



Stories

Christian Lambertsen and the Secret Story Behind Scuba

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Innovation and Tech

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The men and woman of the Office of Strategic Services (OSS) developed many spectacular devices for war-time use: exploding coal, invisible ink, tasteless poisons, miniature cameras and exotic knives.

Some of these developments advanced after the war's conclusion and were integrated into the military's arsenal. One such invention was designed by Dr. Christian Lambertsen, what we refer to today as SCUBA.

Dr. Lambertsen was a US Army and OSS officer who studied respiratory physiology at medical school. He is directly responsible for most of the technology used for Combat Swimming Operations in the United States today.

His inventions laid the groundwork for technology used by NASA, the Navy SEALs, the Army Green Berets, the US Coast Guard, and diving enthusiasts around the world. He has been called the "Father of the Frogmen" and the "Father of American SCUBA."

Dr. Christian Lambertsen — inventor, environmentalist, professor, scientist, combat veteran, medical doctor, and pioneer in undersea and aerospace medicine — is one of the most influential OSS inventors in history.



Breathing Underwater from an Early Age

Born in May 1917, Christian grew up near the coast in New Jersey. Realizing early on that he wanted to study medicine, he attended Rutgers University before enrolling at the University of Pennsylvania School of Medicine.

Christian spent his summer breaks at the Jersey Shore. It was during a break that he and his cousins first started experimenting with underwater breathing devices. They used a rudimentary system consisting of a bicycle pump, a hose, a bag, and a mouth piece.

After tweaking his gadget substantially, Christian notified his physiology professor, Dr. Henry Bazett. Impressed by the prototype and seeing real potential, Dr. Bazett began

reaching out to various organizations he felt would take an interest in his student's invention.

The president of the Ohio Chemical and Manufacturing Company was intrigued and offered Christian a high paying job. He wanted Christian to use his company's anesthesia equipment to develop his underwater breathing apparatus for lifesaving purposes.

Christian accepted the job and began testing his device in Lake Erie and Lake Nokomis. During one test, while sixty feet underwater, Christian's eyes and leg began to twitch. He yanked on the safety rope, an indication he needed to be pulled to the surface, only to watch the end of the rope fall past him to the lake's floor.

He and his colleague had never secured the end of the rope to the boat.

Luckily, Christian was able to swim to the surface and survived.

He returned to school after that summer as somewhat of a celebrity, his exploits having been broadcast nationally. Professor Bazett published a description of the device in the Journal of the American Medical Association.

In his submission letter Bazett wrote, "The equipment was successful because it was designed by a man who studied the physiological principles carefully and is capable not only of testing it himself but training the users. It could not have been developed by a physiologist unfamiliar with the practical side nor by a swimmer without physiological training."

Although conceived underwater, Christian initially thought his device could be used underground, specifically by trapped miners awaiting rescue. However, with the onset of World War II, Professor Bazett — himself a former British Army officer — foresaw its military applications.

In January 1941, Christian and Professor Bazett traveled to Washington, DC to meet with the Navy Experimental Diving Unit (NEDU). Their demonstration of the device did not impress the Navy.

However, Christian was convinced now more than ever that his device wasn't so much suited for lifesaving as it was for military use. This meant an overhaul in its design and more testing.



LAMBERTSON DIVING EQUIPMENT
MADE BY
THE OHIO CHEMICAL & MFG CO
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Covert Swimming

A year later, Christian was back in DC to demonstrate his reconfigured device. This time there were men from the British Special Operations Executive (SOE) and the OSS in attendance.

Christian jumped in the swimming pool at the Omni Shoreham Hotel and proceeded to demonstrate his invention.

Christian had created what he dubbed a LARU — Lambertsen Amphibious Respirator Unit — a stand-alone underwater breathing device. The system contained a carbon dioxide filter which allowed the diver to re-breathe the air he exhaled while underwater.

Due to the configuration of the device, it did not release any air bubbles, which inevitably wiggle their way to the surface, exposing the existence of something below.

The men watched from the edge of the pool as Christian swam below its surface, producing no evidence of his presence underwater. He left no air bubbles in his wake.

The ability to swim underwater undetected meant the difference between mission failure and mission success. Using a LARU a diver could swim at a depth of 50 feet and remain under water for 90 minutes, allowing him time to swim almost a mile.

His invention was perfect for covert operations.

Prior to Christian's discovery, military divers wore large, heavy, uncomfortable metal helmets. The helmets were supplied with air through a hose from a boat floating above, severely restricting the radius of which a diver could swim.

Christian's device freed divers from the vessel's boundaries.

Ironically, Christian wanted to join the Navy, but they disqualified him because of his allergies.

The OSS, however, was impressed by Christian and dismissed his affliction. He was commissioned as a 1st Lieutenant in the Army Medical Corps, where he served from 1944 to 1946.

Christian was in his senior year of medical school when he began working for the OSS.



OSS Maritime Unit

It was around this same time period that the OSS established a Maritime Unit whose mission was to conduct amphibious infiltrations, underwater sabotage, agent infiltrations, and to supply resistance groups by sea.

They were also tasked with developing specialized maritime equipment and devices.

The OSS appointed Christian to develop the dive element of the unit, and Christian eagerly accepted. He was still a medical student when he taught his first class of OSS Operational Swimmer Groups (OSG) in May 1943 at the Naval Academy in Annapolis, Maryland.

This OSG was training for a sabotage mission in the Bay of Biscay on D-Day, but their mission was aborted due to a lack of resources.

A second group of OSGs trained in Nassau, Bahamas before deploying to Hawaii to serve under Admiral Chester Nimitz, the Commander in Chief of the United States Pacific Fleet. These OSGs taught the Navy's Underwater Demolition Teams (UDT) how to use underwater breathing gear and how to swim using fins.

In July 1944, Christian returned to the Bahamas to train another group of OSGs. One day, while demonstrating his device, Christian himself lost consciousness and sank. Thinking this was part of the lesson, his students did nothing before they finally realized Christian was in trouble.

They rescued their instructor, who had accidentally forgotten to purge his breathing bag to prevent dilution hypoxia — a practice he had drilled into his students repeatedly. Upon regaining consciousness, Christian jumped back in the water to continue the lesson.

This particular group of trainees not only learned to dive, but also tested equipment built by the OSS (waterproof watches and compasses, an inflatable motorized surfboard, and a two-man kayak) and developed operational tactics for night reconnaissance and demolition.



Operation Cincinnati

Upon completion of training, the OSG's were asked to demonstrate their capabilities at Guantanamo Bay Naval Base, Cuba in September 1944.

This full scale exercise, codenamed Operation Cincinnati, was designed to test Navy defenses and evaluate the effectiveness of the new group's ability to conduct reconnaissance, infiltration, and sabotage operations from the sea.

This was the first exercise in an actual maritime environment.

Equipped with waterproof compasses, sheath knives, waterproof flashlights, and fins, the swimmers infiltrated the bay at night. They easily navigated past the torpedo nets draped around the harbor. They reached their targets, attached the explosives, and blew up an old barge.

A top-secret government report credited the success of the mission to the divers' ability to remain undetected by Navy sound detection gear.

Shortly thereafter, the OSGs were split up and deployed to the China-Burma-India theater. Dr. Lambertsen accompanied the group to Burma to carry out underwater infiltration and espionage missions.



Sleeping Beauty

Another underwater apparatus Christian helped advance was the motorized submersible canoe, nicknamed: Sleeping Beauty.

The 'Sleeping Beauty' submersible canoe was built by the British SOE to hold a single frogman to conduct clandestine reconnaissance or attacks against enemy vessels. It earned its nickname when a British officer walked past the canoe and found its creator asleep in the craft.

The canoe was 12 feet 8 inches long and the navigator could expect to spend 10 hours or more in the vessel when on a mission.

The top secret canoe was brought to the US in 1944, and Christian began an intense program to train the OSS on how to use the boat; but not before he adjusted its tactical use.

Instead of navigating the vehicle directly up to a target, he trained the swimmers to anchor the canoe within several hundred yards of the target. From there the frogman would swim to the target, place the demolition charge on it and swim back to the Sleeping Beauty.

This concept paved the way for the swimmer delivery vehicle — used by the Navy's UDTs and SEALs — years later.





The Father of the Frogmen

In 1945, President Truman disbanded the OSS, but Christian remained a Captain with the US Army.

Upon his return to the US, he was assigned to an Army hospital. Still believing that his invention would prosper with the military, he managed to get the LARU-X declassified and gave two each to the Navy, Army, and Coast Guard, along with detailed instructions on how to operate the units.

Realizing its value for rescue and recovery operations at sea, the Coast Guard ordered Christian to train a selection of instructors on the LARU.

The Army was impressed with Christian's education in respiratory physiology and suggested he work with the Corps of Engineers on the logistics of river operations. Christian was released from active duty in 1946 as a Major. He joined the University of Pennsylvania faculty, where he studied the physiology of O₂ and its toxicity, eventually becoming a professor of pharmacology.

In 1947, Navy Lieutenant Commander Douglas Fane reached out to Christian for help in saving his UDTs from demobilization.

Christian traveled to Norfolk, VA to train the UDTs in OSS combat swimming operations and tactical diving with the LARU and Sleeping Beauty. He also demonstrated carbon dioxide poisoning and collapsing from anoxia (lack of oxygen).

Dr. Lambertsen's preferred teaching method was hands on, and he let the cadets experience these effects firsthand. Although significantly reduced in size, the UDTs were not disbanded and became the precursor to the Navy SEALs.

In the 1950s and 1960s, Christian developed an advanced version of his underwater breathing system that remained in use by the Navy SEALs until the 1980s.

He also spent a significant amount of time during this period studying undersea medicine and researching Hyperbaric Medicine (medical use of oxygen at levels greater than atmospheric pressure).



The Last Frontier

In 1952, Christian wrote a paper for the National Academy of Sciences where he described his invention as a “Self-Contained Underwater Breathing Apparatus” — i.e SCUBA.

Not only did Christian coin the term that we all associate with diving today, he also developed seven scuba diving patents.

In addition to his work underwater, Christian served as a member of the Panel on Medical Sciences at the Office of the Assistant Secretary of Defense from 1954 to 1961, and as chairman of the Life Sciences Advisory Board for McDonnell-Douglas Aircraft Corp from 1960 to 1967.

Christian then went from underwater exploration to the last frontier: space. He served on President Lyndon B. Johnson’s and Richard Nixon’s Space Board from 1967 to 1970, and served as Vice President of the Aerospace Medical Association. He also became Chairman of the Board for Man in Space.

Christian continued to work for the federal government from the 1990s through the 2000s. In the 1990s, he was on the US Navy’s Oceanographic Advisory Committee, and from 1998 to 2000, he served as chairman of NASA’s Advisory Committee on the International Space Station Decompression Risk Definition and Contingency Plan.

Christian’s impacts on diving physiology, undersea and hyperbaric research and medical treatments, hydrospace sciences, biomedical sciences, and environmental sciences remain unequaled.



Mission Possible

Most of the information relating to Dr. Lambertsen's wartime research and inventions remained secret until 1995 when it was declassified.

Christian became known as the "Father of US Combat Swimming in 2000, when the US Navy SEALs honored Christian with the title. In 2009, Dr. Lambertsen received the OSS Distinguished Service Award from the OSS Society for enabling the OSS to conduct "previously impossible missions."

In his lifetime, Dr. Lambertsen received major medals and awards from across the military, intelligence, and scientific communities, including:

- OSS Legion of Merit
- US Department of Defense Distinguished Public Service Medal
- US Coast Guard's Distinguished Public Service Award
- US Army Special Forces Green Beret Award
- National UDT-SEAL Association Lifetime Achievement Award

- New York Academy of Sciences Award for Research in Environmental Sciences
- Pioneer Award of the Navy Historical Society
- US Special Operations Command Medal and the establishment of the annual 'Dr. Christian J. Lambertsen Award for Operational Innovation'

Christian spent his final years on Maryland's Eastern shore raising cattle and tending to his honeybees and garden. He died in 2011 at the age of 93.

In a fitting commemoration to the "Father of the Frogmen," Christian's ashes were spread over the clear, warm waters off Key West, Florida.

