

# AIC NEWS



Photo courtesy North Carolina Museum of History Collection

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## Please Read the Warning Label: Care of Historic Pharmacy Collections

By Jennifer French, Objects Conservator, North Carolina Museum of History, Health & Safety Committee

Historic pharmacy collections present a unique challenge for the conservators who are charged with maintaining them. Old medications can consist of substances that were once legal but are now illegal due to changing laws. They can contain ingredients that are either hazardous by their very nature, such as belladonna, hemlock, or mercury cyanide tablets, or have become hazardous due to degradation from time, i.e. ether, peroxides. Objects named “Radithor” and “Radon-Water” (the first “energy drinks”) and “Radione” (a tablet one could add to water) all contain a small amount of either radium or thorium, two highly radioactive minerals, and are known to have been sold in pharmacies in the early 20<sup>th</sup> century. Knowing what is in your collection, the various factors involved with keeping or disposing of a medical collection, and the disposal process itself is essential in maintaining historic pharmaceutical collections.

The 1970 Controlled Substances Act forms the legal framework for the regulation of illicit and licit substances that had been previously controlled under varying pre-existing laws. The act places these controlled substances into 1 of 5 schedules where inclusion is dependent on accepted medical use, potential for abuse, and safety or dependence liability (Pharmacist’s Manual, DEA).

- Schedule 1: No currently accepted medical use, high potential for abuse, and a lack of accepted safety for use of the drug under medical supervision. Examples: marijuana, LSD, heroin, peyote.
- Schedule 2: High potential for abuse which would lead to severe psychological or physical dependence. Examples: cocaine, morphine, opium, pentobarbital, amphetamine.
- Schedule 3: Potential for abuse less than substances in schedules 1 and 2; abuse may lead to moderate or low physical dependence or high psychological dependence.
- Schedule 4: Low potential for abuse relative to substances in Schedule 3.
- Schedule 5: Low potential for abuse relative to substance in Schedule 4 and are mainly preparations of limited quantities of narcotics.

Controlled substances placed in schedules 3-5 are also based on the amount of the active ingredient within the preparation. Example: Codeine could be included in schedule 3 or 5, depending on the dosage.

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Care of Historic Pharmacy Collections continued from front page

The decision to keep or dispose of historical pharmaceuticals should not be a quick one. Upon discovery of such materials, it may seem reasonable to dispose of these medications or drugs immediately. However, making informed decision means engaging appropriate stakeholders, such as curators, conservators, collections managers, industrial hygienists, and/or public health officials. Several factors should be considered:

1. **What is the purpose of the collection? Would the disposal of the pharmaceuticals affect how the collection/exhibit is viewed or interpreted?** For example, the removal of medications from their containers within a large exhibit may not have as much of an impact on interpretation as would the removal of medications from a travelling doctor's satchel collection. Furthermore, many visitors enjoy seeing the original pharmaceuticals in their original bottles and boxes; removing them could detract from their experience. Alternatively, some believe what visitors like to see are the boxes and bottles with their colorful and unique labels on display; the actual medications are secondary to the experience. Removing medications completely is a safer route as they can change over time resulting in a more concentrated, toxic mixture.
2. **What exactly is in the collection?** A detailed inventory is essential; such an inventory typically includes the trade name, any active ingredients and their potentially hazardous nature, type of medication (tablet, liquid, etc.), and volume or quantity. Record the type of container, including specific information about component parts such as stoppers (cork or screw top lid) and any trademark/date information. Refer to Box 1 for definitions of traditional measurements found on historic medication labels.

Generally, the amount of active ingredient within a tablet or liquid is but a small portion of the overall medication; the active ingredient is approximately 5-10% of the total; the rest comprises binders and ingredients to make the medication more palatable or easier to swallow or digest. Do not assume that the amount of the active ingredient makes it any less hazardous or has diminished in strength over time; poor environment and/or storage/display conditions can alter the physical nature of the preparation and increase its toxicity. However, the actual amount of the active ingredient should factor into your deliberations.

**Box 1. THE MINIM AND THE GRAIN**

When conducting an inventory of your collection, the term *minim* may be seen on liquid containers (e.g., "2 minim chloroform") or *grain* on tablet containers. According to the Oxford English Dictionary, *minim* is derived from the Latin word "minimus" meaning "smallest." It measures 1/60 of a fluid dram which itself is equal to 3.7mL or 0.125 fluid ounces. The grain is a traditional unit of measurement that was equal to 1 grain of barley and is currently defined as weighing 64.79mg.





Crystals have formed on the interior of this tablet container, Courtesy North Carolina Museum of History Collection.

## Box 2. WHEN TO CALL THE BOMB SQUAD

Some medications contain ingredients that are explosive or become so when they deteriorate. The following is a partial list of ingredients that, if found in your collection, should not be touched or moved from where they were discovered; contact your local law enforcement/fire department for immediate removal and disposal of:

- **Picric acid.** Found in bandage gauze or bottles in early first aid kits (as an antiseptic) and some feminine products, picric acid is flammable as a liquid and explosive when it forms picrate salts after evaporation, especially when in contact with heat or friction.
- **Ether** that has crystallized due to deterioration.
- **Hydrogen Peroxides.**
- **Nitroglycerin.**

3. **What is the condition of the collection? Can the right environment be maintained to prevent degradation?** Proper display and storage of pharmaceutical collections will reduce the potential of the pharmaceuticals' deterioration. Medications should be stored or displayed in a cool, dry environment with a relative humidity between 40-50% and at a temperature below 65°F.  
Any medications that show signs of degradation, such as powdery or crystallizing tablets (see figure 1); residue buildup around the tops of bottles or greasy residues on the sides or bottom of the container; broken glass bottles with residue on the interior glass; corroding screw top lids or broken cork stoppers; or tubes that have split along the sides should be removed from the collection and discarded safely. Care must be taken when handling paper bags or cardboard boxes that contain tablets or powders; these containers can become brittle or fragile over time, resulting in spillage and exposure.  
For information on pharmaceuticals that may contain or become explosive, refer to Box 2.
4. **How secure is your collection?** Pharmaceutical collections should be displayed and stored in a secure cabinet or exhibit case. It is the norm to have key- or card-controlled access to storage and to secure displays in such a way as to impede the public's access to the medications. Schedule 1 and 2 pharmaceuticals require even more stringent storage requirements, as dictated by the US Drug Enforcement Administration's "Security Requirements for Non-Practitioner" in the *Controlled Substances Security Manual*. If your museum cannot abide by this, then disposal is recommended.
5. **Do you and your museum want to be responsible for the pharmaceuticals in your collection?** Museums often are "perceived to have an ethical and, increasingly, a legal responsibility for the safety of the caretakers" (Hawks and Makos, 2000) of these collections. Ensuring the safety and security of the collection, the museum staff, and the visiting public is an institutional responsibility, and caring for a pharmaceutical collection likewise carries a fiscal responsibility.

## Identification of Historical Medications

When dealing with historic medical collections, the most important concern—and the largest obstacle—is the identification of what is in the collection and the determination of any hazardous ingredients. Before the implementation of the Harrison Act in 1914, many historical medications did not always have the ingredients written on the label and were sold under trade names. Labels also fall off or become obscured due to time or spillage of the medication on the outside of the container, making reading of the label difficult.

Identifying components of historical medications can be accomplished using a number of analytical tools:

- Gas chromatography-mass spectroscopy (GC-MS) and high-performance liquid chromatography (HPLC) can be used to separate, identify, and quantify components of the unknown medication.
- Fourier Transform Infrared (FT-IR) can identify organic and some inorganic materials within the medication based on the infrared absorption bands detected.
- Simple spot tests or spot test papers as described in *Material Characterization Tests for Objects of Art and Archaeology* can also help narrow the identification process.
- For those that do not have access to chemical analysis, there are several references that can be used for identification.
  - *Gosselin's Clinical Toxicology of Commercial Products* 5<sup>th</sup> edition (1984) provides the formularies for over 5,000 pharmaceuticals.
  - *The Merck Index*, *The United States Pharmacopeia-National Formulary*, and the *Physicians' Desk Reference* can also have information on medications under trade names; you may need to refer to older editions of these references to obtain information on some medications.
  - The *Physicians' Desk Reference* has an online presence; however, it is free only to physicians and medical/pharmacy students.
  - For a complete list of hazardous pharmaceuticals/drugs as described by the schedules of the Controlled Substances Act, please refer to [www.deadiversion.usdoj.gov/21cfr/cfr/2108cfr.htm](http://www.deadiversion.usdoj.gov/21cfr/cfr/2108cfr.htm).
- The [American Institute of the History of Pharmacy](#) and your local pharmacy school can provide consultant services. AIHP is based at the University of Wisconsin-Madison School of Pharmacy, and this institution answers requests from a wide range of organizations, such as professional associations, teachers, libraries, museums, pharmacy schools, communications media, and scholars in the field.
- A pharmacy school can provide access to their medical library and partnership wherein an intern can assist with the identification of hazardous ingredients within a large pharmaceutical collection.

## Disposal of Pharmaceutical Collections

If the decision has been made to dispose of your pharmaceutical collections, you must do so in accordance with local, state, and federal laws. If it is possible to do this safely and the condition of the pharmaceutical allows, liquids and tablets can be removed from their container and placed in separate receptacles that are labelled prominently for hazards and disposal. This work should be carried out in a fume hood, while wearing proper personal protective equipment (PPE) to prevent exposure to any airborne hazards or spillage. Take care as tablets may look intact and unchanged, but upon being touched, they deteriorate into either a powder or a greasy residue that cannot be removed. In cases where the cork is stuck in the bottle, the decision to remove the cork (knowing that it might be damaged beyond use or repair) needs to be made in discussion with the curator to determine the importance of that medication and whether it is worth removing the cork. An acceptable alternative might be to attempt removal of liquid contents by inserting a hypodermic needle through the cork.

Where the collection is being used for research purposes or there is a desire to keep both the pharmaceutical and the container to retain the context of the object, some or all of the removed material can be retained in a separate, well-labeled container that is then stored with the original container. This decision should be made in consultation with curatorial and collections staff and documented within collection management records, noting the particular hazards of the pharmaceutical. It should be noted that any supplies used in the removal and cleaning of the pharmaceutical should be treated as hazardous and need to be disposed of in the same manner as the medication due to contamination.

For radio-pharmaceuticals (e.g., contains radium or thorium), removal depends on whether radiological



**Collection of historic pharmaceutical bottles. Courtesy North Carolina Museum of History Collection.**

material is in the container or not. Some of these “remedies” have little to no radioactive material in them while others contain a significant amount of radioactive material. A Geiger counter can assist you in determining if radioactive material is present. The most crucial concerns involving radio-pharmaceuticals are for substances that can be ingested or inhaled via contamination in handling and gamma radiation exposure emissions that can affect staff and visitors. This can be addressed by placing these objects behind glass or plexiglass, separated from other radioactive materials, and as far away from visitors as possible.

Radioactive contents can be removed from the container and disposed of in accordance with local, state, and federal regulations. Contacting your state radiation control board prior to content removal will ensure that you are in compliance. The Conference of Radiation Control Program Managers (CRCPD) has a list of contacts by state ([www.crcpd.org/mpage/StateContactDirector](http://www.crcpd.org/mpage/StateContactDirector)). Glass and metal containers can easily be cleaned with water or a slightly acidic solution; porous materials, such as cloth, paper, wood, leather, and cork, are very difficult to clean of contaminated material, however some recommend that they can still be displayed due to relatively low amounts of radiation remaining within the material.

For other pharmaceuticals, the Museums and Galleries of New South Wales, Australia, has suggested that screw top lids can be made secure by injecting silicone sealant diluted with petroleum distillates into the threads of the lid. In theory, this would prevent the contents of the bottle from being removed and allow the whole object to be exhibited. However, the efficacy of this method has not been evaluated, and it is unclear how the sealant might interact with the bottle’s contents. Additionally, future removal of the medical preparation (thus reversibility) of this method is not straightforward.

Contacting your local or state health department, state board of pharmacy, or state public health office is a good first step; they will be able to assist you in determining the best way to dispose of your pharmaceuticals.

- For tablets, you can ask if they can be disposed of through a drug take-back program. This will ensure proper disposal by law enforcement and is a low-to-no-cost disposal measure.
- For liquids, powders, deteriorated tablets that cannot be removed from the container, and any material containing possible blood-borne pathogens, a third-party vendor licensed to handle pharmaceutical disposal is required. Two companies known to accept old medications are [Chemtron](#) (based in Ohio, but have worked throughout the United States) and [Veolia North America](#). Your local or state health department or public health office may also have a list of hazardous waste vendors to contact.

With any disposal, you will need an inventory of what you are discarding, the active ingredient (especially for those medications that are under trade names), and the amount of the material you are disposing. This is a requirement for any pharmaceuticals that are thrown away via law enforcement or through a third-party vendor.

Early vaccination kits from the late 19<sup>th</sup>/early 20<sup>th</sup> centuries also can be found in historic pharmacy and medical collections. Use caution in handling the contents of these kits as they may contain remnants of vaccination samples such as smallpox scabs. These materials have the potential to be very hazardous and

need to be disposed of properly by contacting the Center for Disease Control (CDC) at 1-800-CDC-INFO for removal and disposal.

The handling of pharmaceutical collections should always involve the use of proper PPE. The use of nitrile or latex gloves is essential to prevent the possible absorption of unidentified residues and/or powders on the containers into the skin. Lab coats are recommended to prevent transfer to clothing; dust masks or respirators should be worn, fitted with N95 or P100 filters, especially if the materials are powders or have deteriorated into powders.

By enacting good housekeeping practices and creating a secure environment for display and storage, it is possible to maintain pharmaceutical collections with minimal removal of the actual medications from their bottles and boxes. When disposal is required, collaboration with museum staff and public health officials is key to ensure that the medications are disposed of properly while maintaining the integrity and importance of the collection.

## Personal Communications

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- Thomas Braun, Minnesota Historical Society, St. Paul, MN
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### Need help?

Have a question about health and safety in your conservation work? Send it to us at [Health-Safety@conservation-us.org](mailto:Health-Safety@conservation-us.org).

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## AIC News

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### Commemoration of ECPN's 10th Year Anniversary

**T**his year marks ECPN's 10th year anniversary! To commemorate the occasion, visit the **ECPN column** on pages 25-6 to read reflections on important moments and celebrate the incredible work of ECPN officers, past and present.

### Specialty Groups and Volunteer Leadership Now on the Online Community

Since June, AIC's volunteer leadership have been using AIC's online community (on the Higher Logic platform) to conduct business, share documents, and more. As of August 29, all specialty group communities have been launched on the online community, while the listservs hosted on CoOL are being shut down. We look forward to continued collaboration on this platform!

### AIC News Archives Going Online

Past volumes of *AIC News* are being added to our online archive, beginning with the first issues from 1975. Visit the [AIC News online archives](#) to download and read through these interesting snapshots of AIC's past.

### Renew Your Membership Online to Win

We will soon be opening up membership renewals for 2019, so take advantage of early fall planning to get your renewals taken care of! Whether you would like to pay in the new fiscal year or you'd like to deduct your membership fees on this year's tax forms, this is a great time to renew. It will also ensure that access to your online communities remains uninterrupted!

You pay online for books, supplies, and annual meeting registration. Why not extend this to your AIC membership renewal? Nearly all our meeting attendees register online with a credit or debit card, but only 5 of every 8 members pay online for their membership renewals. In addition to saving time, online payments also help you (and AIC) save money, are eco-friendly, and free up staff to dedicate more time to member service. Help us meet our goal of 90% online renewals for 2019!

If renewing online is confusing or takes too long, give us a call at (202) 991-0643. We can help you renew your membership over the phone and clear up any special issues you may have been encountering. It takes just a few minutes for us to find your account and enter your card number.

Online renewal comes with another benefit: an entry into our Annual Meeting contest. We will hold a drawing at the end of 2018 to award three prizes, and all members who renew online by December 15th will be entered.

- The grand prize is a free registration to the 2019 AIC Annual Meeting in New England, plus two FREE nights at the host hotel
- We also offer two second-place prizes: each one is a free membership (two members will win)
- You must renew online by Saturday, December 15, 2018, for this opportunity!

We will announce the winners in the January issue of *AIC News*, or in our membership e-news. Last year's winners were Janelle Batkin-Hall (grand prize), and Rhonda Wozniak and Rebecca Kennedy (second place prizes).

