David Bushnell & His Invention:

History of America's Mythical Inventor

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History 299: Introduction to the Study of History

April 24, 2026

Abstract

David Bushnell has long been a major player in American history for inventing the submersible machine, the *American Turtle*. This project takes a deep dive into the many accounts to test the validity of such high statements. By reexamining the sources of the eighteenth century, it is clear that Bushnell was a creator of moderate notoriety, but not much beyond that. It is then the work of later historians that has led to the reconstruction of the narratives around the famous inventor. Limited documentation from Bushnell himself has left the door open to revisionism and myth-making, which have grossly exaggerated his historical importance. Indeed, the early feelings of nationalistic pride after the Revolution were responsible for the exaggerated claims. While still recognizing his accomplishments, this article reviews the work of prior historians and finds that Bushnell has not always been such a heavy hitter in American science. Bushnell serves as a cautionary tale for historians to closely examine their sources when conducting research.

Introduction

Today, the submarine has become a normal part of naval warfare and is a vital – if not expected – component of any well-stocked military force. Yet, for most of human history, the idea of underwater traversal has been almost mythical. Indeed, it might be hard for one today to imagine creating a vessel capable of sinking and navigating beneath the ocean's surface without modern metalworking, reliable navigation, or oxygen reserves. Even still, long before these technologies came into existence, making underwater travel possible, inventors and tinkerers were hard at work to push humanity into this unfathomable frontier. As early as 1465, a scientist named Keyser, with scant description, had designed a boat capable of sinking below the surface of the water. Later in the 1620s, Dutch inventor Cornelis Drebbel created a submersible by joining two oar-powered boats and attaching an eyepiece for looking out. These designs, while interesting, lacked much of a practical use. These early designs stretch the definition of the word "submarine," but still proved that the concept of underwater travel and warfare was of interest. Fascination with underwater warfare continued into the eighteenth century, when the latest sciences finally advanced the idea of a submarine vessel. [1]

Among the many who attempted to build a submarine, one name stands out for its particular accomplishments and notoriety. David Bushnell has high claims attached to his name, being called “Father of the submarine” [2] in *The American Dictionary of Biography* and the “pioneer in modern torpedo warfare” by Lieutenant Colonel Henry Abbot. Bushnell has been held up as a symbol of American invention and its spirit of ingenuity for generations. Such grand labels being universally proclaimed naturally raises the question: Is he deserving of such high

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[1] Dan Van, *Stealth at Sea: The History of the Submarine* (Houghton Mifflin Company, 1995). 5-13.

[2] Of American, Dictionary of American Biography. (Scribner, 1928), 348; Henry L Abbott, Beginning of Modern Submarine Warfare, under Captain-Lieutenant David Bushnell, Sappers and Miners, Army of the Revolution (Shoe String Pres, 1966). 1.

levels of praise for what he did, and did his contemporaries herald him in such a way? By examining the accounts of those close to Bushnell and cross-referencing them with later secondary sources, a clear picture of myth-making emerges: David Bushnell's accomplishments were inflated by close friends and then later by patriotic biographies.

A Brief Biography

David Bushnell was born in Saybrook, Connecticut, in August of 1740[3] to a well-established family of New England planters.[4] Following his father's death, the now twenty-six-year-old Bushnell sold his portion of the family farm he had inherited to pursue an education at Yale College, with the support of the local Reverend John Devotion. It was at Yale that Bushnell distinguished himself from his peers, not only by his age but also by his aptitude for mathematics and mechanical engineering. Early in his college years, Bushnell began experimenting with underwater explosive technology, and upon graduating in 1775, he demonstrated the full capabilities of his work. [5]

The Turtle

The culmination of Bushnell's experiments at Yale was the creation of the most ambitious of his projects: a submersible machine he dubbed the *Turtle*. There is a significant amount of correspondence from those close to Bushnell discussing the details of the *Turtle* in vague terms. When constructing the *Turtle*, Bshnell only allowed a select few any details on the function of the machine to keep knowledge of it from getting out. This tendency towards secrecy explains

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[3] This date is contested by many sources, but 1740 seems to be the most common among them. The inconsistency in the different accounts can likely be attributed to the bad record keeping of Colonial era America. The discrepancy does not have a massive effect on the content of the paper, but for the sake of consistency and accuracy 1740 is the date chosen for this essay.

[4] George Eleazer, Bushnell, comp. *Bushnell Family Geneology—Ancestry and Posterity of Francis Bushnell (1580—1640) of Horsham, England and Guilford, Connecticut*. n.p., 1945, 189.

[5] Bushnell, Bushnell Family Geneology, 190.

why so few firsthand accounts go into sharp detail in their descriptions. As a result, it can be difficult to parse the true details of the machine from later mythologizing; one primary resource that stands out for its proximity to the topic is a letter between David Bushnell and Thomas Jefferson.

In a letter addressed to Thomas Jefferson, later published in the Transactions of the American Philosophical Society in 1799, Bushnell describes the mechanisms of his submersible machine. The *Turtle*, a round, barrel-shaped vessel, was designed to house a single operator who would use the machinery mounted on the outside to conduct stealth attacks on unwitting ships.[6] As seen in the reference image, the *Turtle* resembles a large wooden barrel with propellers and other devices affixed to it. At the top of the submersible was a small entrance with a looking glass that allowed light from above in. Inside the operator would sit and use a mixture of valves and oars to maneuver. On the outside, a wood drill and an explosive device carrying a powerful 150 pounds of gunpowder. The idea was to use the two implements in tandem to create a weakness in a ship's underside and then blow it up. [7]

In Action

All of these implements sound compelling in theory, but how do they fare in practice? On the night of September 7th, 1776, all of the years of testing came to fruition in the waters of the New York Harbor. It was here that the operator, Ezra Lee, attempted to attack the underside of the British HMS *Eagle*. Here, Lee attempted to use the intended strategy of drilling and exploding on the British HMS *Eagle*. By cover of darkness, Lee successfully navigated the vessel underneath the Eagle, but found himself unable to bore into the bottom with the drill.

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[6] For a visual representation of the mechanisms of the *Turtle*, see appendix of this essay.

[7] David Bushnell, “General Principals and Construction of a Submarine Vessel.” *Transactions of the American Philosophical Society* 4. Philadelphia, 1799. 303-12

Suspecting he had hit an iron bar on the inside, Lee attempted to move to a different spot on the bottom of the ship, but ended up losing the ship. Bushnell is dismissed for the inability to attribute the drill's failure to an error by the inexperienced pilot rather than to its own mechanism. [8]

After the Eagle

After the failed attack on the *Eagle*, Bushnell moved his attacks to the Hudson River area to continue refining his process. Here, he worked closely with Major-General William Heath, who noted that Bushnell had "great confidence in the machine."[9] There were two more attempts to destroy British ships until October 9th of 1776, when the *Turtle* was unfortunately sunk in battle. Bushnell was able to find and reconstruct the ship, but was too sick by this point to continue using it.[10] A little over a year later, in December of 1777, Bushnell invented a successful mechanism for destroying British Ships. This method, which he dubbed *Torpedos*, involved barrels filled with gunpowder that sat on the water's surface and exploded on contact.[11] For his efforts, the *Torpedos* destroyed the British ship *Cerberus* and served as the opening to the Battle of the Kegs. This moment marked the last of Bushnell's use of naval technology during the American Revolution.

Impact

Bushnell's contributions to the American Revolution are limited, to say the least. Judging the *Turtle* on its ability to be used in combat, it seems to only work in concept. By never once

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8 Arthur S. Lefkowitz, *Bushnell's Submarine: The Best Kept Secret of the American Revolution*. (Scholastic Nonfiction, 2006), 79-87.

9 William Heath, *Memoirs of Major General William Heath* (Congress, 1901), 61–62.

10 Heath, *Memoirs of Major General William Heath*, 61-62

11 Bushnell, "General Principals and Construction of a Submarine Vessel," 303-12.

successfully carrying out one of its missions, the *Turtle* failed to sway the war in any way toward the revolutionaries. However, reducing his accomplishments to mere battlefield results misses what this moment ultimately represents. Although Bushnell was certainly not the first to create a submarine, his efforts were the most advanced at the time. His mechanical design stands out for its creativity and ability to counter issues that a vessel of this type might face. As well, the resolve to continue experimenting with the design for so long, despite little progress, is highly commendable. However, this resolution ultimately did not create a machine useful to the Continental Army. By the time Bushnell had achieved any decent results with his technology, the Revolutionaries had already gained a powerful naval ally in the French, reducing the need for atypical technology.[12]

While Bushnell's creations did not necessarily have a strong impact on the battlefield, it does significantly improve on previous designs for underwater combat vessels. The *Turtle* was the first to use many of the mechanisms vital to its operation, inspiring future inventors to further improve them. Prior to Bushnell, no one had come this close to creating a machine practical for warfare, but it is an exaggeration to attribute the entirety of submarine warfare to him. Many of the systems used in the *Turtle* are featured in future submarine iterations. Robert Fulton's design of the *Nautilus* came after the *Turtle* and was essentially the same, with notable differences in propulsion: it used both a mast and a propeller to move forward. The *Nautilus* was an improvement, but was still built on the *Turtle*.[13] The concepts of the *Turtle,* though, do not translate into the creation of submarine warfare as a whole; it would be more accurate to say that Bushnell was an important step in its development rather than the origin of it.

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[12] Jeremy Black, "Naval Power in the Revolutionary Era." *Defence Studies* 7, no. 2 (June 2007): 171–92. https://doi.org/10.1080/14702430701337975.

[13] Frederick Wagner, *Submarine Fighter of the American Revolution*, (Dodd, Mead,), 1963. 116-118.

Contemporary Thoughts

As Bushnell continued to shape his experiments, no one did more to shape the reputation of the *Turtle* and its inventor than his close friend Benjamin Gale. Dr. Gale had attended Yale, like Bushnell, graduating in 1755, and acted as a mentor to the emerging scholar, who shared a similar interest in the natural sciences. Throughout the mid to late 1770s, Gale sent out many letters to those in the tinkering or scientific sphere praising Bushnell's creation. No other contemporary has done so much of the work to help and shape the reputation of the *Turtle*. In the first of his letters to Silas Deane, he gives a full description of the *Turtle* and the mechanisms by which it operated. When speaking of Bushnell's experiments, Gale has a tone of admiration and excitement, even going as far as to call himself an "enthusiast" of the *Turtle*.[14] Gale is eager to continue learning about the machine. Disconcerted by Bushnell's artificial mystique around his work, remarks that it "makes all his affairs a secret even to his best friends," suggesting that his statements on the machine do not come from a place of active knowledge but are rather old.[15] At the same time, Gale frames any issues with the *Turtle* as minor and easily fixed, rather than as a design issue. When the forcing pump on the machine failed, he insists Bushnell was "by no means discouraged in the attempt," and when fox-fire illumination proved useless in winter, he attributed the delay solely to frost rather than to any flaw in the design.[16]

Gale's letters do much of the work in constructing early myths about Bushnell that are reflected in later accounts. His correspondence promotes the image of a miraculous invention and of a genius bound for success. For those reading this account, it would not be unreasonable to believe what he was saying. Gale had already built up a reputation for himself as a

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[14] Silas, Deane. "Correspondence of Silas Deane Delegate to the Congress at Philadelphia, 1774-1776," Collections of the Connecticut Historical Society, 1860, 315-18.

[15] Deane, "Correspondence of Silas Deane," 322-23.

[16] Deane, "Correspondence of Silas Deane," 322-23.

Yale-educated inventor, writer, and politician. These things make it seem reasonable that he knows what he is talking about when he says the Turtle is as impressive as he claims. Furthermore, his correspondence includes notable figures such as Benjamin Franklin and Silas Deane, the president of Yale. Taken together, these factors make it easy to take his words at face value, but this ignores the bias introduced by his close relationship with Bushnell. While this does not mean that what he says cannot be taken as true, it does mean that a greater degree of discretion needs to be applied to this source than has been done.[17]

Interest in the *Turtle* was not limited to Benjamin Gale, however. Among the figures who went on to inquire about the submersible, one founding father stands out. George Washington's involvement with Bushnell began in 1776 at the recommendation of Governor Trumbull. Washington initially became interested enough in the idea behind the invention to help finance its creation. Washington characterizes Bushnell's work at this point as "ineffectual," and that "One accident or another was always intervening."[18] Still, he recognized the capabilities of Bushnell, attesting "that it was an effort of genius; but that a combination of too many things were requisite, to expect much success from the enterprise…."[19] Compared to Gale's account, Washington seems to have a much more balanced stance on the topic. He recognizes the shortcomings of the inventions while still upholding the merits of such an idea. This more balanced view seems to align more closely with the Turtle's actual success than with fantastical support.

Post War

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[17] George C. Groce, "Benjamin Gale." *The New England Quarterly* 10, no. 4 (1937): 697–716. https://doi.org/10.2307/359933.

[18] Papers of Thomas Jefferson, vol. 13, Library of Congress, Washington, DC. Printed in Thomas Jefferson, The Papers of Thomas Jefferson, ed. by Julian Boyd, et al., 34 vols. to date. Princeton: Princeton University Press, 555-57.

[19] Papers of Thomas Jefferson. 555-57.

Historian Alex Roland argues that in the period following the American Revolution, there was a surge in nationalist retellings of recent events. This rise in patriotic stories was naturally extended to the tinkerers and thinkers of the American Revolution. Included among the great thinkers, as Roland argues, worth having their lives recounted is David Bushnell.[20] Indeed, by reading these books, the vision of the *Turtle* and Bushnell quickly rose. As writers sought to create a patriotic lineage of American inventors, Bushnell naturally fit the bill as a creator of American technology. The mid-Revolution tendency toward moderate support had given way to a patriotic version of historical revisionism, one that portrayed Bushnell as more ingenious and heroic than a realistic scientist who advanced his field.

This broad cultural proclivity towards nationalistic history is evident in some of the earliest accounts of Bushnell and his invention, as the tone lavishes a high degree of praise on the scientist's name. While few writers chose to write about Bushnell himself, many figures who were around the *Turtle* had biographies written about them. These texts often take into practice the post-war tactic of highlighting genius while ignoring shortcomings. One source that highlights this is the account of James Thatcher, written during his service in the American Revolution and later published in 1827. Thatcher speaks with an unmistakable amount of positive regard for the *Turtle*, highlighting the machine as being "so ingeniously constructed."[21] By recounting Bushnell's *Turtle* in such a positive light, Thatcher stands out as one of the first accounts to offer patriotic support for the machine, laying the groundwork that was later expanded upon in subsequent writings.

Later Writings

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[20] Alex Roland, "Bushnell's Submarine: American Original or European Import?" *Technology and Culture* 18, no. 2 (April 1977): 157-174. https://doi.org/10.2307/3103954.

[21] James, Thatcher, *A Military Journal during the American Revolutionary War*, from 1775 to 1783. Cottons & Barnard, 1827.

Later nineteenth-century historians exhibit the same tendency to inflate the overall language used around Bushnell and his invention. Naval historians Francis Barber and Henry Abbot both give high praise to Bushnell's work. In 1875, Barber published his pamphlet titled *Lecture on submarine boats and their application to torpedo operations*, in which Bushnell made a notable feature. Baber continues the idea that Bushnell's *Turtle* was an impressive machine that never got its time to shine, and conveys the idea that he was the father of submarine warfare.[22] Abbot later published *The Beginning of Modern Submarine Warfare*, which contains a message similar to Barber's writing. The study synthesizes a body of primary sources, notably including Gale's letters, to recount the history of Bushnell's invention.[23]

Barber and Abbot both make similar claims about Bushnell's accomplishments, but it is important to consider why they might want to recognize him in particular. Barber had previously served in the military, gaining the rank of Lieutenant.[24] Abbot served in the United States Army Corps and worked with hydraulic systems.[25] Of course, two American Navy men would want to boast about the accomplishments of another American. Their praise of Bushnell then places American science and naval technology at a higher caliber. This does not necessarily invalidate Bushnell's accomplishments, but it does call into question the austerity of their statements. Caution should be used in taking in these comments.

Modern Day Writings of the Twentieth and Twenty-First Century

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[22] Francis M. Barber, *Lecture on submarine boats and their application to torpedo operations*, (U.S. Torpedo Station), 1875, 7-12.

[23] Henry L Abbott, *Beginning of Modern Submarine Warfare, under Captain-Lieutenant David Bushnell*, (Shoe String Press, 1966), 1.

[24] Barber, Lecture on submarine boats and their application to torpedo operations, 1-3.

[25] Charles G. Abbot, "Biographical Memior of Henry Larcom Abbot, 1831-1927," National Academy of Sciences, 1929, 1, 17-18.

In the wake of modern-day depictions of Bushnell, a minor historiographical debate has awakened between writers. From the middle of the century, historian Frederick Wagner writes the singular biography focused on the entirety of David Bushnell's life. In *Submarine Fighter of the American Revolution*, Wagner takes a holistic approach to the life of David Bushnell, and helps to reinforce the myth of genius in creation, similar to those who came before him.[26] Later in 1977, the writer Alex Roland entered the scene with an alternative perspective to the typical narratives surrounding Bushnell,[27] going so far as to suggest that Bushnell had stolen the idea of a submarine from earlier European thinkers. Roland directly combats Wagner in the footnotes of his article, going as far as to call his writing inventive. [28]

The historiographical debate between the two was somewhat settled by later writers Roy Manstan and Frederic Freese in their extensive monograph entitled *"Turtle: David Bushnell's Revolutionary Vessel*." This text synthesizes the two more extreme views of the previous authors, drawing on extensive research and painstaking work to reconstruct the vessel itself. The scholars find, in their reconstruction, that while the *Turtle* was ahead of its time in its ingenuity, it was held back by the era in which it was constructed, to the point that it is obvious why it had no lasting impact, in particular the lack of lighting and oxygen systems.[29] Instead of taking previous accounts at face value, these authors do the hard work of physically fact-checking the capabilities of the *Turtle* through their reconstruction.

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[26] Wagner, *Submarine Fighter of the American Revolution*, 1-5.

[27] In this article, Roland goes as far to argue that Bushnell himself was taking the credit of previous scientists who had experimented with the concept of a Submarine. While this is a pressing thought, this paper decisively does not engage in this discourse. Roland has clearly done a great amount of research in attempting to prove Bushnell as a complete fraud, but seems to come up short in his findings. While possible, it would not be right to speculate in a paper of this nature.

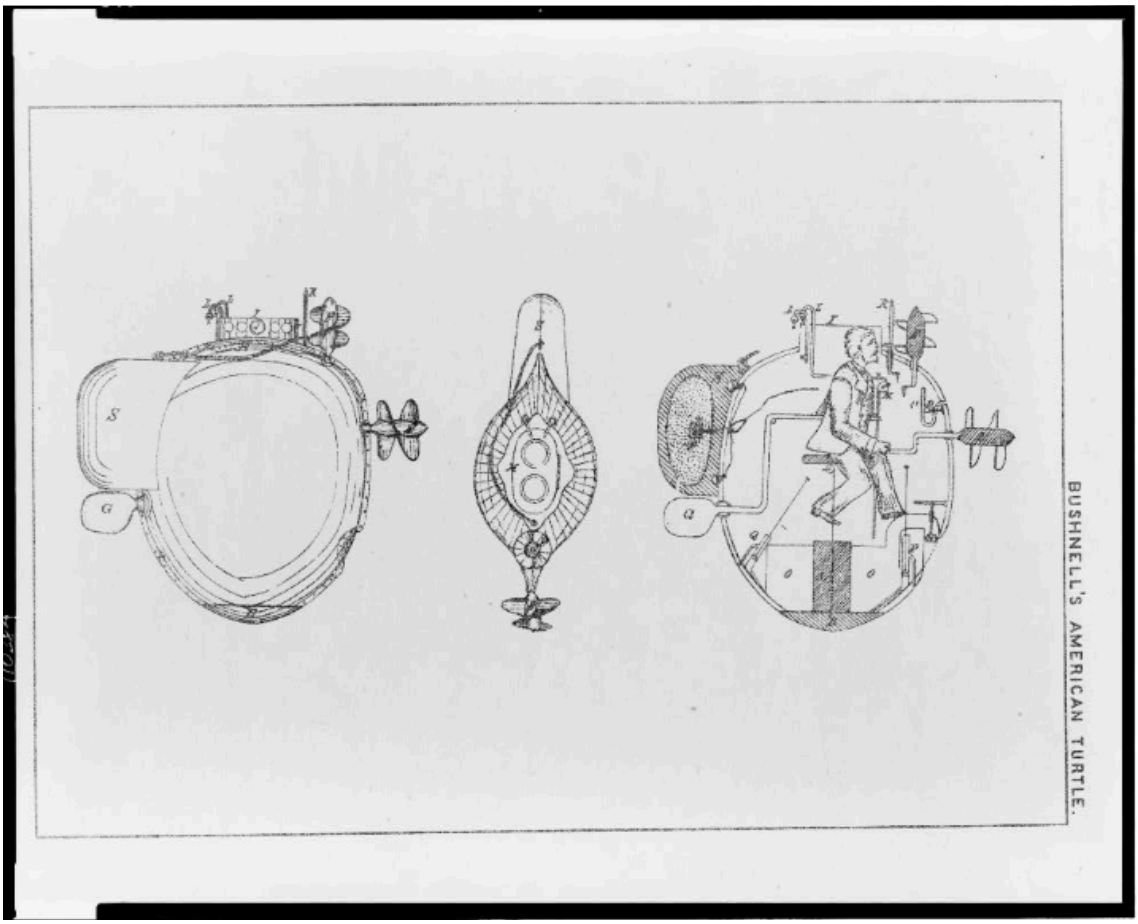
[28] Roland, "Bushnell's Submarine: American Original or European Import?" 161-2

[29] Roy R. Manstan and Frederic J. Frese, *Turtle: David Bushnell's Revolutionary Vessel* (Westholme Pub Llc, 2010), 269-76.

Conclusion

Over the two and a half centuries of American history, the story of David Bushnell and his submersible has been told many times, and, like all history, those accounts have been changed to fit the narrative of the time and place in which they were told. Bushnell's limited impact on the war does not mean he is not a figure worth talking about in any sense of the word. In fact, he might even be more important to the practice of history because of the way that time has shaped his character. Bushnell is not the only figure in American history whose story has been made fantastical by those seeking to tell it. From the enthusiastic letter-writing of close friends to the later celebrations of American military men, one can easily track the increase in Bushnell's reputation. He is another cautionary tale for historians to consider when writing. Any and every source should be taken with scrutiny, and it is just as important to analyze why a source may say something as it is to analyze what it is saying. Bushnell and the submersible serve as a benchmark for how historical ideas can shift over time in the absence of critical thinking.

[Appendix]



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[30] Wagner. *Submarine Fighter of the American Revolution*, 52.

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“I hereby declare upon my word of honor that I have neither given nor received unauthorized help on this work.”

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