

A SECOND GLANCE AT HOME CANNING AND REMOTE HISTORICAL ARCHAEOLOGICAL SITES

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The volume of cans and glass fragments in historic-period trash dumps often may be an overwhelming challenge for archaeologists. Taking the time for a second glance at these items may contribute considerable information in regard to dietary habits and demographics of the depositor's household. The presence of canning jars and related equipment found within an assemblage may indicate whether or not settlers purchased foods from local or distant merchants, and the settler's relative reliance upon home or locally grown canned foods. During the nineteenth and twentieth centuries, settlers living in areas lacking ready access to trade networks may have been forced to recycle and reuse tin cans or glass containers for storing and preserving fruits and vegetables. This paper briefly addresses the history of canning practices and the equipment required for canning, with an emphasis on the shelf-life of canning equipment and canned products themselves, and the implications of these artifacts for historical archaeology.

Except in rural areas or households steeped in family tradition, practices of home canning have almost vanished. Mary Jo Hogue (1978:1) cites the Mississippi Cooperative Extension Service in her thesis, "A Study to Determine the Extent of Use Made of Home Food Preservation By Canning, By the Presidents of Homemakers Clubs in Mississippi":

Home canning gives a great feeling of pride and accomplishment. It brings family members together in creative activity. It provides security in having food within an arm's reach. It offers a supply of food prepared according to family preferences and special dietary needs.

Hogue (1978:2) goes on to note that "until the beginning of the 19th century, the only methods of preserving foods were drying, pickling, smoking and preserving in sugar." Freezing was also used but was limited to areas characterized by low temperatures, until the 1850s, when ice machines were made available to the public.

The first experiments with storing food in containers were performed in Europe during the late 1700s and early 1800s, when the idea of using "vessels of glass, pottery, tin (tin plate) or other metals or fit materials" for storage was patented (Stewart and Clark 1948: 29). The idea of sanitary storage in cans and glass soon spread to the United States, as noted by the works of Louis Pasteur, Thomas Dyott, Robert Arthur, Lewis R. Boyd, John L. Mason, and others (Stewart and Clark 1948). Between the 1840s and on into the 1870s, canning continued to gain in popularity. During this period, many inventors sought means to better preserve food; early methods included the use of tin cans without solder. The development of glass jars, or fruit jars, as Dave Hinson (1996) points out, "made the revolution in canning complete." After World War II, with the rise of fast-food restaurants, frozen "TV dinners," and supermarkets, the practice of home canning declined (Hinson 1996).

Table 1 provides a brief timeline for canning history based upon information compiled from Busch (1987), Fike (2001), Hinson (1996),

Maxwell (1993), May (1937), Miller (2000), Rock (1984), Shephard (2000), Strasser (1982), and Toulouse (1971).

PRINCIPLES OF CANNING

There are ten basic steps associated with home canning (Lopez 1969, McLaurin 2004), as described below:

1. Selecting 'quality' fruits or vegetables;
2. Sorting and grading, or picking out the mature, ripe, and appropriately sized fruits or vegetables;
3. Preparing the foods for canning, including scalding, blanching, peeling and/or coring;
4. Sterilizing containers, such as washing cans or glass in a hot-water bath;
5. Packing the containers with foods. Note that the containers should be filled while hot, at approximately 180 degrees Fahrenheit;
6. Quickly adding water, honey, sugar, brine or syrup;
7. Sealing containers while hot. Note that the vacuum helps seal the vessel;
8. Cooling containers before handling them;
9. Testing containers and lids for defects; and
10. When cold, labeling the container with the date and contents for storage purposes.

EQUIPMENT REQUIRED

Cans or glass jars may be used during the canning process. When canning in tin, generally a sealing device was required: hand-sealing machines were used with rim-sealed or sanitary cans. For hole-in-cap style cans, specialized sealing tools, such as a file or rough sandpaper, tinning copper, capping steel, or a canning flux (hydrochloric or Muriatic acid and zinc) were required.

For canning in glass, pressure canners were frequently recommended (Mixon 2004; National Canners Association Research Laboratories 1975; Olsen 1951). Hogue explains:

The United States Department of Agriculture announced in 1917 that the only safe method for canning vegetables was the use of a pressure canner at ten pounds pressure (240 degrees Fahrenheit) [Hogue 1978:12].

The University of California Cooperative Extension Publication 31-441 (Osaki and Gavranich 1994:1) notes that “nearly all incidents of botulism poisoning in the last 50 years have been the result of improperly processed home-canned foods.” Prior to the introduction of the pressure cooker in the early 1900s, lard cans, a large boiler, or a stock pot were readily used as water-bath canners (Hogue 1978:12). A wooden or heavy wire rack was typically placed inside the canner to prevent the jars from resting on the bottom and to allow water circulation during processing.

A supply of clean cloths or towels, wire lifters or tongs, and a tub of cold water were placed near the stove. If processing on an open flame, additional firewood would also be close at hand. Many of these practices are continued today during home canning activities.

SHELF LIFE OF
CANNING EQUIPMENT AND PRODUCTS

A review of various County Cooperative Extension Service Web pages throughout the United States revealed a series of frequently asked questions such as the following:

- What causes jars to break?
- What causes lids not to seal?
- Can jars, lids, and screw bands be reused?
- How long will canned food keep?
- Is it safe to can in tin?

The answers to these questions are as helpful to home canning as they are to understanding shelf-life, reuse and disposal patterns with regard to canning equipment (University of California Cooperative Extension 1999a, b, c, d). Thus, these questions should also be posed with regard to historical sites.

Table 1: Brief timeline of canning history.

Date	Description
1770s	Dutch begin storing food in tinplate containers.
1795	Nicolas Appert provides French navy with canned goods under Napoleon.
1817	William Underwood introduces canning to America.
1837	Commercial production of canned goods in metal containers begins.
1857	Screw-cap lids are introduced.
1858	John L. Mason patents reusable glass container (jar) with thread-molded top, sealed with zinc lids with rubber ring making a seal between the lid and jar (known as "Mason's Patent Nov. 30th, 1858" used until 1920).
1859	Mason sells five patents to Lewis R. Boyd and the Sheet Metal Screw Company. Patents insert for zinc screw lids (common by 1869).
1870/1871	Mason and Boyd form partnership in Consolidated Fruit Jar Company to make jars: Mason (Patent 102,913) jar with glass lid and screw band.
1882	Henry William Putnam invents "Lightning" fruit jar with bottle stopper patent by Charles de Quillfeldt; used metal clamps to seal jars.
1883	Ball Brothers switch to glass 'cans,' then fruit jars. First automatic line canning factory produces 3,000 cans per hour.
1904	Sanitary Can Company makes airtight cans without solder, but with double seams.
1915	Kerr invents metal disk with composition gasket and threaded rings.
1934	National Canners Association develops program for can-size simplification.
1940	Standardized cans sizes are adopted by most canners.
1941	Glass lids temporarily replace zinc/tin lids (metal is conserved during World War II); smaller mouths are used on glass jars.
1949	More than 350 varieties of commercially canned food products are available in the United States.

CANNING IN TIN

Foods are classified as perishable, semi-perishable, and shelf-stable. Table 2 explains these classifications in terms of shelf-life. High humidity may cause decay, molding, rancidity, lumping, or caking of foods. Although heat-processed canned foods will keep indefinitely without spoiling, for optimum flavor, canned food (in glass or tin) should be consumed within one year of preparation (Hurst *et al.* 1993; Stewart and Clark 1948; University of California Cooperative Extension 1999b, f).

Canning jars are manufactured in various sizes: half-pint, pint, quart, and half-gallon. Glass canning jars have a life expectancy of approximately ten years. Jars may break due to thermal shock (sudden temperature changes); internal pressure (not allowing enough space in jar for food to expand during cooling, temperature changes during processing); and impact (dropping jars, using old jars, or using metal tools to remove air bubbles). Strong-shouldered jars are made with a raised lip to prevent the jar from cracking, which is a common problem when sealing. Chips and cracks actually prevent airtight seals. If jars are being reused, they may be sterilized with a disinfectant bleach solution (Osaki and Gavranich 1994).

It is now known that commercial food jars, such as glass condiment containers and peanut butter jars, should not be reused for canning. The diameter of the mouth is sized differently, as are the threading pitch, sealing surface, and capacities. Further, when using a pressure cooker, commercial jars such as these tend to explode (McLaurin 2004; White 1978). Reuse of these vessels result, most often, in sealing failure and under-sterilization (Osaki and Gavranich 1999); however, as Jane Busch (1987) points out, during the twentieth century, "large numbers of beer and soda bottles were lost to housekeepers who kept them for their own use, particularly in the fall..." for purposes such as bottling ketchup and preserves. Thus, "reuse must be considered whenever bottles are found, and it complicates analysis" (Busch 1987).

Flat metal lids should be used only once. Ring or screw bands may be reused if they are sanitized and are in good condition. Ring bands made with Plastisol or rubber seals should be used only once. Unused lids have a shelf-life of up to five years, if stored in a cool and dry location. Rusted or bent lids should be discarded. One-piece lids such as those from condiment jars should not be used, due to their inaccurate fit and failure to seal adequately (University of California Cooperative Extension 1999c, e).

Between 1914 and the 1940s, home economists from the National Extension Homemakers Council, Inc., educated families on the various methods and benefits of canning in tin including using solder, pressure-canners and hand-sealers (Arnold 1985). Figure 1 provides an example of a hand-sealer (Malcolm 1917). Eleanor Arnold (1985) conducted oral interviews with women who lived in rural areas of eighteen states (Indiana, Michigan, Florida, North Dakota, Nebraska, Hawaii, Arkansas, New Mexico, Oregon, North Carolina, Washington, Alaska, Oklahoma, Mississippi, Louisiana, New Hampshire, Georgia, and Kansas) about everyday life, including food preservation. The majority of these women interviewed about home canning first learned to preserve foods using tin cans. One woman recounted how a friend canned a wool bathing suit to keep the moths out; she also canned pecans and treats in tin for their "boys in the army" (Arnold 1985:144).

In 1917, Ola Powell Malcolm prepared a handbook on canning and preserving for the J. B. Lippincott Company *Home Manuals Series*. She notes, "on the farm ...where there is a large yield of fruit or vegetables to be canned, the canning process in tin can be handled with more speed, less danger of breakage, and at a very much smaller initial cost than canning in glass. For all these reasons ... canning in tin is preferred" (Malcolm 1917:82). "Sanitary cans are more satisfactory for use in home canning than any other type of tin container" (Malcolm 1917:91). Hand-sealing machines were selected for home canning; this manual equipment was used most frequently for No. 2 and No. 3 sanitary cans, both of which were most commonly used for fruits, vegetables, juices, soups, and other specialty products (Malcolm 1917). Enameled cans were preferred for berries, cherries, beets, plums, pumpkins, and greens. To operate the hand-sealing machine, basically, the sealer would be fastened to a table or shelf, the lid applied to the can, the can set onto the sealer platform, and the crank turned rapidly so that it not only secured the can in place, but also served to roll and seal the lid to the can.

Hole-in-cap cans were most frequently solder-hemmed after they were filled. Solder and flux were placed along the groove in the lid, but not within the can itself. A heavy rod was used to hold the lid in place until the solder cooled. Matchstick-filler cans were used for canning in a similar manner (Malcolm 1917).

After being sealed, the cans were placed into water (keeping the top one inch out of the water) for a maximum of three minutes in order to exhaust the air from within the can, thereby forming a vacuum seal.

Table 2: Classifications of food.

Perishable	Semi-Perishable	Shelf-Stable
Shelf-life: 2-30 days (at temperatures ranging between 32 and 35 degrees Fahrenheit)	Shelf-life: 30-90 days	Shelf-life: 90 days to 3 years (based on processing, packing and storage)
Examples: Dairy products, fresh meat, fish, poultry, fresh fruits, fresh vegetables, juices, and some bakery items	Examples: Eggs, cheese, pickled foods, salads, cured meats, and some vegetables	Examples: canned foods, dried foods, nuts, grains, cereals, pasta, salt and sugar

After exhausting, a bead of solder was placed in the center of hole-in-cap and matchstick-filler cans. Once sealed, the cans were then placed into a hot-water canner; if bubbles appeared in the water, the can had a leak. Leaks in the hole-in-cap and matchstick-filler cans were repaired by adding additional solder; sanitary cans had to be opened and reprocessed (Malcolm 1917). After cooling, a paste made from flour, powdered alum, cold water, oil of cloves, and boiling water, was used to affix the paper labels to cans or jars (Malcolm 1917). Today, labels are often silk-screened onto the metal prior to cutting (Figure 2).

In 1940, Jean Burand of the United States Department of Agriculture conducted research regarding canning foods, especially fish, in tin; his research was updated periodically until 1973. By 1949, there were more than 350 various canned foods available on the market; it was the consensus that the tin can was far superior to glass for canning (Stewart and Clark 1949). In 2001, a home-economics staff in Kodiak, Alaska, began conducting additional research. Today, the Cooperative Extension Service in Alaska continues to provide lecture series to the Native Alaskans on how to can salmon (Dinstel 2002, Long 2002).

Stewart and Clark of the American Can Company (1948: 284) explain that “canned foods are thoroughly heat-processed; therefore, they will keep indefinitely without spoiling as long as nothing happens to the can to make it leak.” Canned food should not be stored near hot pipes, furnaces, ranges, or indirect sunlight. Humidity or dampness causes corrosion or rust. Cans with bulging ends or leaks are evidence of spoiled food; they should be discarded immediately to avoid food poisoning.

IMPLICATIONS FOR HISTORICAL ARCHAEOLOGY

It is fairly obvious that the presence of pressure-canner parts, hand-sealer equipment, stock pots, tongs, or wire lifters is indicative of home canning. It should be taken into account, however, that certain artifacts have a limited shelf life, such as metal canning jar lids or screw bands. These items are often used only one time. Trash dumps containing a large assemblage of these items may be indicative of a seasonal dump, which would be deposited at the location around a harvest time (Figure 3). Likewise, canning jars themselves have shelf-lives of approximately ten years. The presence of bleach or cleanser products in relation to these lids may indicate repeated or reuse of jars. A variety of canning jars in an assemblage, such as Ball, Mason, etc., may suggest trade between households, payment for services (barter), or a wide availability of canning supplies at a local market.

A closer inspection of cans and glass within trash dumps may reveal evidence of modified reuse with regard to home canning practices. For instance, tin cans may exhibit evidence of sealing and re-sealing (i.e., fresh or added solder) along the top edges and/or seams. Cans may also exhibit evidence of marks along the outer edges, perhaps caused by a hand-sealing machine (Figure 4); however, it cannot be said conclusively that these marks were not caused by can openers or during the manufacture of the cans. A mixture of commercial jars and canning

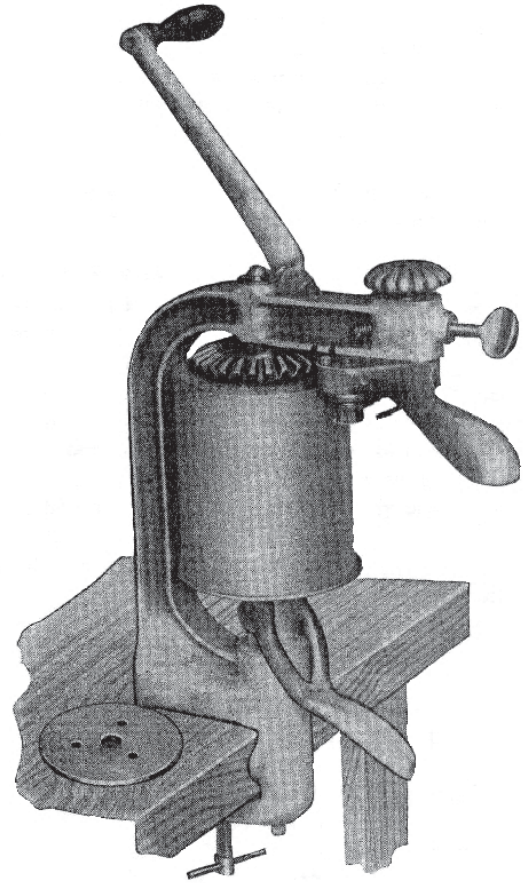


Figure 1: Example of hand-soldering machine (Malcolm 1917).

lids may indicate reuse of whatever supplies were readily at hand, regardless of the danger of reusing commercially produced jars.

Cans exhibiting bulging or dents may indicate poorly canned products, spoilage, or leaks; therefore, certain medicinal products such as bitters, Phillips Milk of Magnesia, etc., found in association with these cans may indicate health problems, such as botulism.

Figure 2: Example of pre-cut cans on sheet metal.

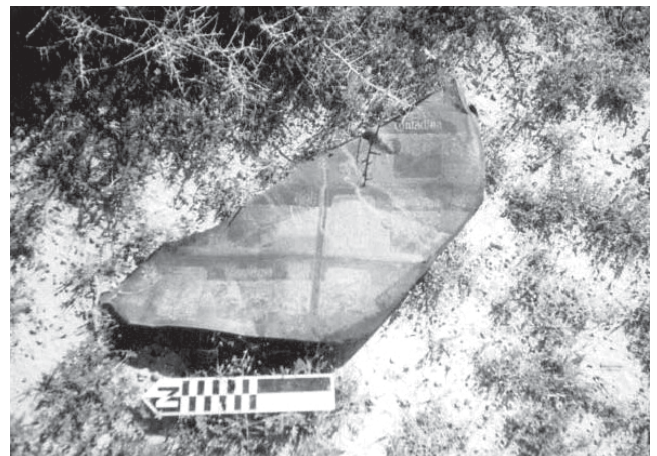




Figure 3: Overview of trash dump containing cans and glass.



Figure 4: Example of marks along edges of can rim.



Figure 5: Women canning (Malcolm 1917).

It should also be noted that an article in the January, 1875 *American Agriculturalist* offered additional suggestions for the uses of cans, such as making a dipper, pitcher, or measure; covering mouse and rat holes; or for using an improvised saucepan, fruit pickers, grater, cake ring, or lantern (Franklin 1997: 582). As Swope and Vrendenburg (2003) have noted, both glass jars and cans (especially pocket tobacco tins) have often been used for storage of mining-claim papers. Lids could be used to patch holes in walls or floors; recent field observations noted the use of can lids to mark the edges of dirt roads (Spinney and Puckett 2006).

The presence of canning jars, or evidence of canning activities, may also reveal information regarding dietary habits of the depositor's household. A large quantity of canning jars may indicate a preference or reliance upon locally grown products. Certain households may have relied upon canned foods as a means to supplement their diets. A diversity of jars may indicate that the jars were acquired through a trade scenario.

In regard to demographics, historically, home canning was a task undertaken by women of the household (Figure 5). Home-economics education was initially focused on women and provided information regarding various aspects of "homemaking" (Arnold 1985). Homemakers' clubs and cooperative-extension services emerged out of home-economics courses and provided a social outlet for many women in rural areas. Thus, at harvest time, women often canned together. Therefore, female-related artifacts, such as hairpins and jewelry, as well as children's items, may be found in context with canning-related artifacts.

CONCLUSION

With all this being said, the volume of cans and glass in historic-period trash dumps may be an overwhelming challenge for archaeologists; however, a second glance at these items may contribute considerable information to the study of remote historical archaeological sites. It is not to say that evidence for canning would render an historic-period trash dump eligible for the National Register of Historic Places; it is rare that such a site is found eligible. But taking a look at the can and glass assemblage may provide additional information regarding the diet and livelihood of the depositors.

Acknowledgments

The author would like to express a sincere thank-you to the following individuals for their support in researching and presenting this paper: Richard Norwood, Base Historic Preservation Officer, Edwards Air Force Base; Fred Budinger, Jr., and Harriot Spinney, Tetra Tech, Inc.; Karen Swope, Ph.D.; Mari Pritchard Parker; and Dan Puckett.

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