

Note

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David Pantalony

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Biography of an Artifact: The Theratron Junior and Canada's Atomic Age

David Pantalony

Canada Science and Technology Museum

Résumé : Dans le présent document, j'examine la vie d'un artéfact, en l'occurrence le Theratron Junior. Il s'agit d'une machine de radiothérapie aux lignes racées et à la couleur verte élégante, datant de 1956 et exposée en permanence au Musée des sciences et de la technologie du Canada. On le voit actuellement à la lumière des innovations canadiennes, mais le Theratron Junior affiche des caractéristiques et possède une histoire qui nous ramène à plusieurs autres trames narratives concernant la science, le commerce, la main-d'œuvre, l'esthétique et l'expérience des patients. Par exemple, la peinture verte « écume de mer » a inspiré, au Musée, une exposition indépendante sur la couleur verte dans la médecine du XX^e siècle. En outre, des recherches sur la vie antérieure de la machine exposée (n^o de série 15, 1956), y compris sur les personnes qui l'ont fabriquée et utilisée, ont engendré une description revigorée d'un artéfact qui enrichit et remet en question les récits classiques sur les débuts de l'ère atomique au Canada. Les leçons à tirer d'une étude soignée des artéfacts sont on ne peut plus claires – nous ratons des occasions d'approfondir nos connaissances en prenant pour acquis les articles les plus familiers présents dans les salles de nos musées.

Abstract: In this article I examine the life of an artifact, the Theratron Junior, a sleek green radiotherapy machine from 1956 displayed in a permanent exhibit at the Canada Science and Technology Museum. It is currently seen through the lens of Canadian innovations, but the Theratron Junior brims with features and history that touch on several other historical narratives—scientific, commercial, labour, aesthetics and patient experience. The striking “sea foam” green paint, for example, has inspired an independent exhibition at the museum on the colour green in twentieth-century medicine. In addition, research into the former life of the specific machine on display (serial no. 15 from 1956), including the people who made and used it, has produced a reinvigorated artifact biography that enriches and challenges conventional narratives from Canada's early atomic era. The lessons from careful artifact studies are readily clear—we are missing opportunities by taking for granted the most familiar items on our museum floors.

In the past three years, I have been doing collection fieldwork in the unlikeliest of places—the very familiar permanent exhibitions of my own museum. In the well-trodden back yard of Canada's national science museum, I have been re-examining and re-discovering artifacts that have

become comfortable fixtures of our main floor displays. A large globe, a long-running fixture of our *Canada in Space* exhibit was brought to the museum in the fall of 1967 as a “spare part” and never accessioned or documented as an artifact. Aside from potentially fascinating provenance from the beginning of the museum and a possible link to Expo 67, the workmanship and detailing on this magnificent Rand-McNally product is worthy of closer scrutiny. We have also uncovered several of its siblings on display and in storage around North America.¹ Not far from the globe is an unlabelled replica of Sputnik which has an equally fascinating provenance dating back to a massive Soviet Space exhibit “Kosmos ‘77” that took place in Vancouver and Ottawa in the spring and summer of 1977. Soviet Ambassador Alexander Yakovlev, friend of Pierre Trudeau and a major influence on Perestroika, donated the replica to our museum in September 1977.² The replica’s provenance makes it as interesting as the real thing (which, of course, no longer exists).

Why is all this information surprising? At the Canada Science and Technology Museum, as with many science museums, provenance files vary greatly in depth and quality. One reason for this situation is that historians and curators have traditionally treated the history of scientific objects on very general terms, as archetypes, while ignoring the actual history of an artifact—who used it, where it was used, who made it, and even its museum history. These details are often ignored or suppressed in order to connect the objects to favoured exhibit and research themes. The more I pursue the life stories of actual objects, however, the more I find their biographies enrich, complicate and challenge traditional narratives. In this paper, I shall present a case study of one such re-examination and show how a close study of an artifact’s features and biographical details reinvigorate its interpretation on the museum floor as well as pointing to useful teaching and researching methods in the history of science and technology.

Theratron Junior—The Official Story

The subject of this study, the Theratron Junior radiation therapy unit (fig. 1) is currently on display in our permanent *Innovation Canada* exhibition; it is present there as a Canadian and international first. In 1951, scientists, engineers and physicians at Victoria Hospital in London, Ontario and at the University of Saskatchewan, in Saskatoon used Canadian-

1. This item, currently being researched by a student researcher, Simon Whitehouse, is in fact filed as a “Spare Part” (SP0693) and not an official artifact at the Canada Science and Technology Museum (CSTM).

2. University of Ottawa history student, Vedran Kapetanovic, unearthed new information on the Kosmos ‘77 exhibits in Vancouver and Ottawa, and the story behind the acquisition of the Sputnik replica at the CSTM. Kapetanovic’s unpublished essay can be found in the supplementary information file for Sputnik, CSTM, artifact no. 1977.088.

produced cobalt-60 (a powerful gamma ray source) to treat cancer patients.³ The context for this achievement is Canada's nuclear history. Just down the hall from the Theratron, the large ZEEP reactor from 1945 looms in the background.⁴ There we learn about Canada's wartime nuclear work, which stimulated a deepening involvement and investment in nuclear research, engineering and industrial activities in Canada. In particular, the Canada Science and Technology Museum emphasizes how Canadian politicians and scientists chose to invest in nuclear power and medicine. As early as the late 1940s, the Chalk River laboratory distributed medical isotopes to hospitals around the country and the world.

Figure 1. Theratron Junior, manufacturing date: 1956, Atomic Energy Canada Limited, Commercial Products Division, Ottawa.



Source: Canada Science and Technology Museum, artifact no. 1966.0043.

This general history is correct, but does not fit well with the actual object biography. The display focuses on Harold Johns of Saskatchewan, a celebrated medical physicist in our Hall of Fame.⁵ But Johns's first machine from November 1951 is presently housed at Saskatoon's Western Development Museum. In addition, Johns and his team sold the rights of

3. Paul Litt, *Isotopes and Innovation: MDS Nordion's First Fifty Years, 1946-1996*. (Montreal and Kingston: McGill-Queen's University Press, 2000); John E. Aldrich and Brian C. Lentle, eds., *A New Kind of Ray: The Radiological Sciences in Canada, 1895-1995* (Vancouver: University of British Columbia Press, 1995).

4. Robert Bothwell, *Nucleus: The History of Atomic Energy of Canada Limited* (Toronto: University of Toronto Press, 1988); R.E. Green and A. Okazaki, "ZEEP: The Little Reactor that Could," *CNS Bulletin* 16, 3 (1995): 3-8.

5. Clive L. Greenstock, "From Szechuan to Saskatchewan: A Profile of H.E. Johns and the Story of the Development of the Cobalt Bomb," in *A New Kind of Ray*, 247-251.

their invention to Picker X-Ray Corporation of Chicago.⁶ The machine on display in our museum, in fact, relates more directly to the London, Ontario part of this history. The Commercial Products Division of Eldorado Mining and Refining Limited, the same group that developed the first London machine in October 1951, successfully created a commercial line of upright cobalt-60 machines in the early 1950s called the Eldorado series. By 1953 Commercial Products Division (now under the ownership of Atomic Energy Canada Limited AECL) introduced a new machine with a built-in patient couch and rotating head which could circle the tumour. They called this “rotational teletherapy machine” the *Theratron*, a combination of therapy and -tron (from the Greek suffix denoting an instrument, and a popular scientific suffix at the time, e.g. cyclotron and betatron).⁷ The Theratron Junior was a simpler, low-cost version of this model meant for smaller hospitals and developing countries.

The making of museum exhibitions and displays, similar to the construction of text-based historical narratives, rely on a series of choices—there are facts (and artifacts) we choose to emphasize and those we choose to leave out. In the above case, the exhibit focuses on the innovation narrative, hence the emphasis on the more general cobalt-60 history. We could have also focused on AECL and its remarkable commercial history within the Canadian and international nuclear establishment in the post World War Two era. Our machine from the mid 1950s represented an aggressive and successful marketing and sales program established by AECL’s Commercial Products Division in several countries.⁸ By the 1960s AECL was making, selling and servicing commercial nuclear reactors around the world.

Re-examining an Icon

Even an alternative commercial context of AECL, which would be more suited to the story of the Theratron Junior on display does not properly capture multiple narratives associated with the sleek, green machine on our museum floor. I therefore dug deeper into its intriguing features and local history. The manufacturing of the machine was in fact quite local. From 1954 to 1964 the AECL Commercial Products Division manufacturing plant was only a few miles away from the museum in the west end of Ottawa at 1523 Laperriere Ave. In 1964 AECL moved to a larger building in Kanata, and what was the “Museum of Man” (from which came the present Museum of Civilization and our museum) took over the Laperriere building as a storage facility. The building is now empty and for lease.

6. Litt, 76.

7. Ibid., 84.

8. Ibid., 81-117.

I have since made several visits to the site and interviewed a retired machinist who worked there, Al Crandell. I have also taken fourth year undergraduate history students there (fig. 2) for our Atomic Nation seminar (University of Ottawa).⁹ Crandall first worked and apprenticed as a skilled machinist in Oshawa before getting a job in the late 1950s with AECL Commercial Products Division, first at their Tunney's Pasture location, then at the Laperriere factory. Using company and product records, as well as information gathered from interviews with Crandell and other colleagues, we have been able to reconstruct activities on the factory floor during the time when the Theratron Juniors were in production.¹⁰ A few findings stand out. First, the main Theratron unit was actually one large, roughly cast piece. One group of workers would sculpt this into a smooth, streamlined shape using an industrial plaster or Bondo-like filler similar to materials used for automobile manufacturing and repair. Second, the green paint was a very specific "Sea Foam Green" ordered from CIL Paints Canada in Toronto.¹¹ This was in fact a distinctive branding colour used by AECL on medical instruments, sales brochures and even their bathrooms.¹² Several specialized painters worked in a large sectioned-off area of the factory floor. Third, machinists produced the distinctive frosting patterns seen on the aluminum couch of the Theratron Junior. It was done with a high-speed dowel with emery cloth on its tip. This too was an AECL Commercial Products Division signature decorative effect representing the proud post-war machinist culture at the company.¹³ AECL had aggressively recruited skilled machinists from across Canada and Britain in the 1950s.¹⁴ Finally, Al Crandell showed us a space on the former factory floor that had been devoted to preparing prototypes not yet seen by the public. Crandell worked in that area and remembers how frosted windows surrounded it so that visitors and even colleagues could not see inside. During the official

9. Al Crandell, September 17 and December 8, 2009. The University of Ottawa seminar students have created the Atomic Age Artifact Forum on Flickr, <http://www.flickr.com/groups/atomic-age-artifact-forum/>.

10. Another excellent source on Commercial Products Division AECL company history (as well as its successors Nordion and Best Theratronics) is recently retired, long-time employee, Dwight Foubert. University of Ottawa fourth-year history students, Leah Dobbin, Shane Zurbrigg, Vanessa Homiak, visited the site on October 13, 2009 courtesy of John McKenna of Metcalfe Realty. The students posted images of the tour on Flickr.com under the title "Former Atomic Energy of Canada Manufacturing Site."

11. CIL # 2201-80490.

12. This characteristic green still remains on sections of walls including the bathrooms at the 1523 Laperriere Ave. site in Ottawa. See Commercial Products Division AECL's green sales promotional source trolley at Flickr.com under "AECL Source Trolley Model." Canada Science and Technology Museum, art. no. 1966.0660.

13. See AECL catalogue in CSTM trade literature collection, "A.E.C.L.'s Eldorado 'A', the 10,000 Curie Cobalt Teletherapy Unit," AECL, cat. no. L48014, c. 1955.

14. Litt, 92.

launch of one such unit, he remembers the team rolling the unit onto the main floor while a female model posed on it for a publicity shoot. There are countless photos of Theratrons being exhibited and displayed for visitors to the factory (fig. 3).

Figure 2. University of Ottawa students visit the former AECL factory at 1523 Laperriere Ave.



Source: Photo by author, October 13, 2009.

Figure 3. Roy Errington (right), manager of the Commercial Products Division, AECL, shows a Theratron Jr. To Argentine Ambassador Marcelo Augone-Quiroga at the Laperriere workshops, May 1959.



Source: Library and Archives Canada, National Film Board of Canada, Photothèque, PA-163958.

Overall, records and interviews from this period reveal an astonishing amount of time, resources and space devoted to aesthetics, style and on-site promotion and display. The Junior's conspicuously refined aesthetics and display features was not an afterthought, but an essential and revealing part of its history. AECL's Commercial Products Division made instruments as much for treating cancer as for selling their image.

Exhibiting Atomic Canada

The distinctive style of AECL Commercial Products Division technologies played an important role in building Canada's identity in the 1950s. Instrument aesthetics was a prominent part of their marketing program that included factory and showroom tours, hospital tours, world fairs and trade exhibitions. One such venue was the 1962 Seattle World's fair. The Canadian Museum of Contemporary Photography holds one of the best visual resources on the fair, a series of over two hundred photos of the Canada pavilion taken by Chris Lund of the National Film Board (NFB) Still Photography Division.¹⁵ Since the 1930s, the NFB had been sending photographers across the country and the world to document a wide variety of Canadian activities from ice fishing in northern Manitoba to asbestos mining in Quebec. The NFB packaged the photos into "photo stories" and distributed them throughout Canada and the US as two-page spreads in newspapers and magazines. Basically, they were upbeat Canadian government promotional materials. The newly built Seattle space needle looms over the photo story about "Canada week" at the 1962 fair.

The Theratron had a prominent position at the Canada pavilion at the 1962 Seattle World's Fair (fig. 4). It was part of a broader effort by the Canadian government to sell itself as a nuclear power for peaceful purposes. The main theme of the exhibit was "Canadian Science and Technology Serving Mankind." Technical and company information can be found on the adjacent wall. It shared the spotlight with other Canadian success stories. There was a Black Brant rocket showcasing Canada's use of rocket technology for research on the upper atmosphere; there was a display about Canada's new cosmic ray detector at Inuvik, North West Territories, and a display about Canada's Alouette satellite (launched in September of that year) high-lighting another basic research project.¹⁶ The

15. NFB photostory #319 entitled "Canada Week"—Special Show for Seattle Sightseers: World's Fair at Canada's Doorstep," Photographer Chris Lund. The full series of original prints are housed at the Canadian Museum of Contemporary Photography, National Gallery of Canada, Ottawa. For a more general overview of the fair, see Bill Cotter, *Images of America: Seattle's 1962 World's Fair* (Charleston: Arcadia Publishing, 2010).

16. Many of these technologies are currently on display at the CSTM. I am researching the exact models that were sent to Seattle. The actual Alouette model that was on display at Seattle has been identified as the "test" model. No one knows where it is now. The CSTM owns the Alouette prototype. The remaining two original Alouette satellites are in space.

displays also showcased Canada as scientific and future-looking amidst classic 1960s iconography. The Theratron, appearing below a multi-coloured atomic motif, fit this message and branding well. When we tie this branding to the activities at the AECL Commercial Products Division factory that heavily emphasized AECL style, we see how the workers quite literally helped construct Canada's image as a modern, scientific nation.

Figure 4. People looking at a Theratron in the Canada Pavilion at the Seattle Worlds's Fair, June 1962.



Source: Canadian Museum of Contemporary Photography, Ottawa, National Film Board Collection, National Film Board photo story no. 319, Chris Lund, photo no. 62-2395.

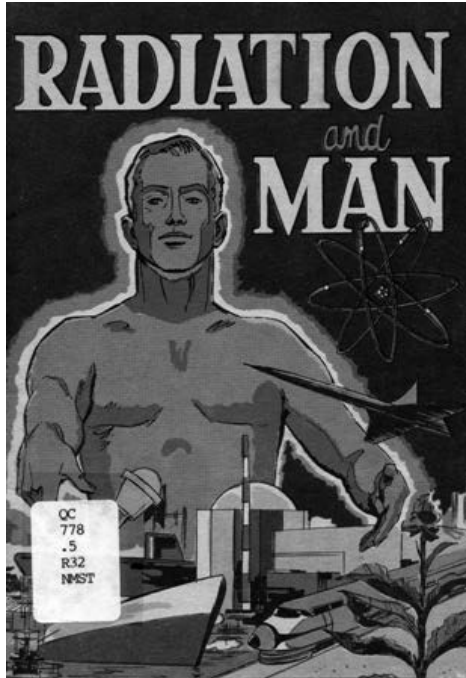
Ideals vs Reality

In Alexander Solzhenitsyn's novel *The Cancer Ward* set in a 1950s cancer clinic in a remote part of the southern Soviet Union the radiotherapy machines, portrayed as overworked and in need of constant maintenance, are no match for the growing, insidious cancers that inhabit the patients, and metaphorically Soviet society as a whole.¹⁷ But Solzhenitsyn's novel is not

17. Aleksander Solzhenitsyn, *Cancer Ward* (New York: Dial Press, 1968).

just a lesson about the nature of rotting totalitarian rule; it also touches on Western society's deeply engrained expectations for medical technologies—what we want them to be, and what they actually are (fig. 5).

Figure 5. *Idealistic depiction of the Canadian nuclear industry in Radiation and Man. Can. Dept. of National Health and Welfare, Canadian Nuclear Association, 1966.*



Source: From the trade literature collection, Canada Science and Technology Museum, Image courtesy of the Canadian Nuclear Association.

It is at this juncture between ideals and reality where the life stories of objects become instructive. According to surviving production and service records recently found at the successor to AECL's Commercial Products Division, Best Theratronics, the Theratron Junior on our museum floor (serial no. 15) was constructed in the fall of 1956, and shipped in January 1957 to Our Lady of Lourdes Hospital in Binghamton, New York. It remained there for over 13 years treating cancer patients. Its purchase and arrival was the subject of fanfare in Binghamton as was the case in other locations and countries (fig. 6). One of the local dignitaries, New York Congressman Sterling "Stubby" Cole, was on hand for several events related to acquisition of the Theratron including the opening of the new

facility.¹⁸ Cole, in fact, had a keen interest in nuclear technology. Since 1946 he had been a member and then chair of the influential congressional Joint Committee on Atomic Energy. In late 1957 he retired from Congress to become the first president of the International Atomic Energy Association (IAEA), a key part of Eisenhower's "Atoms for Peace" program.¹⁹

Figure 6. Dr. Andrew Adams (right) demonstrates the operator console next to the shielded window for the Theratron Junior at Our Lady of Lourdes Hospital. U.S. Congressman Sterling Cole (centre), Sister Irene Kraus, DC, Lourdes Administrator (left), February 1957.



Source: Photo courtesy of the Lourdes Hospital Archives.

The production and service records for serial no. 15, as well as records at Our Lady of Lourdes Hospital, provide detailed information on the installation and functioning of the machine. The local history of Theratron Junior serial no. 15 demonstrated significant additional costs associated with acquiring these machines. The construction of a bunker-style radiotherapy room and shielding at Our Lady of Lourdes took up an enormous amount of labour and financial resources—costing as much as

18. Lourdes Hospital Archives, Theratron press clipping file. Thank you to Archivist Jean Jenkins for assistance in obtaining these clippings.

19. Thomas W. Ennis, "W. Sterling Cole, 82, Dies of Cancer," *New York Times*, March 17, 1987;

"Mr. Sterling Cole, IAEA's First Director General, Leaves Office after Four Years of Service," *IAEA Bulletin* 4, 1 (1962): 16-17.

the machine itself—\$25,000. The maintenance of the machine then became the main expense. Technicians from General Electric X-Ray Corporation, and not AECL, did most of the radioactive cobalt source replacements, probably the most expensive operation. In the 1960s there were several repairs of critical mechanical movements done by the Canadians, such as repairs to the hydraulic couch. There was also repair to the emergency shutter system and signal lights. Many of these changes and visits were routine, but for each of these kinds of interventions there were horror stories that are now part of company legend—a patient on a couch being impaled by a faulty hydraulic system; patients being exposed to too much radiation due to a faulty shutter; technicians being exposed to radiation due to poor shielding.²⁰ Sensationalized or perhaps downplayed, they speak to the realities of what was a dangerous business in wildly varying hospital, architectural and cultural conditions.

The personal recollections of the technician who operated the Theratron Junior during the thirteen years that it was in Our Lady of Lourdes are perhaps the most revealing about its life as a functioning unit. Regina Bartish now 86 years old came to the hospital as a trained X-ray technician in the late 1940s.²¹ She knew the Theratron Junior intimately and also its impact on patients, the hospital and Binghamton and its surroundings. According to Bartish, in the late 1950s and 1960s, Theratron Junior no. 15 was the only cobalt-60 machine between New York City and Buffalo. After a relatively slow start where it was used for different procedures, the lead radiologist Dr. Andrew Adams came to use the Junior primarily for follow-up mastectomies. By the end of its term at Our Lady of Lourdes it was operating at full capacity. Most patients underwent four to five week treatments at a total cost of approximately \$250. Both clients and hospital staff were apprehensive about the new atomic technology and Bartish remembers a prominent radiation warning sign outside the treatment room. She stated in a recent interview: “You have to remember, this was not long after the atomic bomb.”²² (Throughout North America at this time cobalt units in general were colloquially known as cobalt bombs).²³ The Theratron was located within the thick bunker walls, while the operators and sometimes relatives of patients watched in the control room behind a shielded window. Bartish distinctly remembers that the only sounds heard by patients were those of the shutter system and its mechanical timer. Bartish recalled a five-year old boy treated for brain tumour and how the doctor and technicians gave

20. Interview with former employees Al Crandell and Dwight Foubert, September 17, 2009.

21. Interview with Regina Bartish, March 3, 2011.

22. Id.

23. Eric Hutton, “The Atom Bomb that Saved Lives,” *Maclean's*, February 15, 1952.

him Dinky Cars after each treatment as an enticement to keep still during the gamma exposure.

But the finding about Theratron Junior serial no. 15 that surprised me the most was a little note in the final production file before shipment. The unit was in fact painted “GE Grey” because of a distribution agreement with General Electric X-Ray Corp. in Milwaukee. Upon its decommissioning and return to Canada in 1970, slated to be donated to our museum, AECL took the machine and repainted it with their trademark Sea Foam Green before handing it over to the museum. It has been on display since then. I am amazed that after all my careful examinations and musings over this object on the floor, I had missed its most glaring feature—the sparkling, nearly pristine paint job. It does not have the look of an machine that treated hundreds of patients over a thirteen-year period. Other surviving Juniors have much duller and marked complexions.²⁴ Regina Bartish, the technician who worked with the Junior, confirmed that it had been grey with some black. The interior walls and tiles of the Theratron bunker, however, were green.

Conclusions

I mentioned above about society’s expectations for medical technology; the same caution should be applied to curator’s expectations—what we want artifacts to be and what they actually are. I was quite aware of the robust commercial dimension of AECL. I was still surprised by the above case study, however, and how the Theratron Junior was built as much for viewing, impressing and selling as for treating patients. The marketing arm of AECL was so important, in fact, that they repainted the unit before sending it to our museum floor. This perspective on the Theratron tells us much about the broader context of Canadians selling themselves as an atomic nation in the post-war era, and my museum’s history of uncritically repeating that message.

The close study of the provenance of an artifact is one of the best routes to alternative explorations of history. In the present case, the life story of the artifact brought into question the function of the machine. The Theratron was not just a tumor smasher, but also a local and international totem of display and pride. When it arrived in Binghamton it had been the centre of local attention and a minor celebrity. It also played a role in promoting AECL in the United States, and mobilizing Sterling Cole’s ascension later that year to the head of International Atomic Energy Association.

Close examinations of the features of the artifact are another route to alternative historical interpretations. AECL’s trademark Sea Foam Green

24. Ionizing Radiation Standards Laboratory, National Research Council (NRC).

was so important to the company it was reapplied in 1970 for display at the museum. There are deeper cultural dimensions of this feature as well. The colour green has a long history in twentieth century medicine. First used in surgical theatres in the 1910s for technical reasons (reducing glare), it became a powerful symbol of mid century medicine with its associations to nature, rest and modernity. By 1950, hospital architects, administrators and instrument makers applied green generously to their walls, furniture and products. This research inspired an exhibit at our museum, *The Colour of Medicine*.²⁵

The Theratron Junior case study represents a form of micro-history from which museums shy away. Intense artifact analysis and provenance research, however, need not be a call to cram more details and information into exhibits; rather it should serve as inspiration to develop new themes for science and technology museums, themes with a broader cultural outlook and potentially fruitful cross-fertilizations. Another theme that emerges from this research has been the heavy reliance on immigration at AECL, e.g. the highly skilled British machinists and engineers who came to Canada in the 1950s and worked at places like AECL. Using newly discovered files on other Theratron Juniors sold around the world (e.g. Cuba, Italy, Uruguay, Argentina) I am planning to synthesize several of these micro-histories of Juniors into a larger history of cancer treatment, commerce and Canada in the Cold War era. The artifacts will be the primary sources in this research.

As a curator at a science and technology museum I am often asked by historians why our museum exhibits don't take advantage of recent scholarship and interpretations in the field. I agree. Science museums have a tradition of presenting science in conservative, celebratory ways with little reference to broader social, material and cultural forces. It is not a coincidence that some of the artifacts that came to us from world fairs and company showrooms are still interpreted for audiences as they were fifty years ago. But I would also like to flip the question around and finish this paper with a challenge to my colleagues. Why don't we see close studies of historic artifacts reflected in recent history of science scholarship? Even the most radical history of science is missing something without a serious scrutiny of the lives. In the case of the Theratron Junior the study of its features bring to life neglected facets of Canada's early atom

25. David Pantalony, "The Colour of Medicine," *Canadian Medical Association Journal* 181, 6-7 (2009): 402-403.