

The Ark, the Dove, and the Maryland Dove

Everything you ever wanted to know about 17th-century seafaring but were afraid to ask.

Introduction

The *Ark*, the *Dove*, and the *Maryland Dove* are three vessels with an intimate connection to the history of Maryland. The first two were instrumental in the founding of Maryland, while the third allows modern visitors a glimpse into shipboard life in the 17th century and helps them understand what it was like for sailors and landsmen alike to entrust their lives to a wooden shell floating on the broad expanse of the ocean.

The men and women who crossed the Atlantic in the 17th century did so for many reasons. For the sailors who manned the ships, it was their job, a job that, while it had risks, also had rewards. A sailor in the 1670s typically made seven or more shillings a week and possibly much more in times of warfare, while an agricultural laborer made about four to six shillings a week. Out of his earnings, the laborer had to provide his food and lodging, whereas these were provided for the sailor.¹ Further, a seaman if he were competent and hardworking, had an opportunity to rise in status, perhaps becoming a master's mate, or even a master with a little luck.

For the colonist or indentured servant who ventured their luck in crossing the Atlantic, their hope was to make a better life for themselves in one way or another. For some, that hope might be freedom to practice their religion, but for most, it was the hope of bettering themselves economically. Unemployment was high in 17th-century England and there was little chance of bettering oneself at home. While the voyage was risky and life in the New World equally if not more so, the temptation of free land lured many to seek their fortunes across the Atlantic. The purpose of this article is to discuss these three ships, put them in perspective regarding one another, and to give the reader a better understanding of both what it was like to voyage to Maryland in the 17th century, and the use of ships like the *Dove* and the *Maryland Dove* in the coastal and Atlantic trade.

The Ark

How big was the Ark?

Father Andrew White, our most reliable witness, describes the *Ark* as being 400 tons burthen.² Using the same formulas that William A. Baker used in designing his vessels, this gives us a vessel that is 89.5

¹ Davis, Ralph, *The Rise of the English Shipping Industry*, Newton Abbot, David & Charles, 1962. p. 152.

² Although Barbara Lawatsch-Boomgaarden in her translation of Father White's narrative gives the size of the *Ark* as 300 tons, this is a mistranslation. An examination of the Latin text shows that the *Ark's* size is given as "quadringtonorum," or 400.

feet on the keel, 32 feet in the beam and with a 14 foot depth of hold.³ Since there was still a considerable rake in the bow at this time, the *Ark* was probably about 137 feet on deck. Her likely draft, would be in the range of 13 to 15 feet. At 400 tuns, the *Ark* would have been one of the larger ships in the 17th-century English merchant marine. The rigging of the *Ark* would have conformed to the standard large ship rig of the period which is to say, three masted and square rigged. She would have carried courses and topsails on her fore and main masts, and there is a good chance that, given her size, she might have carried topgallants as well. Her mizzen sail would be a lateen sail, but she might well carry a square mizzen topsail as well since this was becoming more common on larger vessels by the 1630s. She would also carry a spritsail under the bowsprit and possibly a sprit topsail as well. There was no steering wheel in the 17th century, so the tiller would have been controlled by a wooden lever called a whipstaff running vertically through a pivot in the deck. By moving the whipstaff from side to side, leverage would be applied to the tiller enabling the helmsman to steer the ship.



Figure 1. The recreation of the *Batavia*, a Dutch East Indiaman of ca. 1628. Although larger than the *Ark*, the sail plan and general layout are very similar.

³ The term "tuns burthen" can be a confusing one to modern readers. It is not the weight of the ship, but the volume of cargo (tun casks, 6 foot high, 4 foot wide holding 252 gallons of wine) it can **theoretically** carry. Since this was used to calculate port duties etc., it was deemed necessary to develop a standardized formula rather than go through a lot of tedious measurements. Until the 1690s, tonnage was calculated by taking the length of the keel, multiplied by the beam (width) to the outside of planking, multiplied by the depth of hold. The resulting figure was then divided by 100 to get the tuns burthen. Since ship design varied considerably, the **actual** capacity could be more or less than the calculated tonnage.

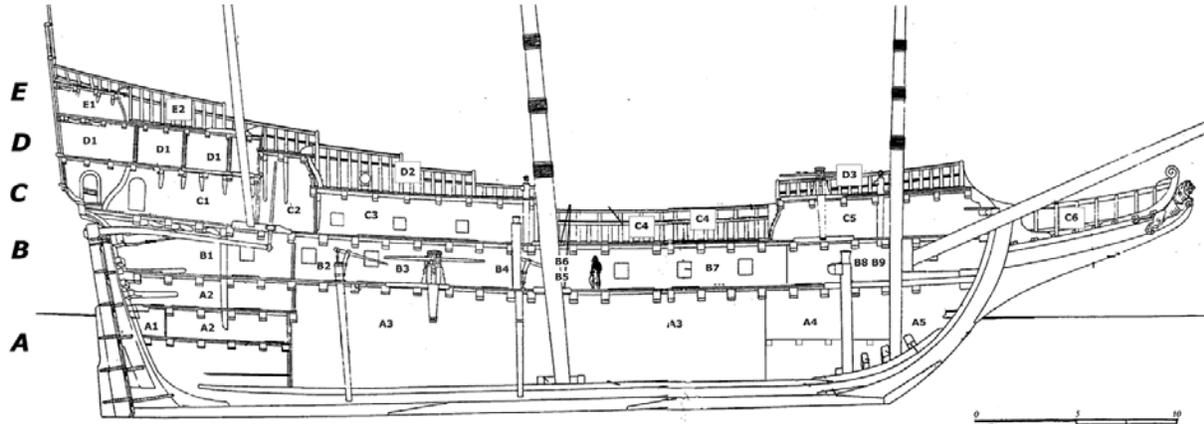
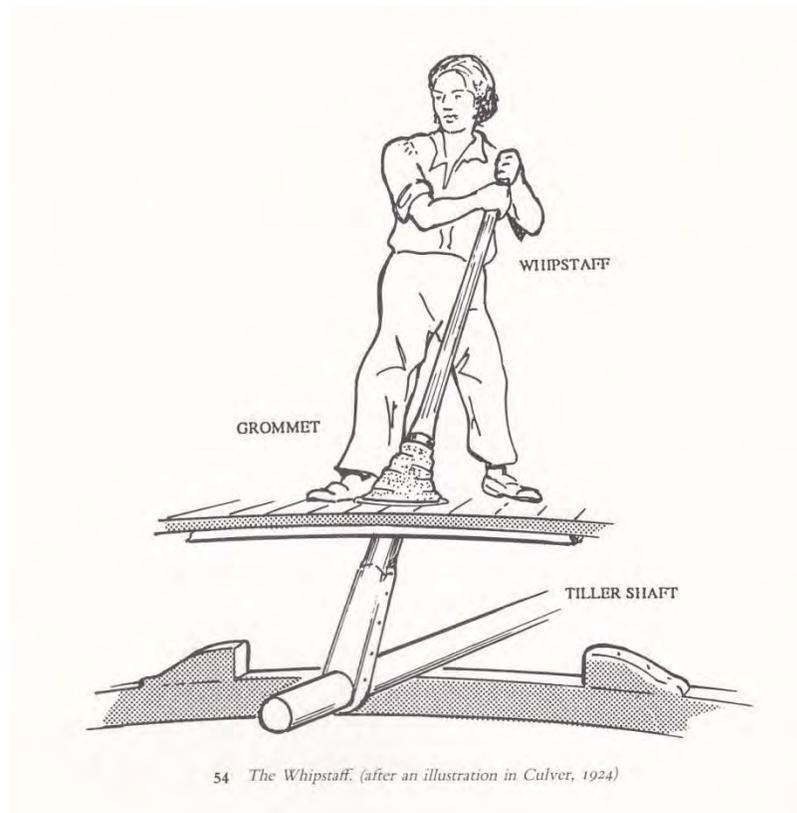


Figure 2. This cutaway section is based on an English built East Indiaman of roughly the same size and date as the *Ark*. The gundeck below the main deck is where the colonists would have stayed. Note the lack of a full second or orlop deck below the gundeck, as opposed to Peter Egeli's reconstruction (on display in the Visitor's Center) which shows such a deck. Source: [Maritime Lanka](http://cf.hum.uva.nl/galle/topics/hullspace.html) (Link: <http://cf.hum.uva.nl/galle/topics/hullspace.html>) web page



54 *The Whipstaff.* (after an illustration in Culver, 1924)

Figure 3. A simplified view of a Whipstaff.

How much personal space did the colonists have on the *Ark*?

The square footage of the *Ark*'s 'tween deck space would have been about 3,000 square feet (100' length x 30' beam). This is about the same as a large 4 bedroom house. Assuming that the gentlemen investors, Jesuits, and Leonard Calvert stayed in the area under the half deck, the probable number of passengers present (plus possibly some crew) in the 'tween deck would be about 120. This means that each person would have 25 square feet to call their own for the voyage, or about 4'x6'. I am inclined to think that, as a cargo vessel, the *Ark* probably did not have a continuous orlop deck below the gun deck (this is more commonly found on warships, rather than merchant ships), but if Peter Egeli's interpretation is correct and there was an orlop deck *and* a gun deck, each person gets 50 square feet or about 6'x8'. Positively luxurious! Compare this to the *Mayflower* of 180 tuns burthen where there would have been about 2'x6', or the *Susan Constant* of 120 tuns burthen where personal space was about 1.5'x5.5'!⁴

In terms of headroom, the *Ark* would have been equally spacious. In designing the *Mayflower II*, William Baker chose the maximum theoretical headroom for a ship of that size and added a bit, so that the space from deck to deck is 6' 9" which gives six feet of headroom under the deck beams. This was done so that modern visitors would not have to suffer the same risk of concussion as the Pilgrims. Baker believed that a more appropriate height would have been about six feet from deck to deck or 5' 3" under the deck beams and possibly less.⁵ As the *Ark* was over twice the tunnage of the *Mayflower*, it is not unreasonable to calculate that the clearance under the deck beams was at least 5' 9" and possibly over 6'. It is unlikely that anyone on the *Ark* had to stoop much.⁶

All of the above assume that most personal possessions, equipment and supplies except for basics needed for the journey would be stored in the hold. I have deducted space for ship's equipment from the square footage for deck space prior to calculating personal space (hence 100 feet rather than 134 feet for the deck length of the *Ark*). In any case, the *Ark* would have been sufficiently roomy for all 140-odd colonists plus all of the necessary equipment and supplies for the colony. It should be noted though, that, at 180 tuns burthen, the *Mayflower* was far more representative of the typical experience of a colonist than the *Ark*. A 100 tun tobacco ship probably would have no more than about 4.5 feet of headroom in the 'tween deck!

⁴ Square footage of *Mayflower II*'s 'tween deck calculated from Baker's plans: 1,320". Probable number of Pilgrims plus possibly some crew (assuming Bradford and some higher ranks stayed in the great cabin and under the half deck): 80. Square footage available to each person: 16' or 2'x6'. Lavery's calculation in *Anatomy of the Ship: The Colonial Merchantman Susan Constant 1605* for personal space: 1.5'x5'.

⁵ Baker, William A. *The New Mayflower: Her Design and Construction*. Barre Gazette, Barre, 1958. p. 87.

⁶ Although people *were* shorter in the 17th century, the actual difference is minimal. Skeletons recovered from the *Mary Rose* which sank in 1545 show an average height of 5' 7.5" whereas the average height for men nowadays is about 5' 8" to 5' 9"

Did the colonists on the *Ark* sleep in hammocks?

There are a number of reasons to doubt the presence of hammocks on the *Ark*. First, it should be remembered that hammocks were a relatively new innovation to Europeans in the 1630s. Even if the colonists were aware of hammocks (which is unlikely as will be shown below) a hammock is incredibly uncomfortable to sleep in if one is not familiar with how to rig it. Sir Henry Colt who immigrated to Barbados aboard the ship *Alexander* in 1631 tried to sleep in a hammock and soon gave it up.⁷ Hammocks were quickly adopted aboard warships where massive crews made it impossible to build bunks for everyone, but this was not the case on merchant ships, and hammocks were seldom used aboard them. The most convincing evidence that hammocks were not present aboard the *Ark* can be found in Father White's narrative. On Barbados, he saw the inhabitants at rest: "Their beds are blankets of cloth, skillfully woven out of cotton. When it is time to rest they sleep in this cloth, after it has been hung by ropes from poles on each side."⁸ It is highly unlikely that Father White would have regarded something that he had slept in, or at least seen every day for weeks with such interest.

Food and Drink:

Rations for the passengers would be much the same as those for the crew. Salt beef or pork, salt cod or other preserved fish, ship's biscuit, dried peas, beans, oatmeal, butter and cheese were typical foodstuffs. Officers and higher ranking passengers would be able to afford more in the way of "petty talley" that is luxury items like potted meats, dried fruits, nuts, and the like. Drink was commonly beer (often "small beer" which is less alcoholic than regular beer), or for the higher ranks, wine.⁹ Water was used mainly for cooking purposes, especially "steeping" the meat to try and soak some of the salt out of the salt meat and fish. Even ashore, water was not the drink of choice in the 17th century. Although germ theory was unknown, people did know that drinking water could make you ill. At sea, the risk was increased since water kept in an oak cask for several weeks strongly resembles stagnant ditch water (this is not to say that water was *never* drunk; only that it was usually out of necessity). Food for the crew would have been prepared in the ship's hearth, typically located in the forecabin on merchant ships. While passengers' food may also have been prepared here, it is also possible that passengers prepared their own food on "cookboxes" of iron, stone, or even wood with beds of sand. In foul weather of course no cooking was possible; although it is unlikely that "pukestockings" as landsmen were called by sailors had much interest in food at such times! In good weather however, crew and passengers alike could look forward to regular, if unappetizing, meals. Soups, stews, and pottages would have been the rule, affording the diner a chance to soften the rock-hard ship's biscuit by breaking it up and mixing into the dish.

⁷ Dunn, Richard S. *Sugar and Slaves: The Rise of the Planter Class in the English West Indies, 1624-1713*. W. W. Norton, New York, 1972. p.3.

⁸ White, Father Andrew, Lawatsch-Boomgaarden, Barbara, trans. *Voyage to Maryland*, Bolchazy-Carducci, Wauconda, 1995. p. 31.

⁹ Ale in the 17th century was not carried on ships because in that time period it was not hopped as it is now. Hops act as a preservative and without the use of hops, Ale would spoil very quickly, making it useless on long voyages.



Figure 4. Cook aboard the recreation of John Cabot's ship the *Matthew of Bristol* uses an iron cook box to prepare a meal.

Ventilation and sanitation.

The only sources of ventilation for the 'tween deck space would be the hatches and the gunports. The gratings seen in the main and fore's'le hatches of the *Maryland Dove* are typical of what would be fitted in situations where passengers or livestock were being carried aboard ship. Gratings permit the flow of light and air without leaving a dangerous hole in the deck. In rough or wet weather, these would be covered over to prevent water from entering. Most ships large enough to have a 'tween deck would be fitted with gunports for defense although cannons were not always carried. On the *Ark* these gunports would have been far enough above the water line to be kept open in fair weather providing additional ventilation (please note that "fair weather" does NOT mean flat calm). During the November storms, the 'tween deck of the *Ark* was undoubtedly cold, wet, dark, and stuffy, but there seems little reason to doubt that the colonists enjoyed a reasonable amount of fresh air and light in the 'tween deck during the fair weather that Father White describes for the rest of the voyage. It should be noted that, as with personal space, the colonists aboard the *Ark* were probably the exception rather than the rule.

Sanitation for the crew of a ship consists of "seats of ease" located in the beakhead of the ship (hence the word "head" to denote the restroom aboard a modern vessel). These are essentially wooden outhouse seats with a chute that drops the detritus straight into the water. By locating these in the forward part of the ship, odors are blown away and water splashing up helps "flush" the seats. In fair weather, colonists might be allowed to use the seats of ease, but much of the time, sanitation would most likely be a chamber pot or bucket which would be emptied over the side when possible. Whatever was used, the contents were *not* emptied into the bilge because this was not possible. The ceiling planking that covers the inside of a ship prevents such an action. Nevertheless, when a lazy colonist urinated or defecated in a hidden corner to avoid going on deck, or an overfull "honey bucket" spilled its contents, the contents remained on the deck until cleaned up, washed out through the scupper holes, or sifted down into the hold through open seams in the deck. In rough weather, the noisome odors of the 'tween deck must have been unbearable and undoubtedly contributed to the spread of disease.

The *Dove*:

What did the *Dove* look like?

Virtually all that is known about the *Dove* is that she was purchased in England by Leonard Calvert and the other investors in the colony, was about 40 tuns burthen, had a crew of seven, and that she was lost on a return voyage to England in 1635. Of her appearance nothing is known other than that White described her as ". . . a dull sailer . . .", that is, rather slow. Again taking Father White's figures as most reliable, we will use 40 tuns as the burthen for the *Dove*. Using Baker's formula again, we find a vessel that is 36 feet on the keel, 16 feet in the beam with a 7 foot depth of hold. This means that the *Dove's* length on deck would be about 54 feet. Her draft, fully loaded, would probably be about 5 to 6 feet. With a crew of only seven, we can be relatively certain that she carried a simpler rig than the *Maryland Dove*, which would require a crew of nine for voyages longer than a few days. There are a variety of rigs to choose from, but the most probable is what William A. Baker called a "bojort", a Swedish variant of the Dutch term "Boier". In his book, *Colonial Vessels: Some Seventeenth Century Ship Designs*, Baker picks this as the most likely rig for the *Dove*, based on the representation on the plaster ceiling at Hook Farm, home of Cecil Calvert in Wiltshire England. The modern sailor would call this a ketch rig, with a mainmast and a mizzen. For the Atlantic voyage, the *Dove* would be rigged as a "square" bojort with a square mainsail and a light topsail. For her coastal sailing, it would be easy to re-rig the *Dove* as a normal bojort with a sprit mainsail and a square topsail. In both cases, a lateen sail would serve for the mizzen. Baker's illustrations show a spritsail under the bowsprit of the "normal" bojort, but the illustration of the "square" clearly shows a staysail, even though it is misrepresented as being set aft of the mainsail rather than forward. In either case it is a reasonable assumption that a staysail could have been set on either version, since this was a common practice on smaller vessels in the 17th century. Such a rig would be easily handled by a crew of seven and offer more flexibility for a ship intended for coastal trading.¹⁰

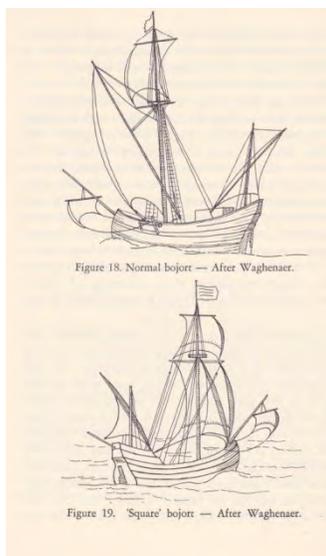


Figure 5. A picture from William Baker showing the bojort or boier rig and a photograph of the "Dove" in the decorated ceiling from Hook House.



¹⁰ Baker, William A. *Colonial Vessels: Some Seventeenth Century Ship Designs*, Barre, Barre Publishing Co. 1962. pp. 67-73.

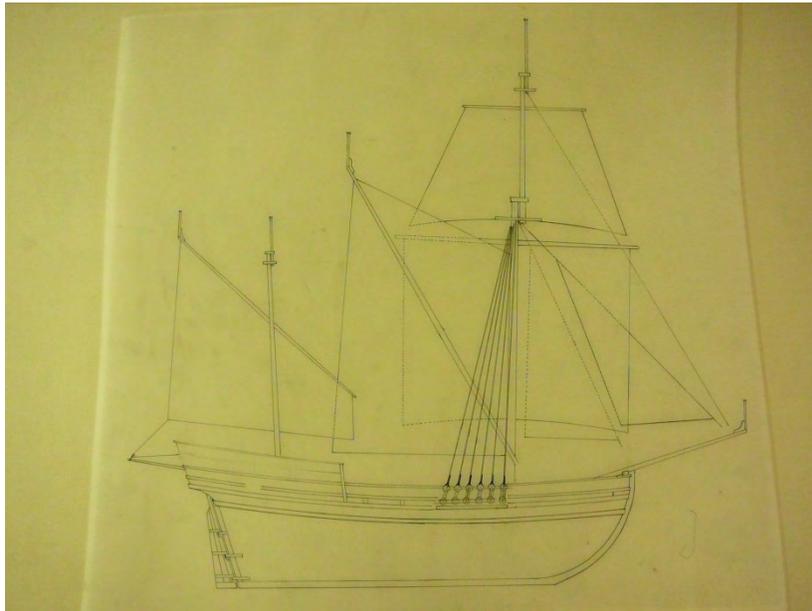


Figure 6. A reconstruction of the 1634 Dove's sail plan. Note that the square mainsail and the main spritsail would not be used at the same time.

What did the *Dove* carry?

While it has been common to refer to the *Dove* as the 'supply ship', this is not the case. The supplies for establishing the colony were almost certainly carried aboard the *Ark* along with the colonists themselves. Although the *Dove* probably did not sail empty, it is unlikely that she carried colonists or anything that was required for the colony's survival. There are several reasons for this assumption. First and foremost, it was unnecessary. The *Ark* was sufficiently large to contain everything needed, including the colonists themselves. The *Dove* was brought, not because extra space was wanted, but because Leonard Calvert and the leaders of the colony knew that they would need a vessel to use in the new colony once the *Ark*, which was hired for the voyage, had returned to England. We do the same today when we move. We pack our belongings into a moving van, but we still bring our family car. The *Ark* was the moving van, the *Dove*, the family car. It is worth noting that, when the *Dove* disappeared into the storm off the English coast, Father White makes no mention of her cargo. Surely if there had been colonists, or something essential for the colony on board, Father White would have mentioned the apparent loss, since it was assumed by those on the *Ark* that the *Dove* had sunk. It was not until weeks later in Barbados that it was learned that the *Dove* had survived. The *Dove's* cargo probably consisted of non-essential items like trade goods, helpful, but not essential for the colony's survival.

The *Maryland Dove*

What is the *Maryland Dove*?

The *Maryland Dove* is a representational vessel rather than a replica. In truth, it is impossible to build a true replica of most 17th-century ships, especially merchantmen. While we have a good idea of the different types of vessels used in the 17th century, pinning down the appearance of a specific ship is virtually impossible in most cases. Most merchant vessels were designed without plans in the modern sense, and it is rare for an English merchant ship to be named when it appears in a 17th century painting or drawing. In the case of the *Maryland Dove* there is no "original" anyway.

In 1974, the Historic St. Mary's City Commission began to explore the possibility of building a vessel representative of the ships that had carried Chesapeake tobacco to England and the other English colonies. Their possibilities ranged from craft as small as 10-20 tuns to as large as three to four hundred tuns, with the average tobacco ship being in the 100 to 200 tun range. Cost and maintenance considerations however led the commission to settle on a vessel of about 40-50 tuns burthen, the approximate size of the *Dove*. Such a vessel was large enough to convey an impression of a seagoing ship, yet small enough that construction and maintenance costs would be acceptable. From the start, the new ship was not intended as a replica of the *Dove*. In fact the original name was to be the *Maryland Merchant*, but fund raising considerations led to her being named the *Maryland Dove* in order to commemorate the colony's first ship.

To design the prospective ship, the Commission hired William Avery Baker of Hingham Massachusetts. Mr. Baker was a well-known naval architect and naval historian. In 1957, he had been responsible for the design of the *Mayflower II*, a representation of the ship that brought the Massachusetts Bay Colony in 1620. Between the *Mayflower II* and the *Maryland Dove*, Mr. Baker had written several books on and produced a number of designs of colonial ships. His work included a design for the *Virginia*, the first ship built in British North America (the original *Virginia* was built at Sir George Popham's colony on the coast of Maine in 1607), and the colonial ketch *Adventure*.

The keel for the new ship was laid on 27 June 1977 in Jim Richardson's Cambridge Maryland boatyard, and over the next 12 months the ship slowly took shape. Finally, on 14 August 1978, the unrigged hull slid into the waters of Lecompte Creek and tasted salt water for the first time. After launch, her masts were stepped and rigging work commenced. On 8 October 1978, the *Maryland Dove* was officially commissioned as the first major exhibit at Historic St. Mary's City.

The *Maryland Dove* is 57 feet on deck, 76 feet sparred length (including the bowsprit), with a total beam of 17 feet (this includes the channels which add a foot to the measured beam) and a depth of hold of 7 feet. Her draft is currently about 6' 10", but fully loaded it would be somewhere around 7'6" to 8 feet. Her 17th-century tonnage would have been about 40 tuns. She carries the typical ship rig of the period, a square spritsail set under the bowsprit, a fore course and fore topsail, main course and main topsail, and a lateen mizzen. When the wind fails, the *Maryland Dove* is also equipped with two 90 horsepower diesel engines. In the 17th century, a ship like the *Maryland Dove* would have been crewed by about nine men-six sailors, a Master, Master's Mate, and one other officer, probably a boatswain. Each officer

would have charge of half the crew so there would always be at least four men on deck. Even so, major evolutions such as tacking would have required all hands. Today, although the *Maryland Dove* has sailed with as few as four, nine is the preferred number of crew.

A number of non-period alterations were made in the structure of the *Maryland Dove* in order to accommodate modern visitors. These changes include the presence of a stairway in the main cargo hatch, a deck in the cargo hold, openings in the bulkheads fore and aft, and the absence of ceiling planking in the cargo hold. The stairs and deck, necessary to allow visitors access to the inside of the ship, occupy valuable cargo space, while the openings in the bulkheads allow visitor access to the forecastle and the Great Cabin without attempting to descend the rather precipitous steps (especially those leading into the forecastle!). In the 17th century the bulkheads would be solid (although not watertight as on a modern vessel) in order to prevent crew pilferage of the cargo and shifting of the cargo into crew spaces. Typically wooden vessels are planked on the inside as well as the outside. This ceiling planking does not serve as a "double hull" since it is not usually caulked as the outer planking is, to make it watertight. It serves to strengthen the ship and to prevent ballast from settling in between the frames and pressing the outer planking away from the frames or clogging up the limber holes (small openings cut in the frames) preventing water from reaching the bilge pumps. It also keeps bilge water from damaging the cargo. Since the *Maryland Dove* carries no cargo and uses lead bars for ballast, such planking is not strictly necessary, and its absence allows for much better ventilation of the bilges, reducing odor and the possibility of rot.

The *Maryland Dove* and the coastal trade

A vessel the size of the *Dove* or the *Maryland Dove* would be primarily engaged in the coastal trade. This is not, as most people assume, because her size precludes a trans-Atlantic voyage, but because the potential for profit would be much greater in the coastal trade. Should the promise of a good profit warrant it, a ship's master would have no hesitation about sending a ship the size of the *Maryland Dove* anywhere in the world. After all, the *Dove* was only 40 tuns, as was the *Godspeed*, second of the Jamestown fleet, while *Discovery*, the third Jamestown ship was only 20 tuns.

The smallest ship to make an Atlantic crossing that the author is currently aware of was the pinnace *Squirrel* which was only 8-10 tuns burthen.¹¹ Further, the Port Records for Boston list the shallop *Anne* of only 5 tuns as departing from Boston to Virginia in September of 1687 carrying 5 hhds molasses, 1 cask wine, 2 cask rum, provisions, salt, and 2 firkins of soap. A 5 tun shallop would be essentially an open boat about 28 feet long and 7.5 feet wide! Furthermore the *Anne* is listed as "English built" meaning that she had crossed the Atlantic somehow!

¹¹ The *Squirrel* was part of an English fleet which explored the coasts of Newfoundland in 1583 and was the personal property of Sir Humfrey Gilbert the leader of the expedition. It must be admitted that Sir Humfrey and the *Squirrel* were both lost in a gale off the coast of Newfoundland, but *Squirrel* had made trans-Atlantic voyages before and Sir Humfrey declined an opportunity to transfer to a larger (40 tuns burthen) ship before the storm closed in. Sources: Morrison, Samuel Eliot, *The European Discovery of America: The Northern Voyages A.D. 500-1600*, pp. 568-78 and Quinn, David Beers. *England and the Discovery of America, 1481-1620*, pp. 237-38.

The coastal trade among the English colonies in the 17th century was fairly extensive, given that it did not exist prior to the 1620s when English colonization gained a firm foothold on the Eastern Seaboard and the West Indies. New England, lacking a cash crop of its own, early on began to specialize as a "middleman." By the 1630s, New England had a thriving shipbuilding industry, and New England vessels were found up and down the coasts, trading for goods which could be sent back to England to obtain the manufactured goods needed in the colonies. The Chesapeake colonies and the West Indies colonies, having staple cash crops, had less need to venture into the coastal trade, but there was sufficient profit in it that by the mid-17th century, they too were sending vessels along the coastline.



Figure 6: The John Smith Shallop built in Chestertown is about the same size as the Anne.

Grain, both corn and wheat (or Indian corn and English corn as the settlers would have called them), were shipped in large quantities from the Chesapeake. By law every plantation owner was required to grow two acres of corn for everyone on his plantation. If there was excess, it only made sense to sell the surplus. When the price of tobacco slipped more sharply than usual, planters would turn to other crops to make up the losses. Both New England and the West Indies were ready markets for Chesapeake grain. Other exports included tobacco (of course), staves and headers (the pieces that make up a cask), beef, pork, beans, cattle and the like. Imports from New England included salt cod and mackerel, earthenware and woodenware (including furniture), rum, cordage and naval stores, and some foodstuffs like cheese. From the West Indies came rum, sugar, molasses, salt, ginger, cocoa, citrus fruits, and cotton among other things.¹²

The *Maryland Dove* often appears small to modern eyes, and compared to the *Ark*, she is a very small vessel indeed, but it should be remembered that the *Ark* was on the large size for the 17th century. The bulk of trans-Atlantic trading was carried out in vessels of only 100-200 tuns burthen, roughly 2-4 times the capacity of the *Maryland Dove*. A semi-truck does not seem large compared to a modern freighter, but consider how much of what we use every day is carried by something with about the same capacity as the *Maryland Dove*. We are able to use semi-trucks to carry loads that would not justify a larger transport because we have an excellent road system. In the 17th century (and indeed the 18th and 19th centuries as well), the Chesapeake Bay and the Atlantic coast served as the equivalent of I-95, and innumerable sloops, barks, ketches and other vessels served their communities just as semi-trucks serve us today.

¹² Middleton, Arthur Pierce. *Tobacco Coast: A Maritime History of Chesapeake Bay in the Colonial Era*, pp. 197-232.

Bibliography:

Baker, William A. *Colonial Vessels: Some Seventeenth Century Ship Designs*, Barre, Barre Publishing Co.. 1962.

Baker, William A. *The Mayflower and Other Colonial Vessels*. Annapolis, Naval Institute Press, 1983.

Baker, William A. *The New Mayflower: Her Design and Construction*. Barre, Barre Gazette, 1958.

Davis, Ralph. *The Rise of the English Shipping Industry in the 17th and 18th Centuries*. Newton Abbot, David & Charles.

Dunn, Richard S. *Sugar and Slaves: The Rise of the Planter Class in the English West Indies, 1624-1713*. New York, W. W. Norton, 1972.

Gardiner, Robert, ed. *The Heyday of Sail: The Merchant Sailing Ship 1650-1830*. Annapolis, Naval Institute Press, 1995.

Greeley, Joseph M. Unpublished research, 2002/3.

Landström, Björn. *The Ship: An Illustrated History*, Garden City, Doubleday & Co., 1961.

Lavery, Brian. *Anatomy of the Ship: The Colonial Merchantman Susan Constant 1605*. Annapolis, Naval Institute Press, 1988.

Middleton, Arthur Pierce. *Tobacco Coast: A Maritime History of Chesapeake Bay in the Colonial Era*. Baltimore, The Johns Hopkins Press, 1984.

Morrison, Samuel Eliot, *The European Discovery of America: The Northern Voyages A.D. 500-1600*. New York, Oxford University Press, 1971.

Quinn, David Beers. *England and the Discovery of America, 1481-1620*. New York, Alfred A. Knopf, 1974.

Ronnberg, Erik A. R. Jr. *William Avery Baker: A Tribute from His Friends*. Stinehouse Press, 1982.

Simmons, Joe J. *Those Vulgar Tubes: External Sanitary Accommodations aboard European Ships of the Fifteenth through Seventeenth Centuries*. College Station, Texas A&M University Press, 1997.

White, Father Andrew, Lawatsch-Boomgaarden, Barbara, trans. *Voyage to Maryland*, Wauconda, Bolchazy-Carducci Publishers, 1995.