A Tale Of Two Machines

and A Revolution In Soft Drink Bottling

2004 © Bill Lockhart, Alamogordo, New Mexico

During a history seminar (ca. 1994) at The University of Texas at El Paso (UTEP), my professor, Cheryl Marin, told us that writing history is like putting together a jigsaw with most of the pieces missing. Bottle research, whether seeking information on the bottles themselves or the companies that made them, is similar. It can also be equated to the role of a detective or to a scavenger hunt. In other words, we look for clues, little tidbits of information that we can eventually piece together to form a coherent account about the company or objects we are studying. The following article looks at a series of semi-related or seemingly unrelated "clues" and eventually brings them together into a coherent account.

The El Paso Connections

I became interested in El Paso bottles in 1992, when I worked for John Peterson, an archaeologist at UTEP. My first task was to clean and catalog 374 bottles excavated from the El Paso Coliseum. After that, just about everything I encountered led me back to bottles. About 1993, I began collecting information for a book on El Paso soft drink bottles. When I began writing my dating section, I noticed that three things seemed to have happened about the same time: 1) volume information (e.g. CONTENTS 6 FLU. OZS.), embossed on the heels or bases of the bottles, began appearing; 2) soda bottles made from manganese-bearing glass (that changed to a purple color with prolonged exposure to sunlight) disappeared; and 3) soda bottles began to be machine-made rather than mouth-blown. The best dates I could come up with for this phenomenon were 1913-1916. So I figured (incorrectly) that the three changes happened about 1914 (see Lockhart 2000).

All That Embosses Must Be Gould

It took a few years to sort out all of the causes for these changes. The first change was actually not too difficult to find once I began looking seriously. I knew that a law must have been passed, and I knew an approximate period – all I needed to do was find it. The problem was that I did not know whether the law had been passed by Congress or one of the regulating bodies like the Department of Agriculture. I also began looking at 1914, then moved forward. My starting point was a year too late, and that delayed my success.

On March 3, 1913, Congress passed H. R. 22526, generally known as the Gould Amendment to the Pure Food and Drug Act of 1906. Although the original Act demanded a great deal of labeling information, it did not require the inclusion of volume specification. The Gould Amendment corrected that oversight when it stated that the "quantity of the contents be . . . plainly and conspicuously marked on the outside of the package in terms of weight, measure, or numerical count" but continued on to explain that "reasonable variations shall be permitted." Although the law went into effect immediately, it clarified that "no penalty of fine, imprisonment, or confiscation shall be enforced for any violation of its provisions as to domestic products prepared or foreign products imported prior to eighteen months after its passage" (U. S. 1913:732). In other words, the industry actually had a grace period to comply with the law – until September 3, 1914.

In order to be in compliance with the Gould Amendment, soda bottlers in El Paso (along with those in the rest of the U. S.) had to include volume information on their containers by no later than September 1914. All bottles bearing volume data can therefore be dated as no earlier than 1913 and possibly not until 1914. Thus far, I have found only one datable, mouth-blown bottles containing volume information. However, a few embossed, machine-made bottles contained no volume information. This suggests that they were produced prior to the Gould Amendment. All other embossed, machine-made bottles (at least those that I have examined), filled by El Paso bottlers, bore volume information. It is important to note that many generic bottles (i.e. no embossed labels) do not contain embossed volume information. Volume data applied to paper labels was also in compliance with the Gould Amendment. Most soft drink bottlers, however, chose to use embossed volume data **[Figure 1]**.

Figure 1: Embossed Volume Label

The Color Purple

The second change in El Paso soda bottles was actually connected to the third one (see below). Since most sand contains impurities, notably iron, glass tends to pick up the colors of these impurities, especially greens and aquas. One of the easiest ways to produce colorless glass was to add a chemical that masked the green colors (Miller and Pacey 1985). Manganese, long used as a decolorant for bottle glass, actually works well in closed tanks, such as those used for mouth-blown bottles. Its use to decolor bottle glass began about 1876 (in the U. S.) and became popular by at least 1890 (possibly earlier). In the early days of the Owens Automatic Bottle Machine, manganese-bearing glass was often used. Bottle makers soon learned, however, that manganese did not work as effectively with open tanks, used by all semi-automatic and fully-automatic bottle machines (Miller and Sullivan 1984). Therefore, glass chemists began experimenting to find the right combination of ingredients to produce colorless glass that would work well in open tanks. The answer was to use selenium in conjunction with one or more other chemicals, often arsenic. Selenium was so effective that it is still used as a decolorant today. Thus began a long process of change from blowing bottles into molds by mouth (and using manganese) to machine manufacture (using selenium). The switch began by at least 1912 and lasted until at least 1933, although most companies had made the switch by the early 1920s. In soft drink bottles, however, the change was more abrupt – between 1912 and 1914.

The Matrix, or the Machines Take Over

The third change noted in the El Paso study is the development of semi-automatic bottle machines and their adoption by glass houses that made soft drink bottles. Semi-automatic machines were not new; the first had been developed in 1881. However, to understand even a basic discussion of the importance of semi-automatic machines to soft drink bottle makers requires some basic knowledge of how the machines work.

Both fully- and semi-automatic machines operate in two stages. In the first stage, two processes operate to form a *parison*, the pre-mold or initial mold. In the first process, the finish (named because it was the *last* stage in the mouth-blown bottle process) is formed. Simultaneously, the second process presses or blows the glass to form a hollow shape. The parison is then transferred to the second mold for the final process where the glass is blown into its desired shape.

The difference between a semi-automatic machine and a fully-automatic machine is simply how the glass is delivered to the parison mold. In a semi-automatic machine, the "gob" of glass is delivered by hand; fully automatic machines deliver the glass mechanically. This means, of course, that there is no way to tell by looking at a bottle whether it was made by a semi-automatic or fully-automatic machine.

Michael J. Owens invented the first fully-automatic bottle machine, patented the device in 1903, and saw it go into actual production the following year (Turner 1938:106). Unlike many of the previous machines, the Owens machine was a blow-and-blow device (the parison was blown, not pressed). The principle under which it operated was similar to those that preceded it, but one aspect was totally unique and remained so. Suction was the method used to introduce the glass into the parison mold. A gob of glass was sucked into the mold and cut off with a "knife." The knife left a distinctive, uneven circular scar on the base of the finished bottle. The parison was then blown into shape and transferred into the final mold.

By 1914, inventors in the glass industry began to develop "gob feeders" for semi-automatic bottle machines in order to convert them to fully-automatic machines and compete with the success of the Owens machines. Initially, I thought this conversion to automatic machine production explained why bottles with machine-made characteristics began to appear in El Paso about the same time as the 1913-1914 Gould Act demanded that bottlers identify the capacity of their bottles. However, it was a red herring.[1] Gob feeders were not actually introduced into common use until about 1917. The real answer was even more interesting although more complex.

Figure 2: Root Semiautomatic Bottle Finish

The Root of the Red Devil

The Root Glass Co. is best remembered by most people for its development of the original "hobble-skirt" Coca-Cola bottle in 1915. However, the company is important for a lesser-known invention as well. In 1901, Chapman J. Root established a glass plant in Terre Haute, Indiana, and followed it with a second operation in the same city the next year. The second plant made fruit jars, exclusively, but closed in 1914. The Owens-Illinois Glass Co. purchased the company in 1932 (Toulouse 1971:445-447).

According to Toulouse (1971:445-446), "Beverage bottles were . . . handmade until about 1912," the year the company began to produce all its soft drink bottles on its own semi-automatic bottle machines. The plant began work on the machines in 1905 and used the developing models to make some bottles prior to 1912, but full implementation did not begin until the new machine, known as the "Root Machine" or the "Red Devil," was perfected. Although there is no certain way to tell the difference between bottles made by the semiautomatic process or a fully automatic bottle machine, the early Root (and many other) bottles had a noticeable horizontal seam that circled the neck just below the crown finish **[Figure 2]**. On most later (fully automatic) bottles, the horizontal seam was placed at joint of the neck and finish (i.e., the base of the crown).

Phillip Arbogast had patented a semi-automatic bottle machine in 1881, but practical semi-automatics were not in use in the United States until 1893. They were not used to manufacture small-mouth bottles (such as soft drink bottles) until about four or five years after the introduction of the Owens machine (Davis 1949:207; Scoville 1948:178-1979). By 1909, there were only 19 semi-automatic bottle machines used in small-mouth container production in the United States. By 1911, the number had grown to 52, and it almost doubled in 1912 to 96. The next significant increase occurred in 1915, when the numbers leaped from 1914's 102 machines to 265 (Turner 1938:108).

Among other things, the increase in semi-automatic machines in 1912 probably reflects the increased use of the machines to produce soft drink bottles. The 1915 increase was almost certainly caused by the use of gob feeders – thereby converting the machines to fully-automatic production. For us, however, the important year is 1912.

The Graham Entrance

Another entrant into the field of semi-automatic bottle machine development was the Graham machine developed by the Graham family who formed the Southern Indiana Glass Co. from the Lythgoe Bottle Co. at Loogootee, Indiana, in 1905. The son of a glass blower, Charles Lythgoe had bought the Caledonia Bottle Co. and renamed it for himself. Joe Graham's first job was with Lythgoe and set the stage for the Graham purchase of the company. Joe began working on a semi-automatic machine in 1906 and had it operational by the following year. The machine was *almost* fully automatic by 1910.[2] The machine was unique because of its "turn-over" design that blew the bottle in the finish-down position during the second stage of the manufacturing operation. The company logo showed an upside down bottle superimposed over a "G" followed by the words "Blown Upside Down" (Keller 1998:17-27; Toulouse 1971:213-215).

The family changed the company name to the Graham Glass Co. in 1907 (Toulouse claimed 1913) and began a program of expansion. In 1910, Robert Graham established a new plant in Okmulgee, Oklahoma, and built the New Lake Park addition the following year. Shortly after that, the Grahams added a branch in Checotah, Oklahoma. The Graham brothers bought the former Citizen's Glass Co. in Evansville, Indiana, in 1912. Business grew to the point where the Evansville plant had the greatest production of any single factory in the U. S. for beer, ginger ale, soda, and general-purpose bottles. In 1916, the Owens Bottle Co. bought the company but continued to run it under the Graham Glass Co. name. The Chacotah plant was sold to the Illinois Glass Co. in 1923. Owens closed the Loogootee plant in 1926 and the Okmulgee branch in 1929 (Keller 1998:21-27;

Toulouse 1971:213-216). Thus, the Graham family added another automatic bottle machine to the glass-making community.

Follow the Leader

At least 15 glass companies manufactured soft drink bottles and switched to semi-automatic or fully automatic machinery during the early 20th century. The trend began, of course, with the American Bottle Co. and the Owens Automatic Bottle Machine in 1905. By 1908, Glenshaw Glass Co. had installed a British Ashley semi-automatic machine,[3] and the Brockway Machine Bottle Co. soon followed with an Olean machine about 1910, the same year the Graham brothers introduced their machine. Root joined the group in 1912, and the Laurens Glass Works obtained a Jersey Devil machine in 1913. Other bottle manufacturers continued to make mouth-blown bottles and waited until as late as the 1920s to convert to fully-automatic machines and bypassed the semi-automatic stage [see **Table 1**].

On the OP Trail

When Michael R. Miller and I began our research on the bottles of the Southwestern Coca-Cola Bottling Co., a multi-plant operation with branches in both New Mexico and Arizona, we found bottles with interesting marks that were not listed in Toulouse (1971) or any of the other, usual sources. These included OP5S, OP1050, OP5S 76, and OP5S 576 **[Figure 3]**, always embossed in fine-lined characters on the heels of Coca-Cola bottles. Other similarly marked non-Coke bottles include OP62 and OP02 found on El Paso soda bottles from the 1913-1920 period, along with a straight-sided Coke bottle marked OP 37 A **[Figure 4]**.

One of these bottles was a very light blue in color, rather than the Georgia Green color usually found in Coke bottles and others were a very light aqua. Porter (1996:6) claimed that light blue hobble-skirt Coca-Cola bottles were only produced by the Chattanooga Bottle Co. and Laurens Glass Works. That led me to the conclusion that the marks had been used by the Chattanooga Bottle Co. because Southwestern bought other bottles from the company later but never from Laurens Glass Works. This proved to be another red herring. One problem with this idea is that it does not explain what OP actually means.

A further reading of Porter (1996:4) disclosed that the number 576 was the code used by the Graham Glass Co. for Coca-Cola bottles. He also noted that "until 1920 [there was] no mark but usually a large mold number on the base." Because one of the marks we found on Southwestern Coke bottles contained the number, 576, I submit that the OP marks were actually used on early bottles by Graham Glass Co. Porter further stated that the Okmulgee plant used OG as an identifier from 1920 to 1926. The OP mark in conjunction with 576 and other numbers may well have been used by the Okmulgee plant prior to 1920.

In addition, two six-panel bottles used by Southwestern for different fruit flavors (i.e. not a Coca-Cola bottle) were marked OS 149 G 20 and OS 149 G 23 **[Figure 5]**.

Table 1: Chronology of Automatic and Semi-Automatic Machine Installation Among Soft Drink Bottle Manufacturers

Company	Location	Type of Machine	Date Installed	Source
American Bottle Co.	Chicago, IL Toledo, OH	Owens Automatic	1905	Miller & McNichol 2002:6 Toulouse 1971:30-33
American Glass Works	Paden, WV	Unknown	1916	Toulouse 1971:22-24
Brockway Machine Bottle Co.	Brockwayville, PA	Olean	ca. 1910	Toulouse 1971:59-62
Berney-Bond Glass Co.	Bradford, PA	Jersey Devil	ca. 1915-1917	Toulouse 1971:70-73
Coshocton Glass Co.	Chosocton, OH	Semi-Auto	1915	Toulouse 1971:102-103
Chattanooga Bottle & Glass Co.	Chattanooga, TN	Unknown	Unknown	Toulouse 1971:108-111
Glenshaw Glass Co.	Glenshaw, PA	Ashley	1908	Toulouse 1971: 211-213
Graham Glass Co.	Evansville, PA	Graham	1910	Keller 1998:21-27 Toulouse 1971:213-216
Hazel-Atlas Glass Co.	Wheeling, WV	Unknown	Unknown	Toulouse 1971:239-242
Laurens Glass Works	Laurens, SC	Jersey Devil	1913	Toulouse 1971234-236
North Baltimore Bottle Glass Co.	North Baltimore, OH	Semi-Auto	Unknown	Toulouse 1971:379-380
Obear-Nester Glass Co.	East St. Louis, IL	Semi-Auto	1915	Toulouse 1971:373-375
Root Glass Co.	Terre Haute, IN	Root	1912	Toulouse 1971:445-447
Southern Glass Co.	Vernon, CA	Hartford-Empire	1924	*Los Angeles Times* April 6, 1924
Three Rivers Glass Co.	Three Rivers, TX	Unknown Hartford-Empire	Unknown 1924	Toulouse 1971:494-495 Smith 1989:7-13

Figure 3: Coke Bottle marked with OP5S 567 G 20 [Miller]

Figure 4: OP 37 A Mark (Okmulgee, Oklahoma)

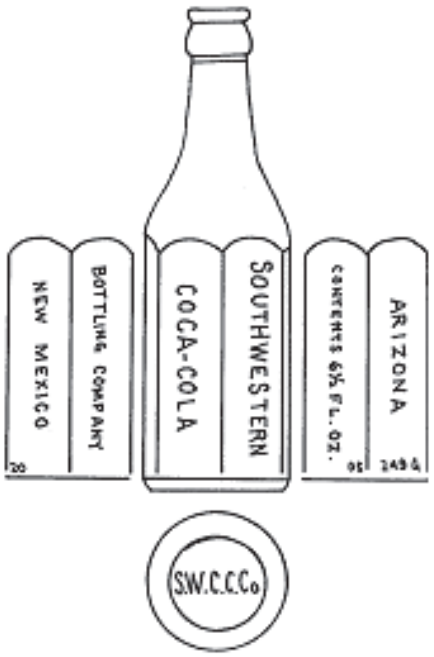

Figure 5: Southwestern Flavor Bottle marked OS 249 G 20 [Miller]

These were used during the same approximate period that the OP bottles were used by Southwestern and may also indicate bottles from the Okmulgee plant. Similar marks are found on six-panel bottles used by the Empire Bottling Works of El Paso (OS 1012) about 1914, the earliest bottles from the Deming Coca-Cola Bottling Works (predecessor to Southwestern) (OS 1102), Woodlawn Bottling Co. (OS 1202P), Magnolia Bottling Co. (OS 1413R), Houston Ice & Brewing Co. (OS 936 A), Triangle Brand (OS 215 S/21), and one of the early Southwestern flavor bottles (OS 1218P) about 1918 **[Figure 6]**.

Keller (1998:28) offered additional information that confirms the above conclusions. He stated:

> Bottles produced in Loogootee carried a "model" or order number on the bottom edge followed by a suffix such as LP, LS, or LG (e.g. 513 LS). Bottles produced at the Evansville plant employed a similar coding system. The model or order number was followed with the letters EG and the date (year), e.g. 2436 EG-29. The last two digits indicate the year of the original order (2436 EG-29 would refer to Evansville, 1929), not necessarily the date of manufacture.[4]

If LP, LS, and LG were indicative of Loogootee, then the OP and OS (and OG as per Porter 1996:4) certainly represented Okmulgee. Bottles marked CH indicate the Checotah plant (see below). Codes of ES and EP almost certainly exist for the Evansville plant. Any marks not specifically noted in this study can be dated according to similarly-marked bottles from the Loogootee or Okmulgee plants.

The "P" and "S" following the plant initial are intriguing, but the answer may be simple. In our sample, all bottles marked "P" are Coca-Cola bottles, and all bottles marked "S" are soft drink flavor bottles. In the bottle-making industry, the term "soda" was usually used for soft drink bottles, and the term "private mold" was used for bottles made especially for a specific bottler. In all likelihood, the OP stands for Okmulgee, Private Mold, while the OS means Okmulgee, soda. In addition, the "G" may have indicated the plant's general purpose bottles (e.g. food, household, etc.) or, of course, may have merely stood for Graham.

Speaking only of Coca-Cola bottles,

Figure 6: Graham's OS 1413 R Mark (Okmulgee, Oklahoma)

Porter (1999:4) stated that EG was used for the Evansville plant, LSQ for Loogootee, Indiana, and OG for Okmulgee between 1920 and 1926. I submit that the OP and OS heelmarks represented the Okmulgee plant from 1913 (the beginning of machine-made bottles by Graham) to 1920 with OP used on Coke bottles and OS used on other soda bottles. The year, 1920, was the year of the change in systems as shown by the date code for 1920 on two OP bottles. Porter also noted that Coke bottles used a G with a date code in 1927 and the word GRAHAM in 1928 and 1929 (a drawing of a Dec. 25, 1923-patent Coke bottle in with GRAHAM 29 in Jones 1966:33 supports Porter).

David Whitten added two soft drink bottles from his collection with "E," "G," and numbers on the heels (816E G25 from M. & S. W. Co., Covington, Kentucky and 2699E 5 G26 from Epping in Louisville). Casi's Coke Collection (2004) also listed an EG 23 1657 mark. These are almost certainly variations on the EG mark. Whitten also found an 1650LG24 mark, another style noted by Keller (1998:28) from the Loogootee plant. That led to the discoveries of more bottles with marks that fit the description. A mark of 1960E G28 appeared in Pollard (1993:185) on an Orange Crush bottle used in Plattsburgh, New York. Similar marks were found on soda bottles with 4143E G29 (Empire Bottling Works, El Paso), 1865EG25 **[Figure 7]**, and 1865E G28. The last two marks were on the same style of container, a square-bodied soda water bottle from Magnolia Coca-Cola Co., El Paso, made

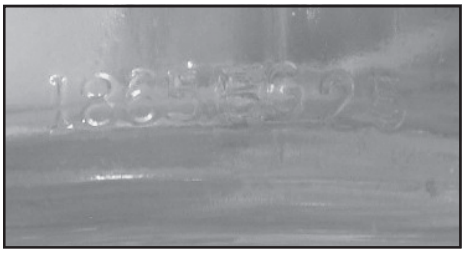

Figure 7: Graham's 1865EG25 Mark (Evansville, Indiana)

in two different years. A second style of "square" bottle was also used by Magnolia, and examples of these are marked 1063E G29 and 30E G11439. The earlier style seems to confirm the hypothesis that the three- or four-digit numerals preceding the "E" represent catalog numbers, but the second variation, with two different numbers seems to question it. A close look, however, shows that there is at least one minor variation, the exclusion of several words embossed around the heel on the first bottle, that may indicate the need for a second catalog number. A Triangle Brand soda bottle from El Paso was marked on the heel with CH 243S G 21 **[Figure 8]**, a mark almost certainly used by the Checotah plant from 1920 until the plant's closing in 1923.

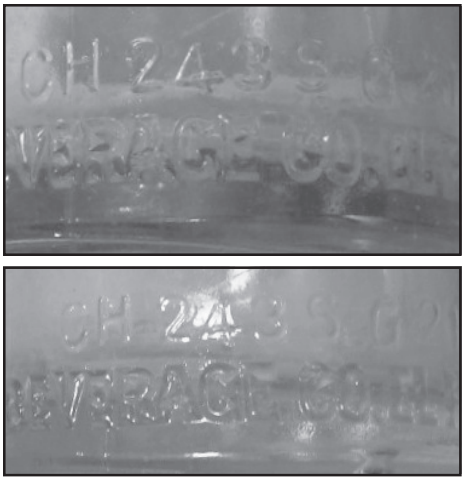

Figure 8: Graham's CH 243S G 21 Mark (Chacotah, Oklahoma)

Michael M. Elling provided an interpretation for one of the marks. He discovered a bottle embossed 2577 EG 26 7. He noted that the 2577 was the "pattern or contract number" (what we would also call a catalog code); EG identified the plant; 26 was the date code; and 7 was the mold number (personal communication). While we cannot verify the mold number code by historical sources, Elling's interpretation fits the general pattern for codes on Graham bottles. Elling also provided marks from Chero-Cola bottles: 46 EG 22, 46 G 20 2, 46EPR 1, 46 EPR, 46 EG 22 7, 46 EPP, 46 EPR 7, 46LP 2.

This list makes it pretty clear that the initial number (46) is a code for Chero-Cola.

A summary of the Graham codes indicates that EP, ES, and EG all indicated Evansville; OP, OS, and OG stood for Okmulgee; LP, LS, and LG were Loogootee marks; and the CH marks represented Checotah. Available evidence suggests that the use of letter codes to identify each factory and possibly the type of bottle, along with a catalog code, probably began with the use of semi-automatic machinery about 1912. Such codes were at least in use by 1914 or 1915. Date codes were not included until 1920, and it may have taken a few years for all of the engravers to catch on (as was *certainly* the case with the Owens-Illinois engravers two decades later – a full transition in code styles required four years). By 1923, the date codes were solidly in place. Even though the Owens Glass Co. bought the plant in 1916, the factory continued using the Graham system of markings until at least 1930.

Where Have All the Illinois Bottles Gone?

As our research group was looking into the Illinois Glass Co. marks, David Whiten asked if any of us had ever seen a Diamond I mark on a soda bottle. Although the mark is very common on pharmacy bottles and is found on other types, we could only find one soft drink bottle (used by the Empire Products Corp. in El Paso and date coded 29 [1929]) with the mark. Illinois Glass received three licenses from the Owens Bottle Machine Co., one in 1910, probably for the manufacture of whiskey bottles; another in 1911 for the exclusive manufacture of pharmacy bottles; and a final license in 1914 to make "5 to 13 gallon carboys" (Miller & McNichol 2002:7-8). Indeed, all the Diamond I pharmacy bottles we have examined or that have been reported to us were made by an Owens machine (and contained the distinctive Owens scars on the bases).

The exclusive Owens license for soft drink bottle manufacture was obtained by the Ohio Bottle Co. and transferred to the American Bottle Co. in 1905. Illinois Glass, therefore, could not have used the Owens machine to make soft drink bottles during the early years when the company used the Diamond I mark. The company noted:

> In 1920 – just ten years after our installation of the first machine [i.e. the Owens Automatic Bottle Machine] – in order to maintain our place of leadership in the bottle industry, we added another completely new type of Automatic Machine to overcome certain license restrictions which hampered us in the operation of the original. . . . at the present time, on either one or the other of our two types of Automatic Bottle Machines, we can make any type of blown container, with the exception of milk bottles and fruit jars (Illinois Glass Co. 1923).

The 1903 Illinois Glass Co. catalog contained an even 50 styles for soda and related (e.g. ginger ale) bottles **[Figure 9]**. The number had swelled to 89 in the 1908 catalog and 96 in 1911 (Putnam 1965). By the 1920 catalog **[Figure 10]**, however, the company offered only 12 bottle styles for soft drinks. The obvious conclusion is that soda bottle sales had fallen considerably. A very likely implication is that Illinois Glass Co. was still offering mouth-blown soft drink bottles prior to 1920. However, soft drink bottles were included at the end of the machine-made glass section of the 1920 catalog, reflecting the new automatic bottle machine production that began that year.

A bit of explanation and speculation is in order. Most soft drink bottlers were not loyal to their suppliers; in fact, most were quite fickle and would take advantage of any reduction in price, transportation decrease, or temporary sale to improved their own profits. For example, the Southwestern Coca-Cola Bottling Co. used bottles made by at least six manufacturers in 12 years. An examination of El Paso soda bottlers shows that this was common practice. Assuming Illinois Glass Co. was unable to immediately change to machine production of soda bottles during the ca. 1913 shift experienced by the industry in general, it is likely that virtually all of its customers would have transferred their allegiance (and their business) to its competitors. It is also unlikely that Illinois glass would have regained the lost business, even with a shift to machine manufacture in 1920, especially in view of the company's limited selection. Three Rivers Glass Co.,

Figure 9: Soda Bottles from the 1903 Illinois Glass Co. Catalog

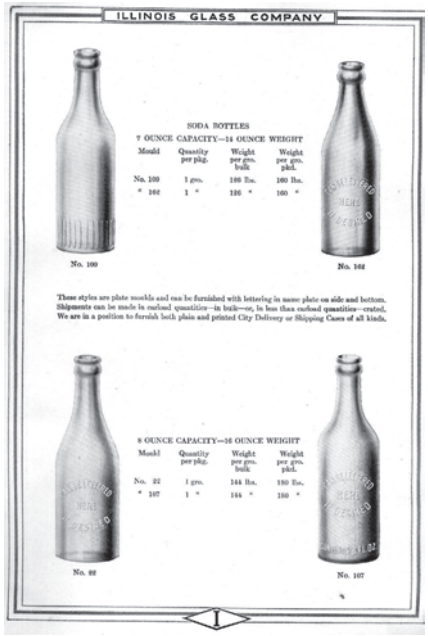

Figure 10: Soda Bottles from the 1920 Illinois Glass Co. Catalog

by comparison, offered dozens of styles (see Smith 1989).

We *Can* Put Humpty Dumpty Together Again

So, now we have as many pieces to our puzzle as I have been able to find. Of course, it would be nice if we had more pieces, so our answers would be absolute, but that rarely happens in any kind of bottle or historical research. It is time to assemble the pieces to make a sensible picture.

Since it all started with observations about El Paso soft drink bottles, we should first look at those. The solarized purple in bottles indeed faded from the soft drink industry with the advent of machine-made bottles, so the evidence concurs with the observations. The timing of the new, machine-made soda bottles beginning just prior to the federal requirement for volume embossing also fits the El Paso timetable. Congress passed the Gould Act in early 1913 with enforced compliance no later than September 1914. Since both Root Glass Co. and Graham Glass Co. had perfected their semi-automatic soda bottle machines by 1912, and other companies were already using similar machines, it is reasonable to assume that machine-made glass production (at least in soda bottles) was available in much of the industry prior to the deadline for compliance to the Gould Act. Machine-made soda bottles (made by companies other than the Owens-licensed American Bottle Co.), therefore, were into the mainstream of soft drink bottlers by 1913, so some bottles were produced without the volume information.

Our look at the OP and OS marks on bottle heels is, of course, a bit of a side trip, but much of our research findings come as a result of serendipitous connections while looking for something else. This particular side trip combines the research conducted by Mike and I in our search for marks on bottles used by the Southwestern Coca-Cola Bottling Co. with published findings to produce a new chronology for Graham Glass Co. bottles as shown in **Table 2**.

Serendipitous research is also associated with the last unconnected thread of our deductive research. Because the Illinois Glass Co. had captured the Owens license for making pharmacy bottles and one of the licenses for whiskey bottle production, they were restricted to using Owens machines exclusively for these containers. The company was therefore constrained to use mouth-blown production for soft drink bottles. As a result, they could not compete with companies using the Red Devil and other machines to produce soda bottles. Evidence from the Illinois Glass Co. catalogs shows that production was, indeed, greatly reduced. David was correct – the Illinois Glass Co. was not producing many (if any) soft drink bottles during the time period when the Diamond I bottles were produced.

I hope that this account has helped to show a bit of the procedure that goes into bottle research. Generally, publications only show the final results – with no hint

Table 2: Graham Glass Co. Manufacturer's Mark Chronology

Mark	Location	Plant	Bottle Type	Dates*	Source
OP **	Heel	Okmulgee	Coca-Cola	1910-1920	Lockhart
OS **	Heel	Okmulgee	Soda	1910-1923	Lockhart
OG †	Heel ?	Okmulgee	Coca-Cola	1920-1926	Porter (1966:4)
LP †	Heel ?	Loogootee	Coca-Cola ?	1910-1920	Keller (1998:28)
LS †	Heel	Loogootee	Soda ?	1910-1923	Keller (1998:28)
LG †	Heel ?	Loogootee	Unknown	1910-1920 ?	Keller (1998:28)
LSQ †	Heel ?	Loogootee	Coca-Cola	1920-1926	Porter (1996:4)
EG ††‡	Heel	Evansville	Coca-Cola, Soda	1920-1926	Porter (1996:4); Keller (1998:28)
CH ††	Heel	Checotah	Soda	1920-1923	Lockhart
G ††	Heel ?	All Plants	Coca-Cola	1927	Porter (1996:4)
GRAHAM	Heel ?	All Plants	Coca-Cola	1928-1929	Porter (1996:4)

* With the exception of those provided by Porter, all dates are the best estimate of the author based on bottles observed, data provided by collectors, and information from sources.

** These marks are usually (maybe always) accompanied by numbers and may include two-digit date codes by at least 1920.

† These marks may include numbers, but the inclusion of the date codes is currently unknown.

†† This mark is accompanied by two-digit date codes and probably other mold numbers.

‡ Frequently, the "E" and "G" are separated in the coding (e.g. 1865E G25).

as to the process involved. Even this account only scratches the surface of the process. It is often years between discoveries. Once I had made my initial observations about El Paso bottles, it took three years to find the Gould Amendment. It was a couple of years after that when I met Mike Miller and began looking at Southwestern Coca-Cola bottles – we did not try to discover which company used the marks until a while after that. It was still later when I found Bill Porter's book on Coke bottles and only very recently that Mike Elling told me about the Graham history. Our glass research group, with its input, is only two years old. It took David's observation about the missing Illinois soft drink bottles and our investigations into the Root and Graham glass company marks to suddenly bring about the realization of how the various clues fit together. Like detective work, glass research is a long-term process.

Acknowledgments

My gratitude to the bottle research group to which I belong (David Whitten, Bill Lindsey, and Carol Serr) for suggestions and proofreading and to Bill for providing access to his 1920 Illinois Glass Co. catalog. Kudos to Mike Miller for his part in our joint effort in researching the Southwestern Coca-Cola Bottling Co. history (hopefully to be published in book form by the middle of 2006) and the use of his drawings. Thanks also to Mike Elling for passing on information from Tim Pillow about the Graham book and for information on bottles in his collection. The book provided the final key to one manufacturer's mark mystery.

References

Casi's Coke Collection. 2004 Casi's Coke Collection. http://www.cokebottles.de/homer2.htm

Davis, Pearce. 1949 *The Development of the American Glass Industry*. Harvard University Press, Boston.

English, S. 1923 "The Ashley Bottle Machine: A Historical Note." *Journal of the Society of Glass Technology* 7:324-334.

Illinois Glass Company. 1903 *Illustrated Catalogue and Price List Illinois Glass Company: Manufacturers of Bottles and Glass Containers of Every Kind*. Illinois Glass Company, St. Louis. Reprinted by Larry Freeman, 1964.

Illinois Glass Company. 1908 *Illustrated Catalogue and Price List Illinois Glass Company: Manufacturers of Bottles and Glass Containers of Every Kind*. Illinois Glass Company, St. Louis.

Illinois Glass Company. 1920 *Illustrated Catalogue and Price List Illinois Glass Company: Manufacturers of Bottles and Glass Containers of Every Kind*. Illinois Glass Company, St. Louis.

Illinois Glass Company. 1923 *Fifty Years of Achievement in Building up a Service of Better Bottles*. Illinois Glass Co.

Jones, May. 1966 *The Bottle Trail, Volume 6*. Nara Vista, New Mexico.

Keller, Michael E. 1998 *The Graham Legacy: Graham-Paige to 1932*. Turner Publishing Co., Paducah, Kentucky.

Lockhart, Bill. 2000 *Bottles on the Border: The History and Bottles of the Soft Drink Industry in El Paso, Texas, 1881-2000*. Townsend Library, New Mexico State University at Alamogordo. http://alamo.nmsu.edu/~lockhart/EPSodas/

Miller, George L. and Tony McNichol. 2002 "Dates for Suction Scarred Bottoms: Chronological Changes in Owens Machine-Made Bottles." Paper presented at the 2002 SHA meetings, Mobile, Alabama.

Miller, George L. and Antony Pacey. 1985 "Impact of Mechanization in the Glass Container Industry: The Dominion Glass Company of Montreal, a Case Study." *Historical Archaeology* 19(1):38-50.

Miller, George L. and Catherine Sullivan.
1984 "Machine-made Glass Containers and the End of Production for Mouth-Blown Bottles." *Historical Archaeology* 18(2):83-96.

Paquette, K. 2002 *Blowpipes: Northwest Ohio Glassmaking in the Gas Bom of the 1880s*. Xlibris Corp., n. p.

Pollard, Gordon. 1993 *Bottles and Business in Plattsburgh, New York: 100 Years of Embossed Bottles as Historical Artifacts*. Clinton County Historical Association, Plattsburgh.

Porter, Bill. 1996 *Coke Bottle Checklist*. Privately printed, n. p.

Putnam, H. E. 1965 *Bottle Identification*. Privately printed, Jamestown, California.

Scoville, Warren C. 1948 *Revolution in Glassmaking: Entrepreneurship and Technological Change in the American Industry, 1880-1920*. Harvard University Press, Cambridge, Massachutts.

Smith, Michael David. 1989 *Texas Glass: An Illustrated History of the Three Rivers Glass Company 1922-1937*. Atwood Printing, New Braunfels, Texas.

Toulouse, Julian Harrison. 1971 *Bottle Makers and Their Marks*. Thomas Nelson, New York.

Turner, W. E. S. 1938 "Twenty-one Years: A Professor Looks Out on the Glass Industry." *Journal of the Society of Glass Technology* 22:99-164.

United States. 1913 *The Statutes at Large of the United States of America from March, 1911, to March, 1913*. Secretary of State, Washington, DC.

(Footnotes)

[1] For those readers who are not fans of mystery novels, a red herring is a particularly smelly fish. It could be used effectively to block the odor of a prisoner being tracked by bloodhounds and throw the dogs off the scent. Mystery authors employed various devices to distract their readers from the actual guilty party, and these came to be known as red herrings. In this case, I use the term, not to denote intentional misdirection, but to indicate a line of inquiry that turned out to be misleading.

[2] Toulouse (1971:215) claimed that "by 1910 the hand-transfer was virtually automatic, and by 1912 the machine was fully automatic with Graham's own feeder." Keller (1998:29), however, stated that "the promise that the Graham machine held out for becoming truly automatic . . . did not come to fruition. . . problems were never overcome. Eventually more sophisticated and efficient machines were developed by the industry and the Graham machine became obsolete."

[3] For the full story on the Ashley machine, see English (1923).

[4] This does not fit with my empirical observations. For example, Southwestern Coca-Cola Bottling Co. used the exact same bottle with codes of OS 249 G 20 and OS 249 G 23. This indicates that the "20" and "23" *are* date codes for the year of manufacture rather than the original order.

Bill Lockhart
1313 14th St., Apt. 21
Alamogordo, NM 88310
(505) 439-8158
bottlebill@tularosa.net