

# Researchers discover new clue that may help explain Hunley's loss

Clemson University conservators have uncovered new evidence that may help explain why the Hunley submarine vanished off the coast of Charleston. The new discovery resulted from the long, painstaking process of removing concretion — the rock-hard layer of sand, shell and sea life — that gradually encased the Hunley during the nearly 136 years she rested on the sea floor.

Removing the concretion led to several clues helping scientists piece together the events that led to the loss of the world's first successful combat submarine. The most interesting discovery was a broken pipe that may have caused water to flow into the submarine the night the crew perished.

The in-take pipe was meant to fill the forward ballast tank with water, but scientists found a roughly 1-inch gap from where the pipe should have been mounted on the side wall of the submarine. If the pipe broke off the night of the Hunley's historic mission, it may have contributed to the sinking of the submarine and the loss of her crew.

This new evidence is not conclusive. The pipe could have become disconnected slowly over time while the Hunley was lost at sea. "Unfortunately, there are no easy answers when investigating what led to a complex 150-year-old sinking. Still, this is a very significant discovery that will help us tell the full story of the Hunley's important chapter in naval history," said Clemson

University Archaeologist Michael Scafuri.

The Hunley disappeared in 1864 after sinking the USS Housatonic, marking the first time a submarine successfully sank a warship in combat. She would remain lost for over a century until New York Times best-selling author Clive Cussler located her in 1995. The Hunley was raised in 2000 and sent to a laboratory in North Charleston to be preserved. Scientists have had a difficult time studying an artifact they could not fully see until the layer of concretion was removed. Now they can finally see the finer features and operations of the innovative submarine that forever changed naval history.

The broken pipe discovery intrigued archaeologists because it could offer new information about whether the crew drowned instead of died from lack of oxygen. If the pipe did burst the night of the attack, the submarine would certainly have taken on water. But would it have been enough to drag the vessel down to the ocean floor? Researchers at the University of Michigan, who partnered with Clemson University and the Office of Naval Research on the Hunley investigation, say yes.

They calculate it would have taken only 50-75 gallons of water to disable the submarine. Using the size of the hole and dozens of other factors in their modeling, they concluded three minutes of unrestricted flow through the breach would sink the submarine.

Given the size of the hole, however, the water could have been significantly slowed with a cloth or other item to block it. And, the crew did not have the valves set to bilge in order to pump water out of the crew compartment, a move they most certainly would have taken to save their lives.

Another possibility is the pipe could have simply broken over time while the submarine rested on the sea floor for over a century. Archaeologists say the pipe was already under stress given the way it was mounted to the curve of the hull, making it a likely fracture or failure point. More study of this area will help us understand whether it broke off naturally overtime or was sheared off by an impact or explosion backlash during the attack on the Housatonic.

Removing concretion from the inside of the crew compartment produced other interesting discoveries, including the discovery of more human remains. A tooth was found near where it is believed Frank Collins sat. His remains were buried in 2004 alongside his crewmates and others that lost their lives in the testing and development of the Hunley. They also uncovered innovative operational features, including a complex gear system that helped enhance the output of the crew's hard work when cranking the submarine.

Removing the concretion was physically and mentally exhausting. Conservators stayed curled up in various awkward positions for hours



working in the small crew compartment. One mistake, drop of a tool or slip-of-the-hand could cause permanent damage to the fragile artifact. Johanna Rivera-Diaz, a Clemson University Conservator spearheading the deconcretion project, said, "Removing the concretion was a slow and challenging task for all of us involved, but the ability to get an up-close look at the true surface of the submarine after all this time has made it entirely worth it." Now that the Hunley has been mostly cleaned of this material, the vessel will sit in a conservation bath for

approximately five years to preserve the metal and make her ready for permanent public display.

*The Hunley Project: On the evening of February 17, 1864, the H. L. Hunley became the world's first successful combat submarine by sinking the USS Housatonic. After signaling to shore that the mission had been accomplished, the submarine and her crew of eight mysteriously vanished. Lost at sea for over a century, the Hunley was located in 1995 by Clive Cussler's National Underwater and Marine Agency (NUMA). The innovative hand-cranked ves-*

*sel was raised in 2000 and delivered to the Warren Lasch Conservation Center, where an international team of scientists are at work to conserve the submarine for future generations and piece together clues to solve the mystery of her disappearance. The Hunley Project is conducted through a partnership with the Clemson University Restoration Institute, South Carolina Hunley Commission, Naval History and Heritage Command, Charleston Naval Complex Redevelopment/Naval Base Museum Authority, and Friends of the Hunley.*

## Tractor Supply, FFA partner for the Grants for Growing campaign

For the fourth consecutive year, Tractor Supply Company and FFA are partnering for the Grants for Growing campaign, a competitive grant program that provides funding to FFA chapters across the country for the development or improvement of a proposed agricultural project. The application period opens today and extends through Feb. 11, 2019.

Agriculture educators are invited to submit a detailed proposal for a new or existing project that benefits both the larger community as well as future FFA members. Applicants must outline how the chapter will start, sustain or expand on the project.

Following the application period, Tractor Supply will host a fundraiser from Feb. 13-24, inviting customers to make donations in-store or online with purchase to support the future projects. Grants ranging from \$500 to \$5,000 will be funded in the spring based on the amount

of funds raised. Donations will fund grants in the same state they were donated.

"Tractor Supply is proud of its enduring support of FFA, an organization that prepares students to be the future leaders of the agricultural industry. The Grants for Growing program is just one more way Tractor Supply can assist these young people in their pursuit of studying and advancing the rural lifestyle, while also benefiting their communities," said Jessica Holmes, marketing manager at Tractor Supply Company.

FFA advisors interested in applying for a grant can visit <http://www.FFA.org/grantsforgrowing> and submit their application. Chapters located near a TSC store are invited to come by and help in the fundraising efforts, while raising awareness for their agriculture programs. Chapters that participate in an in-store activity during the fundraiser can submit a fulfillment form to receive additional

points toward their grant application. Chapters do not need to be located near a store to win a grant.

The success of the Grants for Growing program has increased with each year. In 2018 Tractor Supply was able to fully fund more projects than ever due to the support of stores across the country. The campaign raised a record \$830,000, enabling 271 grants to be awarded and impacting more than 30,000 students.

"Since the program's inception, Grants for Growing has raised more than \$2.2 million and funded close to 1,000 grants for agriculture projects across the country," said Christi Korzekwa, senior vice president of marketing at Tractor Supply Company. "We look forward to inspiring future leaders and positively impacting the agricultural industry with our 2019 program." For more details about the program, visit [tractorsupply.com/FFA](http://tractorsupply.com/FFA).

## Public Records

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| <b>Marriage Licenses</b>  | Carey Dalton Bolt and Lisa Marie Myers, Laurens               | Corey Ryan Davis, Laurens, and Autumn Nicole Fulmer, Spartanburg |
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| Telly Savalas Rennick, Gray Court, and Tabitha Miller, Laurens  | Stephen Edward Ray and Harley Chyanne Hope Wyatt, Clinton     | Nancy Pennington Stone and William Stone                         |
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Donations will be accepted through Feb. 14 at our office located at 226 W. Laurens St., Laurens Mon.-Thurs. 8 a.m.-5 p.m. & Friday 8 a.m.-noon. Monetary donations are also appreciated.

FEB 14

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