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Editorial.

Apologies for the delay since the last issue of *The Invisible Light*. I was not well over the Christmas season and was not at my full level of energy last year. However I am gradually recovering my normal levels of energy.

The BSHR is having its usual presence at UKRC in Liverpool later this year. We have an excellent history session planned, and will have our usual stand at the technical exhibition. If you are able to spend a few hours helping with the stand that would be excellent. Please contact me with your availability.

As always I am interested in receiving papers on the history of radiology, so do please send them for *The Invisible Light*. There are two good submitted papers in this issue and I hope that you enjoy reading them. It's interesting to see the number of British references in the paper on the origins of the Hellenic Radiological Society.

The illustration on the front cover is one of the remarkable series of skiagrams (radiographs) taken by Charles Thurstan Holland in 1896, and which stimulated his interest in skeletal development.

Adrian

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THE FOUNDING OF THE HELLENIC RADIOLOGICAL SOCIETY

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Abstract

This article recounts the founding of the Hellenic Radiological Society, including information from the first elections of the Administrative Council of the newly formed society and later elections and Board meetings, up until 1980, as well as the first radiology conferences in Greece. Furthermore, the curriculi vitae of the founding members and the first Presidents of the Hellenic Radiological Society are reviewed.

Key-words: Hellenic Radiological Society, history, scientist

Introduction

Professor Wilhelm Conrad Roentgen (1845-1923) discovered and first used the term "X rays", utilizing the Greek letter X - the Greek mathematical symbol representing the unknown. His discovery was initially presented to the Institute of Physics at the University of Würzburg on December 28, 1895.

The first X-rays in Greece were taken in Athens in 1896 by Timoleon Argyropoulos, Professor of Physics at the National and Kapodistrian University of Athens. On February 20, 1896*, in the Laboratory of Experimental Physics of the University of Athens, in the Chemistry Institute on Solonos street, he was able to "photograph" bones on radiological plates which were first reproduced on a negative plate and then reprinted on a positive plate. K. Basias and K. Botsis were his assistants in this successful experiment (*It should be pointed out that the Gregorian calendar is used throughout most of Europe, while at the time the Julian calendar was still used in Greece. It wasn't until March 1, 1923 that Greece switched over to the Gregorian calendar, which means that 12 additional days must be added to European dates) [1].

The first X-ray machine brought to Greece was a mobile radiological unit which came to Greece from Great Britain. It was part of the medical supplies provided to the Greek Army by the British people for those injured in the Greek-Turkish War of 1897. The radiological unit, manufactured by the London Company Miller and Woods, was sent to Greece in 15 packages aboard the HMS Prince Crown. The unit's power supply was provided by generators charged aboard the HMS Rodney, which had docked in the port of Piraeus. Head of the medical team was Francis Charles Abbott, a surgeon at St Thomas' Hospital in London and a member of the Royal College of Surgeons. F.C. Abbott departed from London's Victoria Station on April 30, 1897, accompanied by Mrs Bedford- Fenwick (in charge of organizing the nursing staff) and Henry Alford Moffatt, a surgeon at Guy's Hospital. They arrived in Athens on May 4th of the same year. Robert Fox Symons, a surgeon at St Thomas' Hospital, was in charge of the X-ray unit [2].

The X-ray unit was housed in the Athenian suburb of Faliro, in a building granted for this purpose by Queen Olga. In a written report, F. C. Abbott $\kappa \alpha R$. F. Symons noted the fear Greek soldiers expressed when examination was required by this new machine, pointing out that the soldiers crossed themselves not only before but also during their examination, which lasted as long as 35 minutes. The patients' behaviour was due to fear because they considered the machine to be "the work of the Devil" [2, 3].

Abbott published a report based on his experience from Greco-Turkish War which was published in "The Lancet" in two issues, those of January 14 and 21, 1899 [4, 5]. The German Red Cross sent X-ray equipment to a military hospital in Istanbul. This was listed as one of the first times radiological equipment was used worldwide during times of war.

Two years later, in 1898, the first X-ray equipment was installed in hospitals in both Patras and Athens. The first was installed at the General Public Hospital of Patras as a donation from Andreas Kollas [6]. The second X-ray machine was installed in Athens' largest hospital, "Evangelismos" [7].

The Professor of Physics at the National and Kapodistrian University of Athens, Timoleon Argyropoulos, published the first foreign language article in France, which was presented on May 18th, 1896 at the French Academy of Science by the Academic A. Cornu and published in the weekly scientific journal "Comptes rendus Hebdomadaires des séances de l' Académie des Sciences" in the January-June 1896 issue, page 1119, and titled: "Observations sur les rayons X" Note de M. T. Argyropoulos présentée par M. A. Cornu. The following is noted in the publication: "En expérimentant avec différentes substances fluorescentes aux rayons X j' ai constaté que le platinocyanure de potassium et de sodium et aussi le platinocyanure de potassium et de lithium deviennent bien plus lumineux que celui de baryum. La fluorescence des premières était bien visible à une distance de 5m, tandis qu'avec la même intensité des rayons X le platinocyanure de baryum n'était visible qu'à une petite distance." [8, 9].

The first textbook of Radiology written in Greek was a monograph by the Professor of Engineering at the National and Kapodistrian University of Athens, Konstantinos Maltezos (1869-1951), entitled: "Cathode rays and new forms of radiation" (in Greek) published in 1897 by "Estia" Publications. It contained an introduction and three chapters, totaling 55 pages [9].

The Founding of the Hellenic Radiological Society

The political situation in Greece in the decade of the 1930's was unstable. Eleftherios Venizelos wanted to reform Greece, but the international financial crisis of 1929 and the defeat of his party in the elections of March 5, 1933. The new government formed by Panagis Tsaldaris annulled his plans. When the Great Depression broke out, the Greek State was already deep in debt and tried to avoid bankruptcy by taking stringent austerity measures and increasing taxation. The measures were fruitless,

commerce withered due to the severely reduced consumer buying power, wage reductions and social unrest. The Athens Stock Exchange closed until further notice and the Bank of Greece's reserves, in foreign currency and gold, evaporated due to profiteering. Imports decreased drastically and new foreign exchange policies had a heavy element of governmental intervention.

Greece's bankruptcy took place officially in May of 1932 with the declaration of cessation of payments by the government of Eleftherios Venizelos, as a result of the burgeoning foreign debt of the country due to the international financial crisis and the reduction in exports [10].

In August of 1936, Ioannis Metaxas (1871-1941) annulled democratic institutions and imposed a dictatorship, contrary to common opinion but without the most important political leaders of the country who, in the period between the World Wars, had died or been exiled (Eleftherios Venizelos [1864-1936], Panagis Tsaldaris [1868-1936], Alexandros Papanastasiou [1876-1936], Andreas Michalakopoulos [1875-1938]) [10].

It was during this time of economic crisis and political instability that the Hellenic Radiological Society was founded.

On September 20, 1933, at 7:00 in the evening, in the radiology laboratory of Athanasios Lambadaridis, at 8b Polytechneiou Street, Athens, Radiologists, Radiology Technicians and Electrical Inversion Therapists gathered and decided unanimously for the founding of a scientific society to be known as the "Hellenic Radiological Society". The Radiologists that were present and, hence, were the founding members of the society in alphabetical order were: Demetrios Vasilidis, Evangelos Vidalis, Andreas Georgakopoulos, Isidoros Gounaris, Panagiotis Grigoratos, Antonios Throuvalas, Christos Kalantidis, Manos Karzis, M. Kontopoulos, Georgios Kratsas, Michael Kiniras, Athanasios Lambadaridis, Panagiotis Lapatsanis, Joseph Kope, Stefanos Petrohilos, Takis Prapopoulos, Konstantinos Tsaggaris, Vagias Tsarouhas, Evangelia (Lia) Farmakidou, Felix-Eftyhios Hart [9,11,12]. A six member committee consisting of: Athanasios Lambadaridis, Stephanos Petrohilos, Felix-Eftyhios Hart, Konstantinos Tsaggaris, Panagiotis Grigoratos and Panagiotis Lapatsanis, was given the task of formulating the society's charter and its rapid submission to the full body of founding members for ratification (Fig. 1).

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FIGURE (1)

The proceedings of the founding of the H.R.S. on September 20, 1933.

Five days later, on September 25, 1933, at 7:00 in the evening, in the electrical inversion laboratory of Demetrios Vasilidis, at 3 Massalias street, Athens, the first General Assembly of the newly founded society took place for the election of the first Administrative Council. 17 of the 20 founding members were present, ratified the charter and elected: President: Demetrios Vasilidis, General Secretary: Athanasios Lambadaridis, Vice-President: Felix-Eftyhios Hart, Treasurer: Stephanos Petrohilos, Special Secretary: Isidoros Gounaris and Librarian: Evangelia (Lia) Farmakidou. In addition, they delegated to the General Secretary, Athanasios Lambadaridis, the initiation of the necessary procedures for the official governmental approval of the society's charter [13] (Fig. 2).

The charter consisted of 38 articles and was approved by the Court of first instance of Athens with its number 8266 decision of October 31, 1933 [9, 12].

As an aim of the Society, amongst others was: "the eternal legal protection of the practice of the "special" profession of the Radiologist under law 4333/17-08-1929 regarding the monitoring of medical specialties...". In article 27 of the Society's Charter, the basic functions of the Society are defined as scientific meetings, which are convened twice per month from November to May

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FIGURE (2) The proceedings of the 1st General Assembly of the H.R.S. on September 25, 1933. In article 29 the time allowed for case reports, demonstrations of equipment, presentations and lectures was limited to 10, 20 and 30 minutes repectively. In addition, in the same article, the time limit for discussion and rebuttal was also defined. In article 30 it was stated that presentations and abstracts that are destined for the minutes of the meetings were to be submitted at the end of each meeting. In article 35 the necessity was noted of both scientific and lay men's lectures in order to inform and educate the general public regarding the significance of timely radiological examinations and radiotherapeutic intervention. The final article mentions the Society's financial holdings which, in case of the Society's dissolution, would be turned over to another scientific society or to the Medical School of the National and Kapodistrian University of Athens [12,13].

The first seal of the newly formed Society was oval shaped with the year of founding and its seat in the centre and the name of the Society on the circumference (Fig. 3).



FIGURE (3) The first stamp of the H.R.S.

Demetrios Vasilidis, the first president of the Hellenic Radiological Society/ H.R.S., was an Internist-Neurologist, one of the first to work in the field of Radiology in Greece. He preferred, in accordance with his wishes, to be called: "Physician - Electric Inversion Therapist" [14]. According to his own reports, from 1904 and afterwards, he was occupied with the effects of X-rays on various manifestations of tuberculosis. His international papers included: "L' influence de l' eau prise à l' interieur" (1903), "La loi de l'aspiratin des gas" (1904), "De la colite interstitielle chronique causant de graves neurasthenies" (1905), "Le traitement des osteites et des arthritis tuberculeuses par les rayons X" (1906), "Le traitement de la pellade" (1906), "Le traitement de la calvitie et de la seborrée" (1906), "L'hypertrophie des amygdales est querissable par les rayons X" (1906), "Les courants de haute frequence" (1907), "Le myxoedème traité par l' électrotherapie" (1907), "Le traitement de la sclérodermie par les courants de H.F. et H.T." (1907), "Nouveau procedé de traitement radical du goltre exophthalmique" (1910), "Le traitement radicale de la myocardite chronique" (1912), "D' une pseudomyelite independante et de son traitement" (1912), "Le traitement rationel de vitiligo" (1912), "La zymotherapie" (1914). His Greek papers included: "Elements of Radiotherapy" (in Greek) (1908), "Panoramic Fluoroscopic network B" (in Greek) (1909), "The Therapy of Migraines" (in Greek) (1909), "The Energy Mechanism of Radium Rays" (in Greek) (1911), "High Frequency Currents (Physics Part)" (in Greek) (1913), "High Frequency Current Condensers" (in Greek) (1913), "Complex particles of X-rays" (in Greek) (1914), "Panoramic X-ray complex particle B" (in Greek) (1915) and "New Therapeutic Treatment for Pulmonary Tuberculosis" (in Greek) (1917) [15].

FIGURE (4) The cover of the book "A Method of Radical Therapy for Pulmonary Tuberculosis" (in Greek), 1923 edition, ESTIA publications.



In 1923 he published a book me the title: "A Method of Radical Therapy for Pulmonary Tuberculosis" (in Greek) (Fig. 4) in which he describes the pharmaceutical regimen, the physiotherapeutic regimen (radiotherapy, electric inversion therapy, electric hydrotherapy, hydrotherapy), the course, the effectiveness and prognosis of his applied therapy [15]. He founded "the first and best equipped laboratory in the East", according to his own statement in an advertisement for the laboratory as well as a Sanatorium of the same name in Kypseli, Athens, where he applied his therapies [14].

Athanasios Lambadaridis, the first General Secretary of the H.R.S., was a physician-Radiologist at the University of Cambridge, and a former cancer therapist at the Institute of Radium of the University of Paris [14]. He published the first scientific radiology journal in Greece, which was titled: "Cancer Report" (in Greek) (Fig. 5). The journal was in circulation from 1929 to 1932, was published every two months and contained abstracts and articles of his own as well as translations of articles, of specialised content for the time, of well-known University Professors and Directors of clinics in hospitals abroad. In addition to scientific matters, the "Cancer Report" published book reviews, news related to the foundation of Societies, as well as topics of practical medical interest. It is worthy of note that the "Cancer Report" was written exclusively by Athanasios Lambadaridis, and that quite early on one journal specialised in one disease, before such specificity reached today's extent, and indeed at a point in time in which therapeutic intervention was extremely limited [16,17]



FIGURE (5) The cover of the journal "Cancer Report" (in Greek).

At the General Assembly of November 26, 1933, which took place at Massalia Street in Athens, at the home of the president Demetrios Vasilidis, the following members of the Administrative Council were present: Demetrios Vasilidis, Athanasios Lambadaridis, Felix-Eftyhios Hart, Stephanos Petrohilos, Evangelos Vidalis, Isidoros Gounaris and Evangelia (Lia) Farmakidou. A decision was made to send immediately a letter to the specialized Radiologists in Greece, officially informing them as to the foundation of the H.R.S. In addition, the General Secretary, Athanasios Lambadaridis, was delegated the task of correspondence with the President of the IVth International Congress of Radiology which would take place in Zurich in 1934, and to send a communiqué entitled "The fight against cancer in Greece" (in Greek). Finally, it was decided to send copies of the members' published scientific papers to the Librarian, Evangelia (Lia) Farmakidou [13] (Fig. 6).

The death of the first president of the H.R.S., the second General Assembly and the historic meeting of the November 25, 1940

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FIGURE (6) The proceedings of the Administrative Council meeting of the H.R.S. on November 26, 1933.

In an emergency meeting on March 5, 1937, which took place in Athens, the tragic death of the first President of the H.R.S., Demetrios Vasilidis, was announced. The General Assembly decided unanimously: 1) to express the condolences of the members of the H.R.S. to the family members of the deceased, 2) to lay a wreath on behalf of the H.R.S., 3) Administrative Council and H.R.S. members to attend the funeral and 4) and to place a photograph of the deceased in the offices of the H.R.S. [13] (Fig. 7).

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FIGURE (7)

The proceedings of the Administrative Council meeting of the H.R.S. on March 5, 1937, announcing the death of the 1st President of the H.R.S., Demetrios Vasilidis. At the General Assembly meeting of January 31, 1939, at 7:30 p.m., at the offices of the Medical Council of Athens, at 18 Panepistimiou Street, elections were held. The results of those elections were: President: Felix-Eftyhios Hart, Vice-President: Panagiotis Grigoratos, General Secretary: S. Zoumpoulis, Treasurer: Stephanos Petrohilos, Special Secretary: Evangelia (Lia) Farmakidou, Librarian: Michael Kiniras, Advisors: Gaitanos, Lapatsanis, Kope and Vidalis [13].

The second President of the H.R.S., Professor Felix-Eftyhios Hart [18] (Fig. 8), was born on June 22, 1885 in Athens. His father was an Austrian merchant, born in 1857 in Czernowitz, a small town in the Austro-Hungarian Empire, which, with the refixing of the borders after the First World War, initially belonged to Romania and then to the Ukraine. His father married Katerina who was born in Munich and immigrated to Greece. In Athens the Hart family had two sons, Emile and Felix.

He started his schooling at the Italian School in Athens and continued at the Phanar Greek Orthodox College (known in Greek as the Great School of the Nation) in Constantinopolis. There the young Felix Hellenised his name to Eftyhios. Afterwards, he enrolled at the University of Paris from which he graduated in 1909, having completed his studies in Physics, Chemistry and Medicine. He returned to Athens and two years later, in 1911, he was awarded his Doctorate in Medicine, Surgery and Obstetrics from the National and Kapodistrian University of Athens. In 1913 he obtained his license to practice Medicine. When he returned to Athens, he became friends with the future Professor of the Surgical Clinic of Surgical and Topographical Anatomy, Konstantinos Merigas, and they travelled together to Erlangen, Germany. There they met the Gynaecologist Ludwig Seitz and his student Herman Wintz both of whom had worked from very early on with Radiology and Radiotherapy and welcomed Hart to train with them.

He returned to Greece and was conscripted as a reserve military assistant surgeon in the Medical Corps during the wars of 1912-1913, and served in the Military Hospitals in Larisa and Philippiada along with Konstantinos Mermigas. At the end of the war, he returned to Erlangen, completed the first cycle of his studies in Radiology and then moved to Vienna where he trained under the renowned Professor Guido Holzknecht. He returned to Athens and worked with Konstantinos Mermiga as a specialized Surgeon as well as Radiologist in the private surgical clinic in Aharnon street in Athens where he continued to work until 1916. From July to November of 1920 he served in the Navy, as a reserve military assistant surgeon. In July of 1921 he was placed aboard the Hospital ship Konstantinopolis, and then he was transferred to the Red Cross and sailed on the Greek Destroyer "Lemnos" to the Red Cross Hospital in Kordelio outside of Smyrna, where he stayed for approximately one year. There he met his future wife, Efrosini Soutsou, who worked in the same hospital as a volunteer nurse. During the duration of his stay in Kordelio, his father died suddenly. In August of 1921, he was promoted to lieutenant physician and in March of 1922, he was transferred to the Naval Hospital at the naval base.

On the 20th of December, 1922, he was appointed temporary specialist Physiotherapist - Physician at the "Andreas Syggros" Hospital of Cutaneous and Venereal Disease where he served until the 16th of October, 1924. There he taught lessons in Radiology and Physiotherapy to the fifth-year medical students of the University's Clinic of Dermatological Disease, which were the first official lessons in Radiology in Greece. At the same time he proceeded with his first lecture at the Medical Council of Athens on the January 28, 1923 on the subject: "Diagnostic and Therapeutic innovations in Radiology" (in Greek). He worked with "Near East Relief", an organization for the medical care of refugees, and this gave him the opportunity to cure a large number of children suffering from inflammatory mycosis and he came up with a new method, with which he cured four patients using an x-ray tube. Despite the primitivity of the apparatus and measurements with Holzknecht and Saboureau-Noir instruments of questionable accuracy, the results were significant. During this period of time when he served at the "Andreas Syggros" Hospital, in February, 1923, he published his book: "The evolution of Roentgen Ray Therapeutics" (in Greek) which consisted of approximately sixty pages, and which introduced systematic, indepth Radiotherapy to Greece; the founders of which were his teachers Seitz $\kappa \alpha I$ Wintz. In this volume, the knowledge regarding the biological effects of X-rays were methodically recorded and analysed.

In September of 1923 he went to Wiesbaden, in order to represent the University of Athens at the Radiology Congress there. At the Medical Society of Athens, in its meeting of the 10th of November he gave a lecture entitled: "Radiological differential diagnosis of osteochondritis deformans" (in Greek), using, for the first time in Greece, the term "differential diagnosis". In 1925 he was appointed Director of the Radiology Department of the 1st Internal Medicine Clinic of Professor Spyros Livieratos at the Athens Town Hall Hospital "Elpis", and he remained in this position until 1930. In 1925 he started his turbulent University career, which is synonymous with the history of the Department of Radiology. On January 16, 1925 he was appointed Reader in Physiotherapy with his main rival being a fellow Radiologist, Manos Karzis.

During the 1st Medical Congress of Thessalonica, from the 10th-12th of October, 1926, he spoke on the topic: "Surgical indications for peptic ulcers" (in Greek) and showed X-rays. At the same Congress, Athanasios Lampadaridis gave a lecture entitled: "Radium therapy of cancer of the tongue" (in Greek), S. Goritsas: "Radiological diagnosis of diseases of the gall bladder" (in Greek), V. Tsarouhas: "Radiographic diagnostic interpretation of pulmonary tuberculosis" (in Greek) and V. Nomikos: "Radiographic diagnosis and radiotherapy of peptic ulcer" (in Greek). In 1927 he became a member of the Hellenic Anthropologic Society and in 1928 a regular member of the Medicosurgical Society of Athens. The same year he went to Stockholm, to attend a Radiology Conference and in 1930 he went to Liege, to the 5th International Congress of Physiotherapy. In March of 1932 he was appointed Director of the newly-formed Radiology Department of the Athens Town Hall Hospital "Elpis", from which he resigned in July of 1936.

Starting in 1933 he taught post graduate Judges, Attorneys, Prosecutors and Police officers lessons in Technical Criminology at the School of Higher Penal Studies, which, with his own initiative, was founded by the Ministry of Justice. He collaborated with Professor K. Gardika and taught Physics, Chemistry, Mathematics, Graphometry, Graphics and Photography.

In 1935 he was appointed temporary Professor of Radiology and Physiotherapy in the temporary autonomous seat at the University of Athens, a position which was cancelled by the government that resulted from the coup d'état led by Georgios Kondylis. In the same year he published his abridged work "Radiodiagnostics" (in Greek). In 1937 he became a member of the Austrian Radiological Society. From 1938 to 1946 he taught the subject of Scientific Interrogation in the Police Academies. He was appointed Director of the Radiodiagnostics and Radiotherapeutic Department of the "Evangelismos" Hospital of Athens and remained Director of the Radiotherapy Department from 1943 until September of 1953. He served as Administrative and Scientific Director in the same hospital during the period of the Civil War (1946-1949).



FIGURE (8) The 2nd President of the H.R.S. and 1st Professor of Radiology at the National and Kapodistrian University of Athens, Felix-Eftyhios Hart.

Towards the end of the German Occupation the seat of Radiology at the University of Athens was created and he was appointed temporary autonomous Professor on April 1, 1944. He was removed by the law regarding catharsis of the University in June of 1945. In July he again took up his duties as temporary Professor and on October 9, 1948 he was promoted to Full Professor of the "temporary and autonomous" seat of Radiology and Physiotherapy, a position that he held until his death in 1954. In 1948 he was appointed Scientific Advisor of the Direction of the Criminological Services of the Ministry of Public Order and Director of the Radiology Laboratory. Until his death he served as President of the Scientific Council of the Ministry of Health and a member of Medical Specialties.

From the 15th to the 22th of July, 1950, he represented the University at the International Cancer Conference, in Paris, and afterwards he went to London for the presentations of the 6th International Conference of Radiology, where he also represented the University. His last published papers were: "The combined Hormonalroentgen therapy of the cancer of the prostate" and "The indirect roentgen therapy of the vernal catarrh of the eyes". He served as President of the Greek delegation at the 7th International Conference of Radiology, which took place in Copenhagen during August of 1953.

Upon his return from Copenhagen he lost his beloved daughter Ekaterini very suddenly. The loss of his daughter as well as long-time exposure to radiation proved detrimental to his health. The following year, in 1954, he travelled to Germany, where it was established that he was suffering from leukaemia. He returned to Greece and was admitted to "Evangelismos" Hospital. His mental clarity and sharpness remained intact until the end. The excavator, the researcher, the innovator, the teacher and

the first Professor of Radiology in Greece passed away in "Evangelismos" Hospital on September 20, 1954, at the age of 69. In 1955, his wife, Efrosini and son, Alexandros, donated his personal library consisting of 2,290 volumes, to the Medical School of the National and Kapodistrian University of Athens.

At the November 25, 1940 meeting, the Administrative Council of the H.R.S., with Greece's entrance into World War II, issued the following announcement: "The Administrative Council of the H.R.S., in accordance with article 18 of the Charter, has convened a special meeting, taking into account that it is the sacred duty of every Greek to aid "Mother" Greece to the fullest extent in the struggle for freedom and independence that has been forced upon her by the invader, has decided unanimously 1) to make available to the PanHellenic Social Welfare Collection, in its entirety, the small amount of the financial assets of the H.R.S., namely, 25.000 drachmae, with the exception of a small sum in the National Bank of Greece retained solely to maintain the account number 86383 which belongs to the H.R.S., 2) that this aforementioned amount be sent by means of a personal cheque to the President of the Government in order that the full amount to be utilized in the best possible manner, 3) to empower the President and Treasurer of the H.R.S. and to delegate to them the writing of a letter directed to the National Bank requesting from the Bank a cheque in name of the President of the Government, Metaxas Ioannis, and a guarantee to cover the sum".

Athens, November 25, 1940" [12, 13] (Fig. 9).



FIGURE (9) The proceedings of the historic Administrative Council meeting of the H.R.S. on November 25, 1940.



several years and took place after the liberation of Greece from German occupation. It took place on Sunday the May 13, 1945, from 10:00 a.m. to 1:00 p.m.at the offices of the Medical Council of Athens, at 18 Panepistimiou Street. Elections took place with the following results: President: Panagiotis Grigoratos, Vice-President: Konstantinos Tsaggaris, General Secretary: Stephanos Petrohilos, Treasurer: Vasilios Chronopoulos, Special Secretary: N. Kirkis, Librarian: Evangelia (Lia) Farmakidou, Advisors: K. Voudouris, Panagiotis Lapatsanis, Konstantinos Romantzis, Leonidas Stergiou [13].

The 1st Scientific Meeting of the H.R.S.

At the General Assembly that took place on Thursday, 5th of July, 1951 at 8:00 p.m. at the offices of the Medical Council of Athens, at 20 Panepistimiou Street, elections took place with the following results: President: Apostolos Giannakopoulos, Vice-President: Stephanos Petrohilos, General Secretary: Georgios Valavanis, Treasurer: Grigorios Pontifix, Special Secretary: Demetrios Giannakos, Librarian: Georgios Leventakos, Advisors: S. Zoumboulis, N. Michalakopoulos, A. Papapanos, K. Romantzis. In the meeting that followed, on the 13th of July, 1951, the Administrative Council decided to devote a portion of time at each meeting to a topic of general radiological interest. At the same meeting, the official title of the Society in English was designated as: "Hellenic Radiological Society" and it was decided upon the formulation of a permanent three-member committee for monitoring professional issues of the specialty. The first three-member committee consisted of S. Petrochilos, A. Papapanos and K. Romantzis [19].

At the first scientific meeting of the H.R.S., which took place on October 29, 1951, 18 years after its founding, the President of the Hellenic Radiological Society and second Professor of Radiology at the National and Kapodistrian University of Athens, Apostolos Giannakopoulos, emphasised during his opening speech amongst other things, the following:

"Dear Colleagues"

18 years after its founding, the Hellenic Radiological Society convenes its first scientific meeting today.

Greek Radiologists do not fall short of their other colleagues in offering scientific (medical) advice, the volumes of minutes of the Medical Society and other Societies, as well as the volumes of medical journals of our country and abroad, stand testament to that fact.

The meetings of our Society have the purpose of informing its members as to the latest achievements in Radiology and especially to support our younger colleagues enabling them to share the knowledge and experience of older members regarding the important topics in Radiology. The benefit to Greek Radiology will be great if we are able to make our Society a plantation for capable and well-trained Radiologists. The decisions of the Administrative Council and the actions which were taken on behalf of the scientific work of the Society:

1. The use of the Central Amphitheatre of the University for the scientific meetings of the Society was granted by the honourable Chancellor of the University of Athens, Mr. Moutousis, following our request.

2. The meetings of the Society will take place once per month and from October to June each year, on the third Thursday of every month.

3. During the meetings, aside from the presentations and lectures, lectures on topics of general interest will take place. Following these, discussions will take place. With extreme pleasure we would welcome any colleague to chose a topic, either from those announced or one of his own choice.

4. During certain meetings, abstracts of important papers published in the international radiological literature will be passed out. For this purpose the formation of a selection committee was decided which would work under our supervision. 5. The matter of the publication of abstracts of Greek papers aboard which has occupied the other Medical Societies for a long time, I believe we have solved in the best possible way for our Society. We have made a proposal to the renowned medical publication "Excepta Medica" to accept publications in the Radiology volume of Radiology abstracts which have been published in the journal of our Society and in the Greek medical literature in general. In order to achieve this, we will form a committee under our supervision for selecting publications which may be sent. In the aforementioned journal's September 12, 1951 letter to our Society, they informed us as to the acceptance of our proposal. As a result, colleagues who proceed with publications are requested to submit an abstract in German, English or French in order to facilitate the work of the committee.

6. Meetings in conjunction with other Societies are one of our aims.7. Initially, the organization of the first PanHellenic Radiology Congress has been decided for 1952.

8. Publication of the minutes of our Society, the "Report of the Hellenic Radiological Society" is being handled with by an already formed committee.

9. The membership fee for the Society has been set at 100,000 drachmae per annum and 100,000 drachmae registration fee, in contrast to 200 drachmae and 500 drachmae fees in the 1933 Charter of the Society.

And he finished his opening address by saying: I pronounce the opening of the Society's Congress on the day following the celebration of the anniversary of October 28, 1940, please rise and maintain a minute of silence in honour of the Greek Heroes" [20].

The second Professor of Radiology at the National and Kapodistrian University of Athens, Apostolos Giannakopoulos [21] (Fig. 10), was born in Lagadia in the region of Gortynia in 1909. He finished his secondary schooling in Athens and in 1925 enrolled the Medical School of the National and Kapodistrian University of Athens, from which he graduated "summa cum laude". He specialized in Radiology and Radiotherapy, in the Radiological Laboratory of the Athens Town Hall Hospital "Elpis", under Professor Felix-Eftyhios Hart. He served as Director of the Radiology Laboratory, in the same Hospital, from 1933 to 1938. In 1938, he was awarded his Ph.D. "summa cum laude" from the Medical School of the University of Athens with his dissertation: "Regarding Roentgen Ray projections with special methods for obtaining the dimensions of the heart and aorta", while at the same time he wrote: "Basic physical principals in the use of Roentgen ray therapy" (in Greek) and "Bronchography by the same method" (in Greek).



FIGURE (10)

The 2nd Professor of Radiology at the National and Kapodistrian University of Athens, Apostolos Giannakopoulos. In the two-year period from 1938 to 1939 he went to Germany where he did postgraduate training in Radiodiagnostics, Radiotherapy and Radiobiology, under Professors Holfelder, Winz and Berg. In 1942 he was elected unsalaried Reader in Radiology at the University of Athens, with his exceptional thesis: "Introduction to Radiobiology by personal experimental research" (in Greek).

From 1939 to 1943 he served as Director of the Radiological Laboratory of the Athens Town Hall Hospital "Elpis". From 1943 to 1945 he served as Director of the Radiodiagnostic Laboratory of "Evangelismos" Hospital. From 1945 until 1948 he served as Director of the Radiological Laboratory of the Research Centre of the Hospital of Chest Diseases.

The time period from 1938 until 1945 was his most proliferative. He trained many new Radiologists with whom he shared his knowledge but also the true spirit of this new specialty, founding the role and the importance of Radiology in the consciousness of the Greek Medical Community by carrying out research programmes, the results of which were doctoral theses and scientific publications. Through his scientific activity he was able to give Greek Radiology the characteristics of a medically "active specialty" in a short period of time. During the same period he wrote: "Tomography and other Radiodiagnostic methods of the lungs with special research and observations" (in Greek), a book which produced favourable critiques from renowned European as well as American Radiologists of the time and was characterized as "unique". The renowned French Radiologist Nadal, in a letter which described the reception of the book by the French Radiological Society: "...En France nous avons peu de publication sur ce sujet et la Societe d' Electroradiologie le President a fait l'eloge de vos travaux...". Dr. J. Belot, General Secretary of the journal "Journal de Radiologie et de Elektrologie" stated amongst other things: "Votre splendide ouvrage sur la Tomographie...J' ai prie un de nos collaborateurs de faire une analyse de votre ouvrage...". Dr. L. Delherm (President du Syndicat National des Medecines Elektro-radiologistes Qualifies) characterised the book: "...le magnifique volume fruit de vois immenses travaux sur la Tomographie". "Votre oeuvre qui vous fait tres grand honneur et honore aussi la science de votre Patrie...aussi beacoup la Notre". G. Thompon M.D. (Tuberculosis Consultant, World Health Organization) states about the book: "...It is indeed a most impressive volume and undoubtedly the best effort of its kind which has been produced up to the present in the medical literature of our time". In Greece, the book also produced enthusiastic reviews. Professor I. Georgiadis stated: "I consider your book an honour to Greek Medical science and especially to our specialty. You are worthy not only of congratulations, but of the gratitude of Greek physicians because..." (in Greek). Professor M. Geroulanos in reference stated: "In fact your unique and well researched book comprises an achievement in the Greek medical literature" (in Greek). Professor I. Katsaras characterized the book: "Your memorable work "Tomography", is an exceptional honour to you and to the Greek medical literature". Professor M. Georgopoulos stated: "Your book "Tomography" may be characterized as exceptional and unique to its kind and therefore an important achievement for the Greek medical literature and by right may hold a special place not only in the Greek medical literature but in the international as well, due to the small number and size of the existing books in this field".

In 1948 he was elected unsalaried temporary Professor of Radiology of the University of Athens. During the period from 1948 to 1955 he published a number of research studies (approximately fifty), as well as enriching the Greek medical literature with exceptional books. In 1952 he wrote: "The physiology of osteogenesis and the syndrome of bone atrophy with clinical cases" (in Greek). In 1955 he published his classic book: Radiodiagnosis Volume 1" (in Greek), the product of in-depth knowledge and personal experience in radiological study of the upper gastrointestinal tract.

In 1956 he went to Heidelberg and Erlangen in West Germany where, with the Professors Becker and Henning, he learned of advances in Radiotherapy and Nuclear Medicine. He carried out experimental research with Professors Scheer Kat Wachsmann, with which they demonstrated that the required time for the manifestation radiation damage to the skin depended on the total amount of the radiation dose and emphasized the importance of limited exposure while using radioactive substances. The results of the research achieved international acceptance and were cited by the most reputable international medical journals. Professor Becker, referring to the specific study, said: "...Seine Tätigkeit gab uns eine Reihe wertvoller Anregungen fur die Entwicklung neuer Bestrahlungsmethoden mit radioaktiven Isotopen".

In 1957 he was elected Permanent Professor of the temporary autonomous Chair of Radiology. In the same year, in the journal Acta Radiologica (Vol. 47, April 1957, fasc. 4), he published: "Über die unmöglichkeit einer schichtdarstellung pathologischer veränderungen anhand geometrischer untersuchungen". In 1959 he was elected Full Professor in the permanent chair of Radiology at the University of Athens. From 1957 he held the position of Director of the Laboratory of Radiology of the University of Athens at the "Aretaieion" Hospital and succeeded in five years to create a modern, fully equipped Radiology and Radiotherapy Institute in a newly constructed wing of the Hospital.

He was the Radiologist who, for the first time in Greece, taught systematic lessons in Radiology. The teaching of Professor A. Giannakopoulos was unsurpassed. He possessed deep knowledge of the science of Radiology and his lectures, in the amphitheatres where he presented the latest advances in Radiology, were always asphyxiatingly full, not by from students or new interns in Radiology, but by specialized Radiologists and physicians of other specialties. He was a shining intellect with thought that was characterised by important computive and analytical capabilities. He was also hard-working, studious, with penetrating, questioning thought and a source of energy to bring his scientific visions to completion. The research programmes which he directed during his Professorship resulted in the publication of multiple dissertations and scientific publications. The research programmes for polyplanar and transverse tomography, for the improvement of radiodiagnostic methods of examination of the peptic system, as well as for the improvement of radiotherapeutic methods, were of great importance.

Professor A. Giannakopoulos was removed from the Chair of Radiology and from the University by the dictatorship of 1967, turning over the University Department of Radiology at the "Aretaieion" Hospital with modern equipment worth tens of millions. With the return of democracy, in 1974, he was re-instated, but due to the age limit, he was awarded the title of Professor emeritus. He died in 1985. For Greek Radiology, Professor A. Giannakopoulos is considered the founder of the specialty, the leading Radiologist of his time and the scientist who honoured Greek Radiology and projected it internationally.

The Administrative Council of the H.R.S. from 1953 to 1980 and the first PanHellenic Radiological Congresses.

The General Assembly and elections of December 17, 1953, produced the following results: President: Isidoros Gounaris, Vice-President: V. Koutsogiannis, General Secretary: A. Kokkevis, Treasurer: K. Romantzis, Special Secretary: P. Georgakopoulos, Librarian: D. Staikos, Advisors: G. Vlavianos, G. Kratsas, K. Petropoulos, N. Georgiadis.

At the meeting of the General Assembly on June 15, 1954, it was decided unanimously to grant the title of Honorary President of the H.R.S. to the first Professor of Radiology at the National and Kapodistrian University of Athens, Felix-Eftyhios Hart, in honour of the many services he rendered to the science of Radiology and to grant him an honorary diploma.

At the Administrative Council meeting of September 20, 1954, the death of Professor Hart Felix-Eftyhios, Honorary President of the H.R.S. was announced [19]. The General Assembly and elections of January 18th, 1955, which were held at 7:00 p.m. in the central amphitheatre of the National and Kapodistrian University of Athens, produced the following results: President: A. Throuvalas, Vice-President: I. Kontodinas, General Secretary: M. Matsas, Treasurer: A. Georgousopoulos, Special Secretary: N. Georgiadis, Librarian: S. Benetatos, Advisors: P. Georgakopoulos, I. Papadimitiou, E. Farmakidou, I. Demagio. [19].

The General Assembly and elections of December 4th, 1957, which took place at 7:30 p.m. in the Amphitheatre of "Evangelismos" Hospital in Athens produced the following results: President: P. Grigoratos, Vice-President: N. Michalakopoulos, General Secretary: G. Valavanis, Treasurer: V. Christou, Special Secretary: I. Keleki, Librarian: G. Izamouras, Advisors: A. Giannakopoulos, L. Stergiou, S. Benetatos, D. Staikos [19]. The General Assembly and elections of March 1st, 1960, which took place at 8:00 p.m. in Athens, in the Amphitheatre of "Evangelismos" Hospital in Athens produced the following results: President: N. Michalakopoulos, Vice-President: L. Stergiou, General Secretary: S. Benetatos, Treasurer: V. Christou, Special Secretary: G. Bontos, Librarian: H. Perez, Advisors: G. Vlavianos, N. Kokkodis, G. Katrakis, A. Giokos, G. Tzamouranis. [22].

The General Assembly and elections of January 31th, 1972, produced the following results: President: D. Giannakos, Vice-President: G. Valavanis, General Secretary: V. Benakis, Treasurer: V. Triantaphyllou, Special Secretary: T. Kampouris, Members: G. Pontifix, M. Matsas, K. Papabasileiou, D. Androutsopoulos. [22].

The first PanHellenic Radiological Congress took place the same year, from April 14-16, 1972 in Athens. The minutes of the Congress were published one year later, in a hard-bound volume (Fig. 11). The Organisational Committee of the Congress comprised of: S. Kritikos (Honorary President), G. Pontifix (President), A. Christoforidis and D. Giannakos (Vice-Presidents), D. Kelekis, K. Papavasileiou and G. Prinos (General Secretaries), G. Brahliotis, T. Kampouris and K. Spyrou (Special Secretaries), D. Androutsopoulos (treasurer), G. Valavanis, A. Iliadis, P. Katsiotis, I. Konstantes, I. Kostarisis, L. Manuopoulou, M. Matsas, V. Benakis, S. Benetatos, V. Proimos, L. Stergiou, G. Tzamouranis, N. Halazonitis and V. Hatzigiannakis (Members). Worthy of mention was the Banquet Committee which consisted of: Mrs. Mata Pontifix, Helen Valavani, Kiki Giannakou, Sissy Kampouri, Ekaterini Keleki, M. Karamourtzouni, Ekaterini Matsa, Rena Benaki, Margarita Prinou, F. Proimos, Veta Spyrou and Elsa Stergiou.

The President of the 1st PanHellenic Congress of Radiology, Professor Grigorios Pontifix, gave an address during its celebrated opening. There was an address by the President of the European Union of Radiological Societies, the Professor of Radiology at the University of Leyden, Holland, J. R. Von Ronnen, an address by G. Merikas, Professor and Dean of the Medical Scool of the University of Athens, and finally an address by the Minister of Social Services, Mr. Bernaris



FIGURE (11) The proceedings of the first PanHellenic Radiological Congress, April 14-16, 1972, Athens.

During the Congress, there were 3 introductions by renowned international Professors, 4 round table discussions, 237 free scientific presentations, 9 cinematographic films with scientific content were projected and 2 films with technical content. 337 physicians of various specialties registered as regular members as well as 74 as associate members. The closing of the Congress was concluded with a summary speech with thanks by the President of the H.R.S. Reader Demetrios Giannakos, in which, amongst other things, he announced the repetition of the Congress every 2 years, as well as the unanimous decision that the 2nd PanHellenic Congress of Radiology would take place in April of 1974 in Thessaloniki, with the Professor of Radiology of the Aristotle University, Anthimos Christophoridis, as President [23]. The General Assembly and elections of the February 7, 1974, produced the following results: President: M. Matsas, Vice-president: S. Benetatos, General Secretary: N. Halazonitis, Treasurer: K. Spyrou, Special Secretary: Elias Lamprakos and P. Kyparissiadis, Advisors: K. Papavasileiou, P. Katsiotis, I. Konstantes, V. Benakis. [22]. The second PanHellenic Radiological Congress took place the same year in Thessaloniki from the 18th to the 21st of April (Fig. 12). The organizing committee consisted of: J.R. von Ronnen (Honorary President), A. Christoforidis (President), G. Pontifix (1st Vice-President), D. Giannakos (2nd \Vice-President), A. Vritsios (3rd Vice-President), A. Kouskouras (General Secretary), P. Apostolidis and L. Papadopoulos (Special Secretaries), G. Stamoulas (Treasurer), G. Tselepis, H. Koliakou, A. Pantoleon, X. Lavrentiadis, A. Leivadiotis, D. Doumas, P. Kotsaki, K. Sideropoulos, P. Pentzos, S. Efraimidis, I. Sofroniadis and K. Karantanis (Members) [23].

On February 18, 1976, the new Administrative Council convened in the office of the new President of the H.R.S., Papavasileiou Konstantinos, at 16 Massalias street in Athens, and consisted of: President K. Papavasileiou, Vice-President: V. Benakis, General Secretary: I. Konstantes, Treasurer: G. Tzamouranis, Special Secretary: A. Papanikolaou, L. Papadopoulos, Advisors: T. Arapis, A. Paftopoulos, I. Kokkinakis, A. Iliadis [22].

The General Assembly and elections of the February 7, 1978, produced the following results: President: V. Benakis, Vice-President: I. Konstantes, General Secretary: A. Iliadis, Treasurer: P. Kalogeorgas, Members: S. Maragoudakis, N. Throuvalas, V. Kosmaoglou, H. Spanos, Substitute Members: N. Xatziioannou, D. Kostouros, L. Vlahos, Special Secretaries: S. Trakadas, I. Pappi, Elective Committee: F. Angelakis, K. Zoulis, G. Pampouras [22].

On February 14, 1980, N. Throuvalas, G. Ktenas, F. Salaminos, V. Kosmaoglou, M. Tsakonas, A. Papanikolaou, K. Berrouka and P. Karageorgis were elected to the Administrative Council of the H.R.S. On February 22, 1980, the new Administrative Council convened in the office of the new President of the H.R.S., N. Throuvalas, in Athens [24].

The charter of the H.R.S. was modified in 1972, in 1983 and again in 1994 [25].



Summary.

"Everything changes". "And if this held true in the time of Herakleitos, to a large degree it holds true in the time of missiles and our trips in to space.". The epilogue of the speech regarding the role and place of the Radiologist in the various developing stages of the specialty, which was given on June 19, 1976 by the Reader of the National and Kapodistrian University of Athens, Isidoros Gounaris, founding member and the first Special Secretary of the H.R.S.

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18. Gerasimos Livadas. Felix Hart. The first teacher of Radiology in Greece. Hellenic Radiology 26 (1995):362-366 (in Greek).

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20. Paraskevi Papadaki. Hellenic Radiological Society. Meeting of October 29, 1951. Hellenic Radiology, 1997, 28(1):80-82 (in Greek).

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The Colyer Collection of First World War Dental Radiographs and Casts at the Hunterian Museum

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Abstract

The Colyer Collection of First World War dental radiographs and casts is a unique teaching resource with a fascinating history. The story of the radiographs illuminates the role of dental surgery and Sir J. Frank Colyer (1866-1954) in the treatment of maxillofacial injuries during this period.

Keywords

Odontological, Frank Colyer, Radiology, First World War, Hunterian Museum

The Odontological Collection of the Hunterian Museum at the Royal College of Surgeons of England contains a small but historically important collection of First World War radiographic images and dental casts from the Croydon War Hospital (1915-1919). As a specialist jaw injury institution, these diagnostic tools depict the condition of soldiers arriving in Croydon from the Continent with disfiguring fractures of the jaw. The history of this collection illuminates a picture of the place of dental surgery in the war era and of the significant contribution made by Sir J. Frank Colyer (1866-1954) to the treatment of traumatic jaw fractures. In revealing how these objects came to reside at the Royal College of Surgeons of England, we can understand more about the role of x-ray technology in the First World War, the development of treatment for jaw fractures, and encounter other celebrated figures of the era such as Sir Harold Gillies (1882-1960), Sir William Kelsey Fry (1889-1963) and Sir Charles Valadier (1873-1931). The injuries depicted in the radiographs and casts are some of the most traumatic which had yet been encountered by the surgeons of the early twentieth century. As a result of warfare fought mainly in the trenches, maxillofacial trauma became a hallmark of the Great War (1). These diagnostic objects show the battered faces of soldiers arriving home in Britain with un-united fractures often held in place by splints hastily constructed from salvaged metal (2). The collection is a testament to the challenges of secondary war surgery and the evolution of treatment which emerged as a result. The Colyer radiographs and dental casts can be seen as a crystallising point around which to consider the role of x-ray technology and the influence of Sir Frank Colver in the treatment of maxillofacial trauma in the First World War.

The collection

The collection of First World War material contains 23 glass-mounted copies of radiographic images and 14 dental casts of cases treated at the Croydon War Hospital between 1915 and 1919, after which the hospital was closed. In early radiography, the terms skiagraph and radiograph were used interchangeably although skiagraph refers to positive paper prints where dense substances appear dark taken from the original negative radiographs (3). These examples appear to be contact copies of the original images, likely commissioned by Colyer himself for reference use by the Croydon- based photography studio Howard M. King Limited (4). To the modern eye, the images are remarkable for their clarity and the detail demonstrated despite the relatively recent widespread adoption of x-ray

technology. The radiographs and casts are in themselves striking due to the severity of the injuries they show and the extent of the deficiencies suffered by the patients. In some cases, patient details such as name, rank, nature of injury and previous operations are recorded on the reverse of the plates. The radiographs show a wide range of injuries from bullet wounds (Fig. 1), to blunt trauma (Fig. 2) to complex shrapnel wounds (Fig.5). All the objects in the series have been described by Frank Colyer in his inter-war catalogue of the Odontological Collection (5).



Fig 1 Radiograph of a fractured jaw caused by a rifle bullet, 1915-1919. Bullet surgically removed from left molar region, radiograph taken 2 months after injury. (RCSOM/F 9.42). Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.



Fig 2 Radiograph of a fractured jaw resulting from a fall from a mast, 1915-1919. (RCSOM/F 8.3) Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.

Colyer and the Croydon War Hospital

The War Hospital at Croydon was established in 1915 under the Eastern Command with divisions to treat nerve conditions, ear disease, and joint and jaw injuries (6). As the war progressed, the hospital began to focus on the traumatic jaw injuries it was receiving from the Front, particularly mandibular fractures. These cases were treated in 'Division V' located in the Stanford Road School, built only two years previously in 1913 and almost immediately requisitioned by the War Office (7). This division was overseen by the Honorary Consultant Dental Surgeon J. Frank Colyer, who was also Dental Surgeon to the Charing Cross Hospital. By the outbreak of war, Colyer was already well established in his field, serving as the Dean of Royal Dental Hospital between 1904 and 1909 and from 1900 acting as the Honorary Curator of the Odontological Museum. In addition to his Croydon work, later in the war Colyer also acted in the capacity as Honorary Consultant to the Queen's Hospital in Sidcup, home to Sir Harold Gillies' famous Plastic and Jaw Injuries Unit. Gillies thanks Colyer in the introduction to his 1920 book, Plastic Surgery of the Face, and credits his influence with helping establish plastic surgery as a specialty (8).



Fig 3. Portrait of Sir James Frank Colyer, by Clarence White, c.1946. (RCSSC/P 54). Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.

Radiology in the First World War

The production of x-ray imaging and dental casts played a key role in the diagnosis of maxillofacial trauma injuries during the First World War. Although x-rays had only been discovered by Wilhelm Röntgen in 1895, already radiology was considered standard procedure for the assessment of dental injuries by the First World War. X-ray departments had been a central feature of many British hospitals such St. Bartholomew's, Guy's and St. Thomas's since 1897 (9). The Second Boer War (1889-1902) had already provided the opportunity for a limited experience of front-line maxillofacial surgery assisted by nine x-ray machines (10). By the First World War, radioaraphic equipment was available at many of the clearing stations and base hospitals near the Front as well as five supplemental mobile x-ray units (11). On the front lines, radiographs played a crucial part in identifying foreign bodies and preparing for surgery on compound fractures (12). Although field equipment for taking x-rays was available, it was designed mainly for chest and limb wounds and would have been difficult to adapt to complex jaw injuries. As field treatment focused on immediate life-saving care, x-rays were probably not used at the Front to plan facial surgery unless absolutely necessary. Two of the cases in the Odontological Collection show patients previously operated on in the line of evacuation to remove a bullet lodged in the head (13).

Despite working in a division established specifically for jaw fractures, Colyer had to do without the specialist x-ray equipment found by that point at most dental hospitals. It is notable that Colyer and his radiographer were able to obtain what are generally detailed images despite the lack of specialist equipment (14). The majority of the images are taken in an oblique lateral view, likely because this position would have caused the least distress to the patient during the still lengthy exposure time. In this view, the head is rotated to place the injured mandible close to the cassette and the neck extended so the mandible is not obscured by the shadow of the spine. Alongside radiographs, dental casts played an important role in this assessment of injuries entering the hospital. Sir Harold Gillies in his 1920 work Plastic Surgery of the Face similarly argued for the joint use of radiographs and plaster casts to diagnose facial injuries and plan reconstruction (15). Indeed Gillies used very similar radiographs to illustrate his work. Models of the mouth could be used to verify the nature of the injury, confirm the soft tissue loss, plan treatments and fit the wire splints used by dental surgeons of the time. With these images taken and assessed, the patient would be anaesthetized and moved into the theatre to reduce the fracture as far as possible.



Fig 4. The x-ray equipment at The Queen's Hospital, Sidcup, c. 1917-1920. The patient is shown ready for an oblique lateral image similar to those seen in the Colyer Collection. Courtesy of the Antony Wallace Archive at the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS)



Fig 5. Fracture of the jaw caused by shrapnel, August 1916. Note the visibility of the alua chambers. (RCSOM/F 9.2) Courtesv of the Hunterian Museum at the Royal College of Suraeons of England.

Jaw injuries at Croydon

In 1916, Colyer noted to the Royal Society of Medicine that the cases he encountered at the hospital were 'practically nothing but un-united fractures' (16). This conclusion is confirmed by the collection at the Royal College of Surgeons which shows entirely patients with fractured jaws, mainly as a result of gunshot wounds (17). As a result of the compound and comminuted nature of the injuries, the wound tracks through soft tissue would have often been contaminated by bone, tooth fragments, metallic remnants and clothing. Jaw injuries of this type were the main work for dental surgeons like Colyer as well as plastic surgeons like Gillies due to the nature of war and the weapons used. Fighting in the trenches, wounds were more likely to occur in the exposed head and neck areas. While steel helmets may have avoided some injuries, they resulted in an increased amount of facial wounds where bullets ricocheted (18). Of the 37 items in the collection, 32 show injuries from machine gun bullets, rifle bullets or shrapnel. The high velocity of bullets resulted in injuries which dental surgeons of the time had never previously encountered - large portions of soft tissue and bone were shot away (19), resulting in displaced fractures or worse, completely pulverised bone (Fig. 6).



Fig 6. Fracture of the jaw from a machinegun wound, 1915-1919. (RCSOM/F 9. 11) Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.

Shrapnel wounds are particularly complex with multiple entry and exit wounds and serious risk to the major blood vessels in the neck. Figure 5 shows a fracture of the jaw as a result of such a wound from August 1916 shows just how complex shrapnel injuries could be. The slightly difficult angle of the head in the radiographic image could be a result of difficulty in moving the neck as healing and scarring impaired movement.

The Croydon War Hospital Collection of radiographs and casts includes examples of the main types of jaw injuries encountered by Colyer and his colleagues at Croydon War Hospital. The vast majority show fractures, vertical, horizontal and comminuted, resulting from projectiles. Five of the cases demonstrate fractures caused by injuries sustained away from the trenches: a motorcycle accident, a fall from a mast, and a kick from a horse. The radiographs reveal the internal fragmentation of bone and the loss of teeth while the dental casts are particularly relevant for illustrating the resultant external displacement. As diagnostic tools, these specimens provide a direct perspective on the fragmented jaws of soldiers arriving at Croydon. In some it is possible to discern entry and exit points of bullets as well as observing the effects of the angle of entry on the displacement of the jaw. For example, Figure 6 of a fractured jaw resulting from a machine gun bullet shows the extreme comminution of the bone near the left canine where the bullet has exited and a vertical fracture near the right incisors where it entered the jaw. Colyer in his catalogue has taken care to document the location of bone fragments and their effects on displacement and occlusion. Many of the casts show typical gunshot displacement as the mandible swings inwards relative to the maxilla (20). The casts in the collection are particularly poignant for showing the muscular drag on the facial structure faced by front line surgeons whose primary goal would be to maintain open airways (Fig. 7).



Fig 7. Dental cast showing displacement of the fragments of the mandible following gunshot injury, 1915-1919. (RCSOM/F 9. 921) Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.

Removal of teeth in the fracture line

By the time the radiographs were taken at Croydon War Hospital, patients could have been injured for as long as a year, still suffering from these disfiguring fractures (21). Colyer was clear that saving the life of the patient should be considered before any surgical measure for fixing the jaw (22). Colyer would have been well aware that his second line work could not be compared to the trauma of first-line injuries where stopping bleeding and maintaining airways was a constant battle. However by feeding back his experience obtained using higher quality equipment to primary surgeons would have assisted in saving lives during immediate field treatment. Colyer believed that there were two essential reasons why he was faced with so many ununited fractures: want of rest for the patients and septic teeth at the fracture line (23).

The issue of whether or not teeth should be removed from the fracture line was a contentious one between the dental surgeons of the day. Colyer was adamant that teeth left on the fracture line would become septic and act as foreign bodies, delaying the process of union. He advised that the 'removal of those teeth should be undertaken straight away' at a special meeting of the Odontological section of the Royal Society of Medicine convened in 1916 specifically to address jaw fractures from the war (24). The collection at the College contains several images of patients being received by Colyer with just this condition. In Figure 2 premolar teeth can be seen holding apart the ramus and the mandible along the line of the fracture. In Figure 8, a molar tooth appears to be floating in the soft tissue as the bone has been shot away. Yet at the same meeting, William Herne of the No. 3 General Hospital in Wandsworth argued that the removal of teeth in a fracture, when treated early, was 'unnecessary.'(25). By the time W. Kelsey Fry wrote his Dental Treatment of Maxillo-Facial Injuries in 1942, the removal of teeth from the fracture line had become the accepted practice in many cases (26).



Fig 8. Radiograph of fracture of the jaw caused by a glancing shot from a rifle bullet, c.1917. (RCSOM/F 9.3) Courtesy of the Hunterian Museum at the Roval College of Surgeons of England.

Just as he was critical of teeth remaining in the fracture line, Colyer and his colleagues at Croydon Captain Holt and Sir Frederick Eve were unconvinced by the plating and wiring they were finding in the mouths of patients received from France. Although wiring and splint were crucial tools in treating jaw injuries, such measures performed too early could prove life-threatening. In his 'Treatment of Gunshot Injuries of the Jaws' article, Colyer recalls the case of a patient received from France with plating across a comminuted fracture which had become septic. Had the teeth been removed and an appropriate splint fitted, 'the man would have been fit for duty by the end of the year' (27). The retention of teeth in the line of fracture was Colyer's great burden but a belief firmly expounded by the dentist Sir Charles Valadier operating at the specialist jaw hospital in Wimereux, France. C. Bowdler

Henry recalled Colyer's displeasure at the cases he received at Croydon from Valadier's care in France (28), 'Colyer removed the splints, extracted doubtful teeth, treated the sepsis and prided himself that his treatment was sound and Valadier's unsound' (29). The dispute between Colyer and Valadier over teeth in the fracture line remained unresolved until the Second World War when the introduction of penicillin rendered the point largely moot (30). Despite any professional disagreements, the First World War was also an era of collaboration amongst specialties. Colyer, in his article, notes the steps a dental surgeon could take to address scar tissue in order to improve the results of plastic surgery where necessary (31). Writing in 1916, Colyer is almost certainly referring to Harold Gillies' pioneering work at Aldershot. Gillies himself acknowledged the necessity of close cooperation with dental surgeons to reconstruct the faces of the war injury, working in close collaboration with Kelsey Fry as his Chief Dental Surgeon (32). Colyer would later serve as an Honorary Consultant at the Queen's Hospital in Sidcup (33).

Colyer after Croydon.

For his efforts in the treatment of jaw injuries during the First World War, Frank Colyer was knighted in 1920 (34). At the Royal College of Surgeons, Colyer is remembered mainly for his fascination with comparative odontology as the curator of the Odontological Museum from 1900 until his death in 1954. Colyer later went on to publish John Hunter and Odontology as well as Variations and Diseases of the Teeth of Animals (1936). He served as a Trustee of the Hunterian Museum from 1945 to 1954, one of the few dental surgeons to do so (35). Although his dedication to the collection as well as the fields of dental pathology and history has been well-noted, his extensive involvement in treating the shattered jaws of First World War soldiers has been largely overlooked. The Colyer Collection is remarkable as a thoroughly documented record of secondary intervention in maxillofacial trauma. Using radiographs and dental cases like these, Colyer illustrated his 1916 article 'Treatment of Gunshot Injuries of the Jaw' in the Journal of the Royal Army Medical Corps.

Case study: Mandibular fracture from a rifle bullet (RCSOM/F 9.42)

Figure 1 of a mandibular fracture caused by a gunshot wound serves well as an example of the interesting perspective which the images provide, while also highlighting the need for further research. The injury shown in this radiograph demonstrates the complications generated by the shattering of the mandible and retained metallic fragments. Dark areas in the region of the chin demonstrate the presence of foreign material within the soft tissue. The image shows a distally inclined un-erupted lower premolar which has become impacted against the mesial roots of the first molar. This impaction is in one of the lines of fracture, and yet it is doubtful a surgeon would attempt such an extraction unless absolutely necessary; a luxury hardly available to either front line surgeons or even secondary practitioners receiving high volumes of injured soldiers. The radiograph also seems to show a maxillary plate placed to stabilise the mandibular fragments. From the documentation we know that the patient underwent an operation early in the line of evacuation to extract the bullet from the left molar region, and it appears a metal splint has been wrapped around the mandibular teeth to support the fracture. Later in his treatment a more sophisticated splint could have been fitted (as in Figure 9) however it is likely that the arch-bars and wires were the best solution available to the primary surgeon dealing with a life-threatening facial wound.



Fig 9. Fracture of the jaw caused by a rifle bullet, 1915-1919. Note the molar tooth in the fracture line. (RCSOM/F 9.43) Courtesy of the Hunterian Museum at the Royal College of Surgeons of England.

Conclusion.

While most donations to the Odontological Collection are recorded in the acquisition register no mention of the radiographs and casts haves been identified. It is unknown whether Colyer gave these examples of his Croydon cases shortly or long after the war had finished. Perhaps Colyer himself did not feel they were of note, being quite different from the rare animal specimens usually donated under his name. The Centenary of the First World War has presented an opportunity to remember Colyer's contribution not only to the collection but also to the treatment of war injuries. The Colyer Collection offers a wide range of research potentials for historians of science, technology and medicine, radiologists, dental surgeons and those with an interest in war surgery. In light of the centenary it seems appropriate to note the historic relevance of the collection; however it should be noted that these images are still valuable teaching purposes.

To make an appointment to view the specimens, please contact the Hunterian Museum: <u>museums@rcseng.ac.uk</u>.

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