

Learning through Objects: Development of the UWO Medical Artifact Collection as a Teaching and Research Resource

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Abstract. In 2004, the authors redeveloped the UWO Medical Artifact Collection as a teaching and research resource. Students enjoy learning through objects and gain new historical inquiry skills and insights in working with artifacts as primary sources. This paper also discusses collections management issues and object research.

Résumé. En 2004, les auteurs de ce texte ont réaménagé la collection d'artefacts médicaux de l'University of Western Ontario en un centre d'enseignement et de recherche. Les étudiants ont maintenant le loisir d'apprendre en voyant et en manipulant des artefacts. Ce texte aborde aussi diverses questions reliées à la gestion et au développement des collections.

In the early 1920s, the Faculty of Medicine at the University of Western Ontario in London began collecting medical artifacts from students, alumni and doctors for a Medical Historical Museum. Over the next several decades, a modest collection of 19th- and 20th-century medical objects, from bloodletting instruments and surgical sets to microscopes and pharmaceuticals, was assembled at the university. The collection

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however remained without a formal museum setting until 1972, at which time the Medical Museum opened at the newly built University Hospital. The collection was transferred from the university to the hospital for the purposes of this museum. Two exhibit areas—a recreated Victorian doctor's office as well as cabinet displays—showcased the drug chests, stethoscopes, electrotherapeutic machines, doctor's bags, wooden legs, trephines, scalpels, anesthetic masks, X-ray tubes, obstetrical instruments, and other artifacts. Museum curators Joan Stevenson (1972-86) and J. T. H. Connor (1986-92) managed and promoted the collection as a teaching and educational resource for the community and the university.¹ In 1994, the Medical Museum was closed when University Hospital administrators declared that it could no longer dedicate required resources for its maintenance. Subsequently, the collection was divided and transferred to three different London locations—Fanshawe Pioneer Village (a living history museum of 19th-century restored buildings), the Victoria Hospital Museum and Archives, and the Department of History of Medicine at the University of Western Ontario.² At the university, the medical artifacts were adequately stored but difficult to access, more or less lying dormant and untapped as a resource by students, instructors and researchers.

In 2004, the authors undertook to redevelop the university's medical artifact collection, renamed the UWO Medical Artifact Collection, as a more viable teaching and research resource. It is our assessment that these artifacts hold potential as a meaningful study collection for university students and researchers interested in material culture, object study, regional practices as well as any number of themes in the history of health and medicine. Review of this collection indicates strengths relating to diagnostic equipment (such as cardiographs, sphygmomanometers, haemocytometers, urinalysis sets), surgical sets, electrotherapy machines, homeopathy drugs, ophthalmology tools, obstetrics and gynecology instruments, and orthopedic devices.³ Lesser strengths of the collection include objects relating to radiography, public health, phlebotomy, veterinary medicine, dentistry, surgery, military medicine, and general pharmaceutical preparations. There are several objects in this small, regional collection that, while not rare items, are in good condition and uncommon in many medical artifact collections such as a carbolic spray (post-1869), a Luer surgical set (French-made), a trephination set, a drug chest, a monoaural stethoscope, among other artifacts.

Our objectives in developing this collection are twofold. First, once organized and made accessible, this collection will contribute to a larger research project on the material history of medicine and health. Second, this collection development program is an effort to address the underutilization of medical artifacts in Canadian universities as a teaching and research resource. Our endeavour is certainly not unique. There are many well-known university collections utilized as teaching and

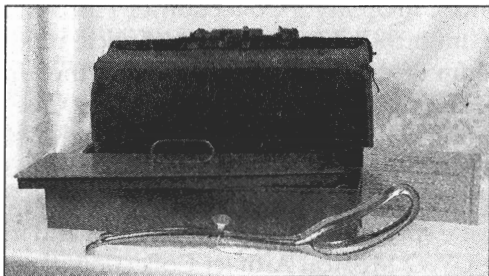
research resources, including medical and scientific artifact collections such as Harvard University's Collection of Historic Scientific Instruments, the Dartmouth Collection of Historic Scientific Instruments, the Whipple Museum of the History of Science at the University of Cambridge, and the Dittrick Medical History Center at Case Western Reserve University, among others.⁴ Drawing from these examples, as well as from material history scholarship, methodology and experience, we defined and implemented a three-phase collections development framework to overcome specific challenges of physical and intellectual control relating to the UWO Medical Artifact Collection, thereafter facilitating the creation of teaching and research opportunities. This is a work in progress. However, initial assessments suggest that students enjoy learning through objects, and more importantly, gain new historical inquiry skills in working with artifacts as primary sources. More scholarly research on medical instrumentation, technology and its practice is to be encouraged alongside material culture theory and practices for use in and out of the classroom. This paper discusses collections management issues, object research, and teaching opportunities as revealed through this university collection of medical artifacts.

CHALLENGES IN COLLECTIONS MANAGEMENT AND ACCESS

Our first challenge concerned the poorly documented nature and disordered storage of the UWO collection. In this state, the collection was an inaccessible and ineffectual resource. According to standard collections management theory, improper documentation equals a loss of utility; correct and adequate documentation allows for greater and more innovative use of collections for research and teaching purposes.⁵ Therefore, the reorganization of the collection necessitated a complete inventorying, cataloguing and numbering process; indeed, until we had finished, the total number of artifacts and the scope of the collection was unknown.

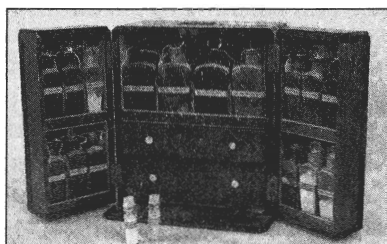
Documentation systems should address the needs of staff, instructors, and users, particularly researchers, of the collection, and include four types of information: identification such as object name and number; acquisition information such as the name and address of the donor; control documentation which tracks the location and movement of objects; and research data such as the date of production of the object, manufacturer name, and patent information.⁶ In selecting the database fields for the UWO Medical Collection, we accommodated both our needs and those of the users rather than a "systems approach" which begins by considering available software. For example, instructors need to be able to locate artifacts for teaching purposes, students may wish to know the names of instrument manufacturers or related research materials, and others are likely to be interested in objects donated by colleagues or family members. Thus, a variety of information fields were required.

Figure 1



Obstetrical case, c1900, complete with Yankauer anesthesia mask, sutures, gauze, umbilical tape, catheter and irrigators. Copper sterilizer holds numerous midwifery forceps (foreground). Notice of birth form is for the province of Ontario as regulated by the Vital Statistics Act (back right). UWO Medical Artifact #2004.911

Figure 2



Doctor's Medicine Chest, about 1850, reputedly once used by a ship's captain, containing bottles of sulphate quinine, laudanum, sugar lead, lavender, opium, among other medicines. UWO Medical Artifact Collection #2004.127

The end product of documentation systems should consist of acquisition records, a comprehensive catalogue of all objects, and an index or search mode, which allows for easy location of specific artifacts and associated records.⁷ As a first step, we transferred information from the paper inventory record into a digital form using Filemaker Pro, an affordable, commercial software recommended for small databases.⁸ This Filemaker database is utilized only by the collections managers to generate reports, to search for specific objects, to identify common manufacturers or donors, and more. Located on one computer terminal designated for the project, this database enables us to print a complete listing of the collection in various forms or level of details. Our second step involved importing the data fields from our Filemaker database into a more sophisticated, online database, designed and maintained by Information and Technology Services (ITS) at the University of Western Ontario

specifically for this project. The ITS database encompasses all information within the Filemaker database but with controlled access by providing two different online viewing screens: (1) a public, fixed display for students and researchers, which allows keyword searching of all fields but restricts access to sensitive information; and (2) an editable, password-protected display for collections staff. Unlike the Filemaker database, the ITS online database is accessible beyond our one designated terminal and allows for the incorporation of object photographs and links to related online material. The embedded artifact photographs within the object record supplies visual documentation and a reference point, in particular for those users who will consult the online database rather than visit the visible storage area on campus. To facilitate academic research, archival sources located at Western, which are relevant to the objects and to the history and practice of medicine, are also contained within the database. For students, teaching modules assist them in analyzing the objects and directing them to additional materials.

The significance of object research partially depends upon the accuracy and consistency of documentation.⁹ For example, erroneous dating of medical instruments may lead to an inaccurate picture of the technological development and use or associations of these objects. Standard terminology is also very important in the consistency of documentation.¹⁰ Although it recognizes some anachronisms in the application of modern terminology to historical instruments and the concepts which they represent, the UWO project team utilized the Medical Subject Headings and terms created by the United States National Library of Medicine; it provides the proper names for objects as well as the broader category to which an item belongs.¹¹

Artifact documentation provides an understanding of the scope of a collection, hence allowing the formation of a collection mandate.¹² Through the cataloguing process, we discovered that the scope of the UWO Medical Artifact Collection is representative of late 19th- and early to mid-20th-century practice and teaching of health and medicine in southwestern Ontario, and thus our mandate is to collect, preserve, research, and make accessible such material history within this region and time period. Documentation also facilitates the creation of policies to direct further acquisitions and potential deaccessions based on the mandate.¹³ With cataloguing, the strengths of the collection, such as otorhinolaryngologic and ophthalmic diagnostic items, became evident. Consequently, it is unlikely that duplicates of comparable artifacts will be accessioned unless they are older, rarer, or in better condition than the pre-existing ones, or unless they were owned by a significant or local personage.

It is also apparent that the collection possesses a number of duplicates, and because our mandate is to be a study collection, not a museum, it is questionable whether all duplicates need to be kept. Deac-

cessioning objects can be considered an opportunity to provide better care and storage for remaining artifacts and room for growth of objects more relevant to the intended use of the collection, rather than a loss of information. If deaccessioning is pursued, a rigorous attempt to relocate rather than discard objects will be conducted. After cautiously identifying potential objects for deaccession based upon poor condition, lack of documentation, duplication or irrelevance to the collection mandate, the first step will be to contact local London or Middlesex county institutions that may be interested in these items.¹⁴ The next level will be to offer the remaining items to museums in the southwestern Ontario region, and then to other provincial museums such as the Museum of Health Care in Kingston. Third, items could be restituted to the families of the donors, if such information exists, and fourthly, objects may be selected for sale.¹⁵

In reorganizing the medical collection, we were also challenged by the nature of the artifacts themselves, and the necessity of proper and safe storage. Medical collections can pose threats to health and safety, as they may contain radioactive material and radium sources, hazardous chemicals and medicines, as well as controlled and now illegal drugs.¹⁶ Dirty and bloodstained instruments such as amputation knives can transmit harmful micro-organisms, even decades after their last use, especially those instruments used before sterilization became common.¹⁷ Our collection holds medicines with poisons such as arsenic, cyanide and strychnine, as well as sphygmomanometers and thermometers, instruments which contain mercury, a toxic substance which can be absorbed through the skin. It also includes controlled narcotic substances, those which are used by medical professionals but can be abused, such as morphine and opium, and unsterilized surgical instruments. Several unknown or unlabelled drug containers are also problematic and potentially dangerous. Professional conservators recommend the disposal of such items;¹⁸ however, many removal services will not accept unidentified substances, as indeed the UWO Hazardous Waste Disposal policy stipulates.¹⁹

Museums debate the benefits and hazards of keeping original medicines. Purists argue that the medicine is in itself as, or possibly more, interesting than the container. Students might learn about significant medical developments such as pharmaceutical preparation procedures or the evolution of standardized dosages through examination of the actual liquids or pills. Other scholars assert that the hazards are greater than the research opportunities and indeed the chemical properties of the preparations may change over time making the substance inert to more dangerous.²⁰ We decided to maintain both the medicines and the containers, and instead ensure a rigorous and comprehensive labelling and documentation system to identify potential hazards. For example, all such items are visibly marked in storage, and the catalogue records con-

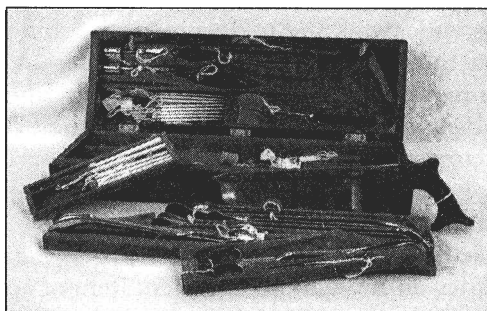
tain information about the proper handling of these objects. A work-study student has researched all medicines and chemicals to ascertain potential problematic items and to document the contents of each, ultimately in order to create workplace material safety data sheets. All researchers are required to read and sign a form which describes the potential hazards and prudent handling techniques. To further ensure safety, we are currently developing an online research and teaching module about pharmaceuticals which includes photographs of numerous items; this reduces the need for handling drugs.

The UWO Medical Collection also poses problematic cultural issues because it includes an Indigenous rattle, an item of spirituality (UWO Medical Artifact Collection #2004.086). The ownership and display of First Nations spiritual and medical objects is controversial.²¹ Many Native traditionalists feel the historical collection of such items was based upon the assumption that their culture was dying out through evolutionary forces, and was facilitated by forced religious assimilation. Museums often displayed these objects as “curiosities,” rather than examples of ongoing spiritual beliefs. Many traditionalists also state that the associated knowledge attached to such items is secret, or at least should be restricted to appropriate practitioners. Across North America, legislation and ethical codes have been enacted by governments and museums in order to curtail access to such items, remove them from display and potentially repatriate them to Native groups.²² Unfortunately, little is known about the provenance of the rattle in our collection, but we will be exploring the issue with the relevant communities.

The UWO Medical Artifact Collection is also relatively inaccessible. Although the objects have been reorganized into a more accessible storage plan, the collections area itself is located within the Department of the History of Medicine, and hence cannot be a public space. Faculty from the Department of History or the History of Medicine must be present to accompany visitors. Many museologists fear that putting collections online will deter visitors, or replace visitors' onsite museum experiences.²³ In our case, however, internet access to the artifact database and photographs, as well as online research modules, is essential to increase student and instructor use, and may in fact stimulate more queries from the public.

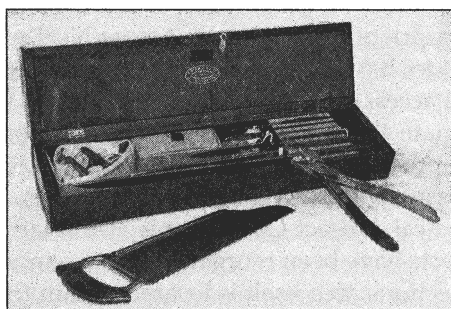
At Western, we've met our challenges in practical ways, while also drawing on “best practices” and standards theories, to make the collection a more effective resource. In imposing physical and intellectual control on the objects, we now have a system that is amenable to incorporating new acquisitions. More importantly, we now are able to utilize the artifacts at hand, developing new opportunities to study these objects.

Figure 3



Surgical Set, mid- to late-19th century, manufactured by Luer of Paris, containing 64 components such as various saws, trephination drills, scalpels, amputation knives, and even eye surgery instruments. Once owned by Dr. Peter Stewart, it was donated by Dr. Charles Thompson, his great-grandson and Head of Ophthalmology at Western. UWO Medical Artifact Collection #2004.147

Figure 4



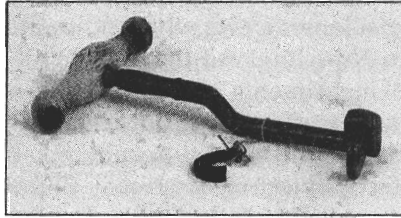
Nineteenth-century Amputation Set, manufactured by George Tiemann and Co., New York, containing a tourniquet, several saws, and suture material. This set was probably owned by Dr. Septimus Thompson, grandson of Dr. Peter Stewart and father of Dr. Charles Thompson. Septimus Thompson specialized in ophthalmology and otolaryngology, and taught these subjects at Western in the early 20th century. UWO Medical Artifact Collection #2004.119

OPPORTUNITIES FOR OBJECT RESEARCH AND TEACHING

Historically, museums were considered educational institutions where students utilized collections for their studies.²⁴ In the early 20th century, museums began to focus more intensively on the collection and preservation of material culture, rather than relating to the public. In the last 20 years, museums have returned to the idea of education, and now offer programs run by professionals.²⁵ These museum educators argue that the materiality of three-dimensional objects often stimulates a greater

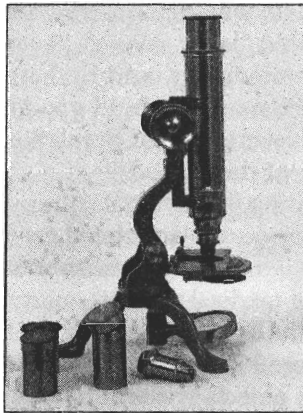
response and a greater interest in learning than simply reading two-dimensional words. All the senses are involved in an exploratory examination of objects, as visitors assess the texture, weight, temperature, scale, colour and smell of artifacts.²⁶ Still what does one learn from objects?

Figure 5



Tooth Key, early 19th century. Owned by Dr. S. McGarry of Niagara Falls, this key was donated to the Faculty of Medicine by a Dr. Glaister of Wellesley, Ontario. UWO Medical Artifact Collection #2004.387

Figure 6



Brass Monocular Compound Microscope, 1870s, with interchangeable eye pieces and objective lenses. Donated to the Faculty of Medicine in 1922, it was used by William E. Waugh in his classes at McGill University under William Osler who was one of the first Professors to teach diagnostics with microscopes. Waugh later became one of the first Professors of Medicine at Western in the 1880s. UWO Medical Collection #2004.340.

Anthropologists, archaeologists and museologists have long recognized 'things' as symbols of particular ideas or behaviours, and have contributed to defining (and redefining) object research as a field of study since the 19th century.²⁷ As theory and methodology, material culture²⁸ or material history²⁹ is an interdisciplinary field with a growing body of scholarship.³⁰ With anthropologists and archaeologists often

leading the way, various approaches have been developed with different artifact emphasis, such as its function, its construction or structure, its beauty, its relationship to society, among others. Archaeologists use objects as part of the archaeological record to illuminate larger sociocultural contexts. This is well demonstrated by folklorist Henry Glassie who shows the importance of "folk" or vernacular architecture in early America as evidence of shared common ideas and their manipulation, and by historical archaeologist James Deetz who studies the changes in Anglo-American culture in New England through small things (doorways, gravestones, musical instruments, etc.) of daily life so often forgotten.³¹

Many historians tend to shy away from artifacts, stating that they are much more comfortable with textual documents. For those historians who do utilize artifacts, object research may illuminate social institutions and social relations in which the "things" served as mediating tools amongst themselves and within their physical world. Using objects as historical sources, scholars may identify the ways in which individuals utilized, altered, or abandoned "things" as well as how people interacted with each other and within their physical environment.³² The structures of everyday life, such as household economies and practices, can be illuminated. This is well-demonstrated by Ruth Schwarz Cowan in her study of household "labor-saving" devices, which did not transform women's roles immediately, and by Laurel Thatcher Ulrich and her study of early American household goods, which show how relationships and identities were shaped in relation to cultural encounters, politics, and commerce of this period.³³

Scholarship highlighting the material culture of medicine ranges from technical narratives of devices to annotated catalogues of medical instruments to more comprehensive historical analyses.³⁴ Moving beyond the functional properties of medical artifacts, many historians and museum curators are exploring the broader meanings of these objects in medicine and society.³⁵ As proposed by John Pickstone, focusing on the material culture of medicine as objects within social relationships—that is, the broader context in which objects are constructed, used and given meaning—illuminates the dynamic interactions of medical work.³⁶ Early seminal works include the studies of Stanley Reiser and Audrey Davis who examine how medical diagnostic instruments shaped the delivery of medical care, the doctor-patient relationship, and the life insurance industry.³⁷ More recently, Joel Howell demonstrates how urinalyses, blood tests, and x-ray machines changed patient care in early-20th-century American hospitals while Margarete Sandelowski argues that the professional skill and identity of nurses was eclipsed by such technologies as oxygen therapy, thermometers, x-ray machines, electronic fetal monitoring, and other equipment.³⁸ Andrew Cunningham, Keith Wailoo and others reveal how laboratory tests and their results shaped our understanding of disease.³⁹ Katherine Ott's work on prosthetics as well

as J. T. H. Connor and Felicity Pope's study of electrotherapeutic devices raise larger issues of the body, human-machine relations, culture, consumerism and more.⁴⁰ These works notwithstanding, curators tend to accuse many medical historians of using medical artifacts only superficially (if at all) and not as objects of close, thoughtful examination.⁴¹

Objects can be valuable source material for historians because artifacts are the unwritten record of the past and complement textual documents. Objects may defend or challenge histories based solely on textual documents. Or they may fill a gap left in the incomplete written record, thus revealing something in the past that cannot be studied in other ways.⁴² For example, an historian may study the training of physicians (as represented in contemporary medical texts) by examining the instruments and case books of practitioners to determine if theory always translated into practice.⁴³ Or objects may be interpreted as signs or cultural symbols which are greater than the object itself, such as authority, professionalism or individual status. For example, a rural doctor may use a simple surgical set (UWO Medical Artifact Collection #2004.149)—with wooden handled knives and few components—while a society doctor may own a more elaborate, European-made surgical set (UWO Medical Artifact Collection #2004.147)—with ivory handled knives and numerous components.⁴⁴ Made by the French company Luer of Paris, this latter item may also be seen as representative of "commodity fetishism," in that its significance is partially created by its brand name and the greater cultural value placed on European artistry, not just its monetary or use-value.

Far from being static items, artifacts have communicative and expressive features, just as words do. There is great potential to learn from artifacts because the interpretation of objects is fluid and occurs on many levels.⁴⁵ For example, a 19th-century amputation set (UWO Medical Artifact Collection #2004.119) can speak about the state of medicine during war or about contemporary medical practice. Wear patterns show how the instruments were used while decoration can exemplify the status of the person who once owned the object or reflect the skills of the instrument maker. Comparison with other amputation sets (UWO Medical Artifact Collection #2004.892) can illustrate the history of a manufacturer or the development of instrument technology. Interpreting the object within a larger collection from the same donor can reveal the history of this individual.

Objects can also speak about common meanings and values held by individuals or societies, such as identity as defined by appearance. For example, a wooden prosthetic (UWO Medical Artifact Collection #2004.596), functional in itself, can be made more aesthetic and less visible by its resemblance to a human leg if complete with carved toes and toenails.⁴⁶ Exotic or curious objects, or "fetishes," can reveal the mindset of the collector; for example, an early 19th-century child's caul (UWO Medical Artifact Collection #2004.958) paired with old newspaper adver-

tisements seeking to purchase cauls for the superstitious protection against drowning says more about the eccentricities of the 20th collector than the item itself. Relationships between people are also embodied in artifacts. For example, one might speculate that a local physician received the Indigenous rattle (UWO Medical Artifact Collection #2004.086) as a gift or in exchange for medical treatment. Objects can also declare allegiance or show commemoration, such as a sterling silver decorative plate celebrating 50 years of the Royal College of Physicians and Surgeons of Canada (UWO Medical Artifact Collection #2004.121). They can also mark the biography of an individual. A German medical kit (UWO Medical Artifact Collection #2004.254), taken by a London physician in World War One, shows not only his interest in medicine but also his desire for a trophy of his experience.⁴⁷

It is within this philosophy of object lessons that the UWO Medical Artifact Collection is being developed as a research and teaching resource. In fact, as curator James Hamilton reminds us, part of the mandate of a university curator is to inform educators that, compared to books, object collections hold a different, but equally important role as sources of information, which can be explored in teaching and research.⁴⁸ What are the methods or techniques employed in the analysis of objects? How does the historian study an artifact as a primary source? Various object research models and methodological frameworks developed in such disciplines as archaeology, anthropology, art history, and folklore provide a point of departure for historians.⁴⁹

Three of the more well-known artifact study models are those proposed by E. McClung Fleming, Jules Prown and Robert Elliott. In 1974, Fleming presented an artifact study model developed in his seminar "The Artifact in American History" as part of the Winterthur Museum-University of Delaware Program in Early American Culture, and thereafter it became known as the Winterthur Protocol. In Fleming's model, the first stage required a description of the five properties of an artifact: its history, material, construction, design, and function. For example, when and where was it made? What is it made of? How are its parts organized so that it functions as intended? What is its shape? How has it been used over time? The second stage was an analysis of these properties: identification, evaluation, cultural analysis, and interpretation. For example, do you base identification on its function, its material, or its subject? How does it compare with objects of similar function or within the same time period? What are the tasks and behaviours associated with this object in the culture(s) in which it has been used? How do its users express the significance of this object?⁵⁰ As Fleming invited, Jules Prown tested this model but reduced it to only three steps: description, deduction, and speculation.⁵¹ In 1986, Robert Elliott outlined five necessary steps: material, construction, function, provenance, and value.⁵² The three methodological approaches share more similarities than differ-

ences; the later two clearly indebted to the Fleming model. For that reason, many instructors (including the authors) introduce their students to artifact study via the Fleming model upon which they later compare and contrast with other frameworks.

In our hands-on workshop, students examined objects with interpretation guidelines based on the Winterthur Protocol. They spent time studying the properties of the artifact (history, material, construction, design, function) as well as the meaning of the artifact (identification, evaluation, cultural analysis, interpretation). In the end, each student was successfully introduced to working with objects as primary sources in the historical practice, knowledge or experience of health and medicine. It encouraged students to formulate broader historical inquiry questions and to identify additional source materials to complement object research.

An additional opportunity to participate in object lessons will be through future web-based research and teaching modules on selected topics. Each will feature a series of 3-D object photographs, with links to their catalogue records, among possible other materials. As in other educational modes, a series of questions based on the Winterthur Protocol will be posed. Students can respond to these questions through examination of the artifact, via the visual documentation, or through extended research. They will be directed in this research by a list of further readings available in the library, and potentially by digitized primary sources, such as instrument catalogues or 19th-century teaching textbooks, also linked to the modules.

At Western, history graduate students may also incorporate public history into their Masters of Arts degree. Beyond artifact research, the UWO Medical Artifact Collection provides an additional opportunity to learn about collections management and documentation issues. For example, students may be interested in studying the identification, labelling and handling procedures for potentially dangerous objects such as homeopathic medicines. One online teaching module currently being developed incorporates the catalogue records and photographs of such items, and then asks students to think about how they would create collections policies to deal with these hazards. Students would need to address methods of examining the stability and toxicity of chemicals. How would they indicate a potentially hazardous material to museum staff, researchers or visitors to an exhibit? What policies would they instigate for researchers who wished to examine hazardous materials, or to ensure regular checking, maintenance or disposal of hazardous materials? What are the legalities of possessing controlled drugs in a museum collection, and what collections management standards would they suggest for proper control and storage?⁵³

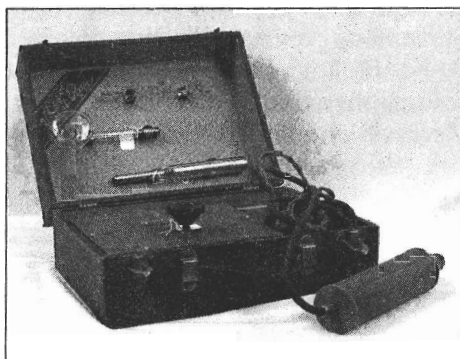
Online teaching modules will become increasingly important as more museums digitize their collections. The visitor experience onsite at a museum revolves around viewing the original and authentic artifact,

while the visitor experience within an online collection includes the representation of the object, but focuses on the knowledge surrounding the artifact, rather than the artifact itself, unless available technology can provide exceptional three-dimensional photographs. According to some museum scholars, online visitors are often more interested in the contextualization of the object, and the relationships between objects, rather than how an object is classified and described within a museological taxonomy.⁵⁴ On the UWO Medical Artifact Collection website, the modules and the database are linked so that users can examine both the object and its documentation, and the historical contextualization of the object. As information specialist Howard Besser has suggested, this approach will potentially provide an information rich experience through this linking of a collections management database with a more thematic section. Consequently, as the collections management database is updated with students' research on artifacts, so too is the online learning module portion expanded.⁵⁵

In general, museum educators currently advocate a shift from an "object-based epistemology" to an "object-based discourse or narrative;" the focus changes from the object to the participation of the object in the history and culture of the visitor.⁵⁶ Similarly, museologists theorizing about the web as a new form of museum communication emphasize a learning environment which is people-centred, not object-centred. To them, it is as much the meaning of the object to visitors and how it relates to their own experiences, as the object itself, which is important.⁵⁷ Consequently, simply making a collections database accessible for searching on the internet is considered to be a limited approach, and indeed the available computer technology has overtaken the content embodied within collection inventories.⁵⁸ The purpose of the UWO Medical Artifact Collection straddles the object-centred and people-centred paradigms; faculty have documented and stabilized the collection for future use, and provided academic access through the online database, but the future research and teaching modules will engage web visitors through a people-centred experience.

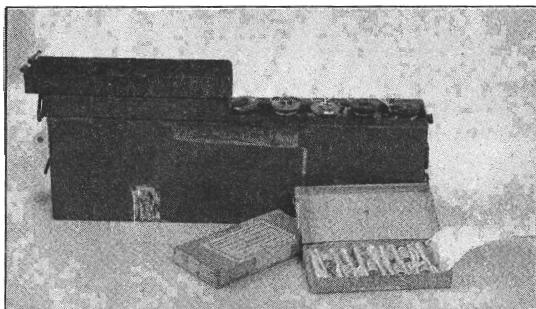
Another opportunity to increase the use and significance of the collection is networking with physicians and the medical teaching faculty at UWO. Not only do some of these individuals remember the collection when it formed the Medical Museum at University Hospital and can shed light on its previous history, but they may also be able to help further document items. Similarly, the UWO Medical Artifact Collection will strive to work with other institutions. In Canada, this may include collections at the Canada Science and Technology Museum in Ottawa, the Museum of Health Care at Kingston, McGill's Osler Library, and/or the Niagara Apothecary in Niagara-on-the-Lake.

Figure 7



Ultraviolet Ray Machine [Electrotherapeutics], made by Elco Instruments, Chicago, early to mid-20th century, UWO Medical Artifact Collection #2004.001

Figure 8



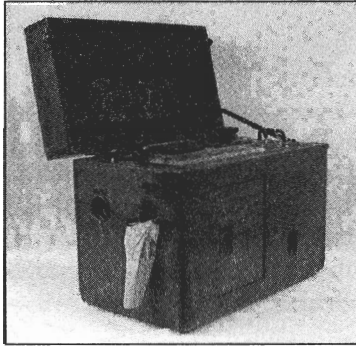
Medical Kit, made in Germany, used in World War 1, containing morphine, laudanum, valerian, and camphor. Captain Herbert C. Allison, graduate of the UWO Medical School and doctor to the 19th Canadian Battalion, B.E.F, found this kit in a German dugout at Vimy Ridge, and brought it home to Canada in 1917. A relative donated it to the Faculty of Medicine in the 1940s. UWO Medical Artifact Collection #2004.254.

A WORK-IN-PROGRESS: ACHIEVEMENTS AND ASSESSMENTS

After one year of collection development, we can present several achievements. Most fundamentally, we now know much more about the condition, the scope and the value of the UWO Medical Artifact Collection. In Phase 1, we sought physical and intellectual control of the collection. Towards this goal, the collection team has numbered, catalogued, and documented 965 objects (with components this number is closer to 4,000). We compiled an inventory of all objects and their components

which generated several thousand paper records. Inventory numbers were assigned to all objects and all components were tagged and numbered. During the inventory process, collection policies and procedures were also formulated. Related documentation including physician account books, photographs and other archival sources was transferred to the University Archives and notations made in the collection inventory record to co-ordinate research.

Figure 9



Cardiette, manufactured by Sanborn Company, Cambridge, Massachusetts, mid-20th century. It was made for Dr. Edward A. Bartram, a graduate of Western's Medical School, and one of the first cardiologists in southwestern Ontario. UWO Medical Artifact Collection #2004.418.

Figure 10

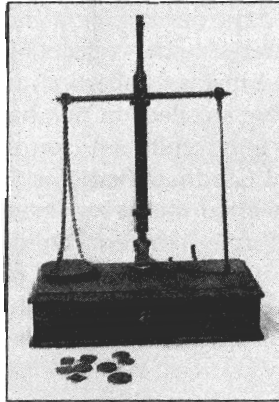


Lister Carbolic Spray, made by Godman and Shurtleff, Boston, late 19th century. The spray was given by Joseph Lister to a Dr. Taylor, who was his surgical dresser at the Glasgow Infirmary, and donated by his son Dr. A.H. Taylor. UWO Medical Artifact Collection #2004.082.

In Phase 2 we sought to provide access to the collection for greater usability—by the collection team, students, faculty and researchers—and thus constructed an online searchable database (soon to be live and

available to the public). The database includes information from the paper inventory record and photographs of most objects in the collection. In this digital form, we are able to generate reports and conduct searches that illuminate the scope of the collection, highlight the range of manufacturers, identify various practitioners involved in the practice and teaching of health and medicine in the area, and so forth. This is extremely useful. Many of the objects were once owned by London and Middlesex county physicians, thus contributing to the historical understanding of the local community. We are able to identify collection strengths, which include diagnostic equipment, several types of surgical instruments, and medical teaching material such as microscopes and anatomical stereoscope slides. We can identify the rarer items in the collection. The two oldest objects, probably dating from the late 18th and early 19th centuries, are: (1) a tortoiseshell and metal thumb lancet for bloodletting (UWO Medical Artifact Collection #2004.216); and (2) an ivory and metal tooth key used in dental extraction (UWO Medical Artifact Collection #2004.387).⁵⁹

Figure 11



Apothecary Scale, late 19th century, complete with weights, owned by Ninian Wildridge Woods, who received his M.D. from the University of Glasgow in 1842, and practised in Bayfield, Ontario, after 1857. UWO Medical Artifact Collection #2004.138.

In Phase 3, we are creating tools for greater utilization of the collection, specifically teaching and research modules. In the past, we have successfully organized workshop modules in our courses in which students are assigned objects for research and presentation projects. Our pedagogical objective is to broaden the inquiry skills and research techniques of our students with this introduction to material culture theory and methodology. We shall continue to do this, as well as create online modules based on these workshops. For the online modules, we hope to

incorporate computer-generated 3-D models in an attempt to mimic the physical experience of handling objects. Planned themes of the online modules include "History of Pharmaceutical Drugs," "Collections Management for Hazardous Material," "The Practice of Homeopathy in Ontario," "Microscopes and their Role in Medical Science," among others.

Our efforts in developing the collection promise to reap substantial teaching rewards. Students enjoy both the stories and the materiality of the objects, clearly substantiating our views of the value of objects in teaching and learning medical history. Commenting on the workshop format, one undergraduate student wrote, "It was a really enjoyable experience.... We also learned about how the research process takes place, how curators perform tasks in order to find more information on the object, and how we could go about finding clues on the object itself for our research."⁶⁰ Another student wrote, "I feel that the artifact collection was an excellent learning experience for me. I came to understand how medical artifacts could be used as a primary source and the amount you can learn about medical history by studying instruments from past doctors. I feel that the experience was unique and valuable."⁶¹ Graduate students in public history at Western, a program which emphasizes the use of material culture and the development and management of cultural institutions, expressed interest in the collections management issues, the problems in dealing with a medical collection, and the challenges of reorganizing and documenting a collection that has lain dormant for many years. Graduate students and faculty who toured the collection as part of the McCaffrey Memorial Graduate Seminar Series were fascinated by handling objects, and asserted that it was beneficial to be able to learn about Canadian history through material culture.⁶²

Has it all been worth it? This is a work in progress yet initial assessments suggest that students enjoy learning through objects, and more importantly, gain new historical inquiry skills and insights in working with artifacts as primary sources. We have also received considerable interest from retired medical practitioners and local museum personnel, who believe that the collection is a valuable resource. As historians advocating the use of objects as primary sources, we certainly believe our efforts in the development of this collection have been worth it. As a teaching and research resource, we are confident that the UWO Medical Artifact Collection has substantial potential. It is our hope that its utilization will grow. More scholarly research on medical instrumentation, technology and its practice should be encouraged, and the employment of material history theory and practices in and out of the classroom promoted. Both the doctor and the historian can take up the scalpel—or the trephine, ophthalmoscope, or sphygmomanometer—albeit within different contexts.

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NOTES

- 1 The Medical Museum, operating under the auspices of the hospital's Public Relations Department, was a modest operation but developed a significant profile locally and among other medical museums. Curator J. T. H. Connor published research on medical technology and museums, conducted oral interviews with prominent UWO doctors, incorporated objects in his university teaching, and established an archives in conjunction with the Medical Museum, among other activities. Personal communication to authors 15 September 2005. For more information, including photographs, see J. T. H. Connor, "The Medical Museum, University Hospital, London, Ontario," *Caduceus* 3, 3 (Autumn 1987): 36-47. Also noted in J. T. H. Connor and Jennifer J. Connor, "Medical and Related Museums, Historic Sites, and Exhibits in Ontario: An Annotated Guide and Review," *Canadian Bulletin of Medical History* 8, 1 (1991): 101-19. For an extended history of the collection, see Michelle A. Hamilton and Rebecca Woods, "'A Wealth of Historical Interests': The Medical Collection at the University of Western Ontario," unpublished paper.
- 2 As exhibit space was being disassembled, J. T. H. Connor and hospital administrators negotiated local storage arrangements for the artifacts. See Correspondence W. D. Finlayson, Fanshawe Pioneer Village to L. Stradeski, University Hospital, 2 March 1994; and Correspondence L. Stradeski, University Hospital to P. Potter, Department of History of Medicine, University of Western Ontario, 26 January 1994.
- 3 Expert Review with Judy Chelnick, Associate Curator, Medical Sciences Division, National Museum of American History, Smithsonian Institution, Washington, D.C., 16-18 November 2004.
- 4 Incorporating artifacts into university teaching was explored by scholars of these and other institutions at the conference "Scientific Instrument Collections in the University," 24-27 June 2004, Dartmouth College, co-sponsored by Dartmouth College and the Scientific Instrument Commission, International Union of the History and Philosophy of Science.

- 5 Sheila M. Stone, "Documenting Collections," in John M. A. Thompson, ed., *Manual of Curatorship: A Guide to Museum Practice* (London: Butterworths-Heinemann, 1992), p. 213.
- 6 Stone identifies three types of required documentation: initial or acquisition, control, and research information in Stone, "Documenting Collections," p. 215. An older, but still useful discussion on documentation systems is Elizabeth Orna and Charles Pettit, *Information Handling in Museums* (London: Clive Bingley, 1980).
- 7 Stone, "Documenting Collections," p. 217.
- 8 Other commercial or prepackaged software programs utilized for collections management purposes include PastPerfect, KE Emu, Microsoft Excel, Heritage Sentinel, STAR, and others.
- 9 For typical parameters of social history research in artifact collections, see Roy Brigdon, "Research—Social History," *Manual of Curatorship*, p. 549-50.
- 10 Prina Wentz, "Museum Information Systems: the Case for Computerization," in Anne Fahy, ed., *Collections Management* (London and New York: Routledge, 1995), p. 201-3. See also Robert A. Pisciotta, "Authority Control in Library Catalogues," in Laurie L. Thompson, ed., *Bibliographic Management of Information Resources in Health Sciences Libraries* (Lanham, Maryland and London: Medical Library Association and Scarecrow Press, 2001), p. 115-49.
- 11 *Medical Subject Headings. Annotated Alphabetic List* (Bethesda: National Library of Medicine; Springfield: National Technical Information Service, 2003); and *Medical Subject Headings. Tree Structures* (Bethesda: National Library of Medicine, 2003). These reference texts are also available online at www.nlm.nih.gov/mesh/meshhome.html. For the problems with updating subject headings, see Susan L. Gullion, "Classification and Subject Analysis," *Bibliographic Management of Information Resources*, p. 97-111.
- 12 For the formation of collections/accession policies, see Peter Cannon-Brookes, "The Nature of Museum Collections," *Manual of Curatorship*, p. 500-12; Ontario Ministry of Citizenship, Culture and Recreation, *Writing a Collections Management Policy for the Museum* (Toronto: Ministry of Citizenship, Culture and Recreation, 1998); Gary Edson and David Dean, *The Handbook for Museums* (London and New York: Routledge, 1994), p. 28-37, 67-84; and Marie Malaro, "Collections Management Policies," *Collections Management*, p. 11-18.
- 13 Stone, "Documenting Collections," p. 213.
- 14 For a comprehensive grading process of artifacts to determine relative worth, see Martin Wickham, "Ranking Collections," in Simon J. Knell, ed., *Museums and the Future of Collecting* (Aldershot: Ashgate, 2004), p. 222-34. See also Edson and Dean, *Handbook for Museums*, p. 38-41.
- 15 For discussions on deaccessioning, see Patricia Ainslie, "Deaccessioning as a Collections Management Tool," *Museums and the Future of Collecting*, p. 235-41; Steven Miller, "Deaccessioning—Sales or Transfers?" *Museum Management and Curatorship* 10, 3 (1991): 245-53; Steven H. Miller, "'Guilt-Free' Deaccessioning," *Museum News* 75, 5 (1996): 32, 60-1; and Geoffrey Lewis, "Attitudes to Disposal from Museum Collections," *Collections Management*, p. 172-87.
- 16 See Paul W. Frame, "Radioactive and Radium Sources in Medical Museums," *Caduceus* 7, 2 (Autumn 1991): 47-54; Ramunas Kondratas, "The Preservation and Disposition of Hazardous Substances and Controlled Drugs in Museum Collections," *Caduceus* 7, 2 (Autumn 1991): 55-62; and Patricia L. Miller, "Arsenic, Old Lace, and Stuffed Owls May be Dangerous to Your Health: Environmental Concerns for Museum Personnel," *Caduceus* 7, 2 (Autumn 1991): 63-70.
- 17 Eleanor Reilly, "Decontamination and Sterilization of Medical Instruments in Museums," *Caduceus* 7, 2 (Autumn 1991): 39-45.
- 18 Kondratas, "The Preservation and Disposition of Hazardous Substances," p. 58.
- 19 The UWO Hazardous Waste Disposal Procedures follow UWO institutional guidelines on this subject.

- 20 For guidelines on the disposal of chemical substances, see Kondratas, "The Preservation and Disposition of Hazardous Substances," p. 58-61.
- 21 The literature surrounding this issue is voluminous, but a few select are Devon Mihesuah, ed., *Repatriation Reader: Who Owns Native American Remains?* (Lincoln: University of Nebraska Press, 2000); Andrew Gulliford, *Sacred Objects and Sacred Places: Preserving Tribal Traditions* (Boulder: University Press of Colorado, 2000); Tamara L. Bray, ed., *The Future of the Past: Archaeologists, Native Americans and Repatriation* (New York and London: Garland, 2001); and Laura Peers and Alison K. Brown, eds., *Museums and Source Communities: A Routledge Reader* (London and New York: Routledge, 2003).
- 22 American Indian Ritual Object Repatriation Foundation, *Mending the Circle: A Native American Repatriation Guide: Understanding and Implementing NAGPRA and the Official Smithsonian and Other Repatriation Policies* (1997); and Assembly of First Nations and the Canadian Museums Association, *Turning the Page: Forging New Partnerships between Museums and First Peoples* (Ottawa, 1992).
- 23 Daniel Cunliffe, Efmorphia Kriton and Douglas Tudhope, "Usability Evaluation for Museum Web Sites," *Museum Management and Curatorship* 19, 3 (2001): 231; Howard Besser, "The Changing Role of Photographic Collections with the Advent of Digitization," *The Wired Museum* (Washington: Association of American Museums, 1997), p. 120; and Howard Besser, "The Transformation of the Museum and the Ways It's Perceived," *The Wired Museum*, p. 157-58. The opposite opinion is expressed in Diane M. Zorich, "Beyond Bitlag: Integrating Museum Sources on the Internet," *The Wired Museum*, p. 181; C. Olivia Frost, "When the Object is Digital: Properties of Digital Surrogate Objects and Implications for Learning," in Scott G. Paris, ed., *Perspectives on Objects-Centred Learning in Museums* (Mahwah and London: Lawrence Erlbaum, 2000), p. 80-93.
- 24 See Archibald F. Key, *Beyond Four Walls: The Origins and Development of Canadian Museums* (Toronto, McClelland and Stewart, 1973); and Joel J. Orosz, *Curators and Culture: The Museum Movement in America 1740-1870* (Tuscaloosa: University of Alabama Press, 1990).
- 25 Eilean Hooper-Greenhill, *Museum and Gallery Education* (Leicester: Leicester University Press, 1991), p. 1-2, 9.
- 26 Hooper-Greenhill, *Museum and Gallery Education*, p. 98, 102. Similarly, experiential learning in museums is advocated by Margriet Maton-Howarth, "Knowing Objects through an Alternative Learning Systems: The Philosophy, Design and Implementation of an Interactive Learning System for Use in Museums and Heritage Institutions," *Objects of Knowledge*, p. 174-203.
- 27 See Ruth B. Phillips, "Re-placing Objects: Historical Practices for the Second Museum Age," *Canadian Historical Review* 86, 1 (2005): 85, n. 5, for several "important late twentieth-century theorizations" including Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 1986); Annie E. Coombes, *Reinventing Africa: Museums, Material Culture and Popular Imagination* (New Haven, CT: Yale University Press, 1994); Nicholas Mirzoeff, *An Introduction to Visual Culture* (New York: Routledge, 1999); and Christopher Tilley, *Material Culture and Text: The Art of Ambiguity* (London: Routledge, 1991). See also Margaret A. Stott, "Object, Context and Process: Approaches to Teaching about Material Culture," in Barrie Reynolds and Margaret A. Stott, ed., *Material Anthropology: Contemporary Approaches to Material Culture* (Lanham: University Press of America, 1987), p. 13-30; Christopher Tilley, ed., *Reading Material Culture: Structuralism, Hermeneutics and Post-Structuralism* (Oxford: Basil Blackwell, 1990); Michael Brian Schiffer, *The Material Life of Human Beings: Artifacts, Behavior and Communication* (London and New York: Routledge, 1999); Elizabeth S. Chilton, ed., *Material Meanings: Critical Approaches to the Interpretation of Material Culture* (Salt Lake City: University of Utah Press, 1999); Ian Hodder, ed., *The Meaning of Things: Material Culture and Symbolic Expression* (London and Boston: Unwin Hyman, 1989); and

Edwina Taborsky, "The Discursive Object," in Susan Pearce, ed., *Objects of Knowledge* (London and Atlantic Highlands: The Athlone Press, 1990), p. 50-77; Susan Pearce, "Objects as Meaning; or Narrating the Past," *Objects of Knowledge*, p. 125-40.

- 28 Material culture is defined as all artifacts in a culture, or as archaeologist Leland Ferguson contends, "all the things that people leave behind....[or more broadly] all of the things people make from the physical world— farm tools, ceramics, houses, furniture, toys, buttons, roads, cities." According to historian Thomas J. Schlereth, material culture study is "...the study through artifacts of the belief system—the values, ideas, attitudes and assumptions—of a particular community or society, usually across time." Even more succinctly, art historian Jules Prown states that "the term material culture refers both to the subject matter of the study, material, and to its purpose, the understanding of culture." See Thomas J. Schlereth, ed., *Material Culture Studies in America* (Nashville: American Association for State and Local History, 1981), p. 2-3.
- 29 In Canada, the term "material history" is strongly advocated, introduced in 1972 with the launching of the peer-reviewed *Material History Bulletin* (renamed the *Material History Review* in 1991). In its first issue, the *Bulletin* offered a definition of material history as being "the study of artifacts produced or used throughout history." A different emphasis emerged in a later definition, printed in 1981 in the *Bulletin*, that material history was "the application of artifact-related evidence to the interpretation of the past." Cultural historian Gregg Finley attempted to combine these two definitions in this way:

... material history refers to both the artifacts under investigation and the disciplinary basis of the investigation. The word "material" encompasses the broad range of historical objects which exist as concrete evidence of the human mind in operation at the time of construction and/or use, and as the three-dimensional, nonverbal record containing to a greater or lesser degree, the ideas, concepts, opinions, beliefs, intentions, and values held by people in the past. The word "history" refers to the scholarly preoccupation with the human past and with historical change that is implicit in the practice of history.

For many historians, the term "material history" fits more comfortably for it situates objects as research material within our discipline. That is, material history is the investigation of artifacts (along with related textual records, oral history, and other source materials) to explore historical questions in various research areas (such as history of technology or history of medicine). See Thomas J. Schlereth, "Material Culture or Material Life: Discipline or Field? Theory or Method?" in Gerald L. Pocius, ed., *Living in a Material World: Canadian and American Approaches to Material Culture* (St. John's, Newfoundland: Institute of Social and Economic Research, Memorial University of Newfoundland, 1991): p. 232-33.

- 30 A small sample of this literature includes Thomas J. Schlereth, ed., *Material Culture Studies in America* (Nashville: American Association for State and Local History, 1981); Gerald L. Pocius, ed., *Living in a Material World: Canadian and American Approaches to Material Culture* (St. John's, Newfoundland: Institute of Social and Economic Research, Memorial University of Newfoundland, 1991); Steven Lubar and W. David Kingery, eds., *History from Things: Essays on Material Culture* (Washington, D.C.: Smithsonian Institution Press, 1993); W. David Kingery, ed., *Learning from Things: Method and Theory of Material Culture Studies* (Washington, D.C.: Smithsonian Institution Press, 1996); Daniel Miller, ed., *Material Cultures: Why Some Things Matter* (London: UCL Press, 1997); and Judy Attfield, *Wild Things: The Material Culture of Everyday Life* (Oxford, UK: Berg, 2000).
- 31 See Henry Glassie, *Folk Housing in Middle Virginia: A Structural Analysis of Historic Artifacts* (Knoxville: University of Tennessee Press, 1996, reprinted edition); *Material Culture*, rev. ed. (Bloomington, Indiana: Indiana University Press, 1999); and James Deetz, *In Small Things Forgotten: The Archaeology of Early American Life*, rev. ed. (New York: Doubleday, 1996).
- 32 Historians of scientific instruments include a technical assessment or physical analyses of the object towards better understanding the practice of science at that

- time. See Randall C. Brooks, "Forty Years of Analytical Studies," *Bulletin of the Scientific Instrument Society* 82 (2004): 4-9.
- 33 Ruth Schwarz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983) and Laurel Thatcher Ulrich, *The Age of Homespun: Objects and Stories in the Creation of an American Myth* (New York: Vintage Books, 2001). See also John Michael Vlach, *By the Work of Their Hands: Studies in Afro-American Folklife* (Umi Research Press, 1991); and Alison J. Clarke, *Tupperware: The Promise of Plastic in 1950s America* (Washington, D.C.: Smithsonian Institution Press, 1999).
 - 34 For further discussion of the range of scholarship, see J. T. H. Connor, "Review Essay: The Technology of Medicine," *Canadian Bulletin of Medical History* 6 (1989): 67-70. As Connor points out, annotated catalogues are less analytical, but nonetheless useful, for good technical descriptions and images of medical objects. Several good examples are: Elisabeth Bennion, *Antique Dental Instruments* (London: Sotheby's Publications, 1986); Audrey Davis and Mark Dreyfuss, *The Finest Instruments Ever Made: A Bibliography of Medical, Dental, Optical and Pharmaceutical Company Trade Literature, 1700-1939* (Arlington, Mass.: Medical History Publishing Associates I, 1986); and James M. Edmondson, *Nineteenth Century Surgical Instruments: A Catalogue of the Gustav Weber Collection at the Howard Dittrick Museum of Historical Medicine* (Cleveland: Cleveland Health Sciences Library, 1986).
 - 35 Robert Bud, Bernard Finn, and Helmuth Trischler, ed., *Manifesting Medicine: Bodies and Machines* (Toronto: Harwood, 1999); and Ghislaine Lawrence, ed., *Technologies of Modern Medicine* (London: Science Museum, 1994).
 - 36 John Pickstone advocates widening customary views of medical technology by studying people-object relations. He explores different materials and material relations, and he argues that the variety of materials in medicine share a coexistence and interdependence with the various forms of medical work (or "ways of knowing" in medicine). His typology of the "ways of knowing" is: biological medicine, analytical medicine, experimentalist medicine, and technomedicine. He then outlines the "object worlds" associated with each category of medicine. See John Pickstone, "Objects and Objectives: Notes on the Material Cultures of Medicine," in Ghislaine Lawrence, ed., *Technologies of Modern Medicine* (London: Science Museum, 1994 and *Ways of Knowing* (Manchester: Manchester University Press, 2000).
 - 37 Stanley Reiser, *Medicine and the Reign of Technology* (Cambridge: Cambridge University Press, 1978); and Audrey Davis, *Medicine and Its Technology: An Introduction to the History of Medical Instrumentation* (Westport: Greenwood Press, 1981).
 - 38 Joel Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore: Johns Hopkins University Press, 1996); and Margarete Sandelowski, *Devices and Desires: Gender, Technologies and American Nursing* (Chapel Hill, N.C.: University North Carolina Press, 2000).
 - 39 Andrew Cunningham and Perry Williams, eds., *The Laboratory Revolution in Medicine* (Cambridge: Cambridge University, 1992); and Keith Wailoo, *Drawing Blood: Technology and Disease Identity in the Twentieth Century* (Baltimore: Johns Hopkins University Press, 1997). In *Labour in the Laboratory: Medical Laboratory Workers in the Maritimes, 1900-1950* (Montreal: McGill-Queen's University Press, 2005), Peter Twohig explores both professional skill and identity alongside laboratory-based knowledge production.
 - 40 Katherine Ott, et al., ed., *Artificial Parts, Practical Lives: Modern Histories of Prosthetics* (New York: New York University Press, 2002); J. T. H. Connor and Felicity Pope, "A Shocking Business: The Technology and Practice of Electrotherapeutics in Canada, 1840s to 1940s," *Material History Review* 49 (1999): 60-70.
 - 41 Ghislaine Lawrence, "The Ambiguous Artifact: Surgical Instruments and the Surgical Past," in Christopher Lawrence, ed., *Medical Theory, Surgical Practice: Studies in the History of Surgery*, Wellcome Institute Series in the History of Medicine (London and New York: Routledge, 1992), p. 295-314; and James M. Edmondson,

- "Learning from the Artifact: Surgical Instruments as Resources in the History of Medicine and Medical Technology," *Caduceus* 9, 2 (Autumn 1993): 87.
- 42 Ruth Phillips states that, "Historical objects are witnesses, things that were there, then." She argues "for the irreplaceable value of museum collections as resources that can help fill in blanks in the historical record caused by the absence of textual documentation." See Ruth B. Phillips, "Re-placing Objects," *Canadian Historical Review* 86, 1 (2005): 108.
- 43 For an interesting account of what artifacts might tell us about past medical practices, see Robert L. Blakely and Judith M. Harrington, eds., *Bones in the Basement: Postmortem Racism in Nineteenth-Century Medical Training* (Washington, D.C.: Smithsonian Institution Press, 1997). The analysis of 19th-century human bones buried under the Medical College of Georgia suggests medical cadavers were disproportionately African-American. Blakely and Harrington state this as "silent testimony to the marginalization of Augusta's slave and free black communities; human dissection was illegal in Georgia until 1887 and thus most of the cadavers were certainly procured by grave robbers."
- 44 For an excellent study of objects as signs of consumption and conferring status and/or meaning, see Richard L. Bushman, *The Refinement of America: Persons, Houses, Cities* (New York: Alfred A. Knopf, 1992); and Grant McCracken, *Culture and Consumption: New Approaches to the Symbolic Character of Consumer Goods and Activities* (Bloomington, Ind.: Indiana University Press, 1990).
- 45 Hooper-Greenhill, *Museum and Gallery Education*, 99-100.
- 46 See Ott, et al., eds., *Artificial Parts, Practical Lives*; and David Serlin, *Replaceable You: Engineering the Body in Postwar America* (Chicago: University of Chicago Press, 2004).
- 47 For an overview of objects as signs, commodity fetishes, fetishes, and as invisible, commemorative and biographical items, see Tim Dant, *Material Culture in the Social World: Values, Activities, Lifestyles* (Buckingham and Philadelphia: Open University Press, 1999). For theories of signification see Taborsky, "The Discursive Object," *Objects of Knowledge*, p. 50-77; Pearce, "Objects as Meaning; or Narrating the Past," *Objects of Knowledge*, p. 125-40; Tilley, *Material Culture and Text*; and Hodder, ed., *The Meaning of Things*. For the commodification and commodity fetishism of objects see Appadurai, ed., *The Social Life of Things*.
- 48 James Hamilton, "The Role of the University Curator in the 1990s," *Museum Management and Curatorship* 14, 1 (1995): 73.
- 49 See E. McClung Fleming, "Artifact Study: A Proposed Model," *Winterthur Portfolio* 9 (1974): 153-57; Jules Prown, "Style As Evidence," *Winterthur Portfolio* 15, 3 (1980): 197-210; Jules Prown, "Mind in Matter: An Introduction to Material Culture Theory and Method," *Winterthur Portfolio* 17, 1 (1982): 1-19; Robert S. Elliott, "Material History—Testing a Method for Artifact Analysis," *Material History Bulletin* 20 (Spring 1986): 87-92; Pierce F. Lewis, "Axioms for Reading the Landscape: Some Guides to the American Scene," *Material Culture Studies in America*, p. 174-82; Craig Gilborn, "Pop Pedagogy: Looking at the Coke Bottle," *Material Culture Studies in America*, p. 183-91; McCracken, *Culture and Consumption* (1988); Gregg Finley, "The Gothic Revival and the Victorian Church in New Brunswick: Toward a Strategy for Material Culture Research," *Material History Bulletin* 32 (1990): 1-16; Jean Claude Dupont, "The Meaning of Objects: The Poker," *Living in a Material World*, p. 1-18; Jacques Maquet, "Objects as Instruments, Objects as Signs," *History from Things*, p. 30-40; Betsy Cullam-Swan, and Peter K. Manning, "What Is a T-Shirt? Codes, Chorontypes, and Everyday Objects," in Stephen Harold Riggins, ed., *The Socialness of Things: Essays on the Socio-Semiotics of Objects* (New York: Nouton de Gruyter, 1994), p. 415-33; and John A. Fleming, "The Semiotics of Furniture Form: The French Tradition, 1620-1840," *Journal of the Canadian Historical Association* NS#10 (1999): 37-58. This is by no means an exhaustive list.
- 50 This is a slight variation of the Winterthur Protocol for analyzing artifacts, used at the Winterthur Museum/University of Delaware in *Early American Culture*, but first developed by Fleming, "Artifact Study," (1974) and reprinted in Schlereth, ed.,

- Material Culture Studies in America*, p. 162-73. To see how Fleming put his theory into practice, see his analysis of a 1680 American court cupboard in *Winterthur Portfolio* 9 (June 1974): 161-73.
- 51 Prown, "Mind in Matter," p. 7-16. See also Prown, "Style as Evidence," p. 197-210.
 - 52 Elliott, "Material History," 87-92.
 - 53 Taken from the History of Pharmaceutical Drugs (Part I) and Collections Management for Hazardous Material (Part II) modules under development by Michelle Hamilton and Rebecca Woods.
 - 54 Fiona Cameron, "Wired Collections—the Next Generation," *Museum Management and Curatorship* 19, 3 (2001): 309.
 - 55 For a discussion on the potential of integrated collections management systems and online exhibitions, see Howard Besser, "Integrating Collections Management Information into Online Exhibits: The World Wide Web as a Facilitator for Linking 2 Separate Processes," Paper presented at the Museums and the Web 1997 Conference, 16–19 March 1997 <www.archimuse.com/mw97/speak/besser.htm>.
 - 56 E. Margaret Evans, Melinda S. Mull and Devereaux A. Poling, "The Authentic Object? A Child's Eye View," *Perspectives on Object-Centred Learning in Museums*, p. 56. See also Lisa C. Roberts, *From Knowledge to Narrative: Educators and the Changing Museum* (Washington, D.C.: Smithsonian Institution Press, 1997).
 - 57 See, for example, Lynne Teather, "A Museum is a Museum is a Museum...or is it?: Exploring Museology and the Web," Proceedings of Museums and the Web '98, Toronto, Canada, 1998 <www.archimuse.com>.
 - 58 Cameron, "Wired Collections," *Museum Management and Curatorship* 19, 3 (2001): 309.
 - 59 Expert Review with Judy Chelnick, Associate Curator, Medical Sciences Division, National Museum of American History, Smithsonian Institution, Washington, D.C., 16-18 November 2004.
 - 60 Correspondence S. C. to S. McKellar, 15 April 2005.
 - 61 Correspondence R. W. to S. McKellar, 29 April 2005.
 - 62 Personal Communication to M. A. Hamilton, 14 April 2005.