

William James Morton (1845–1920). Author of America's first X-ray textbook

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William James Morton (1845–1920) was the son of a famous father and by supporting his father is linked to the story of ether anaesthesia. Ether and the dentist William Thomas Green Morton (1819–1868) has far outlasted any medical/scientific contributions made by the electrotherapist/radiologist William James Morton. It is also noticeable that several of his obituaries make no mention of any of his contributions with X-ray work. In later life he served a prison sentence for fraud relating to non-existing silver mines. The X-ray textbook written by William James Morton, in association with Edwin Hammer, was published in September 1896 and was the first X-ray textbook to be published in the USA. Several X-ray images made by William James Morton are included in this brief biography.

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Introduction

Both William James Morton (1845–1920) and his father were involved in various controversies during their lifetimes: for the elder Morton these were linked to the priority claim for the use of ether as an anaesthetic [1–5]. The younger Morton was drawn into these controversies by supporting his father. William James Morton was also convicted for fraud later on in his life, in 1912, relating to non-existent silver mines in Canada. Several of his obituaries fail to mention his contribution to X-ray knowledge in 1896 and this brief biography redresses this to a certain extent, including five X-ray images dating from 1896. As well as being the author of the first X-ray textbook in the USA [6], William James also published the world's first whole body radiography taken as a single image: as distinct from a whole body radiograph being made of two or three

sections. The most detailed of his biographies [7] is that found in the book *Trail of the Invisible Light* by E.R.N. Grigg. Although this reference does not include a selection of Morton's radiographs.

Morton family genealogy

The Morton family were originally from Scotland with Robert Morton an immigrant to the USA. William Thomas Green Morton was Robert's great-grandson. The 1870 USA census entry shows William James Morton as a 25-year old medical student living with his mother and three of his four siblings (Edward, Elizabeth & Nathaniel) in Needham, Norfolk, Massachusetts. A decade later in 1880 William James (Fig. 1) is living in New York City with his first wife, Elizabeth Lee, and her family. By 1900 his home was in Manhattan and he was described as a physician. In 1910 he was still living

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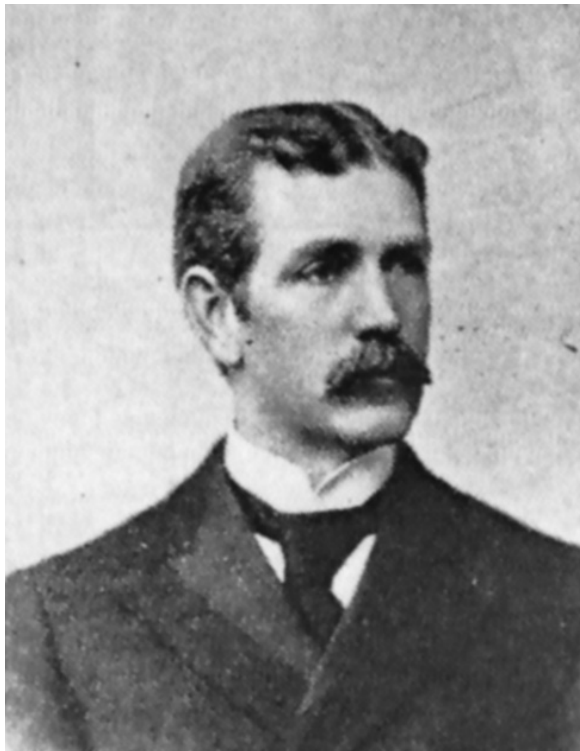


Figure 1. William James Morton in the 1880s

in Manhattan but described as a physician-general practice. However, by 1920 he had moved with his 2nd wife (who was much younger than him) to Miami, Florida. He had no children with either wife and died in 1920 of heart disease.

William Thomas Green Morton

William Thomas Green Morton (1819–1868) is famous for being the first to publicly demonstrate, in September 1846, that inhaled ether could be used as a surgical anaesthetic. This was for a tooth extraction. He claimed throughout his life that he was the discoverer of anaesthesia and it became his obsession to obtain exclusive patent rights for the use of ether anaesthesia. He was to give up his thriving dental practice, became involved in much litigation, and died deeply in debt.

Morton originally worked as a clerk, printer and salesman before entering Baltimore College of Dental Surgery in 1840 and qualified in 1842 when he left college to study with the dentist Horace Wells (1815–1848) in Hartford, Connecticut and for six months, became his business partner. In 1844 Morton entered Harvard Medical School and was present at the lectures of Charles Thomas Jackson (1805–1880) who introduced him to the anaesthetic properties of ether. Then in January 1845 he was present at Massachusetts General Hospital when Wells tried and failed to demonstrate the pain killing effects of nitrous oxide during surgery. It was on 30 September 1846 that Morton successfully demonstrated the use of ether as an anaesthetic during extraction of a tooth and on 16 October followed the success with a patient undergoing tumour surgery.

Morton attempted to obtain exclusive patent rights to the use of ether anaesthesia but completely failed over the succeeding years. For example, he unsuccessfully petitioned

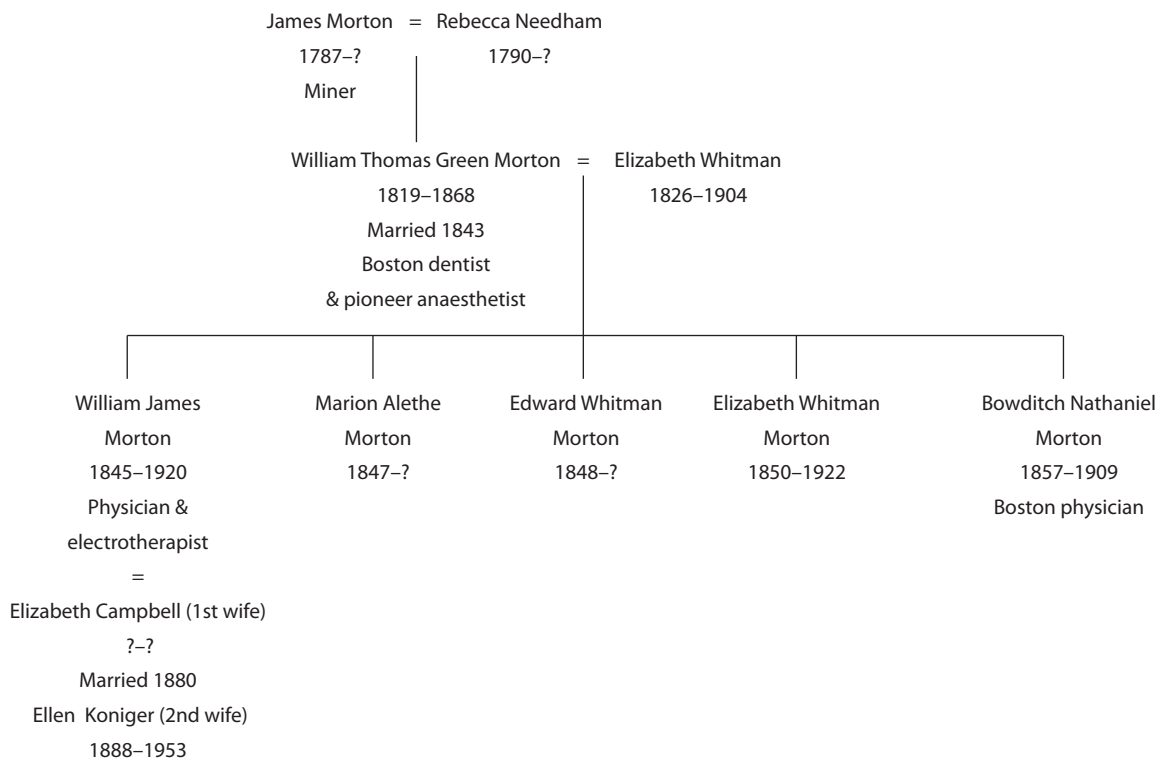


Figure 2. Morton family tree

ned the United States Congress three times for recognition of his rights to enable him to receive subsequent profits. The truth concerning priority is that the Georgia surgeon Crawford Williamson Long (1815–1878) employed ether as an anaesthetic in March 1842 and demonstrated the use of ether several times before physician and surgeons in Georgia. However, Long did not publish his findings until 1849.

In December 1846 and during 1849, 1851 and 1853 he made failed applications to the United States Congress for a 'national recompense' of US\$ 100,000. All these applications failed. This failure was in part due to the claims of Jackson and Wells as the discoverers of ether.

In 1852 he received an honorary degree from Washington University of Medicine in Baltimore (later to become the College of Physicians & Surgeons). In 1862 he joined the Army of the Potomac as a volunteer surgeon and used ether on more than 2000 soldiers during the battles of Fredericksburg, Chancellorville and the Wilderness.

Just before his death he exhibited rather bizarre behaviour in July 1868 in that when riding in a carriage with his wife, he suddenly demanded the carriage stop, and he ran into the lake in Central Park 'to cool off'. This was because he had suffered a major stroke which proved fatal soon afterwards [1–5, 8].

Education & early years of William James Morton

William James Morton (1845–1920) attended the first established public school in the United States, the Boston Latin School. He entered Harvard in 1863 and obtained his M.A. in 1867. In 1867 he interrupted his Harvard studies and taught for a year at the Gardiner (Massachusetts) High School. He matriculated at Harvard Medical School following father's death in July 1868.

In 1869 he supported himself financially by being the resident medical officer in the Discharged Soldiers' Home and then as a junior doctor at Massachusetts General Hospital, becoming a House Surgeon in 1871. He graduated M.D. from Harvard in 1872 and later that year travelled to Europe. It was also in 1872 that he was awarded Harvard's Boylston Prize for his thesis about his father's work on *Anaesthetics*. Morton travelled first to Vienna, 1872–1874, and then to Kimberley, South Africa where he became the medical officer of a mining company (as well as establishing a profitable private practice). During this period to 1876 he hunted big game and staked his own diamond mining claims.

He returned to the USA at the end of 1876 via England, France and Germany. During his French visit he received teaching in Paris at the Salpêtrière Hospital from Jean-Martin Charcot (1825–1893). Morton spent time defending his father's work on anaesthesia [9–14] and undertook his own work using cocaine for local anaesthesia. However, he was to become better known as an electrotherapist and radiologist than an anaesthetist [5, 7, 15].

Professional life 1878–1895

Morton settled in 1878 in New York City, opening an office at 33 East 33rd Street and married in 1880. Following its purchase by Morton, he became the Editor of the *Journal of Nervous & Mental Disease* (which he sold in 1885 and then was no longer the Editor) and from 1882–1885 was adjunct Professor of Nervous Diseases at the New York Post-Graduate Medical School. He obtained full Professorship in 1890 and this remained his main academic title for the following 30 years. He served as a neurologist to the New York Infant Asylum 1887–1897. On the frontispiece of his X-ray textbook [6], following he listed several memberships (Table I).

The basis for his reputation as a famous electrotherapist was his design of apparatus for producing what he termed the 'Morton current'. This was a static machine with Leyden jars, a wet sponge electrode and a gun-shaped electrode [7, 16]. He specialised in neurology and with some 20 other physicians watched Daniel Smith Lamb (1843–1929) perform the autopsy on Charles Guiteau (1840–1882) the executed assassin of President Garfield. Morton himself reported on the examination of Guiteau's brain [17]. He published several papers on electrotherapeutics [*for example*, see 16, 18–23]. This period 1878–1895 predates the discovery of X-rays in November 1895 and of radioactivity in 1896 and radium in 1898. From 1899–1908 Morton again published on electrotherapeutics [24–34] as well as on X-rays.

X-rays 1896–1897

The electrotherapeutic apparatus available to Morton enabled him to immediately start experimenting with X-rays (Fig. 3) once the knowledge of their discovery reached the USA. In 1896, as well as his book [6], written with the electrical engineer Edwin Wesley Hammer (1867–1951), he also published several papers on X-rays [35–42].

Morton's textbook [6] is arranged in four parts I–IV with three appendices A–C. {I} Definitions. {II} Apparatus. {III} Operation. {IV} Surgical value of the X-ray. {A} A new form of radiation: the preliminary communication to the Würzburg

Table I. Memberships held by William James Morton in 1896 [6]

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- Professor of Diseases of the Mind & Nervous System and Electro-Therapeutics in the New York Post Graduate Medical School & Hospital
 - Member of the Medical Society of the County of New York
 - Permanent Member of the Medical Society of the State of New York
 - Member of the New York Academy of Medicine
 - American Electro-Therapeutic Association
 - American Neurological Association
 - Harvard Medical Society of New York City
 - American Medical Association
 - Societe Francaise d'Electrotherapie
 - New York Electrical Society etc. etc.
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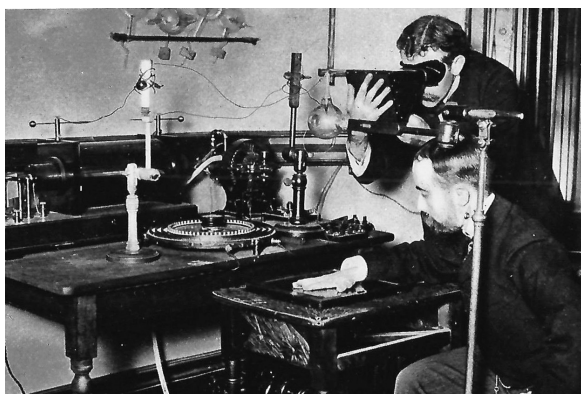


Figure 3. Morton's X-ray apparatus arranged for simultaneous radiography and fluoroscopy [6]

Physico-Chemical Society by Professor Konrad Roentgen dated December 1895. {B} Experiments with Roentgen rays, Roentgen ray lamps and other experiments, Influence of temperature on X-ray effects by Thomas A. Edison. {C} The surviving hypothesis concerning the X rays by Oliver Lodge. Table II gives the eight subsections of Part IV.

The subsection on curative action of the X-ray is produced here in full as it represents the start of thoughts on X-ray therapy and on X ray damage. "Much interest has been excited as to the influence of X-rays on bacteria. In February 1896, Dr Morton exposed cultures of the cholera vibrio of the bacillus colli communis, the bacillus of typhoid fever and of diphtheria to the X-rays for 30 minutes and for one hour. They were from time to time compared with other cultures kept under the same conditions except for the exposure to X rays in the usual manner. No differences could be determined at that time between the cultures which had been exposed to the X rays and those which had not been so exposed.

These experiments, however, were conducted in the early days of the X ray, when it was not by any means powerful, and yet it remains with the powerful X ray of today to determine whether or not in reality the X ray possesses a germicidal action.

In favour of an influence of the X rays upon tissue is the experience of the experimenter that after viewing a powerful X ray continuously through a fluoroscope, the eyes are

Table II. Surgical value of the X-ray

- Normal anatomy
- Fractures, Dislocations, Diseases of the Bones & Deformities
- Stiff joints (Ankylosis)
- The X-ray in Dentistry
- Foreign Objects in the Body
- Soft Tissues & Location of Organs
- Medico-Legal
- Curative Action of the X-ray

frequently affected painfully. Inflammation of the eyelids, upper lips and of the skin of the face generally, somewhat if the nature of sunburn, has been recorded by more than one experimenter as the result of exposure to the X ray."

His publication of a whole body X-ray image was in 1897 [43] (Fig. 4) and in the same year he also published an image of the head [44]. The apparatus included a 12" induction coil whose primary was supplied from the 117 volt Edison current of the New York street mains. The distance of the

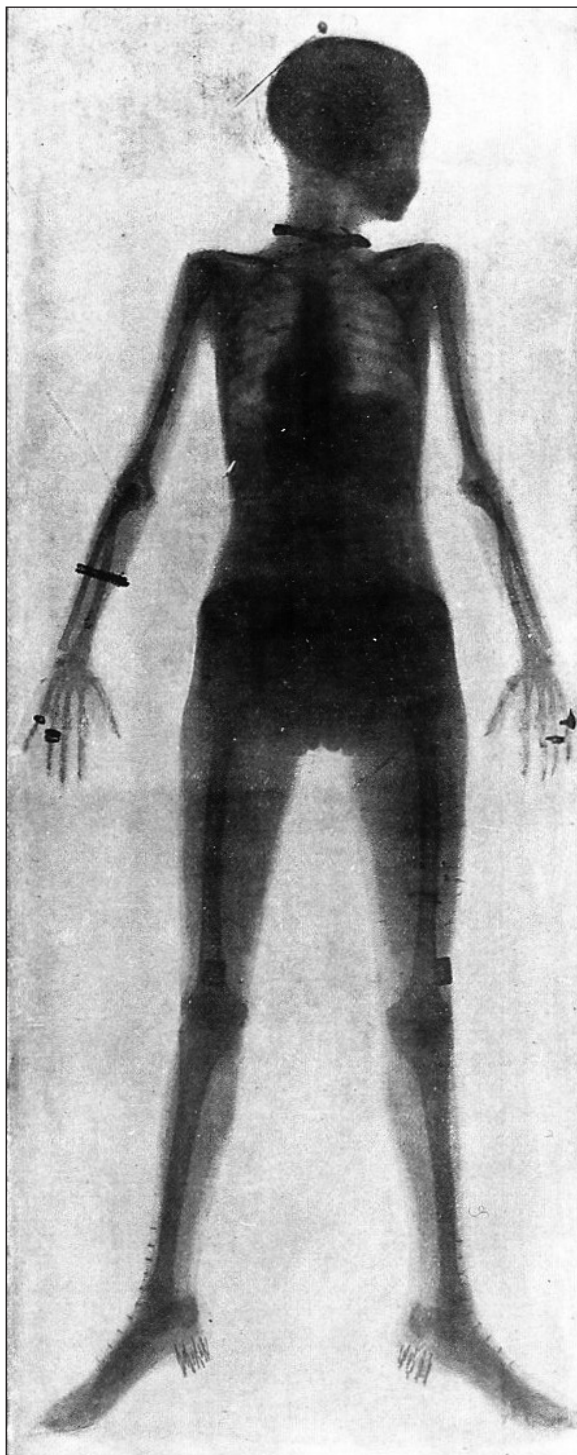


Figure 4. The world's first whole body radiograph taken in a single exposure [43, 44]

tube to the X ray plate was 54" and the time taken including stoppages was 30 minutes.

At the end of Morton's book [6] is a list of radiographs which could be purchased from the American publisher of the book: American Technical Book Company of 45, Vesey Street, New York. They are advertised as life size and handsomely mounted. Most cost 60 cents. Figures 5–8 are examples.

Cancer 1902–1915

Morton not only published on X-ray diagnosis but also on X-ray therapy and radium therapy for cancer [45–56]. He was most productive up to 1908. His final publication was in 1915 [57].

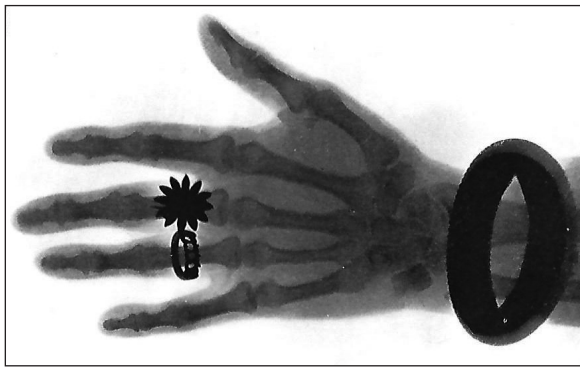


Figure 5. Gold rings & bracelet [6]

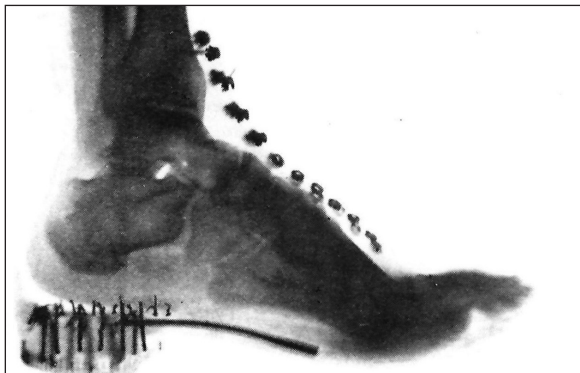


Figure 6. Illustration of bones in the foot [6]



Figure 7. Picture of a non-living subject: frontal view of skull showing not only the location of the teeth where concealed within their sockets but also the outlines of the cavities of the teeth themselves [6]

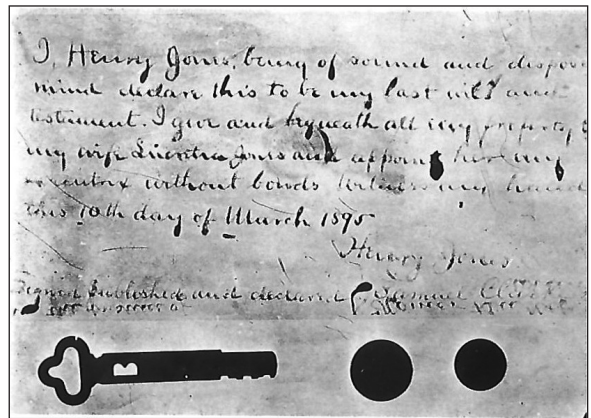


Figure 8. Handwriting, purporting to be a will, photographed as an experiment by the aid of the X ray in a sealed envelope [6]

Mining fraud & prison 1911–1913

Morton's earliest publications on mining were in 1877–1878 relating to the South African diamond fields [58, 59]. Many years later in 1911 a New York promoter, Albert Freeman, induced Morton's friend Julian Hawthorne (1846–1934), who was the son of the famous novelist Nathaniel Hawthorne (1804–1864), to participate in the organisation of four companies, created to operate mining properties in the Canadian cobalt region. The four companies were combined into the Hawthorne Iron & Silver Mines Company and a considerable amount of stock was issued. The Board of Directors included William James Morton, and the lawyer Josiah Quincy (1859–1919) who was a former mayor of Boston and former assistant United States Secretary of State. The advertising claims circulated in leaflets by the U.S. Mail were in fact false, but investors nevertheless subscribed over 3.5 million U.S. dollars as investment in the non-existing silver mine.

Eventually the fraud was exposed and the Federal Government indicted Freeman, Hawthorne, Morton and Quincy on the charge of using the U.S. Mails in aid of a scheme to defraud. The proceedings opened on 28 November 1912 with 106 witnesses giving testimony during six weeks at a cost to the Government of U.S. \$50,000. The jury deliberated for 28 hours and acquitted Quincy but found Freeman, Hawthorne and Morton guilty. Freeman was sentenced to five years in prison (Atlanta Federal Penitentiary) and Hawthorne and Morton to one year and one day.

They served six months. Hawthorne moved to California and became a successful writer. Morton on 13 December 1913 was granted a pardon by President Woodrow Wilson and on 26 June 1914 was reinstated as a practicing physician by the New York Board of Regents. After his prison term Morton returned to his old office at East 28th Street, New York, but he had lost his old stamina [7, 60, 61].

Conflict of interest: none declared

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References

1. Asbell MB. William Thomas Green Morton. *Worcester Medical News* 1970; 35: 15–18.
2. Vandam LD. The last days of William Thomas Green Morton. *J Clin Anesthesia* 1996; 8: 431–434.
3. Wolfe RJ. *Tarnished Idol: William Thomas Green Morton and the Introduction of Surgical Anaesthesia, a Chronicle of the Ether Controversy*. San Anselmo, CA: Norman Publishing, 2001.
4. Snow SJ. *Blessed Days of Anaesthesia: How Anaesthetics Changed the World*. Oxford: Oxford University Press, 2008.
5. Aponte-Feliciano A, Desai SP, Desai MS. William James Morton (1845–1920): like father, like son (?). *J Anesthesia History* 2013; 31: 18–20.
6. Morton WJ in collaboration with Hammer EW. *The X Ray or Photography of the Invisible and its Value in Surgery*. London: Simpkin, Marshall, Hamilton, Kent, 1896 and New York: American Technical Book Company, 1896.
7. Grigg ERN. William James Morton (1845–1940), first medical electro-radiologist in America. In: Grigg ERN. *The Trail of the Invisible Light*. Springfield: Illinois, 1965. Chapter 6, pp 778–799.
8. https://en.wikipedia.org/wiki/William_T._G._Morton (accessed 12 August 2018)
9. Morton WJ. The introduction of anaesthesia. *Med Record* 1892; 42: 719–720.
10. Morton WJ. Memoranda on the “Discovery of anaesthesia”. New York 1895; Washington DC: National Library of Medicine.
11. Morton WJ. Origin of the term anaesthetic. *Med Record* 1894; 46: 799–800.
12. Morton WJ. Discovery of anaesthesia. *Hartford Times* 12 April 1895; 8: 1.
13. Morton WJ. Memoranda relating to the discovery of surgical anaesthesia and William T. G. Morton's relation to this event. *Postgraduate New York*; 1905: 20: 333–353.
14. Morton WJ. Geschichtliche Beitrage zur Entdeckung der Anaesthetie in der Chirurgie und ueber die Beziehungen Dr. William T.G. Mortons zu derselben. *Wiener med Presse* 16 September 1906; 47: 1888–1897.
15. Aponte-Feliciano A, Desai SP, Desai MS. William James Morton, MD. His life and contributions to medicine. Abstract: Anesthesiology 2011 conference October 2011.
16. Morton WJ. The Franklinic interrupted current, or, my new system of therapeutic administration of static electricity. *Med Record* 1891; 39: 97–104.
17. Morton WJ, Dana CL. Microscopical appearance of Guiteau's brain. *Med Record* 1882; 22: 134–135.
18. Morton WJ. On static electrotherapeutics or treatment of disease by Franklinism. *Med Record* 1881; 19: 367–371, 395–398.
19. Morton WJ. Size and kind of Holtz machine adapted to medical uses. *Med Record* 1881; 19: 472.
20. Morton WJ. A new current of induction electricity; or, a new method of producing electrical nerve and muscle reaction. *Med Record* 1881; 20: 62–63.
21. Morton WJ. The place of static or frictional electricity in medicine. *Med Record* 1890; 37: 609–610.
22. Morton WJ. A brief glance at electricity in medicine. Lecture: Columbia College. *Tr Amer Inst Electrical Engineers* 1893; 10: 555–602.
23. Morton WJ. Electricity in medicine from a modern standpoint. Lecture: New York State Medical Society. *Tr Med Soc New York* 1895; 245–267.
24. Morton WJ. Cases of sciatic and brachial neuritis and neuralgia; treatment and cure by electrostatic currents. Cases compiled from records by W.B. Snow. *Med Record* 1899; 55: 521–527.
25. Morton EWJ. Electrostatic currents and the cure of locomotor ataxia, rheumatoid arthritis, neuritis, migraine, incontinence of urine, sexual impotence and uterine fibroids. *Med Record* 1899; 56: 845–849.
26. Morton WJ. Is static electricity a specific for organic and structural nervous disorders? *Med Record* 1900; 57: 43–44.
27. Morton WJ. The static induced current. *Med Record* 1900; 57: 520, 746–747.
28. Morton WJ. The use of electricity in chronic rheumatism. *Med Record* 1900; 57: 674–676.
29. Morton WJ. A case of multiple neuritis with atrophy, fibrillar twitchings, cramps and exaggerated reflexes: two years duration and recovery. *J Nervous & Mental Disease* 1900; 27: 605–608.
30. Morton WJ. Galvanisation. Properties of the Galvanic current. *Post Graduate, New York* 1905; 20: 35–41.
31. Morton WJ. Recent advances in electrotherapeutics. *New York Med J* 1905; 81: 634–637.
32. Morton WJ. New high potential high frequency ‘cataphoric’ electrode or phoric medicamental electrode. *Med Record* 1905; 68: 843.
33. Morton WJ. The wave current and high frequency currents. *J Advanced Therapeutics* 1908; 26: 227–239.
34. Morton WJ. Static electricity; its method of application and therapeutic value. *Post Graduate New York* 1908; 23: 331–343.
35. Morton WJ. Photography of the invisible without the aid of a Brookes {this is an error and should be Crookes} tube. *Elec Engineer* 5 February 1896; 21: 140–141.
36. Morton WJ. A Roentgen picture from a medical point of view. *New York Med Journal* 14 March 1896; 63: 333.
37. Morton WJ. A needle in the foot demonstrated by Roentgen rays. *Med Record* 14 March; 49: 371–372.
38. Morton WJ. The x-ray detection of deformity of bones. *New York Med Journal* 11 April 63: 479–480.
39. Morton WJ. A Roentgen picture of the bones of the wrist and hand. *New York Med Journal* 18 April 63: 516.
40. Morton WJ. A Roentgen picture of a marasmic infant. *New York Med Journal* 25 April 1896; 63: 540–541.
41. Morton WJ. The x-ray and its application in dentistry. *Dental Cosmos* June 1896; 38: 476–486.
42. Morton WJ. The x-ray and some of its applications in medicine; stereopticon views. *Med Record* 4 July 1896; 50: 9–11.
43. Morton WJ. X-ray picture of an adult by one exposure. *Elec Engineer* 19 May 1897; 23: 522, also in *Archives of the Roentgen Ray* July 1897; 2: 17.
44. Morton WJ. The x-ray picture of the living human head. *Items of Interest, New York* July 1897; 19: 313–315, also in *Amer X-ray Journal* October 1897; 1: 89–91.
45. Morton WJ. The treatment of malignant growths by the X ray with a provisional report on cases under treatment. *Med Record* March 1902; 61: 361–365.
46. Morton WJ. Radiotherapy for cancer and other diseases. *Med Record* May 1902; 61: 801–805.
47. Morton WJ. Primary and recurrent mammary carcinoma treated by the X ray. *Med Record* May 1903; 63: 845–851.
48. Morton WJ. The X and violet radiations in the treatment of cancer and other diseases. *Med Brief St. Louis* June 1903; 31: 842–844.
49. Morton WJ. Some cases treated by the X ray. Facial cancer, carbuncle, cheloid, acne, alopecia, areata, sychosis, fibroid tumor, psoriasis, lupus. *Med Record* July 1903; 64: 121–127.
50. Morton WJ. Treatment of cancer by the X ray, with remarks on the use of radium. *Int J Surgery* October 1903; 16: 289–294.
51. Morton WJ. Radiotherapy and surgery, with a plea for preoperative radiations. (Lecture before Harvard Medical Society) *Med Record* March 1905; 67: 443–447.
52. Morton WJ. Trypsin for the cure of cancer; with report of the microscopic examination of a cancer tumor of the breast, thus treated. *Med Record* December 1906; 70: 893–900.
53. Morton WJ. Trypsin for the cure of cancer. *Med Record* January 1907; 71: 110–111.
54. Morton WJ. A case of cancer treated by trypsin. *New York Med J* March 1907; 85: 443–444.
55. Morton WJ. Some problems in the chemotherapy of cancer. *New York Med J* March 1912; 95: 625–627.
56. Morton WJ. Imbedded radium tubes in the treatment of cancer. With a report of a case of sarcoma remaining cured nine years after treatment. *Med Record* November 1914; 86: 913–915.
57. Morton WJ. Radiochemotherapy; the internal therapeutics of the radio-elements. *Med Record* March 1915; 87: 381–390.
58. Morton WJ. South African diamond fields, and a journey to the mines. *Bull Amer Geographic Soc* 1877; 9: 66–83.
59. Morton WJ. To South Africa for diamonds. *Scribner's Monthly* 1878; 16: 551–663, 662–675.
60. https://en.wikipedia.org/wiki/William_J._Morton (accessed 18 August 2018)
61. https://en.wikipedia.org/wiki/Julian_Hawthorne (accessed 18 August 2018)