

# *FIN DE SIÈCLE* SCIENCE INTERSECTING THE ARTS:

Puccini, Debussy, and radium therapy



Pitchblend

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“It can be thought that radium could become very dangerous in criminal hands, and here the question can be raised whether mankind benefits from knowing the secrets of Nature. The example of Nobel is characteristic as powerful explosives have enabled man to do wonderful work. They are also a terrible means of destruction...I am one of those who believe with Nobel that mankind will derive more good than harm from the new discoveries.”<sup>1</sup>

**T**he early 20th century was truly a “best of times” for science. At the *fin de siècle*, in 1900, Max Planck awakened scientific thought from dogmatic slumbers with the Quantum Theory. Shortly thereafter, Einstein—with his Theories of Special and General Relativity—shattered long-held perceptions of how the

universe, time, and energy are ordered. Space, time, and light would now be filtered through a remarkable, and at times, counterintuitive prism.

There would also be the work of Niels Bohr on electrons, their orbits, and complementarity. Marie and Pierre Curie discovered radioactivity emanating from the heretofore undiscovered elements of radium and polonium. But, not all discoveries would emerge from physics. The science of medicine would begin in parallel during this period. There would be Roentgen’s X-rays; Landsteiner discovered the blood groups in 1901; the germ theory of disease opened a door into microbiology and nascent vaccines; and Paul Ehrlich’s “magic bullet” would result in a scientific treatment for syphilis.

The time from “bench to bedside” in this era was

Above, pitchblende is a brownish-black rock consisting mainly of uranium chemically combined with oxygen. It forms crystals called uraninite. Once considered useless, it is now the main source of uranium and radium.

unusually brief. The progression of X-rays from Roentgen's discovery in 1895 to their therapeutic application was rapid, and would be a first salvo in an unfinished war against cancer, the "Emperor of all Maladies."<sup>3</sup> As early as 1896 medical student Emil Grubbe tried to harness X-rays as therapy for breast cancer.<sup>3</sup>

The arts were concurrently exploding with radically novel ways of presenting music. A sampling of early 20th century composers—Schoenberg, Stravinsky, Sibelius, Bartok, and Holst—reveals a revolution in compositional technique. Two contemporaries, Claude Debussy in France, and Giacomo Puccini in Italy, figure prominently in the history of classical music and opera.

Puccini and Debussy's experiences with cancer reflect a historical intersection between early 20th century medical science in the form of radium, and their terminal malignancies. Debussy had rectal cancer and was treated with radium, while Puccini suffered from laryngeal cancer and died during radium therapy. Their stories open a window into an intellectually vibrant era when major discoveries ushered in medicine's scientific age.

### Radium's evolution to therapeutic agent

Three radioactive substances were discovered between 1898 and 1900—polonium, radium, and actinium.<sup>4</sup> Radium, the archetypal radioactive element, rapidly went from scientific curiosity to internationally accepted therapy for cancer.

Twenty-three cases of X-ray injury to tissue were published prior to January 1897.<sup>5</sup> Leopold Freund successfully irradiated a hairy nevus in November 1896 in Vienna.<sup>5</sup> Although the child who was treated was cured of the nevus, it took six years for her X-ray-induced ulcer to completely heal.<sup>5</sup>

In 1900, the Friedrich Otto Walkhoff wrote, "...radium owns astonishing physiologic properties, an exposure of the arm to two 20-minute sessions has produced an inflammation of the skin."<sup>6</sup> As early as 1903, Curie suggested that radium's ability to induce flesh burns might presage the element's potential in cancer therapy.<sup>7</sup> In 1904, Robert Abbe demonstrated that varied lengths of exposure to radium positively correlated with the degree of tissue erythema and necrosis.<sup>5</sup> Around the same time, French physicist Henri Becquerel found that he had an inflammatory lesion on the left side of his body which he attributed to a tube of radium carried in his waistcoat pocket,<sup>4</sup> and Pierre Curie burned his forearm from exposure to radium.<sup>6</sup>

Exposure to radium by chance damaged human skin. The longer the exposure, the greater the harmful effects on

living tissue. Deliberate exposure to radium killed bacteria on a medium where it was known to reproduce rapidly.<sup>8</sup> Curie, Becquerel, and Abbe saw a connection between radium-induced cellular damage and the dividing cells of malignancy.

One hurdle remained. How to get radium to internal, solid tumors such as cancer of the prostate, larynx, or anus? When in contact with exposed skin erythema would follow, but the tissue damage did not penetrate into deeper organs. "Afterloading," or the technique by which a delivery system is established and then filled with radioactive medicine, was introduced. In 1903 in Munich, Hermann Strebel said, "I am now in a position to increase the effectiveness for radium for deeper seated pathological conditions...intra-tumoral application is carried out by inserting the radium, which is enclosed in the drilled tip of a small aluminum rod, directly into the center of the tumor."<sup>5</sup>

Multiple variations on this theme quickly followed. There would be "cystoscopic" radium instruments, and mechanical hands to hold the radium in place against the tumor.<sup>7,9</sup> Treating tumors with radium was on the rise. As early as 1922, a series of 217 prostate cancer patients treated with radium was compared to an untreated group of 363.<sup>10</sup>

### Puccini and Debussy undergo radium treatment

The composers Puccini and Debussy were treated with radium via brachytherapy and afterloading, respectively.

As they were just two of many who were receiving such treatment, patient records and accounts of the treatment were prevalent:

When the patient opened his mouth...a large septic mass, obviously inoperable, was seen to occupy the position of the tongue...(which was) displaced to the left. Nine days ago, six radium needles, 10 cm. long, the radium occupying 1.5 cm. at the pointed end, were pushed 5 cm. through this mass....They were pulled out 1.5 cm. after 8 hours, further in 12 hours, and removed 7 hours later, so that the tumor was radiated systematically from back to front during 27 hours by radium in 18 different positions....Two days later, one at once saw the tongue, and had to look for the tumor, the anterior part of which had almost disappeared.<sup>11</sup>

Puccini, the composer of *Manon Lescaut*, *La Boheme*, *Tosca*, and *Madame Butterfly* was working on what would be his final opera, *Turandot*, in August 1921, when he complained, "I have a sore throat. Several otolaryngologists have examined me, some recommend one treatment, others



Portrait of Italian composer Giacomo Puccini (1858–1924)

Photo By DEA / A. DAGLI ORTI/De Agostini/Getty Images

another. I have been suffering from tonsillitis and pharyngitis for seven months.”<sup>12</sup> Over the following months, he exhibited hoarseness, weight loss, and cervical adenopathy that interfered with buttoning his collar.<sup>12</sup> Finally, the sore throat had an explanation, a supraglottic mass was biopsied and diagnosed as cancer.<sup>12</sup>

In the early 20th century, palliative treatment was typically indicated for Puccini’s dire situation. The surgical option was a dangerous one. The first laryngectomy was performed in 1873 by Christian Albert Theodor Billroth

on a 36-year-old theology teacher with laryngeal cancer.<sup>13</sup> Billroth stated that the surgery was necessary in an effort to “tear this still young man from the arms of a certain and tortuous death.”<sup>14</sup> During surgery, the pharynx and trachea were not separated.<sup>14</sup> However, the surgery was both a success and a failure. The patient survived for seven months, but the Billroth approach led to fatal aspiration pneumonia.<sup>13,14</sup>

In 1909, D. Bryson Delevan observed, “I am compelled to believe that operations in general for the cure of

carcinoma of the larynx have...lessened the sum total of the duration of human life.”<sup>13</sup>

Billroth's reputation was such that no one dared to alter his surgical approach for years. As a result, Puccini was referred to Brussels for radium therapy under the care of Dr. Ledoux, an expert in the field of cancer therapy with radiation. Puccini's radium treatment was prescribed via two disparate techniques.

First, in November 1924, a radium collar was placed externally over Puccini's neck.<sup>12</sup> Puccini described the treatment as:

I am being crucified like Christ! I have a collar around my throat that is like torture. I have external X-ray treatment at the present, and then they will put crystal needles into my neck and make a hole, again in my neck so that I can breathe...the thought of that hole, with a rubber or silver tube in it terrifies me...What an ordeal! God help me... They assure me I will be cured.<sup>12</sup>

Bleeding was the initial complication, but it ceased, and Puccini's appetite began to improve. The external treatment was followed by radium needle implants or brachytherapy on November 24. Seven radioactive needles were placed directly in the mass, and the procedure, accompanied by tracheostomy and nasogastric tube, took three hours and 40 minutes.<sup>12</sup> Puccini explained, "I feel as though I have bayonets in my throat."<sup>12</sup>

Unfortunately, the maestro died November 29, presumably of a heart attack.

His untimely death had profound effects on his last creation, the opera *Turandot*. Despite Puccini's physical deterioration, he did not expect to die. On September 6, 1924, Puccini met with Toscanini to discuss how he intended to finish the opera:

Toscanini has just left here and all of the clouds have evaporated...I am sure that in his hands *Turandot* will have an ideal performance...I will have all the time required to finish the little that I still have to do...My throat seems better. Smoking does not bother me.<sup>15</sup>

All that was left was 36 pages of preliminary Puccini sketches.<sup>13</sup> The responsibility of completing *Turandot* fell to Franco Alfano.<sup>15</sup> A full year passed without a premier, and then Alfano presented his work to Toscanini. The conductor sent it back for extensive revisions.<sup>15</sup> The ending is that second revision.

At the La Scala premier of *Turandot*, Toscanini put his

baton down when Puccini's text was halted by his death. He told the audience that at this specific point in the composition, Maestro Puccini died. He then left the stage without conducting Alfano's revised ending.<sup>15</sup> Toscanini never conducted the opera again.

## Claude Debussy

"Nature alone has all the time in the world; mine is beginning to run out...mother nature is usually deaf to her children's suffering...I was at a point...of finishing '*La Chute de la Maison Usher*' ('The Fall of the House of Usher,' by Edgar Allan Poe), but the illness has quashed my hopes...I am suffering like a condemned man!"<sup>16</sup>

Much less is known of Debussy's symptoms at his presentation with rectal cancer. There is scant information on the manner in which his initial diagnosis was made. Much more is known about his struggle with the fatal disease as he communicated his personal ordeal through letters to friends.<sup>17</sup>

Debussy first saw a physician in November 1915. He was apprised that he had rectal cancer and that it could be fatal.<sup>16</sup> On December 15, he developed an intestinal obstruction and was treated with a colostomy, drained by an animal skin drainage bag.<sup>16</sup>

Radium therapy was a choice available to Debussy in 1915:

Inoperable cases of cancer of the rectum have certainly found in radium a palliative and useful treatment...Thus in two cases which before the radium treatment were in a cachectic condition, we were afterwards able without colostomy to prolong their existence and enable them to resume their occupations for twelve and fifteen months respectively...The most favorable cases are those where the rectoscope can determine the exact site of the cancer... a tube of radium is fixed into the end of a catheter, and inserted either directly into the rectum or into a rectoscopy... (for) 1-2 hours.<sup>4</sup>

Debussy's postoperative and radium therapy periods were painful:

I've just started a new treatment. It is all shrouded in mystery and I'm asked to be patient...Good god!...After 60 days of various torture. I'm still cultivating my rectal flora...the disease is always one step ahead of me.<sup>16</sup>



**Portrait of French composer and pianist Claude Debussy.**

Photo By DEA / G. DAGLI ORTI/De Agostini/Getty Images

Debussy noted the side effects from morphine hampered his composing:

...there was something broken in this curious mechanism that is my brain...this illness had to come at the end of a spell of good work...and in addition to all of this misery, there were four months of those morphine injections that turn you into a walking corpse and completely annihilate your will...was preparing to write that violin and piano sonata...but now, I do not know when the impulse to write will return. There are times when I feel as if I had never known anything about music.”<sup>18</sup>

After radium treatment, Debussy was described as “very emaciated, his complexion sallow and ashen.”<sup>17</sup> The composer’s subjective descriptions match those of his friends, “I don’t take this tattered body for walks anymore in case I frighten little children and tram conductors.”<sup>17</sup>

From December 1915 on, Debussy was a very sick man in the hands of doctors and surgeons. In spite of operations and radium treatments he was in constant pain, and growing ever weaker. Nearly the whole of 1916 passed without his writing a single note of music. Life had become unbearably hard. “Since Claude Debussy is no longer writing music, he has no excuse for being alive,” he wrote.<sup>18</sup>

There were moments of rally interspersed by despair,

"I cannot say that I feel any better, but I have made up my mind to ignore my health, to get back to work, and to be no longer a slave of this over-tyrannical disease."<sup>18</sup> But these moments would be short lived, "a terrible fatigue, a disinclination for all exertion, overwhelmed him. The lightest work exhausted him...there are mornings when the effort of dressing seems like one of the twelve labors of Hercules...I have to fight against both disease and myself," he added."<sup>18</sup>

Alas, his pen was stilled, "Claude Debussy lived his last sorrowful days to the sound of the bombardment of Paris by airships and long-distance guns. He had not even the strength to allow himself to be carried down to the cellar of his house when warning was given of the approach of the enemy," wrote one of his friends.<sup>18</sup>

### The first generation war on cancer in retrospect

...there is a wave of enthusiasm for this line of treatment (radium) which threatens to be overwhelming, and will inevitably be followed by a reaction and much disappointment...(The) public are already obsessed with the idea that radium will cure any case of cancer *however far advanced*...They think that thousands of people are dying simply because they cannot afford radium...As a palliative measure...radium is by far the best agent we have ever had...so long as we entirely neglect to educate the public so that they will consult their doctors on the onset of the earliest symptoms.<sup>19</sup>

The luminaries of the *fin de siècle* in science, medicine, and music continue to impact thought and art.

Despite the untimely deaths of two musical giants, Puccini and Debussy, their extant creations are frequently played, and enjoyed, today. "Nessun Dorma" is one of the most popular arias in the history of opera. The same can be said for "Che gelida manina" from *La Boheme*. Among the many works from Debussy's opus, "La Mer" continues as a crowning achievement of the Age of Impressionism.

Although the medicine of today has come a long way from the primitive use of radiation, the scientific discoveries of the early 20th century, and the patients who endured the treatments, were models for today's physicians.

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