when he sought membership of the Society he had submitted letters from doctors vouching his ability to report. Blake's view was that they were accepted by the Society and there was an expectation that radiographers would supply reports to those members of the medical profession who requested x-ray examinations. Nothing would shake the radiologists belief that reports by non-medical practitioners was bringing the Society into disrepute although there is no record within the Society minutes of any evidence brought forward to substantiate this position. The situation was further complicated by the Society's dependency on the British Institute of Radiology for financial support. The Institute, dominated by radiologists, did not support reporting by radiographers and as it nominated radiologists to the Society's Council it held a more than privileged position. It would have been surprising therefore if the Institute had adopted a stance other than trying to protect the medical position. Its view, made clear by one of its medical members, was that, "laymen had no right to report". Notwithstanding the bitter opposition by the electrical engineers Mr Blackall intimated that

the Society as a whole had to think carefully about its long term position. Campbell Swinton's amendment was lost.

The next meeting was in June and a position was reached that all could agree. The resolution stated [23]:

> "That no member (i.e. who is without the qualifications entitling him to practise in Great Britain and Ireland as a physician or surgeon) shall accept patients for radiographic, radioscopic, or therapeutic work except under the direction and supervision of a qualified medical practitioner, neither shall such member make any report or diagnosis on any radiograph or screen examination, and any breach of this regulation shall be deemed conduct unfitting the member guilty thereof to remain a member of the Society, provided that it shall be considered as acting contrary to the spirit of this rule for a member under special circumstances at the request of a medical practitioner in charge of the case and in the absence of a radiologist to describe to such medical practitioner the appearances seen in an x-ray examination to such an extent as may be necessary to assist in making a diagnosis."
>
> SoR 1924

There was a caveat to the resolution that stated:

> "this rule shall not apply to such existing members of the Society as have been employed in X-ray work for not less than 15 years, except so far as is covered by the rule as to working only under the direction and supervision of a qualified medical practitioner , the names of such members to be embodied in a schedule and entered on the minutes of the Society."
>
> SoR 1924

It was agreed to forward the resolution to the Board of Trade for inclusion in the Articles of Association. The Board again consulted the GMC for advice. The GMC objected even to radiographers of 15 years proven experience from giving reports. In due course a general meeting of the Society was called for 15 September 1925 [25]. The situation was deadlocked and Dr Melville, the President, informed the members present that they would have to decide the future of the Society and if the wishes of the GMC were not met then the medical members would resign. He also drew attention to the erroneous statement in a circular letter which had been issued by one of the members that the medical representatives had applied to the GMC for assistance. The President invited members to address the meeting and Mr Blake, a long time advocate of radiographer reporting, questioned the legality of the meeting and he wished to know on whose authority the meeting had been called. Blake, could

probably, see the end of his battle to preserve reporting and he suggested a that a suitable name for the Society should be that of a Society of Radiologist's Assistants. Mr. Ede, a council member spoke as a radiographer of 20 years standing, his comments are also recorded in the minutes and he stated that with the advances in radiology it was inevitable that radiographers must suffer.

The electrical engineers were diametrically opposed to submitting themselves to the GMC's wishes and were discussing the situation with the GMC via the Institute of Electrical Engineers but to no avail. The radiographers were put in an impossible situation, the pressure from the Board of Trade, the GMC and within from the Society's own medical members proved to be too great and the radiographers acquiesced. The electrical engineers, who had joined with the radiologists to form the Society, had fought against the restrictions from the start were not going to capitulate to medical pressure and withdrew from the Society. AA Campbell Swinton who had produced the first radiograph in Great Britain back in 1896 was therefore excluded from the Society he had helped to establish. With the resignation of the electrical engineers the field was clear for the articles of the Society to be amended to prohibit any non-medical member issuing reports. The dispute settled within the Society was one matter but whether or on not medical practitioners would cease to use radiographer's reports was another. Whether it was coincidental with the changes in the Society or not is unclear but an article entitled 'Radiology and Radiography' appeared in the BMJ [25] in November 1925. The intention of the article was to alert medical practitioners the risks of not using radiologists:

> "Medical practitioners are prohibited from associating with unqualified persons who may assume medical functions, but the General Medical Council has no other power of restraining the unauthorised activities of lay-diagnosticians and healers. It is therefore incumbent on medical practitioners, in the interests of their patients as well as for their own professional security, to see that the line between radiographers and radiologists is honourably observed".
>
> BMJ 1925:855

The Aftermath

The Society of Radiographers was instrumental in establishing the boundary between radiology and radiography and took its responsibility in restricting extremely seriously. This was evident from a special meeting of Council held in June 1932 [26]. A resolution passed by Council stated:

> That this Council has very carefully considered the facts of Mr. C. J. Dresser's case and is prepared to allow him to remain on the register of the Society

on condition that he desists immediately in the following practices about which complaints have constantly been received in the past.

The Society of Radiographers does not approve of advertising, but if done at all

(a) only lists of fees with no vulgar comments may be issued, and these only to be issued to the Medical Profession.

(b) that the “Hire of X-ray apparatus" leaflet be withdrawn. This is a particularly offensive and obnoxious document.

(c) that the words "Screen and Report" must not be merely cancelled in ink, but new forms issued so that no such words can be seen through the deleting agent.

(d) that no list of diseases treated be published.

(e) that nothing be said or done that is likely to lower the general tone of radiography, or the status of the Society of Radiographers.

In the event of Mr. C. J. Dresser not complying immediately and permanently with the above, the council considers that there can be no alternative but to remove his name at once from the register. The period of probation cannot exceed six months from the date of this resolution.

SoR 1932

The resolution was copied to the Medical Committee of the British Institute of Radiology, The British Medical Association, Newcastle upon Tyne, and three named doctors. There was no apparent evidence that it was copied to any radiographers leaving the conclusion that the Society’s priority was to do all, it could to please its medical masters.

Opportunities were not lost in consolidating the divide. In November 1930, Dr J Duncan White, later to become the first Melville Lecturer and President of the Society of Radiographers in 1943, delivered a paper [27] ‘Training in Radiography.’ He commented upon the comprehensive nature of the syllabus and could find no fault with it except for minor details. But he did go on to find ‘fault’ with training in some centres, which gave the impression that he did not see them as at all minor. He was critical of one centre teaching pathology which he thought was entirely unnecessary which he expressed as a:

“smattering of knowledge may lead to an expression of opinion as to possible variations from the normal.”

The 1930s brought about the Board of Registration of Medical Auxiliaries (BRMA). It was founded in 1936 by the British Medical Association (BMA) in conjunction with the Society of Apothecaries of London, the Society of Radiographers and the Chartered Society of

Physiotherapists. The BMA had taken a strong interest in 'medical auxiliaries' in 1928. The reason for their interest was stated by the BMA chairman who put it to members that they had to decide on the kind of register they were prepared to accept and what they were not prepared to tolerate unless imposed by Parliament. According to Larkin [14] radiologists were growing in strength and brought pressure to bear on the BMA so that it passed a resolution to the effect that only radiologists or properly qualified general practitioners should interpret x-ray films. The resolution served to exert further strong pressure on doctors to stop the practice of reporting by radiographers for fear of falling foul of the BMA. Medical control over radiography was now complete

In 1942, Dr (Major) J Duncan White was invited to became the President of the Society**.** Major White's views on training were set out in his Presidential Address delivered before the Society on January 9th 1943 [28]. In his Melville Lecture he had been critical of a centre teaching pathology which he thought was entirely unnecessary but in 1942, his view had changed. The chosen topic of his lecture was teamwork.

> "It is so obvious that, since radio-diagnosis, depends upon the radiograph, there must be real team-work between those who make the shadow picture and those who interpret it."

He emphasised the difference between radiologists and radiographers and recommended to radiographers the adage 'never try to appear what you are not".

CONCLUSION

In the space of the 16 years from 1909 to 1925 there were significant developments. In 1909, the view of the radiologist [7] who claimed that the person taking a radiograph and knowing the relative position of tube, patient and plate at the time of the exposure was the only one who could interpret it correctly did not survive until 1925. That view had lost its currency. The mystery was no longer that of 'making the plate' but of the interpretation of the 'plate.'

The division of labour and the occupational boundaries in x-ray work been settled around the question of 'who reports?' The cost was high with the electrical engineers, including Mr. AAC Swinton the first person to produce a radiograph in Britain, resigning from the Society of Radiographers. Perhaps the views of Furby [29] best summarise the position that evolved out of the early years:

> "The primary function of the radiographer is to be of utmost service to the radiologist.'
> "The function of the radiologist is the interpretation of the radiograph."

C.W. Furby *Radiography* 1944: **10:**10:9-10.

This view was not challenged until a Swinburne, a radiologist, uttered the unthinkable in 1972 [30]. Swinburne recognised the potential for radiographers and others to comment on images as a means of alleviating radiological work-loads and in the face of a chronic shortage of radiologists. A far cry from the 1920s but it set in motion a process of debate that would eventually lead to a return to plain film reporting by radiographers in the 1990s. The situation today is a reversal of the 1920s. There is no longer a debate about who should report but one of the standard and timeliness of reports. What would be wrong in aspiring to a standard of service offered by Mr. EJ Barber of Finnsbury Park in 1923?

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