Ancient Bottles Found in Sri Lanka

Free-blown and mould-blown hand finished bottles

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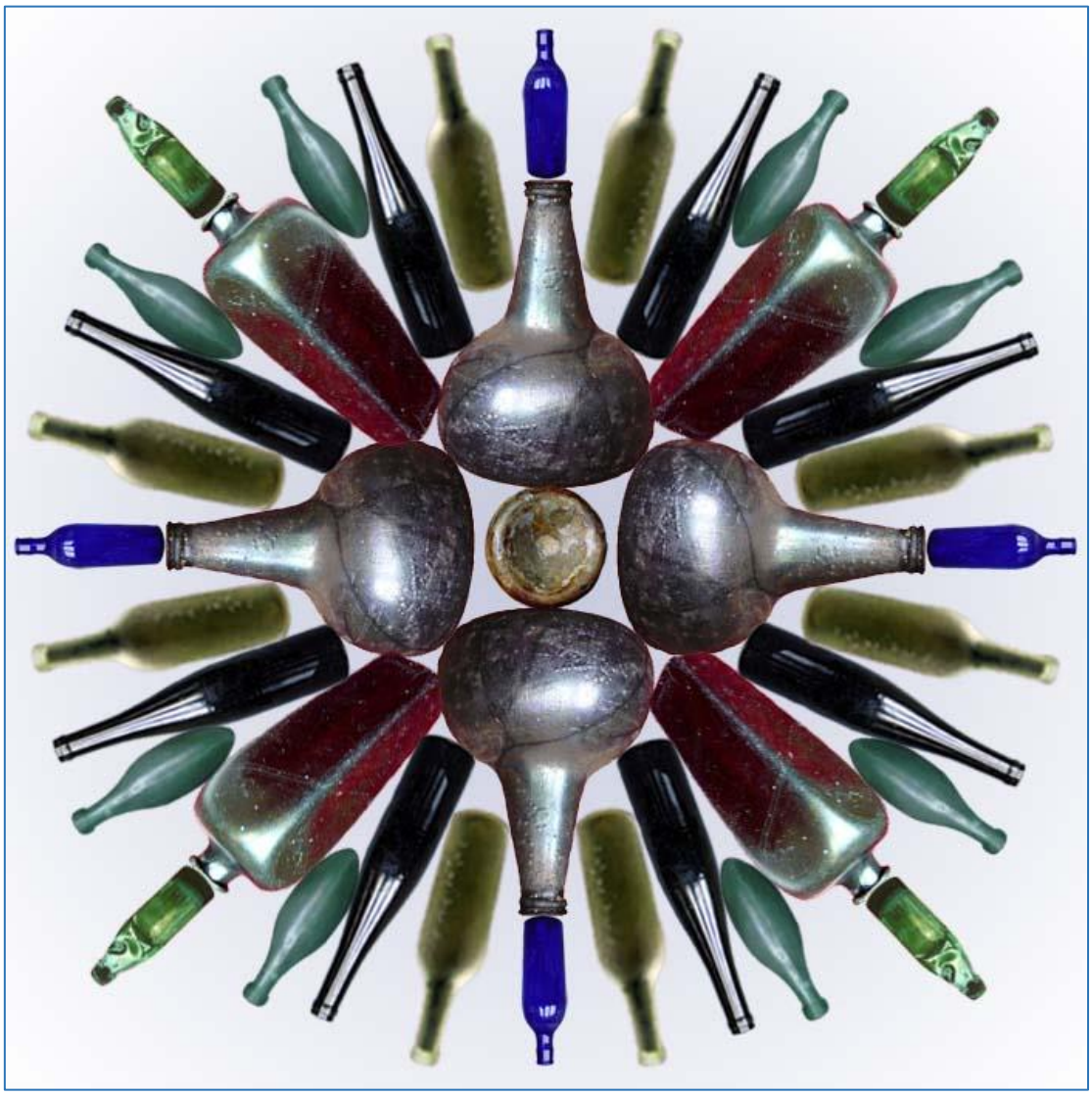
Colombo

2019



This article is about a collection of glass bottles pre-dating the era of the fully automatic bottle-making plants that we are in today. Many have been found in the sea—particularly in the Galle Harbour—while others have been found buried or in personal collections. The initial collections were finds during diving expeditions by the author and his colleagues in the harbour at Galle, in Sri Lanka, while the majority were purchases from a number of antique shops in and around Galle. The illustrations are images made by the author from bottles in his collection.

The first draft of the text was written in 2014; this version in 2019.

INTRODUCTION

Glass bottles are ubiquitous items we see every day. They are very much a part of our lives, used for many purposes—for storing liquids, powders, ointments or creams, both harmless and poisonous, for external use only or ingestible. But they were not always commonplace. Collectible bottles are those dating from the early period of their history when they were manufactured more or less on a commercial scale. The very earliest glass bottles were made in small numbers for special use and are very scarce and costly. The bottles that form this collection and that are described in these pages are those manufactured from the seventeenth century to the end of the nineteenth that are wholly or partly made by hand. The beginning of the twentieth century saw the introduction of the fully automated bottle making machine and the beginning of another chapter in the history of bottles.

The Beginning The start of the collection began on the 10th of April, 1988 when the author found an onion bottle on the seabed of the Galle Harbour while diving. Onion bottles are so named on account of their shape, possessing a globular body with a wide flat base and an elongated neck. The find was thought to date from the 18th century and stirred an interest in its finder and others interested in maritime archaeology as to what other items dating from the early periods of the Island's history lay in the harbour. Over the following years other old bottles and bottle fragments were found by diving, and many more pieces were found in the numerous small antique shops in the area to which local divers sold their under-water finds. In more recent years, bottles from the homes of casual collectors also appeared in the shops, having been located by roving scouts. A few items have been obtained from antique shops in Colombo, but the vast majority are from Galle.

This compilation is a catalogue of the bottles in the Malik Fernando Collection with explanatory notes for the interested reader. Identification of the finds were at first accomplished with the aid of helpful people in foreign museums, who are acknowledged in the annotations to the images. A few books on collecting bottles were kindly donated by others, who are acknowledged at the end

of this chapter. Most recently, much information has been obtained from on-line sources that are acknowledged appropriately. A list of the books and articles consulted appears in the bibliography. A number of my diving colleagues donated their finds to the collection and these are acknowledged in the annotations to the images. My thanks are also due to the many divers of the Sri Lanka Sub-Aqua Club who participated in the Club dives over the years and made the whole process an enjoyable experience as well as a rewarding one.

The Nature of Glass

Glass is a non-crystalline amorphous solid that is often transparent and very durable. It is resistant to most chemicals and acids, except hydro-fluoric acid. It softens and becomes malleable when heated. The oldest types of glasses are "silicate glasses" based on silica—silicon dioxide or quartz, the primary constituent of sand. Pure silica quartz glass is very clear and durable, but its high melting point (about 1700°C) makes glass working difficult. For many applications, various compounds are added to lower the melting temperature (to around 800°C) and improve the workability at the cost of toughness, thermal stability and optical clarity.

The main constituent of most glass is sand. To this is added soda ash or sodium carbonate (Na_2CO_3) and other compounds like calcium oxide (CaO) and magnesium oxide (MgO), that is contained in limestone, as well as aluminium oxide. Glass of this composition is used for windows and bottles. Other compounds are added to impart colour, commonly green, blue and amber (brown). Glass for special purposes are made to different recipes. Lead glass is made by adding lead oxide (PbO) instead of calcium oxide, and potassium oxide instead of sodium oxide. This produces the glass known as lead crystal glass used for making decorative table ware such as drinking glasses and decanters. It can be easily cut and engraved and has a high degree of brilliance. The lead is chemically locked in the glass and does not pose a health hazard.

Borosilicate glass is used for making heat resistant ovenware. It consists of 70-80% silica with small amounts of boric oxide and smaller amounts of sodium and potassium oxides and aluminium oxide. It is not only resistant to temperature changes but also chemically durable and is used in making laboratory glassware and pharmaceutical containers.

References -

Wikipedia, the free encyclopedia - available at https://en.wikipedia.org/wiki/Glass;
Types of glass - available at http://www.britglass.org.uk

History of Glass in Sri Lanka

Glass beads and pieces of glass have been found in Sri Lanka, dating from ancient times, for example from Giribawa (3rd century BC - 2nd century AD), from Kelaniya (3rd century BC - 2nd century AD) and from Ridiyagama (4th century BC-1st century AD) (Dussubieux *et al*, 2008). Glass beads—more than 600,000—and fragments of glass vessels and bangles have also been found during excavations at the Jetavana *stupa* in Anuradhapura. These are thought to have been offerings, as glass items would have been very precious in those days and are dated to the period between the 2nd century BC and the last quarter of the 3rd century AC (Hema Ratnayake, 2003).

The earliest examples of glass beads are known from the 3rd millennium BC (Early to Middle Bronze Age), but they have been found more frequently only from the 2nd millennium BC (Middle to Late Bronze Age), primarily from Egypt and Mesopotamia. The oldest glass ingot was found in a 1300BC Egyptian shipwreck off Turkey. Production of raw glass has occurred in only a few primary workshops of which only three are known, all in Egypt. Trade in raw glass from Egypt to India was described in

the 1st century texts of the *Periplus of the Erythraean Sea*, a navigation and trading manual written in Greek, the Erythraean Sea extending from the north-east coast of Africa to the Arabian Peninsula and the western coast of India. It is also thought that some glass was traded via the Silk Road.

Glass is known in Northern India from the 2nd millennium BC, and during the following millennium becomes more common throughout South East Asia. The commonest finds have been glass beads and bangles. Glass beads originating in India have been found in a wide area ranging from Africa to Japan. They were given the name 'Trade wind beads' as they spread from India along trade routes that followed the trade winds. There is evidence that in ancient Sri Lanka, glass was manufactured in order to use for magnifying glasses or spectacles (there is no reference for this statement).

References -

The Jetavana Treasure, Hema Ratnayake, in Senaka Bandaranayake, Lorna Devaraja, Roland Silva and K.D.G. Wimalaratne Eds. *Sri Lanka and the Silk Road of the Sea*, 2003, Sri Lanka Institute of International Relations, Central Cultural Fund, Sri Lanka National Commission for UNESCO, Colombo, pp. 37-46.

Ancient glass trade - available at https://en.wikipedia.org/wiki/Ancient_glass_trade#South_East_Asia.2C_Africa_and_the_Indian_Ocean

Ancient Beads - available at http://www.ancientbead.com/Ancient_and_old_beads_from_SriLanka.html

(a trade site of Gunnar Muhlman- contains images of Sri Lanka glass beads)

The Trading of Ancient Glass Beads: New Analytical Data from South Asian and East African Soda–Alumina Glass Beads, Dussubieux, L., Kusimba, C.M., Gogte, V., Kusimba, S.B., Gratuze, B. & Oka, R., 2008, Archaeometry, 50(5), pp. 797–821.

The Evolution of Glass Bottles

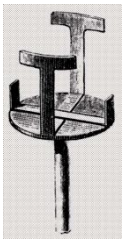
The explorations of the Sri Lanka Sub-Aqua Club in the Galle Harbour showed that it was a repository of glassware representative of the evolution of glass bottles from the earliest free-blown bottles to the modern bottle made in fully automatic bottle-making machines. Over the years, examples of practically all types of bottles have been collected, mostly originating from the harbour, a few from elsewhere including a river and from people who found them in their homes. In the following paragraphs the main types of bottles are described with descriptions of the principal features that aid identification. The bottles that ended up in the harbour with other refuse, and inadvertently from shipwrecks, are from the period of colonial occupation of the Island—by the Portuguese (from 1505), the Dutch (from 1660) and the British (from 1796-1948). The finds are therefore of European origin, there being no representatives from the Americas. The evolution of the bottle is shown in the schema that has been put together with information from many sources. It shows the evolution of bottle types by shape and intended use and the approximate dates when they were introduced and superseded, with sub-sections dealing with specific manual operations.

The following sections describe briefly the main bottle types, most of which are represented in the collection and are shown in the image galleries on separate files.

Glass Bottle Manufacture

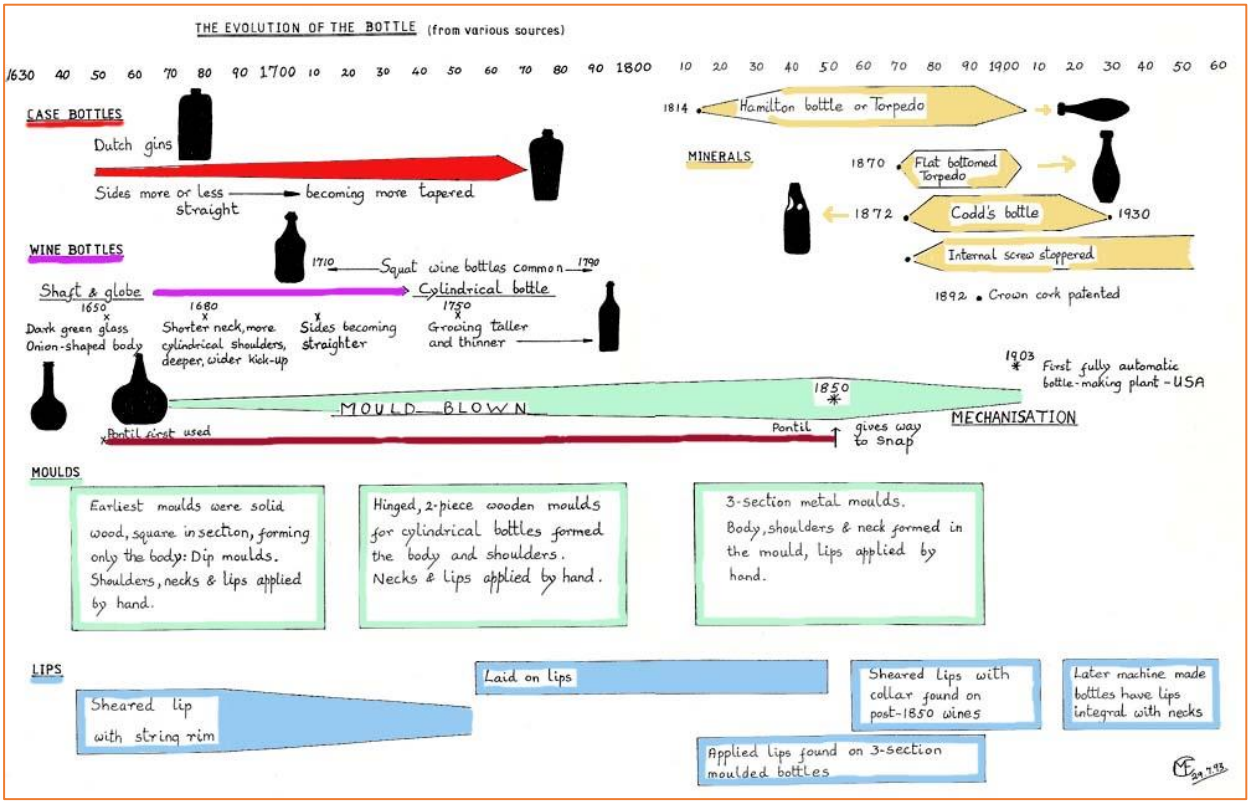
The bottles in this catalogue were all made manually, without the use of machinery, the various steps imparting specific characters to the finished product. The procedure common to all bottles, from the earliest to the latest, involved blowing air by mouth through a tube (blowpipe) into a blob of molten glass (a parison) to form the body of the bottle. Subsequent steps involved manually finishing the bottle—such as forming a standing base and finishing the neck and lip. Later bottles were made using moulds of various shapes and complexities

and specially developed tools to shape the lip. These procedures of increasing complexity leave marks that enable bottles to be grouped into various types. Bottles were also made in various designs to contain different substances, both liquid and solid, providing another means of differentiating various types. The sections that follow explain these differences in detail.

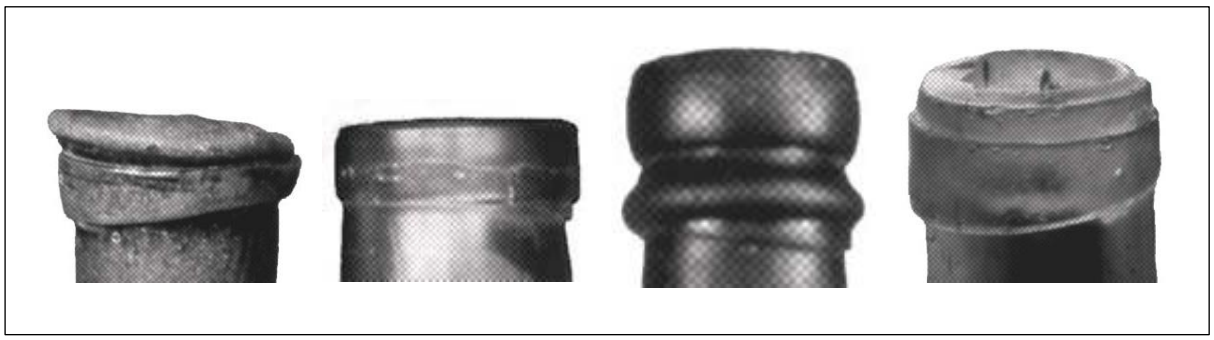


A snap case (after Peligot, 1877)

Pontil marks - An important development in the evolution of the bottle was the introduction of the *pontil* and later for the replacement of the pontil by the *snap case*. A pontil (also called punt) is a metal rod or a blowpipe that is used to hold the bottle by its base so that the neck of the bottle may be sheared off the blowpipe to enable finishing the neck. Once the glass blower has formed the body of the bottle, the pontil is attached to the bottom using a small blob of molten glass. Driving the pontil into the bubble of glass pushes the bottom in creating an indentation in the base referred to as a *kick-up* that gives a flat standing rim. Once the work on the lip is complete the pontil is broken off leaving a circular scar—the pontil mark (also punt mark). Around 1850 a metal clamp or cage that came to be called a *snap case* was introduced in France and came to be universally used replacing the pontil. The presence or absence of a pontil mark is a useful feature in dating old bottles. Two types of pontil marks may be found. The more common mark is a ring-shaped scar that is left when a blowpipe is used. A bare-iron mark is left by a metal rod and is circular.

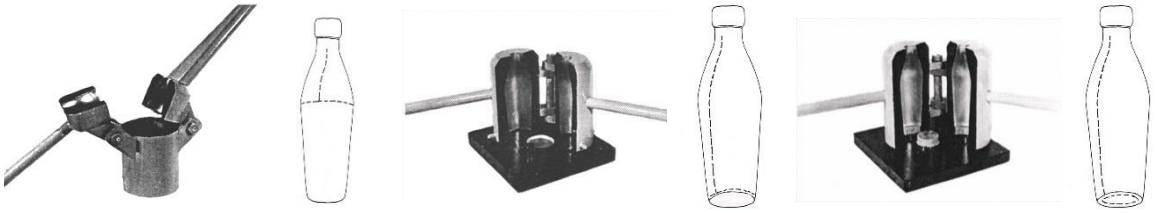


Lip finishes–A number of lip finishes are seen on old bottles. The earliest, and simplest, is the *sheared lip*. In these bottles the attachment to the blowpipe is sheared, leaving a simple cut end. These are usually finished by the application of a *string rim* just below the cut end. In the oldest bottles this took the form of a strip of glass wrapped around the bottle neck providing a ridge around which the stopper could be tied down. *Laid-on lips* are found in later bottles and consist of a ring of glass fused around the very end of the bottle over the sheared end, giving a neater finish and suitable for a loose-fitting cork. *Applied lips* are moulded on to the end of a bottle after it had been formed in a mould by the application of molten glass that is shaped using a special tool. The design of the tool used imparts various designs to the lip and usually incorporates string rims. They were suitable for tight-fitting corks. Wine bottles made after 1850 have characteristic lips consisting of a sheared end with a flat collar forming a string rim. The end of lip evolution was reached with the development of the rounded lip edge to take crown corks. In hand-finished bottles there is usually visible a seam where the extra glass to form the lip finish joins the blown part of the bottle, or an irregular edge where molten glass has run down.



Lip finishes (Left to Right): Sheared with string rim, Laid-on, Applied, Sheared with flat collar.

Moulds –The earliest moulds were simple dip moulds to form only the body of the bottle. The shoulders, necks and lips were formed by hand. They were of solid wood, square in section, narrower basally than at the shoulder (to facilitate removal from the mould) and were in use as early as the late sixteen-seventies to produce the so-called case bottles for gin. Cylindrical bottles were made in dip moulds too, as well as in hinged 2-part wooden moulds that formed the body and shoulders, the necks and lips being formed by hand. Later, 3-section metal moulds formed the bodies, shoulders and necks, the lips alone being applied by hand. The bases were often formed by an additional piece.



Three-part dip mould | Full-height cup-bottom mould | Full-height post-bottom mould

The typical seams left by the moulds (dotted lines) are illustrated on the right-hand side of each mould

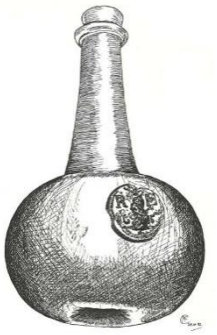
These moulds left characteristic mould marks in the form of raised seams: vertically on either side of the body (2-part moulds); a circular seam around the base of the shoulder and vertical seams on either side of the neck (3-part dip moulds). In addition, there would be a circular seam around the base of the bottle in the case of cup-bottom moulds and a seam around the periphery of the underside

in the case of post-bottom moulds. When the shoulders and necks of the bottles were formed by manipulation and stretching, characteristic marks in the form of swirling grooves and elongated bubbles were left on the finished products.

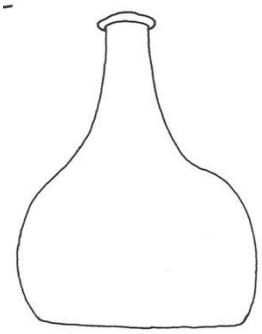
Free blown bottles

Free blown bottles are those blown and shaped without the use of a mould. The earliest types had round bottoms and were placed in wicker baskets to keep them upright. *Shaft and globe bottles* had rounded bodies with long necks and a shallow kick-up giving a small standing base. A small fragment found in the Galle Harbour probably belongs to a bottle of this type. These bottles were unstable on account of the long necks and small bases and led to bottles with shorter necks and wider bases being produced.

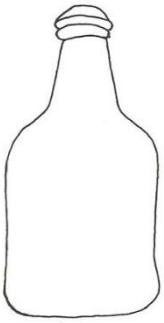
Onion bottles, as these designs came to be called on account of their shape, have been found in the Galle Harbour (and on land sites) and are represented in the collection. A variant is the *Mallet bottle*, with a body flattened on opposing sides. Further development resulted in bodies gradually assuming shapes tending to the cylindrical and the appearance of the short cylindrical *Squat wine bottle* that gradually became slimmer and taller over the years. No intermediate forms have been found. The squat bottles in the collection being later types, blown in dip moulds, are described in the next section.



Shaft & Globe bottle
17th century



Onion bottle
Late 17th century



Squat bottle
17th century

Mould blown bottles

Bottles blown in moulds are of numerous designs. As technology improved, so did the design and complexity of the moulds employed. Most mould blown bottles show characteristic seam lines that vary in number and position depending on the complexity of the mould. They all have in common the seam below the lip finish as lips were hand applied. Some bottles had the body seams smoothened by additional manual work. Bottle shapes were dictated to some extent on the purpose for which they were manufactured, enabling us to group them in various categories

Case bottles

Case bottles are so called because they were made with square bases and rectangular sides so that they fitted into a rectangular wooden case in which they were exported. They were made in Germany, Holland and Spain and this was a traditional bottle shape from the 17th century onwards. They were generally made for containing gin, an alcoholic beverage that originated in Holland.

Gin is an abbreviation for 'genever', a now unused Dutch word for juniper, the berry which is used to flavour gin. It was first distilled by a Dutch doctor working in Leyden in the mid-seventeenth century who was searching for a diuretic to promote kidney function. Used at first as a medicine, it became so popular that apothecaries soon took to full-time gin-distilling.

The traditional bottle shape from the 17th century onwards "a tall, square-based, rectangular one with hunched, almost squared-off shoulders and a short stubby neck. The more or less straight sides of the 17th century began to taper to a narrow base in the 18th century". The colour of the glass used, in most cases, were dark shades of olive and olive-amber. They are occasionally found in lighter colours, even clear glass.

The bottles were so designed that one dozen would fit into a wooden case. Each bottle contained 2.4 litres of liquid[1]. Early bottles were mostly in amber and brown, blown in wooden moulds with slightly tapering sides. Early bottles had sagging sides. The short, strong necks were created by the blower pushing his iron inwards and producing a double thickness of glass at the neck before removing it from the body of the bottle.

The collection of case bottles found in Sri Lanka include three examples of bottle fragments and an entire bottle with straight sides, short necks and pontil marks, mould seams being absent (#009, 090, 154,). Bottles with tapered sides, longer necks and absent pontil marks have mould seams present (#112, 156, 157, 134, 117, 136 and 116), barring one small bottle in black glass (#118). #134 and #117 have seals on them and #136 and #116 are embossed on the sides indicating a much later date of manufacture than the plain bottles.

Beck, Doreen (1973) *The Book of Bottle Collecting*, Hamlyn, London.
Hedges, A.A.C. (9175) *Bottles and Bottle Collecting*, Shire Album 6, Shire Publications Ltd, Aylesbury.
[1]Ton van der Horst, 1989, pers. comm.

Wine bottles

Wines were originally stored in wooden casks and carried away by customers in their own leather or stoneware jugs. Most of the stoneware, often inscribed with the mask of Cardinal Bellarmine, an Italian prelate bitterly opposed to the Reformation, were imported from the Netherlands. It was customary for the drinker to show his contempt for the Cardinal by drinking the wine and then smashing the container.

From the beginning of the 17th century however, glass containers came into use. They were globular, had no flat base, were pale green in colour and were encased in baskets. They were in use till the middle of the 18th century. In 1650, a dark green bottle with a globular body and a long neck was introduced. This "shaft-and-globe" bottle was easy to make, and was manufactured until 1680, when its instability brought out newer bottles with shorter necks and more cylindrical shoulders. Kick-ups too became wider and deeper. Three bottles in the collection belong to this category. They were originally sealed with wads of oiled hemp and later by loose-fitting wedge-shaped corks tied down to a "string ring", a ridged band on the neck placed below the lip.

By the early 18th century the sides began to settle down to straighter lines. Minor variations in the curves at the shoulder and base were seen in the second half of the 17th century. They then began to grow taller by the decade.

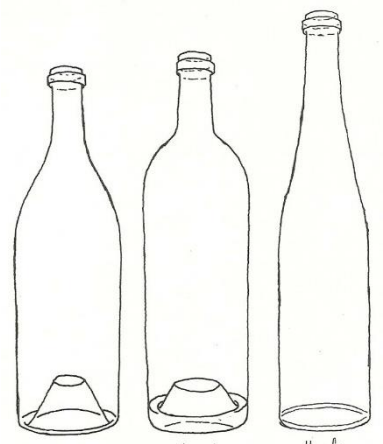
The cylindrical bottle evolved by 1750 from squat wine bottles with necks as long as the body which began to be produced when corkscrews were invented and tight-fitting corks came to be used. The shape enabled bottles to be stored on their sides. The narrow, cylindrical shape of the average bottle of today is known in a slightly asymmetrical, free-blown form from as early as 1737.

More standard moulded versions appeared in the latter part of the 18th century. Many shapes probably co-existed for years. Some were more egg-shaped than others. Dutch bottles of the late 17th and early 18th centuries are said to have longer necks on average and a higher kick-up. An example in the collection are the two Constantia wine bottles.

The most common colour for all wine bottles, until well into the 19th century was a very dark green or brown, sometimes called black. Bottles from the later 19th century have a wider range of colours.

By the 19th century wine bottles had developed characteristic shapes in the principal wine growing districts of Europe that persist to this day. Pontil scars disappeared soon after 1859, the bases being moulded by the dip moulds into which they were blown. The shoulders and necks were drawn by hand and the lips finished with collar-like string rims.

Four distinct bottle shapes are recognised: Burgundy, Claret, Hock and Champagne.



These shapes evolved in the various wine-growing districts and began to appear in England after 1802. – Dorrien Beck p.35

Burgundy Wine Bottles. These bottles have sloping shoulders and were used for wines from the Burgundy district in France. The deep kick-up has a central swelling called a mamelon.

Claret Bottles. Claret was the name used in England for the wines of the Bordeaux district in France. They were bottled in containers with rounded, rather humped shoulders and somewhat shorter necks than Burgundy bottles. There is a deep kick-up with a large mamelon.

Flute Bottles. German wines (called hock in England) were bottled in slim flutes with long sloping shoulders. Rhine wines were traditionally bottle in amber glass and Moselle wines in green.

Champagne Bottles. These bottles are readily recognisable by their long sloping shoulders and extra wide bodies. The kick-up is deep, with a very large, somewhat conical mamelon.

Beck, Doreen (1973) *The Book of Bottle Collecting*, Hamlyn, London.
Hedges, A.A.C. (9175) *Bottles and Bottle Collecting*, Shire Album 6, Shire Publications Ltd, Aylesbury.

Beer bottles

The earliest beer bottles resembled wine bottles. Secondary fermentation occurring in bottles was discovered in 1600 by Dr. Alexander Niwell. An adequate seal was necessary to assure good quality beer—only wired-on corks were then available.

The invention of the internal screw stopper in 1872 by Henry Barrett solved the problem of bottling beer. Early bottles made for internal screw stoppers had "blob tops". By the early 20th century the tops were not excessively thick to take the internal screw stopper. No early bottles of this type have been found in Sri Lanka. Swing stoppers were invented in 1875 and the crown cork was patented in 1892 by an American, William Painter. The collection has a bottle made for a swing stopper (the stopper itself is missing). There is also a bottle with a crown cork finish. Many of the bottles are in black glass, of various dimensions, with applied lips of varying profile. A number of green-glass bottles are embossed.

Mineral water bottles (carbonated water)

Bottles used for liquids with carbon di oxide added under pressure come in various forms based on the type of closure. Because of the increased pressure inside the bottle, a gas-tight closure (seal) was necessary. The earliest bottles relied on a tight-fitting cork and required a strong lip—resulting in the so-called blob-topped bottles. The earliest were the Hamilton patents, also called 'eggs', 'torpedoes', and 'cucumbers' depending on the shape of the body. They all had in common blob-tops and rounded bottoms, necessitating the bottles to be stored on their sides so that the stoppers remained moist and gas-tight. Once the bottle was opened, they would be placed in the upright position in a cradle.

The Hamilton bottle was patented in 1814 by William Hamilton, an Englishman. Hamilton bottles did not become popular till the 1840's, but were then used till the end of the century. A 'flat-bottomed egg' was patented in 1870—this could be laid on its side or stood up. (Beck, p. 74)

'Codd bottles' were devised by Hiram Codd, a British soft-drink maker of Camberwell in London in 1872 (Wikipedia). According to Beck it was patented in the USA in 1873, but Hedges (p. 14) writes that it was invented in 1875. This was the most widely used bottle for carbonated water and survived till 1930 when it was superseded by the crown capped bottle; survived, no doubt in Europe and across the Atlantic. 'Codd-neck' bottles continue to be used in Japan for bottling the soft drink *Ramune*, and in India for bottling flavoured soda water, where they are called Banta bottles, the drink itself being referred to as *Banta soda*.

The seal in the Codd bottle is made by means of a glass marble inside a chamber in the neck of the bottle that presses against a rubber washer, held in place by the internal gas pressure. To reach the liquid the marble has to be pressed in using a short stick. Later bottles came with the refinement of two little nibs that trapped the marble when pouring out, preventing it from blocking the mouth.

Beck, Doreen (1973) *The Book of Bottle Collecting*, Hamlyn, London.

Hedges, A.A.C. (9175) *Bottles and Bottle Collecting*, Shire Album 6, Shire Publications Ltd, Aylesbury.

https://en.wikipedia.org/wiki/Codd-neck_bottle

https://en.wikipedia.org/wiki/Banta

Household bottles

The term 'Household bottles' is used to describe a variety of glass bottles used for containing edible liquids and powders, excluding alcoholic beverages and carbonated drinks. The collection includes a few bottles of this description, the most attractive being bottles used for salad oil and vinegar, as they were designed to grace the dining table.

Poison and non-potable substance bottles

Substances that were not edible, such as poisons and chemicals, were bottled in containers of a readily identifiable colour—such as dark blue or brown—or of an unusual shape, such as hexagonal. These may have included prominent ribbing to make them distinctive in the dark. However, somewhere around the nineteen-thirties it was decided that the unusual shapes and colours actually attracted children and these were gradually phased out and emphasis given to developing secure closures (Beck, 1973). The collection includes a few examples of deep blue-coloured bottles.

Perfume and toilet water bottles

One 19th century toilet water bottle is included in the collection. In very good condition, it is embossed, made in a two-part mould with applied neck and a laid-on lip. It would have had a ground glass stopper.

Ink bottles

Small bottles used for ink were made in distinctive shapes. None have been found so far.

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