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Florence Ada Stoney: Formidable Feminism in the History of Radiology.

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Introduction:

Historically women have always played an integral role in medicine. However, a gender gap between men and women practicing medicine, has always been evident (Jefferson, Bloor, and Maynard, 2015; Platoni *et al,* 2018). Midwifery is an excellent example of this. Traditionally it was an unregulated profession centred around women, caring for women (Barnawi, Richter and Habib, 2013). Jefferson, Bloor, and Maynard (2015) reflected that after the introduction of obstetric forceps in the 17th century, male practitioners were increasingly tempted into pursuing careers in obstetrics. This was partly because only members of the all-male Barber Surgeon Guild were allowed to practice with surgical instruments (Sheikh, Ganesaratnam and Jan, 2013). This led to a reduction in the traditional female midwifery figures within communities. And so to demonstrate this proposed gender gap; women with years of experience both as practitioners, and quite often having experienced childbirth themselves were frozen out, in favour of male practitioners. This was evidenced by Jefferson, Bloor, and Maynard (2015), who concluded that due to the social status of a medically trained man, it became 'fashionable' to have an obstetrician attend to you in labour, over a female midwife with no formal qualifications.

Despite several of the first Radiological Practitioners being women (Thomas, 2022), Radiology is and historically has been dominated by a male workforce (Hardy, 2017). Gender disparity is an ongoing concern in Radiology (DeBenedictis, 2019). Weigel, Kubik-Huch, and Gebhard (2019) stated that there is a distinct lack of women involved with Radiology Academia, resulting in a lack of female role models for aspiring Radiologists and Radiographers alike. Weigel, Kubik-Huch, and Gebhard (2019) also argued that it is the lack of female role models in Radiology, that negatively affects the career choices of young women in medicine, widening the gender gap that already exists. Although it could be disputed that this is not a worldwide issue, it is commonly recognised that globally, women are underrepresented in medicine, and in particular, Radiology (Cater *et al,* 2018). There are also multiple studies which explore the issue of gender disparity in Radiology across different countries in the World (Lim, Gupta, and Mandel, 2022; Hamidizadeh *et al,* 2018; Zener *et al,* 2015). Grimm *et al* (2017) explored differing motivations for pursuing a career in Radiology according to gender. In their study Grimm *et al* (2017) stated that unfavourable working hours and working conditions both negatively affected women considering Radiology as their chosen career path. Furthermore, a study by Magnavita (2013) explored the mental health of female and male Radiologists. Magnavita (2013) reflected in her findings that female Radiologists suffered greater stress levels than their male counterparts. Although this study was focussed on Radiologists based in Italy, it is important for demonstrating that gender disparity exists within the job role itself, as well as recruitment into said posts.

Despite these common trends, Jefferson, Bloor, and Maynard (2015) and Shannon *et al* (2019) argued in their research that the UK medical workforce was undergoing 'feminisation', with many medical students now being female. This was echoed by Moberly (2018), who produced statistics highlighting the increase in women attending medical school over the last decade. However despite this, as of 2019, only 30% of members of the European Society of Radiology were women (Kubik-Huch *et al*, 2019). Interestingly, a review by Jackson (2022) of 'Invisible Light: The Remarkable Story of Radiology' by Adrian Thomas, criticised illustrations used for being "stale, pale and male". Jackson (2022) reflected that a potential reader viewing these illustrations may be mistaken for

believing women have not contributed to the success of Radiology or play a part in its future. In a stark contrast, the opposite can be said of practicing Radiographers. According to statistics published by the Health and Care Professions Council, as of 2019, there were 26,059 female Radiographers, compared to 8480 male Radiographers registered in the United Kingdom (HCPC, 2019).
Despite this modern-day dilemma, women have played an integral role in the discoveries and developments in Radiology. The lives and achievements of women such as Kitty Clark, Marie Curie and Edith Quimby are all well documented and celebrated (DeBenedictis, 2019). However, the life and career of the less well-known Florence Stoney, is also one to be admired (Thomas, 2003). Even her obituary in the British Medical Journal (Watson Smith, 1932) described the great regret that not more honour was bestowed upon her during her life, given all that she had contributed to her profession**.** Her resilience and determination to fight against the inequalities she faced due to her gender make her an incredible role model, not only for women, but for all embarking on a career in Medicine and Healthcare.

Childhood in Ireland and Education:

Florence Ada Stoney was born into a distinguished family on the 4th of February 1870, in Dublin, Ireland. Florence's father, George Johnstone Stoney, was a Mathematical Physicist and a Fellow of the Royal Society (Thomas and Duck, 2020). George Stoney was a pioneer within his own field (Duck, 2014). It would be fair to remark that George Stoney was a modern thinking man. Throughout his life, he was an advocate for women's rights to Higher Education in Ireland. He actively encouraged his daughters to take an interest in education, science, and innovation (Duck, 2014). As Thomas and Duck (2020) reflected in their biography of the Stoney family, this was highly unusual for the era. This was echoed by Kelly (2010) who remarked that a woman studying was deemed a 'waste' in the 19th century. Women were not expected to engage with higher education, let alone embark on a career. The consensus was still that a woman would marry, have children, and run a household. Crossman (2017) debated this and highlighted that some women could choose to have a career, but the choices were limited to jobs as nurses, schoolmistresses, or workhouse matrons. It could be argued that there was an increased difficulty to have a career as a middle to upper-class woman, as lower-class women were already contributing to the economy, working within Britain's ever growing textile trade; thanks to the Industrial Revolution (Braybon, 1981). After The Education Act was introduced in 1870, working class women could work their way into jobs as teachers. Braybon and Summerfield (2012) remarked that this rendered the job 'dead-end' and not worthy of someone with class and status, limiting women of higher society even further.

Life in Ireland during the late 19th century was tough. The country was striving for independence and trying to establish its own identity (Graham and Hood, 1998). Female rights were not a priority on the agenda. Conley (1995) described how women were viewed as delicate, and incapable of achieving anything without the supervision of men. Conley (1995) also highlighted that this was a widely accepted opinion during the Victorian Era, and women were expected to be content with a life of submission and obedience. Dyhouse (1998) echoed this in her work, suggesting that women having passions did not reconcile with Victorian and Edwardian ideals. It is certainly no surprise then, considering the chauvinistic attitudes of the era, that women did not dare to pursue their ambitions (Kelly, 2014; Sharma, 2021).

Florence, along with her sister Edith, were privately educated at home, before continuing their education at The Royal College of Science in Dublin. Despite the social reservations at the time, Florence moved to London to study Medicine. This was a necessary move, as women were not permitted to study medicine in Ireland at the time (Thomas and Banerjee, 2013). The London School of Medicine for Women was highly unique, offering medical education to female only

intakes (Thomas and Duck, 2020). There were still many arguments about women studying medicine. Kelly (2014) reflected in her research, that the common consensus was that women were not needed in medicine. Kelly (2014) remarked that it was believed an influx of female doctors would cause an unbalance in a male dominated profession, that was already deemed to be successful, without a need for any change.
During Florence's time as a student, the dean of the institute was Dr Elizabeth Garrett Anderson- the first woman in Britain to obtain legal qualifications in medicine and surgery (Thomas and Banerjee, 2013). Thomas and Banerjee (2013) reflected that this would no doubt have been inspirational to Florence, and highlighted to her what she could achieve in her own career. During her time as a student Florence excelled, won many prizes, and eventually qualified at the top of her class (Sharma, 2021).

Florence was successful in obtaining her Bachelor of Medicine and Surgery with Honours degree from the London School of Medicine for Women in 1895, just as Wilhelm Roentgen made his remarkable discovery of X-rays (Thomas and Banerjee, 2013). Unbeknown to all, it would be the start of a new age of discovery in medicine. In 1897, 'The X-ray Society' was founded, with an aim of bringing together all those who were interested in the study of 'Roentgen Rays' (Thomas, 2022). This new society would later amalgamate with the British Association of the Advancement of Radiology and Physiotherapy (BARP) to form the British Institute of Radiology in 1924 (BIR, 2023).

Early Career and Exposure to Radiology:

During her studies, Florence excelled at anatomy (Sharma, 2021). After qualifying, she had several small posts, including a House Surgeon position in Hull, and as an Assistant Anaesthetist at the Royal Free Hospital (Guy, 2013). However she returned to her roots in 1899 and took up post as an anatomy demonstrator at the London School of Medicine for Women, following in the footsteps of the women who had inspired her during her own studies. Florence had a keen interest in female health and used her role as a demonstrator to further her knowledge and understanding of female anatomy and pathology (Thomas and Duck 2020). However Florence would yet again face impossibilities due to her gender. Florence aspired to join the academic team, and further her career as an anatomist. However, her application was denied, as women were not permitted to formally teach medicine at the institute (Sharma, 2021). This was surprising given the uniqueness of the institute, and the female driving forces, to which its success could mostly be credited (Guy, 2013).

In 1901, Florence was appointed to the post of Medical Electrician at the Royal Free Hospital. Guy (2002) summarised that clinicians working in early Radiology services were known as Medical Electrician, Medical Photographer, or Honorary Medical Radiographer. It was not until the 1920s, that the role of the Radiographer as we know it to be today, really took shape, and the clinicians involved in imaging adopted their new title of Radiologist (Guy, 2002). Florence worked alongside her sister Edith to establish the X-Ray department. Edith was, by this time, working as a physics lecturer, and had helped introduce physics into the curriculum for medical students (Roth, 2023). Alongside their active parts in the Women's Movement, Florence and Edith selected, purchased, and installed X-Ray equipment into the department (Duck, 2014). As reflected by Thomas (2022), acquiring equipment, and setting up an X-ray department was straightforward, and by the Easter that followed, the new service was up and running (Roth, 2023). Using the equipment to obtain diagnostic images was less straightforward however, and practitioners required skills in photography and electricity with a sound knowledge of anatomy (Thomas, 2022).

Florence eventually moved on to become the head of the Electrical Department at the New Hospital for Women (Duck, 2014). She also set up her own private practice in the prestigious Harley Street. Duck (2014) reflected that it was during this time that Florence continued to develop her skills in

Radiology, and Electrotherapy, and began to use X-rays to treat conditions such as uterine fibroids - combining her passion for medical imaging, and female health.

In 1914, just before the outbreak of the First World War, Florence travelled to America to observe how Radiology services were developing abroad (Duck, 2014). Florence later commented at how refreshing her travels to America were. She found the medical staff extremely helpful and commented "I found the doctors in America, both in the hospitals and in private, very ready to allow me to see the work in their departments- medical women not being kept out of everything so much as in England" (BIR, 2023). Florence returned from America, bringing with her a new Coolidge tube. This type of X-ray tube was much more powerful than any used previously, but was easier to regulate (Guy, 2013). So much so, that all modern X-ray tubes are variants of this design (Thomas, 2022). As Duck (2014) summarised, Florence was the first clinician to begin using this new and advanced equipment in England, once again becoming a forerunner in pioneering new ideas in British medicine.

Women at War:

On the 28th of July 1914, hostilities in Europe led to the outbreak of war. The war quickly resulted in high levels of unemployment. For the first time in history, the position of women in society was considered detrimental for ensuring the upkeep of the economy, and in turn, achieving success on the battlefield (Braybon, 1981). At the time, there were insufficient numbers of military hospitals to meet with the demands of the conflict. The armed forces became reliant upon voluntary hospitals (Guy, 2013). Despite the early insufficiencies, the British military medical provision was strong, with over 82 percent of injured soldiers returned to the front line after an initial injury (Carden-Coyne, 2014). The war was an opportune moment for women to strengthen their independence and further their fight for more rights. As stated by Leneman (1994), it was an opportunity for women to prove themselves in a man's world. By the close of the Great War around one-fifth of female doctors in Britain had undertaken medical work both at home and abroad, during the conflict (Crawford, 2006).

Britain declared war on Germany, on the 4th of August 1914. Guy (2002) surmised that the war resulted in medical developments being brought to a pause in England. However, it could also be argued that the war allowed female practitioners to further their knowledge and earn accolades amongst their male counterparts. The War Office advertised for 'Military Radiographers' to assist in the conflict. Duck (2020) reflected that the advertised salary was £200 per annum, highlighting the skill required to fulfil such a role. At the outbreak of the war, Florence already had 13 years' experience in Radiology (Thomas and Duck, 2019).
The very day the war with Germany was declared, Florence, along with her sister Edith, presented at the War Office in London, to volunteer their services to the British Red Cross. The sisters were keen to provide a Radiology service to aid troops fighting in Europe (Duck, 2014). Once again, misogyny would prevail. Even at a time of great need, Florence and Edith's offer was rejected, purely because of their gender. Moore (2022) described how women were told to 'go home, and sit still' in the face of war, rather than volunteering to help. This was echoed by Thomas (2022), who reflected that the War Office felt they needed to protect women from the horrors unfolding in Europe. Moore (2022) also reflected that despite women having the exact same medical qualifications as their male colleagues, they were not viewed as equals. It was still classed as taboo for a woman to treat a male patient, highlighting the consensus that women were inferior to men. Thomas (2022) also debated this, stating that there was almost a fear about women gaining equality with men, which could be true for any aspect of society at the time, including Politics and the Law.

However, the conflict of the Great War created an environment in which Florence's knowledge and skills became widely needed (Thomas and Duck, 2013), and as reflected by Castelow (2015), ideals

about who could participate in the war effort soon changed. Leneman (1994) reflected that suddenly the consensus changed, and women were actively encouraged to train in medicine to assist with the war effort. Pressure from women for their own recognised uniformed service to join the war effort began shortly after its commencement (IWM, 2023). This was also echoed by Shipton (2023), who reflected that a small but significant number of women, rebelled against gender division to actively seek prominent roles within the Armed Forces. By the end of the war, over 200,000 women were in uniformed roles, serving their country (Gritkis, 2013). Interestingly, to highlight the lack of recognition given to these women, Braybon (1981) described how social propaganda in 1918 painted a picture of great appreciation for women at the time, and yet the truth was very different. Braybon (1981) reflected in her research that after the war, the opinion of the surviving male population regarding women, remained the same as it had been before the war. Shipton (2023) also summarised that despite the statistics, many historical accounts still only focus on women in the role of a nurse or working in administration as part of the war effort- not fighting in battle on the frontline.

Despite the rejection, Florence was undeterred. Shipton (2023) reflected that female doctors began to form their own field hospitals and ran them on a voluntary basis. Florence went on to become the Medical Lead at a unit founded by the Women's Imperial Service (Duck, 2014). This fully female team established a 100-bed field hospital in Antwerp. In her own pieces of reflective writing in 1915, Florence remarked on the tough environment she found herself working in during the war. Her team was made up of six female doctors, ten nurses, and several female orderlies. After just two weeks in Antwerp, the team had dealt with over 200 cases of injured soldiers, mostly brought directly from the trenches. Florence described the harrowing scenes, and conditions; including spending eighteen hours under shell fire and trying to run the field hospital with no water and very limited supplies (Stoney, 1915). Duck (2014) reflected that Florence demonstrated amazing clinical skills and expertise in extremely dangerous circumstances throughout her war career.

As the Germans advanced Florence and her team were forced to leave Antwerp (Duck, 2014). Florence would later describe the road out of Antwerp as "a sad procession of fleeing peasants, troops, cattle, guns, wagons, children, and carts, all moving in the same direction as rapidly as possible" (Thomas and Banerjee, 2013). The bridge used to escape Antwerp was bombed, a mere twenty minutes after Florence had fled (Thomas and Banerjee, 2013). The group were then invited to set up base in Cherbourg by the British Red Cross (Thomas and Banerjee, 2013), the very organisation who had earlier rejected Florence and Edith's offer of their skill and expertise. It is this very expertise, as well as the bravery demonstrated by Florence that make her stand out as a pioneer of her time (Duck, 2014).
In Cherbourg, Florence was named 'Radiographer and Head of Staff', working hard to transform a disused chateau, into a modern military hospital (Thomas and Banerjee, 2013). There were many difficulties for the team to overcome. In the diary of Doctor and Surgeon Mabel Ramsay, (who worked alongside Florence) she described the following issues encountered by the team in Cherbourg:

> *"1. Only one tap of water in the kitchen to supply 150 people.*
> *2. All drinking water had to be fetched by hand.*
> *3. Sanitation very primitive and earth closets had to be built.*
> *4. The turbine engine for electric lighting was out of order and had to be made to work."*
> (Ramsay, 1920).

Florence returned to London in 1915 (Duck, 2014). London was dominated by the conflict, with much of the war effort being organised within the Capital (White, 2014). Florence was one of the first women in Britain to be recruited by the War Office and was appointed as Head of Radiology at Fulham Military Hospital (Duck 2014). The hospital had a 1000 bed capacity and was busy in its

efforts to treat the wounded and return them to the battlefield. Florence's extensive anatomical knowledge and clinical experience proved useful for surgeons with the localisation of bullets and shrapnel within wounds (Thomas, 2003). Thomas (2003) also summarised that Florence was able to identify bony sequestrum, which helped aid the treatment of many wounded soldiers, saving many lives. Florence later credited her time as an anatomy demonstrator with being a great help in her success as a Radiologist (Thomas, 2022). Florence was awarded an OBE in 1919 for her service to the country during the war (Sharma, 2021). She also earned many accolades for her military service, and was awarded the 1914 Star, the British War Medal, the Victory Medal, and the British Red Cross Medal (Thomas and Banerjee, 2013).

Rebuild and Recover: Life After the Great War

The war was declared over on the 11th of November 1918, and the rocky transition back to normality post war for Britain began (Beaumont, 2021). Life for women after the war would be very different, for many reasons (Braybon, 1981). Many women found themselves widowed, or even childless- with generations of families wiped out during the bloodiest conflict seen for centuries (Braybon, 1981). Male security was considered a main priority in the rebuilding of the country, but as Braybon (1981) reflected, it quickly became evident that the role women had carved out for themselves during the war would need to remain, if the country was ever going to rebuild and recover.

There are differing opinions on how the war shaped the future for women in Britain. Braybon (1981) surmised that although some literature reflects on how the war pushed forward the women's rights movement in Britain, other literature argues the war resulted in a watershed in women's history. It could be argued that both points apply, and that whilst women's rights increased significantly after the war, the cause was not for women themselves, but rather a concern for the economic growth of a battered Britain. This was also debated by Leneman (1994) who reflected that it took another war to break out, before medical women gained commissioned rank in the British Army.

After the war Florence was awarded the Radiological Examination Diploma, which had recently been created, as well an Honorary Degree from the University of Cambridge (Thomas and Banerjee, 2013). This was a feat, considering Florence's earlier struggles to access Higher Education. She continued to help develop Radiology as a profession and founded and presided over the Wessex branch of the British Association for the Advancement of Radiology and Physiotherapy (Sharma, 2021). However, Florence's health was failing (Thomas, 2003). As reflected by Matthews and Sexton (2015), the dedication of refining the new technology in Radiology, came at a great personal cost to the professionals involved. Florence herself, personally knew many of the pioneers of Radiology, and knew that the risks of the profession would no doubt catch up with her eventually (Thomas, 2022).
Florence developed dermatitis on her hands, a direct result of exposure to radiation during her career. Florence moved to Bournemouth, and continued to practice privately, before retiring in 1928 (Sharma, 2021). Whilst her health allowed, Florence enjoyed travelling with her sister Edith, continuing her learning and research whilst abroad. Her last academic paper was written during a trip to India, where she researched osteomalacia and the link with vitamin D deficiency (Thomas and Banerjee, 2013).

Florence's final years were plagued with cancer. Watson Smith (1932) later reflected in Florence's obituary, that Florence suffered 'greatly and bravely', but did not let her fate deter her from her work. Florence passed away prematurely in 1932, at the age of 62 (Sharma, 2021). Although her death was described as premature, Thomas (2022) reflected that Florence only managed to live with the effects of over exposure to radiation for so long, due to the care she took when using radiation. It was decided that there was not enough evidence to suggest Florence's death had resulted from

exposure to radiation, meaning her name was not included on the Martyr's Memorial in Hamburg (Thomas, 2022).

Florence's Lasting Legacy and the Future of Radiology

After Florence's death, Edith set up the Johnstone and Florence Stoney Studentship Fund. The charity aims to support women carrying out scientific research in Australia, South Africa, or New Zealand (Charity Commission for England and Wales, 2023). Thomas and Banerjee (2013) reflected in their account of Florence's life, that Florence had a firm belief in the capabilities of women, and their ability to fill positions of the highest responsibility. Thomas and Banerjee (2013) credited Florence for her courage, iron will, and determination to pass on all her knowledge to the next generation of strong, like-minded women- whether that be through medical education, or the fight for women's rights through movements such as the Suffragettes. Edith herself, died in 1938, leaving behind her own legacy.

In modern healthcare, Radiology is a vital element in both the diagnosis and treatment of patients (GIRFT, 2023). Since 1970, developments in Radiology have transformed it beyond anything previously imagined (Thomas, 2022). There were 43.3 million imaging examinations conducted in NHS settings in England, between April 2021 and March 2022 (NHS Improvement, 2022). Radiology continues to be a popular speciality for medical students. A report for the Royal College of Radiologists by Garrett, Booth, and Kosmin (2016) found that the ratio of Radiology applicants to available study places was consistently at an average of 4:1. This is interesting, given Thomas (2022) reports that satisfaction levels are low amongst Radiologists, and that this has only worsened post pandemic.
There are 44 Medical Schools in the United Kingdom (MSC, 2018) and on average 9500 places to study Medicine at the start of every academic intake (MSC, 2021). There is currently a push to increase the number of places to study Medicine in the United Kingdom (Lewis and Lewis, 2023). The British Government published their NHS Workforce Plan in June 2023, and have pledged to increase capacity. As part of this commitment, the University of Cumbria have recently announced plans to open the first ever Northern based Medical School, based in Carlisle, in partnership with Imperial College London, in 2025. (Hicking, 2023).

Many advancements have been made since Florence's days as the first female Radiologist in England, not least the formation of the National Health Service in 1948. The role of the Radiographer as we know it today has developed and advanced into a profession of its own, separate to the role of Radiologists. On the 6th of August 1920, the Society of Radiographers was founded, which led to the development of a syllabus, and advancements in the education of Radiographers (Price, 2020). Schools of Radiography were developed, and in 1989, the move into degree level education for Radiographers began (Price, 2009). Since 2003, Radiographers have been regulated by the Health and Care Professions Council (Price, 2020), and the scope of practice for Radiographers has continued to develop and expand. As of 2019, around 11.9% of registered Radiographers in the United Kingdom have roles within advanced practice (SoR, 2019).

The role of the Radiographer is also supplemented by other professional roles, such as Assistant Practitioners, and more recently, Apprentice Radiographers (Sevens, Nightingale, and Ali, 2022). Thanks to the development of these new roles, the routes into Radiography have expanded, which will ultimately help to grow and maintain the Medical Imaging workforce (SoR, 2019, Sevens, Nightingale, and Ali, 2022).

And whilst gender remains a hot topic in modern day Britain, women have elevated their status in society through the pursuit of education, bravery, and iron will- all characteristics demonstrated by Florence Stoney in her remarkable life and career. Both female Radiologists and Radiographers

alike, will forever be in her debt. For it is thanks to the platform which she created, that women earned their right to contribute to Radiology, and to uphold careers in one of the most important fields in medicine and healthcare.

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