Looking Through the Glass: Analysis of Glass Vessel Shards from Pinagbayanan Site, San Juan, Batangas, Philippines

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Abstract

This paper studies glass artefacts recovered during the excavation of Structure B, San Juan, Batangas, Philippines in 2011. Whole glass artefacts, as well as glass shards with diagnostic traits are studied in order to infer their form and function. Dating of select glass shards were also attempted based on diagnostic features especially with regards to lips and seams. Invaluable information was also gleaned from embossed letters or words as these words were used as key words to research more about the glass artefacts.

Introduction

Artefacts preferred for analyses in Philippine archaeology include stone tools and ceramics. Glass vessels seem to have been largely ignored as evidenced by the lack of detailed study. This may be due to the different kinds of research required to fully understand glass artefacts and the site they belonged to. For instance, there is great difficulty in tracing the source since double research should be undertaken- one regarding bottle manufacture and the other, regarding product manufacture. Both require exhaustive archival research together with analysis of the physical features of the artefacts.

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The excavation held in April to May of 2011 in Pinagbayanan, San Juan, Batangas (Figure 1), has yielded 328 glass shard artefacts, which provide ample specimens to be studied. A great bulk of these was recovered from midden contexts. Echoing James Deetz's (1977) call for the study of "small things" as significant materials in the understanding of history, I decided to study these glass shards. Structure B, with site code IV-2009-G, is interpreted as a residential building constructed in the latter half of the 19th century, in particular a *bahay na bato*, based on the lay-out and the artefacts associated with it (UP-ASP 2011). The significance of this study lies in the insights on the quotidian life of the 19th century to be gained from glass artefacts as source material in addition to historical documents. The many uses of glass such as windows, containers, decorations, and lighting offer a wealth of knowledge waiting to be disclosed, and which may not be available to scholars if only written documents are studied.

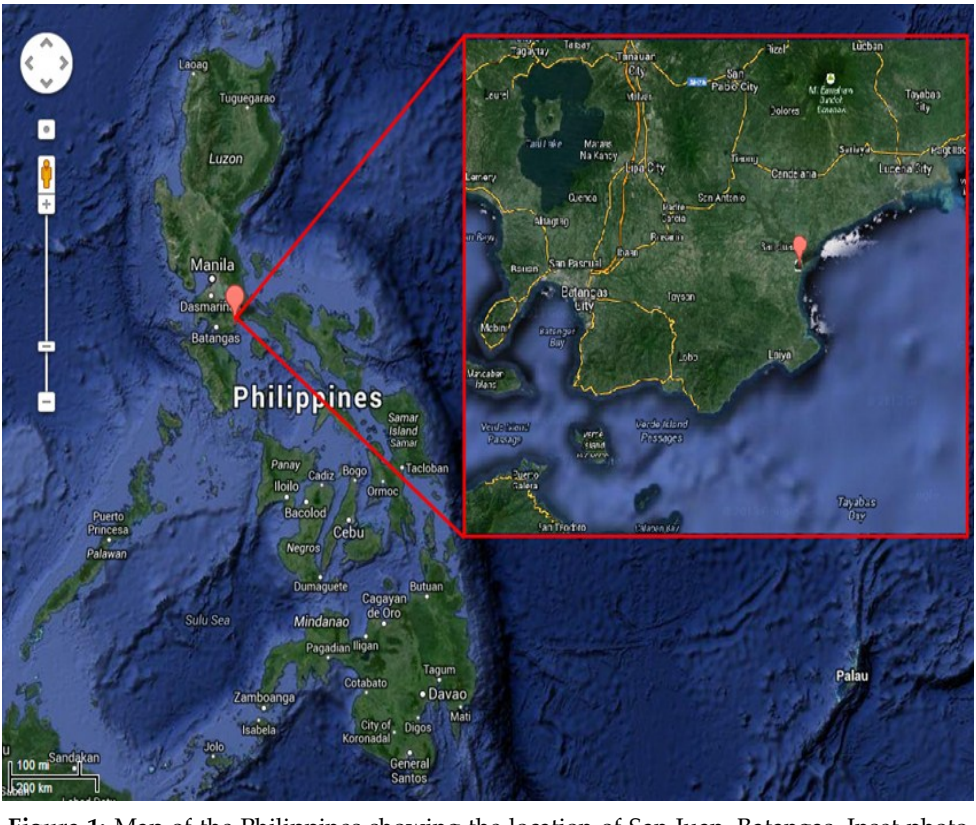


Figure 1: Map of the Philippines showing the location of San Juan, Batangas. Inset photo shows where the excavated site is located.

This paper has a number of objectives, first and foremost being the identification of glassware types and functions found in Structure B. In the process, analyses of the glass shard parts are inevitable, which can provide us with approximate dates of manufacture which in turn shall help date the site (Horn 2005). This paper also attempts to investigate where the glasswares were manufactured based on existing labels in the form of embossed designs, if any. With the knowledge of the place of manufacture, we can tell if the glassware was imported or produced locally. This may have a bearing in the interpretation of the site as it gleans information on the social status of the residents of the *bahay na bato.*

Short history of glass making techniques

Glass is an amorphous non-crystalline solid mainly composed of Silica (SiO_2), Sodium oxide (Na_2O), and Calcium oxide (CaO) (http://www.glassonweb.com/articles/article/41/). Contrary to popular beliefs that glass is a modern invention, glass has been around for millennia. Grossman (2002) places glass manufacture to as early as the 3rd millennium BC in Egypt. So far, nobody knows where and when it was invented but sources like Pliny's (A.D. 23-79) accounts tell of the accidental discovery of glass by the Phoenician traders who noticed the forming of a clear liquid when the nitrate blocks on which they placed their cooking pots melted and mixed with beach sand. Archaeology was able to recover Assyrian stone tablets dated to about 650 B.C. containing information on how to make glass. Around 2000 years ago, the Syrians used the glassblowing technique to produce glass, a technique adopted by the Romans who became agents of savoir-faire dissemination as they conquered nations and established the Roman Empire (Macfarlane and Martin 2004).

There were three major techniques of glass manufacture (Polak 2005) though some would say nine (Stelle 2011). For the purpose of giving a brief overview of the evolution of glass manufacture, the three major ones will be discussed as taken from Polak (2005) since he provided a comprehensive study of bottles for beginners and discussed other techniques which he subsumed under the three major ones. The free-blowing technique had been common for thousands of years until 1860 (Polak 2005, 2007) and was the most common method used (Lorrain 1968). A long hollow metal rod was employed which was dipped in molten glass to gather a glob on the end. The glassmaker then would huff and

puff into the rod until a big bubble is formed and was further shaped into the desired form.

From 1618 to 1866, pontil marks became a characteristic feature of the bases of bottles (Keane 2008; Polak 2005). These were formed when a long metal pontil rod was removed from a blown bottle. The pontil rod would first be attached to the bottom of a blown bottle to hold it after the blowpipe was removed. While pontil marks may be categorised into many types (Keane 2008), basically put, it is the "scar or roughage left on the base of a bottle" (http://www.sha.org/bottle/pontil_scars.htm) (see Figure 29). The invention of the snap case in 1850s replaced the pontil rod, which then marked the loss of the pontil marks and which enabled embossed designs to be placed at the bottom of the bottles (Polak 2005). The snap case was a five foot metal rod with pincers to hold the bottle while the neck was being finished. The second major technique was the use of moulds which dated to 1 A.D. up until 1900 (Polak 2005). This technique was used in combination with the free-blown process but because the moulds provided ready forms, lesser effort in blowing was necessary. The glassblower would blow into the blowpipe, which was placed in the mould, with molten glass on its end until the molten glass compressed itself against the sides of the mould. The moulds also made it possible to impress design patterns and letterings (Lorrain 1968).

Two types of moulds were used. One was an open type mould which formed only the body of the bottle sans the lip and the neck which were formed last. The other was a closed type wherein the lip and the neck were formed simultaneously with the body (Polak 2005, 2007). Features to be paid attention to are the seams which may indicate the method of manufacture. Later on, two types of moulds emerged. The first was the three-piece mould (1809-1880) in which a mould formed the lower half of a bottle while two moulds formed the upper half up until the shoulder. The important thing to look at is the presence of seams from the lower lip up until the shoulder and the presence of a seam encircling the bottle at the shoulder (Polak 2005, 2007). The other type was called turn mould or paste mould (1880-1900) in which wooden moulds were used. The wood was kept wet to prevent them from being burned from the heat emitted by the glass. The moulds were constantly turned, thus the term "turn mould", so as to prevent the charring of the mould. In the process, it erased seams and mould marks and also gave the bottle high luster. The wooden moulds were later replaced by metal ones and to facilitate the sliding of the turning process, paste was added inside the

mould, thus the term "paste mould" (Polak 2005, 2007). We see from the above that progress in glassmaking technique was very slow and basically almost uniform with very little change. In 1903, however, progress was speeded up with the invention of the automatic bottle making machine by Michael J. Owens (Keane 2008; Polak 2005). In 1909, improvements were made on the machine, making it possible to make small prescription bottles. Soon after, with the growing demand for glass bottles, bottles were manufactured by means of machine, a milestone in the glassmaking industry. As a general rule according to Polak (2005, 2007), therefore, the higher the reach of the seams from the bottom, the younger the bottle. For instance, prior to 1860, seams extend to just over the shoulder. From 1860 to 1880, seams extend up to the neck of the bottle. From 1880 to 1890, seams extend up to the lower part of the lip, and from the 1900 onwards, seams extend up to the orifice, or the top of the lip. Another important event in the history of glass bottles is the standardisation of threads in 1924 which made it possible to mass produce screw-topped bottles, which used to be confined to specialty bottles because of its complex production method (Polak 2005).

Methods

To study the glass artefacts from Structure B, Pinagbayanan, San Juan, there is a need to refit the glass shards to more or less be able to infer the type of glassware found in the site. To do this, sorting the recovered glass shards according to colour would be a great start. Next is to further sort the shards according to the context they were found. This is based on the assumption that a glassware is shattered into pieces in a certain context and therefore, shards found in a certain context can be most probably be refitted together. Sorting the shards based on context number also helps in determining the spatial and temporal distribution of glass in the site. A context number is simply an arbitrary number assigned to a specific context in a site. A context is a physical location, the formation of which is of utmost importance in archaeology as it indicates an event in relative time preserved in the archaeological record. A context may refer to sediments, features, or other locations where an artefact is found. To achieve the goal of identifying the function of the glass, field guide books to bottles were consulted (Digger Odell Publications 2001; Dust of the Bottle 2011; Grossmann 2002; Harris 2006; Historic Glass Bottle Identification and Information Website; Keane 2008; Lindsey 2010; Lorrain 1968; Macfarlane and Martin 2004; Polak 2005, 2007; Schroy 2007,

2008; The Bottle Guide; Wine Bottle). This is to familiarise myself with the possible forms of glassware and which particular forms correspond to functions. In this digital age where information is more accessible than ever regardless of geographical locations, the internet provided an invaluable source of information on the different kinds of bottles with embossed designs indicating the company that produced it and/or their content. The dates of manufacture were taken into consideration as these gave *terminus post quem* (the earliest possible) dates of some glass artefacts. Archival research was also employed, most especially regarding the local glass industry and trade with other countries. Documents at the National Archives of the Philippines were consulted. Last but not the least, a visit to the Bote't Dyaryo Museum (Bottle and Newspaper Museum) at Escolta in Manila in 2011 served as a reference.

This study is limited to glass artefacts with diagnostic traits like seams and bases. All whole bottles recovered from Structure B are included in the study, as well as lip and neck shards, and body shards with features that may provide any information on the glass. The study of some glass artefacts will be limited to descriptions in the absence of more information, but these descriptions will at least provide a record of the said artefacts. Terminology used is based on Lindsey (2010) as he provides simple terms to name the basic parts of a bottle (Figure 2).

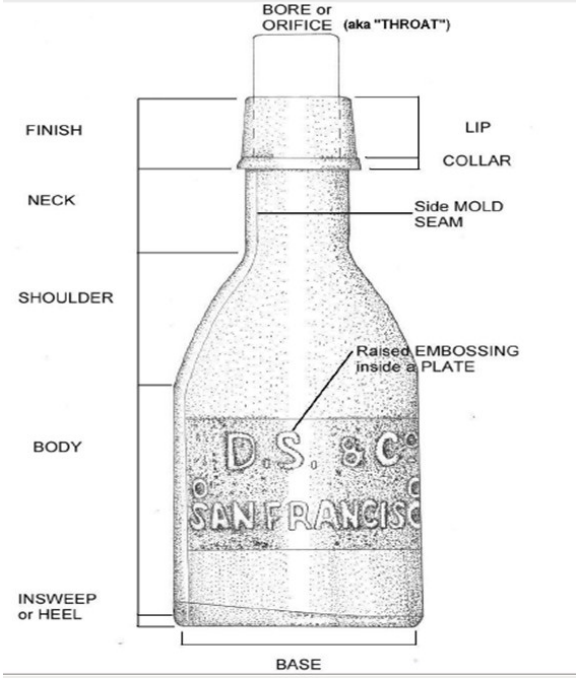


Figure 2: Basic parts of a glass bottle (Lindsey 2010).

My work on glass was initially confined only to form and function but during the process of data gathering, I discovered that dating can also be made possible, which greatly changed the trajectory of the paper. Datable features shall be analysed and this will fall mainly on the earliest possible date of manufacture of the bottles in question. This paper will not include the composition of the glasswares nor will it delve into microscopic details. Much as I would like to include information regarding the dates of import of glass bottles, as gathered from archival research, I would have to set a realistic goal of presenting whatever information has been gathered and shall leave for future papers the would-be results of archival research. This is mainly due to time restriction.

The Glass Bottles from Structure B

The 2011 excavation at Structure B in Pinagbayanan, San Juan, Batangas yielded a total of 328 glass artefacts, making up almost 8% of the sum total of the artefacts recovered. Categorisation of glass artefacts were made based on form, part, and inscriptions. Whole bottles automatically comprise one category. The same goes for flat glass. Shards with inscriptions are grouped together since one can look up the words on the Internet for any information regarding the bottle be it the bottle itself, or the liquid it used to contain.

A. Flat Glass

Of the total number of glass artefacts recovered only 19 were flat glass, with thicknesses ranging from less than 2-3 mm. These flat transparent glass shards could have been used for jalousie windows. The transparent, already patinated flat glass shards were found only in Trenches 2 and 4 (Figure 3), in contexts associated with post-destruction phases namely Contexts 317 and 346 (Trench 4 middens), and Contexts 105 (dark yellowish brown silty sand forming the matrix of the rubble Context 107) and 107 (rubble layer). This suggests that perhaps there was a shift from using Capiz shell windows to glass jalousies, but it could be worthwhile also to investigate the possibility that the two were used alongside each other simultaneously, given the paucity of flat glass shards. This is not explored further in this paper as the focus is more on glass vessels.

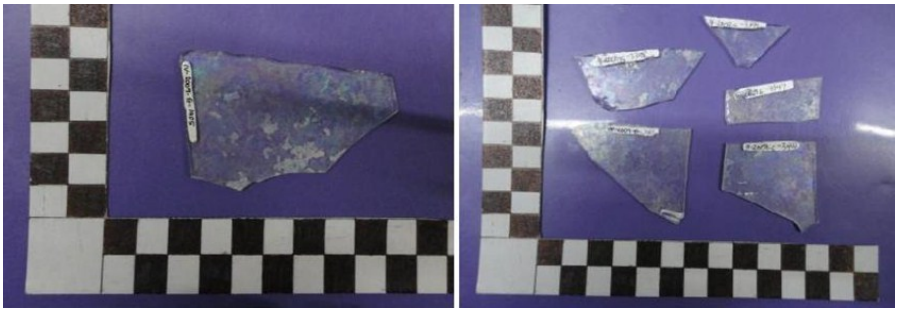


Figure 3: Flat glasses from Trench 2 (left) and Trench 4 (right).

B. Message on the Bottle:

A Van Hoboken & Co. Rotterdam Gin

This is a glass body shard with embossed letters "HOB" and under it, "TER" (Figure 4). The shard was initially believed to be part of the Hoskins Brothers Ales HOB Bitter manufactured in Leicester, England. On reviewing my notes made during the visit to the Bote't Dyaryo Museum, though, I realised that most probably it is an A Van Hoboken & Co. Rotterdam Gin bottle (Figure 5). This case gin bottle is described as "produced in a two-piece cup-bottom mould, has a crudely applied "blob" finish, no evidence of air venting, and has a blob seal on the shoulder" (www.sha.org). So far, no information on the company that produced this bottle and gin can be found on the internet.

Figure 4: Shard from a A Van Hoboken & Co. Rotterdam Gin (IV-2009-G-2655) recovered from Structure B.

Figure 5: An intact bottle of A Van Hoboken & Co. Rotterdam Gin (Source: http:/www.sha.org/bottle/liquor.htm).

Cerveza San Miguel

Ten shards, all from the midden (Context 317), were refitted to form this nearly whole bottle (Figure 6). It is dark olive green in colour, with circular base and body. It has a very slight insweep, which is not sloped upwards, unlike the kick-up in wine bottles. This may have been due to the pontil mark found at the bottom. It is curious to note, though, that the indentation was not as deep as commonly found in wine bottles. This must be due to the fact that wine is a more expensive commodity and the high kick-up eats up a big volume. (For more information on kick-ups, see section on bases below). The lip of this bottle is an applied double collar (1840-1870) and it is interesting to find a cerveza bottle which has yet to accommodate the crown cap or in popular local appellation, *tansan*. The Cerveza San Miguel was produced both in Spain and in Manila. So far, there is no information if this bottle was made in Spain or in the Philippines.

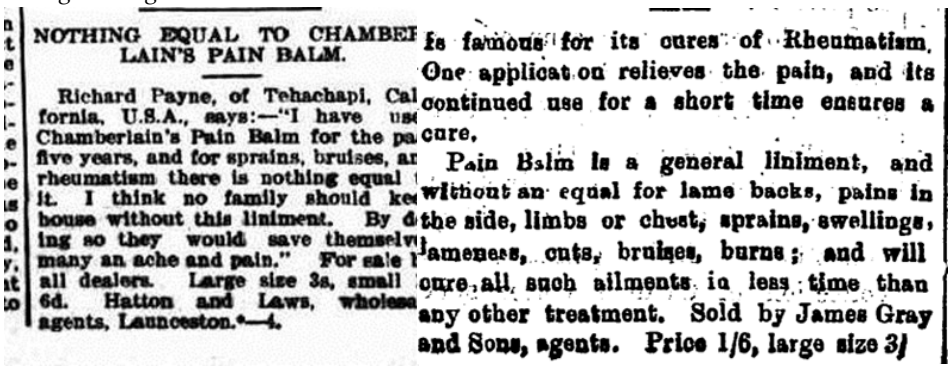
Figure 6: Left: Refitted shards of a Cerveza San Miguel beer bottle (IV-2009-G-1393, 1803, 1806, 1807, 1816, 1862(2), 1864, 3336, 3372); Right: The seams of the Cerveza bottle extend a little over the shoulder, indicating that this could have been manufactured between 1860 and 1880 (illustrated by M. Cruz, retraced by H. Valerio).

Chamberlain's Pain Balm

This light aqua rectangular bottle has the embossed words "CHAMBERLAIN'S PAIN-BALM" in the front and "CHAMBERLAIN'S MED. CO." on the side (Figure 7). It has a tooled applied tapered lip which was common in the years between 1840 and 1870. The seams form a slanting line to the left and they extend until the neck (Figure 8), a common characteristic between 1860 and 1880. The Chamberlain Medical Company was established in Iowa by Lowell Chamberlain in 1872 (www.chamberlainlotion.com). The pain balm is one of their many famous products as newspaper advertisements were made to promote it (Figure 9).

Figure 7: A bottle of Chamberlain's Pain Balm (IV-2009-G-353, 354).

Figure 8: IV-2009-G-354 lip and neck of Chamberlain Pain Balm prior to refitting with IV-2009-G-353 (illustrated by M. Cruz, retraced by H. Valerio).



NOTHING EQUAL TO CHAMBER LAIN'S PAIN BALM.

Richard Payne, of Tehachapi, California, U.S.A., says:—"I have us Chamberlain's Pain Balm for the pa five years, and for sprains, bruises, ar rheumatism there is nothing equal it. I think no family should ke house without this liniment. By d ing so they would save themselv many an ache and pain." For sale all dealers. Large size 3s, small 6d. Hatton and Laws, wholesa agents, Launceston.*—4.

is famous for its cures of Rheumatism. One applicat on relieves the pain, and its continued use for a short time ensures a cure.

Pain Balm is a general liniment, and without an equal for lame backs, pains in the side, limbs or chest, sprains, swellings, lameness, cuts, bruises, burns; and will cure all such ailments in less time than any other treatment. Sold by James Gray and Sons, agents. Price 1/6, large size 3/

Figure 9: Advertisements of the Chamberlain Pain Balm (Sources: http://trove.nla.gov.au/ndp/del/article/35340265 and http://www.paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&d=BH19000209.2.27&e=-------10--1----0--).

Hauthaway

A piece of glass with the letters 'AUTHAWAY' was recovered from Structure B and interpreted as from a Hauthaway Shoe Polish bottle (Figure 10). The shoe polish was first concocted by Charles L. Hauthaway in 1852, in Bridgewater, Massachusetts. The Hauthaway & Sons Company still exists and has expanded their product line. Note that in the advertisement, the place of manufacture is in Boston, U.S.A (Figure 11).

Figure 10: Sherd of a Hauthaway Shoe Polish Bottle (IV-2009-G-3012).

Figure 11: On the left is an intact Hauthaway Shoe Polish bottle (Source: http://www.museumoflondon.org.uk/ceramics/pages/largerimage.asp?obj_id=506571%20&img_id=45003) and on the right is its advertisement (Source: http://www.promare.co.uk/ships/Finds/Fd_11A12Bottle.html).

Manuel Zamora's Tiki-tiki

This is a clear glass base shard with visible letters "EL ZAMORA" and under them, "SALVACO" (Figure 12). The discovery of this type of bottle was purely by chance when I participated from September to October 2011 in an Archaeological Impact Assessment for the proposed museum of the archdiocese of Manila located at the back of Manila Cathedral. In this site, two empty whole bottles of Manuel Zamora's tiki-tiki medicine were recovered. The bottles also indicate the address of Manuel Zamora's pharmacy which was located at 928 Hidalgo St., Quiapo, Manila.

Manuel Zamora was born on March 29, 1870 in Sta. Cruz, Manila. Even as a student, he showed excellence in pharmacy, his chosen field, and earned his licentiate with distinction *as sobresaliente* (outstanding). In 1908, he established a small drugstore and laboratory at 928 Hidalgo St., Quiapo where he would invent a cure for beri-beri, the tiki-tiki in 1909 (NHI 1992). With this biographical information, the *terminus post quem* date we can give for the bottle is 1909.

Figure 12: Left: Shard of a Manuel Zamora's Tiki-tiki bottle (IV-2009-G-1370); Right: An intact Tiki-tiki bottle (NCR-2011-Q-130) found at the back of the Manila Cathedral, Intramuros, Manila.

Nanyang Company bottle (IV-2009-G-1387)

This is a clear glass body shard with embossed Chinese characters which read "南洋公司" in vertical orientation (Figure 13). This translates to "Nanyang Company". The function of this bottle is not clear, and no information can be found on the internet in relation to a Nanyang Company that produces glass or has products that necessitate glass containers.

Figure 13: Body shard with embossed Chinese characters (IV-2009-G-1387).

Palanca (IV-2009-G-3328)

The clear glass body shard has the embossed word "PALANCA" (Figure 14). Personal communication with Manny Encarnacion, a history and archaeology enthusiast, hints at the shard being part of a *cuatro cantos* bottle (literally meaning four corners which refers to a gin bottle), as the La Tondeña. On a visit to the Bote't Dyaryo Museum at the suggestion of Mr. Encarnacion, I saw that indeed the clear glass body shard is part of the case gin bottle, with the words "LA TONDEÑA CARLOS PALANCA". La Tondeña Distillers Inc. was established in 1902 by the Chinese-Filipino businessman and philanthropist Tan Quin Lay, more popularly known as Carlos Palanca after whom the famous award for Philippine literature was named.

Figure 14: Left: Shard from a Palanca gin bottle (IV-2009-G-3328); Right: Cuatro cantos bottles with embossed "LA TONDEÑA CARLOS PALANCA" in Bote't Dyaryo Museum, Manila.

Soda water bottle

This is a light bluish green body shard with the embossed letters "ATER" which is most probably used as container for soda water since the colour is most commonly associated with soda water based on my observation of soda bottles (Polak 2005) (Figure 15).

Figure 15: Shard from a soda water bottle (IV-2009-G-3282.2).

Tarza Highes Poma

This is a clear glass body shard with embossed "TARZA HIGHES POMA" and webbed designs (Figure 16). No information has been found regarding the glass shard. Web search words used were "Tarza highes poma", "Tarzan highest pomade", "Tarzan highest poma", "highest pomade".

Figure 16: Shard from a Tarzan Highest Pomade bottle (IV-2009-G-1372).

"Wine Manufactured in Japan"

This is a buish-green glass base shard with embossed Chinese characters (Figure 17). The Chinese characters are most probably the Kanji system used by the Japanese. The embossed words are "酒來本日標創" and are read from right to left. The word-for-word translation is "manufacture-brand/label-Japan-come-wine", and the translation I give is "wine manufactured in Japan". The base shard, with slight insweep, is a common characteristic of Japanese wine bottles (Ross n.d.)

Figure 17: Base of a wine bottle 'manufactured in Japan' (IV-2009-G-3282).

C. The Lippy Finish

Lips are important to look at for dates (Figure 18). When lips connected to necks were recovered, these offer further information based on seams. Of the bottles recovered in Structure B, majority have rolled or folded lips that date to 1840-1860 (Figure 18). These are IV-2009-G-3284 (Figure 19), IV-2009-G-1381(Figure 19), IV-2009-G-3808 (Figure 32), and IV -2009-G-1792 (Figure 34). Lips with applied square band (1840-1870) include IV-2009-G-1366 (Figure 20), IV-2009-G-3281, while tooled applied lip, as evidenced by horizontal striations encircling the lips, are present in IV-2009-G-3279 (Figure 20) and IV-2009-G-3531. IV-2009-G-1783, 1784, 1786 forming a lip, exhibit an applied bob lip. IV-2009-G-3531 on the other hand, exhibits a tooled tapered lip with collar (Figure 19).

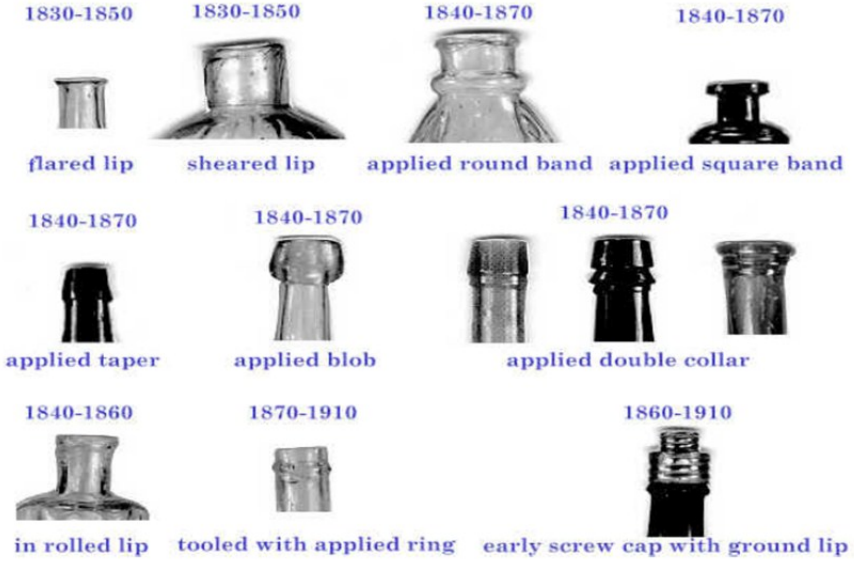


Figure 18: Different kinds of lips on bottles and their dates. (Source: www.bottlebooks.com /basics.htm).

Figure 19: Examples of rolled and folded lips on bottles: (from left to right) rolled lip (IV-2009-G-1381); tooled applied tapered lip (IV-2009-G-3531); rolled lip (IV-2009-G-3284).

Figure 20: Examples of tooled applied lips: (from left to right) tooled applied tapered lip (IV-2009-G-3279), tooled applied square lip (IV-2009-G-3283 and IV-2009-1366).

An interesting find is IV-2009-G-3814, a cobalt blue lip featuring a three-point closure and with seams up to the orifice top (Figure 21). According www.bottlebooks.com, "Unlike most screw caps, the three point screw top had three lugs jutting out from the lip which were to engage a metal cap. This closure can be found on whisky and medicine bottles of the 1837-1940 period." (Figure 22). The seams would indicate that the bottle was machine made. For the meantime, orifices shall be included in this category. Some clear glass orifice shards were recovered which could have been part of drinking glasses. These include IV-2009-G-1834, IV-2009-G-1836, and IV-2009-G-2836 (Figure 23).

Figure 21: A shard showing a three-point closure (IV-2009-G-3814).

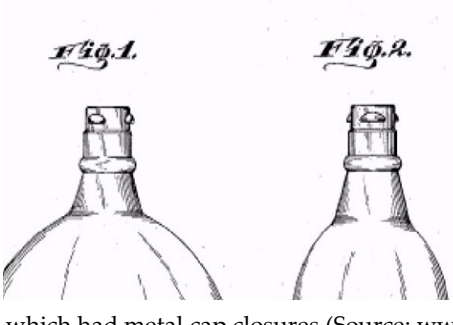


Figure 22: Examplebottles which had metal cap closures (Source: www.bottlebooks.com).

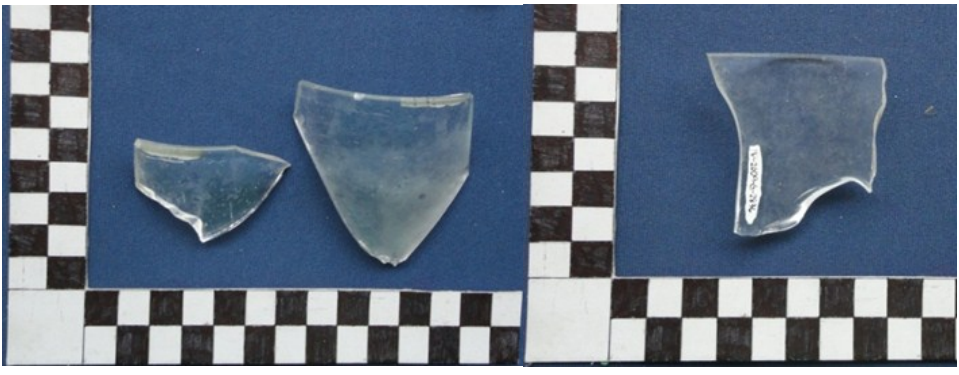


Figure 23: Clear glass orifice shards which could have been part of drinking glasses (from left to right: IV-2009-G-1834, IV-2009-G-1836, and IV-2009-G-2836).

D. Touching Base

Bases can provide information on the function of bottles. One feature to look at is the kick-up or the punt which is associated with wine bottles. Sometimes, the bases have embossed words or images that may help identify the product it the bottles used to contain or the manufacturer of the bottles, like the previously mentioned base shard (IV-2009-G-3282) (Figure 17). Kick-ups or punts refer to the deep indentation formed by pressing a wood or metal in the base of the mould while the glass is still hot and are commonly associated with wine bottles and calabash flasks (Polak 2005). There are many functions of the kick-up, but the most common and rational ones are as follows (http://en.wikipedia.org/wiki/Wine_bottle):

1. It contributes to the stability of the bottle by preventing the punt mark or the scar derived from the pontil rod from making an imperfection that might result in instability of the bottle. This is also to prevent the punt mark from scratching the table.

2. It facilitates the handling of bottles and accommodates the pourer's thumb for ease of pouring. This may be in relation to the growing fondness of 19th century people for etiquette and finesse in manners, but this hypothesis remains to be tested.

3. The indentation impresses customers into thinking that a bottle holds a huge volume of whatever it contains, thus a form of cheating on the part of product manufacturers.

4. It facilitates the transport of bottles as bottles can be stacked on cargo holds on ships without rolling around and breaking. This is to prevent losses caused by breakages of bottles since these are fragile.

Four base shards with kick-ups were recovered (Figure 24) These are clearly wine bottles, as can be observed through the colour. For instance, IV-2009-G-327 is dark greenish which is most appropriate for wine as it prevents wine from being exposed to sunlight which might alter the taste and quality. IV-2009-G-3171 is light green in colour and could have been used to store wine that is not sensitive to sunlight exposure. IV-2009-G-2254, on the other hand, may look like crockery or stoneware but the cross section reveals that it is actually glass painted to produce a semblance to crockery. This could have contained ginger ale according to Anna Pineda (personal communication, 5 September 2011), a graduate student at the UP-ASP. It might indicate a transition from the use of stoneware to the use of glass in storing beverages. IV-2009-G-3290 forms a rose-coulored round base with rounded kick-up. I have not yet encountered any bottle of similar type and colour thus will have to suspend judgment. Another shard (IV-2009-G-3172) is fragmented but it is clear that there used to be a kick-up attached to it as the interior part slopes upward which could have been a slight insweep.

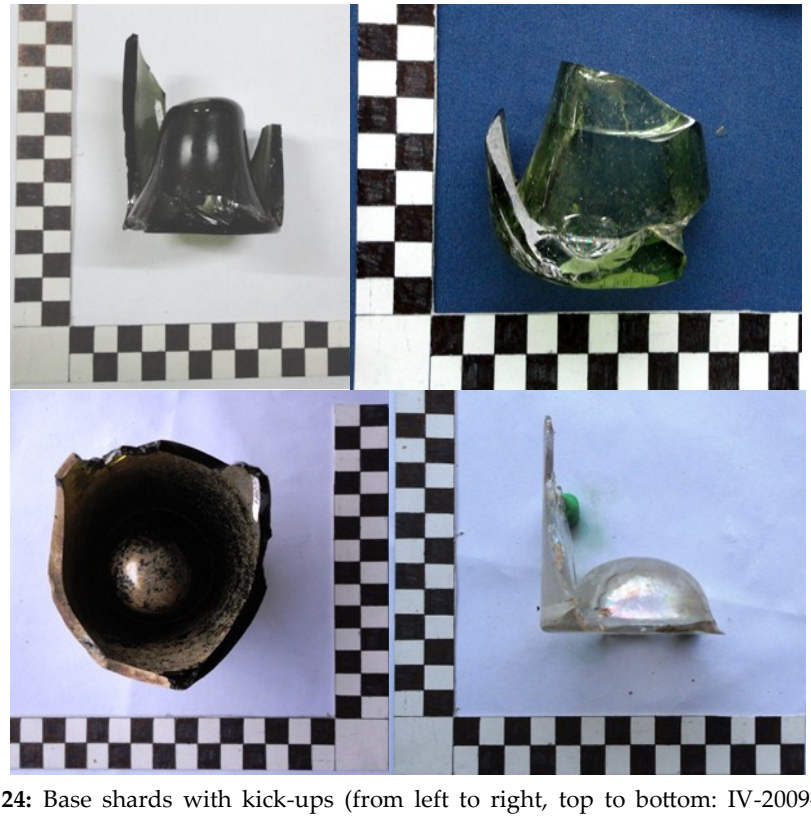


Figure 24: Base shards with kick-ups (from left to right, top to bottom: IV-2009-G-327, IV-2009-G-3171, IV-2009-G-2254, IV-2009-G-3290).

One base shard (Figure 25) has a French square shape and thick emerald green glass was used. No information can be obtained from this aside from that it looks relatively younger due to its lack of patination and still polished look. IV-2009-G-163 is a glass base shard of probably a fluted shot glass (Figure 26). IV-2009-G-649 is made of clear plain frosted glass with no kick-up (Figure 27). IV-2009-G-650 is made of dark glass and has no kick-up nor insweep (Figure 28). IV-2009-G-1822 has a slight insweep and is made of dark amber-coloured glass. IV-2009-G-3812 is unique in that it ribbed or ringed (Figure 29). It was initially thought to be a lid because the ribs were first thought to be threads but on closer look, the features are not threads but rings atop each other. This could have been part of a preserved fruit bottle based on its light aqua colour based on my observations of fruit jars (Polak 2005).The base of the Cerveza San Miguel (IV-2009-G-1803) has a pontil mark (Figure 30) and it is curious to note that it does not have a kick-up.

Figure 25: Base shard with a French square shape (IV-2009-G-1802).

Figure 26: A base shard which could have been a fluted shot glass (IV-2009-G-163).

Figure 27: A base shard of a plain frosted glass (IV-2009-G-649).

Figure 28: A dark glass with no kick-up or insweep (IV-2009-G-650).

Figure 29: Ringed base shard (IV-2009-G-3812.

Figure 30: Base of the same Cerveza San Miguel bottle with a pontil mark (same bottle shown in Figure 6).

E. Whole Bottles

Five whole bottles were recovered from the site and all of these were found in Context 317, which is the midden located at the back section of the Structure B). One nearly intact brown bottle, also from Context 317, will be included in this category.

Brown Bottle

This brown bottle (IV-2009-G-1978) was recovered in four pieces which were glued together (Figure 31). It has a threaded lip, with seams extending all the way to the orifice, suggesting that it was machine-made. The absence of patination suggests that it is a relatively young bottle compared with the other bottles found in Context 317. This bottle could have functioned as a medicine bottle, based on observations on contemporary medicine bottles which are more often than not, brown in colour.

Figure 31: Brown bottle which was probably a medicine bottle (IV-2009-G-1978). Right: Illustrated by M. Cruz, retraced by H. Valerio.

Clear Bottles

Two intact clear bottles were recovered from the site. Bottle A (IV-2009-G-3308) has a base diameter of 4cm. It has a threaded lip and the body has bubbles in it. The seams extend up to the lower part of the lip (Figure 32). Bottle B (IV-2009-G-2872) is of the same size and shape as Bottle A (IV-20009-G-3308), and also has a threaded lip. There is, however, a marked difference between the two. For one, it is clearly observable that Bottle A has a dull appearance compared to the polished look of Bottle B. Two, Bottle B lacks bubbles. Three, the seams of Bottle B extend all the way to the orifice. Four, Bottle B has an embossed trademark design at the bottom. The differences suggest that Bottle B is younger, with evidences of it being manufactured by a machine.

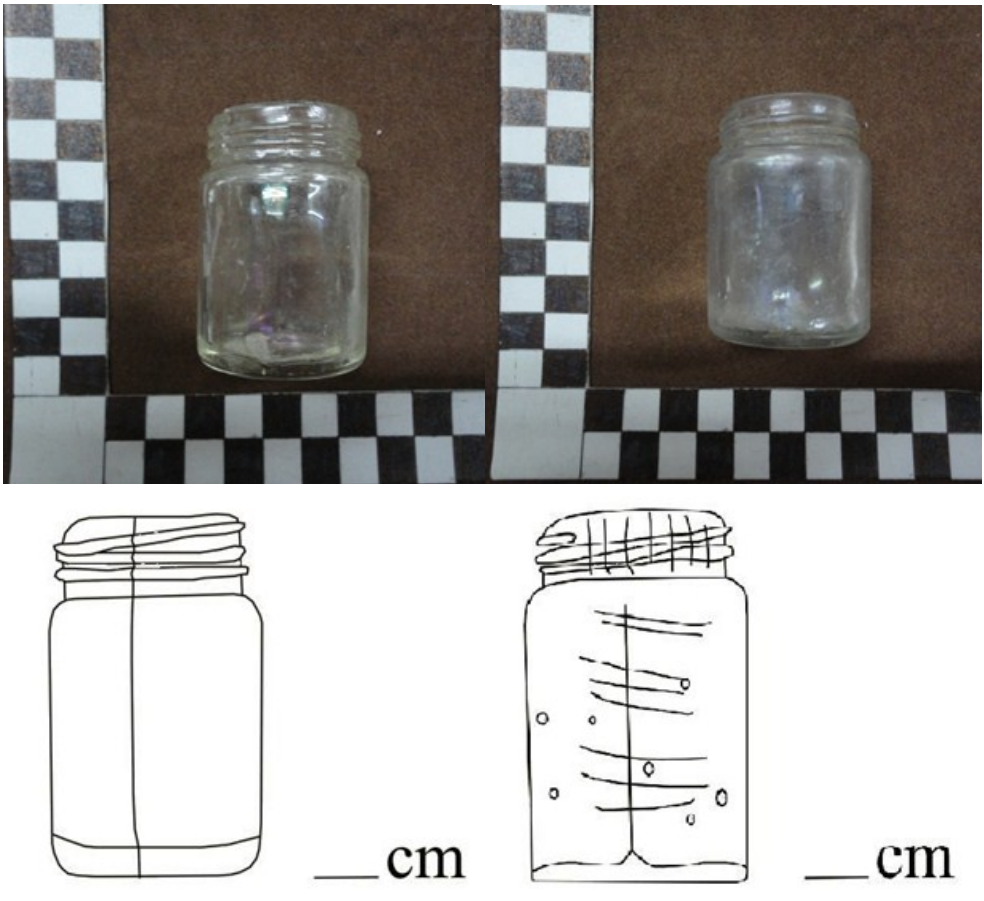


Figure 32: Top: Clear glass bottles: IV-2009-2872 (left) in contrast to IV-2009-G-3308 (right). Below: illustrations of the same clear glass bottles (illustrated by M. Cruz, retraced by H. Valerio).

Magsimpra Ink Bottle

This is a bluish-green circular bottle with small bubbles which indicate that it was made when glassmaking techniques were not that yet developed. The base is embossed with "MAGSIMPRA INK". The seams extend until the lower part of the lip which was rolled or folded, suggesting that it is made between 1840 and 1860 (Figure 33). (www.bottlebooks.com).

Figure 33: Left: Magsimpra ink bottle (IV-2009-G-3808), Right: Illustration of the same ink bottle (illustrated by M. Cruz, retraced by H. Valerio).

Scott's Emulsion Cod Liver Oil with Lime and Soda

One of the most interesting glass artefact recovered was the patinated whole empty bottle of Scott's Emulsion Cod Liver Oil with Lime and Soda. Scott's Emulsion was manufactured by Scott & Bowne in New York by the cousins Alfred Scott Bowne and Samuel Bowne. According to "Digger" of www.bottlebooks.com, the brand hit the market at around 1878. The company first used the image of a man with a fish on his back in 1884 and six years later, it became the trademark. The seams of the bottle extend all the way up to the orifice and the lip is threaded.

This suggests that the bottle was machine made and this would mean that it was manufactured in 1903 at the earliest. 1903 is the year when Michael J. Owens invented the first bottle-making machine. It should be noted also that between 1909 and 1917, a number of other automatic bottle-making machines were invented and since then, bottles around the world were machine-made (Figure 34). (Polak 2005).

Figure 34: The bottle of Scott's Emulsion Cod Liver Oil with Lime and Soda (IV-2009-G-277) recovered from Structure B on the left. An illustration of the same bottle on the right, side view (illustrated by M. Cruz, retraced by H. Valerio).

Unidentified Distorted Bottle

This clear glass bottle is unique in that it is distorted. The neck was bent and a little crack on top was formed due to the bending. Its bottom was embossed with the number "20", which may be an indication of the volume in milliliters that it can hold. The visible seam extends up to the lower end of the lip which is folded or rolled. It is not clear whether the bending was the result of anthropogenic forces or caused by other forces such as taphonomic processes. It is, however, to be noted that to be able to change the form of glass, a very high temperature is required. If the distortion is caused by high temperature taphonomically, then why are the other glasses not affected? With this is mind, the researcher believes that the bottle was distorted intentionally, the purpose of which remains to be a mystery (Figure 35).

Figure 35: Distorted bottle (IV-2009-G-1792). Right: Illustration showing the seams (illustrated by M. Cruz, retraced by H. Valerio).

Discussion

Different glassware types are present in Structure B which include wine bottles, medicine bottles, an ink bottle, and flat glass. Based on the embossed letters on some glass bottles and body shards, we know that most of these bottles functioned as vessels of imported contents like medicine, pomade, and shoe polish. Most bottles contained foreign products, with the exception of the locally produced wines like the Palanca liquor. The presence of these bottles indicates the affluence of the occupants of Structure B who had access to these imported items.

Based on the dates gathered from the glass shards with common manufacture date of 1870, we can be certain that Structure B was occupied in the latter half of the 19th century. Aided by archival and historical research, we arrive at the conclusion that Structure B was built after 1881, when the old church was built (UP-ASP 2011). This is based on the assumption that the people strictly followed the Law of the Indies which stated that the residential buildings should be constructed in reference to the church which should be at the centre of the town.

Moreover, the presence of different medicine bottles might suggest that preventive measures were undertaken to counter diseases which were prevalent during the late 19th century. It should be noted that

Pinagbayanan suffered from episodes of flooding and the floods bring about many diseases:

> *"pidiendo la traslación de la población al barrio de Calit-Calit, fundándose para ello en la situación que ocupa el pueblo próximo al mar y a ríos que en tiempo de aguas inunda la población convirtiéndola a una verdadera isla, produciendo las aguas estancadas enfermedades perniciosas."* (Erreción de Pueblo: Batangas Hojas 269-270)
>
> "requesting for the transfer of the town to Calit-Calit as justified by the proximity of the town to the sea and to rivers which inundate the town during the rainy season, which makes the town a real island and with the stagnant waters causing pernicious diseases." (author's translation)

The presence of depression glass (IV-2009-G-3268) (Figure 36), so called because it became the "it" thing in the 1920s when America was plunged into a financial crisis during the Great Depression and it was also the time when America was on the cusp of the Industrial Revolution (Schroy 2007, 2008), also says a lot about the status of the original residents of Structure B. Depression glass became the first mass-produced glassware in the 1920's but prior to that, only the rich could afford this luxury. The machines available made it possible to produce huge quantities of glasswares with different patterns and colours. However, as to which period it pertains to may be difficult to ascertain as it was found in a midden (Context 346).

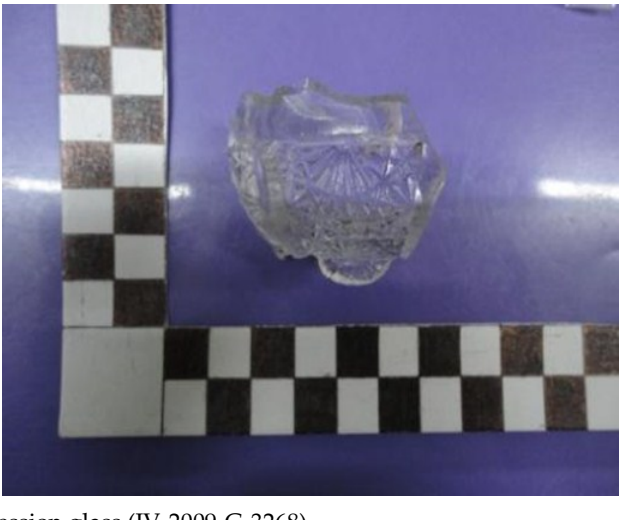


Figure 36: Depression glass (IV-2009-G-3268).

Insights in studying glass vessels

The presence of four middens in Trench 4 of the site provides a challenge to the analyses of artefacts recovered from them. Most of the glass artefacts analysed in this paper were from Context 317 and 346 which were considered to be post-destruction middens. The consensus is that these middens contained artefacts from different phases which were accumulated through time. It is up to the researchers to determine which are to be associated with the original occupants of the *bahay na bato*.

A problem that needs to be resolved that I encountered was the lack of agreed terminology in relation to the study of glass. This may be attributed to the changes in technological processes. For example, prior to the invention of the bottle-making machine, the lip was the last one to be made, thus it is called the *finish*. With machine-made bottles however, the lip was formed first (Polak 2005). There is a need to fix the terminologies that will take into account these changes. At present, I am continuing my studies and working on modifying the terminologies as well as ways on how to describe glass, with the belief that these will prove useful in future studies as these will facilitate understanding and sharing of data.

Another problem in the study of glass bottles is that there is a distinction between the bottle manufacturer and the product manufacturer (Harris 2006). For instance, a product like soda water may have been around much earlier but which comes in a vessel of different material, with the glass bottle being in use much later. In this case, the pain balm antedates the bottle (IV-2009-G-353, 354) (Figure 7). This is based on the assumption that different products change containers. A very good example would have to be softdrinks which used to be sold in glass bottles but which now come in tin cans and plastic bottles.

In line with this is the difficulty of gaining company information with regards to which company associated with which glass company since a company's brand may retain the same logo but let a new glass company manufacture glass vessels (Lockhart *et al.* 2007). We can also trace the technological evolution through time in rigid investigations of bottle manufacturers (Lockhart *et al.* 2007) Dates gathered from the period of production of a certain product can become *terminus ante quem* (latest possible) dates and may be used to give an approximate date range for the site.

There is also the problem of reuse which further complicates the study of glass (Busch n.d). Moreover, Horn (2005) points out that one must exercise caution in assigning a disposal date since glasswares may be used multiple times until unusable. Another is that earlier techniques of glass production may be used in later periods, thus contributing to the problems in dating glass bottles.

Regarding archival research so far, I have looked at the *Estadistica Mercantil* 1867, 1876, and 1878-80 (*Estadistica Mercantil del Comercio Exterior De Las Islas Filipinas* 1868, 1877, 1879, 1880, 1881) where lists of imported and exported items in the Philippines can be found during colonial times. The bundles of aforementioned dates were the only ones available. The main problem is that specific items were not provided and one can only see general items. For example, one can see *cervezas y sidras* (beers and ciders) on the list but as to the names of the brands, these are not provided. Checking other document bundles with lists of items consumed in the 19th century will be most recommended should time permits. Last but the not least, one shortcoming of this paper that I acknowledge is the exclusive categorising of glass shards into five major categories based on parts. The case is that there are overlapping characteristics like for example, the bases can also have embossed designs. Or for instance, the bases and lips of whole bottles were not tackled in the respective categories. But this is justified by the fact that this is just an initial study and as such, flaws are to be expected which were not rectified at the moment.

Recommendations

This paper presents information from a look at select glass shards with incomplete findings mainly attributed to lack of time, resources, and expertise at the time of writing the report. A second look, or to be more precise, an in-depth look would be necessary to complement this paper. In this section, I provide a list of recommendations for the study of glass, acknowledging my own limitations in the research itself.

One shortcoming of this paper is the non-inclusion of other base shards aside from those discussed above which are only wine bottles. Other bottle types were also found as can be inferred from the study of other base shards. Studies on stoppers, closures or caps should also greatly complement studies on glass.

Aside from glass bottles, glass artefacts recovered from the site also include Depression glass (IV-2009-G-3268). I have not done further research on this although I was able to acquire reference guides. Since Depression glass was associated with the rich, it would be nice to study them to identify the elites in archaeological sites.

More research regarding bottle manufacture and product manufacture should be undertaken. For instance, it would be recommended to have composition analyses done alongside the study of readily observable physical features. This is because while glass is essentially composed of silica (SiO_2), sodium oxide (Na_2O), calcium oxide (CaO), additives are sometimes mixed for example, to produce glass of varied colours. Moreover, compositional analysis will provide more insight on the technological aspect of glass study as it looks into the ratios of composition which may vary.

Studies on patination including the rate of patination of glass exposed to different environments would also prove useful in future studies. Composition analysis would be of particular importance to patination studies. Another important consideration is the study of sediment type where the glass was deposited since moisture, alkalinity and acidity are significant decaying factors (http://www.sha.org/research_resources/conservation_faqs/treatment.cfm#D1).

At the time of this writing, there was not much time to excavate the National Archives for documents pertaining to the date of import and/or availability of imported glass bottles, it is therefore highly recommended that archival research be undertaken. In particular, the bundles *Comercio* (trade) and *Aduana* (customs) may be of utmost importance. It would be wise to check the bundles *Botica y Botiquines*, too, as these may provide information on whether a specific locality or a particular pharmacist sold a particular medicine. Continuation of the review of Philippine archaeological sites yielding glass artefacts similar to the ones found in Pinagbayanan is also recommended for the understanding of the distribution of imported items on a larger scale.

Getting to know bottle collectors in the Philippines may be of immense help. So far, Douglas Wong, who sometimes help in detecting metals in archaeological impact assessments, has offered to help. He has a friend who collects bottles but the problem is that the collection is in Bacolod, which is outside of Manila. Should time and resources permit, I would like to see the collection and to take pictures as well as notes for

future reference. In the process of studying glass artefacts, I came to realise how valuable a partnership between antique collectors and archaeologists can be, as echoed by Lindsey (in Keane 2008).There is much to do in the study of glass artefacts in the Philippines. While the difficulties in doing so, as outlined in this paper, are many, this paper has in one way or another proven that it is not entirely impossible. Hopefully, glass artefacts from other Philippine sites will be studied so we can have a view of glass consumption and/or manufacture on a larger scale.

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Appendix A: Refitted Glass Shards

Accession Numbers	Number of Pieces
IV-2009-G-327, 328, 4099	3
IV-2009-G-353, 354	2
IV-2009-G-1023, 1024	2
IV-2009-G-1082, 3067	2
IV-2009-G-1390, 1391, 1392	3
IV-2009-G-1393, 1803, 1806, 1807, 1816, 1862 (2 pcs.), 1864, 3336, 3372	10
IV-2009-G-1398, 3313	2
IV-2009-G-1676, 1907	2
IV-2009-G-1783, 1784, 1786	3
IV-2009-G-1802, 3067	2
IV-2009-G-1805, 1808, 1809	3
IV-2009-G-1822, 1827	2
IV-2009-G-1828, 1830	2
IV-2009-G-3140, 3158, 3159	3
IV-2009-G-3143, 3150	2
IV-2009-G-3151, 3160	2
IV-2009-G-3310, 3290	2
IV-2009-G-3327, 3328	2
IV-2009-G-3329, 3330, 3332	3
IV-2009-G-3398, 3399	2