Secrets From the Ice

As Glaciers Retreat, They Give up the Bodies and Artifacts They

Glaciers exist on all continents except Australia and at virtually all latitudes from the tropics to the poles. Mountain glaciers, such as those that exist at higher elevations near the equator are particularly sensitive indicators of climate change. The volume of ice in a glacier and its surface area, thickness, and length is determined by the balance between inputs (accumulation of snow and ice) and outputs (melting and calving: the breaking off of ice chunks at the edge). As climate changes, the balance between the inputs and outputs may change, resulting in a change in the thickness and the advance and retreat of the glacier. Temperature, precipitation, humidity, wind speed and other factors all affect the balance.

There is widespread evidence that glaciers are retreating in many mountains of the world. For example, since 1850 the glaciers of the European Alps have lost about 30–40% of their surface volume. New Zealand Alps have lost 25% in the last 100 years. US Glacier National Park's 37 remaining glaciers have shrunk an average of about 40% since 1966. Scientists predicting they will be gone in a matter of decades.

There is a positive side of the melting glaciers! The ice is revealing secrets that have been hidden for hundreds to thousands of years. Over the past 20 years, Canada and other Artic countries have become the frontier of a new science related to climate change. Ice patches are melting faster than ever and are revealing ancient human artifacts, wildlife and human remains, telling us more than we have ever known about human history in the sub-Artic and at altitude in the mountains!

What kind of items do you think scientists will start finding in the melting snow?
How did those items get there?
How old do you predict they will be?
Archeological Discoveries Made Possible

The retreating of the ice is exposing long buried objects – many with priceless historical significance that have been well preserved by the ice for decades, or even thousands of years. But once these items are released from their icy tomb and are exposed to the elements, they rapidly decay and disappear. Scientists and archaeologists around the world are racing against time to find these emerging artifacts before they are lost.

Roman Artifacts

A route through the Alpine Mountains of Europe called Schnidejoch pass links two Alpine valleys, has been used for centuries by travelers passing from Italy to the north. Scientists believe European ancestors have been traveling the Schnidejoch pass for 6,000 years. Because humans have been using this pass for so long, they have left behind thousands of years of trash. The melting glaciers in and around the pass is now revealing priceless scientific artifacts from antiquity. The objects that are recovered are found clustered into distinct time periods. Scientists believe the objects correspond to time periods when the pass was open and people were using it. One period has revealed artifacts associated with the Roman Empire, about 1,800 years ago. The items discovered include a belt used for a Roman tunic, Roman shoe nails, cloak pins and coins. Scientists believe the area where the items were discovered, a few miles from the Schnidejoch pass, may have been a Roman settlement or outpost.

Missing Couple

The remains of Marcelin and Francis Dumoulin were found in the Swiss Alps in July, 2017. The remains were found huddled close together by the base of a ski lift used by thousands of tourists every day. The couple had gone missing 75 years ago. DNA tests confirm their identity. The couple, who had seven kids, were last seen on August 15, 1942 in a meadow nearby and were leaving to go tend the cows. They never returned. The whole village searched for the couple but they were never found. The bodies were found with their identity cards, backpacks, a bottle, a book and a watch. It is believed that they had fallen into a crevasse where they stayed for decades.
Ancient Forests
About 2,000 years ago, in Juneau, Alaska, the Mandenhall Glacier slowly moved through a hemlock and spruce forest. In front of the glacier was glacial ice melt – ice water pushing tons of gravel. The gravel slowly engulfed the trees, snapping off branches but leaving the trees themselves standing and rooted to the ground. Eventually the gravel covered most of the trees and protected them as the glacier slowly moved over the forest. As the glacier has started to melt, it is revealing not only the standing trees that are intact, but many of the trees still have their bark. This has allowed scientists to study the trees as they lived and better estimate their age. One tree was dated at 2,350 years old.

Ancient Moss
Around 500 years ago, in the Arctic region on Ellesmere Island, Nunavut, approaching glaciers covered some moss and lichen. These simple plants were then buried under tons of ice for hundreds of years...until recently, when the ice melted and the emerged. The scientists who say these plants growing out of what appeared to be the melting ice thought to themselves..."Could the plants be alive?" Some of the plants appeared brown and dead, but others were growing new, green stems. The scientists took samples of these plants back to their lab to see if the moss was still viable. The scientists simply repotted the moss in new potting soil and waited to see what happened. The moss began to grow! Even buried under ice for hundreds of years, these plants remained alive and viable. If the ice continues to melt and exposing enough of these long sleeping plants, they could recolonize northern climates!

Do you think scientists will discover some new plant species that had gone extinct hundreds to thousands of year ago? Do you think scientists should be worried that a new plant species could be detrimental to current species? Society?
World War I Soldiers and Weapons

During World War I, the northern regions of Italy near the Austrian border was the scene of heated fighting between Italian forces and Austro-Hungarian soldiers, in what became to be known as the "White War." At the time, it was one of the most remote and formidable battlefields of that war. Today, the area is an alpine Ski resort that is popular for middle-class Italians as well as Russian tourists. Today, melting glaciers are giving up the dead and the weapons used by soldiers who fought in the Alps.

In 2003, over 200 World War I munitions emerged from the melting ice at the altitude of 10,000 feet in Northern Italy. The soldiers had apparently dug a munitions cache into the glacier to store the explosives. When the glacier melted, the ammunition, each weighing 22 lbs. were found on the ground stacked on top of each other. Soldiers are being discovered too, still locked in battle formation, frozen together where they died. At first, their personal artifacts emerged from the ice: diaries, bits of clothing, letters. Then the mummified bodies started to appear. Italian and Austrian troops, thawing and returning to the world of sunlight. So well preserved, scientists have discovered two soldiers that were blonde, blue-eyed Austrian men aged 17 and 18 years old when they died. Three Hapsburg soldiers were discovered hanging upside down out of an ice wall near San Matteo, at 12,000 feet. The three were unarmed and had bandages in their pockets, suggesting they may have been stretcher-bearers who died in the last battle for the mountain on September 3, 1918.

In 2005, a natural cave in the ice appeared and materials scattered over the surface – steel helmets, straw overshoes, boxes of ammunition. Connected to the cave was a cabin built right against the rocky peak. Inside the cabin, scientists found documents, posters pinned on the walls, postcards, love letters and other items. In the last decade, more than 80 soldiers who fell in the White war have come to light in the melting glaciers. Scientists believe there are more to come. Many family members still wait for their family members to be discovered in the ice.
How would you feel finding a family member that had been missing since World War I? Do you think the family was relieved to discover the final fate of their relative?

Bronze Age Leather Shoes
In 2006, an amazing discovery emerged from the Lendbreen ice patch in Norway. An amateur archaeologist found an amazing well-preserved ancient leather shoe. When the shoe was examined and tested, archaeologists were stunned. The shoe was over 3,000 years old and dated from the time of Otzi the Iceman – the Bronze Age man found in 1991 in the mountains of Northern Italy.

Leather objects are an amazing discovery! When the ice melts, leather objects are exposed to the elements and quickly disintegrate. Therefore, when scientists discover ancient leather objects, they know the ice had entombed the object since it was left or lost. The shoe was made of tanned leather and is about a size 7. It is one of the oldest shoes ever found in the world and the oldest shoe ever discovered in Norway.

Norway's Glaciers Release over 2,000 Artifacts
Scientists in Norway have been working on an Archaeological program called "Secrets of the Ice Project." They have uncovered at Norway's highest mountains in Oppland, thousands of objects that date as far back at 4,000 B.C., including wooden skis, bronze-age arrows and wooden shafts, Viking swords, clothing and the skulls of pack horses. Objects recovered were not spread out evenly over time. Some eras saw a clustering of artifacts while others saw relatively few.
Mexico's Tallest Volcano

On Mexico's tallest volcano, Pico de Orizaba, ice patches are melting near its summit. The thaw has unnerved archaeologists, given hope to relatives of lost mountain climbers and solved mysteries of old plane crashes. Pico de Orizaba is a popular mountain for climbers to train for high-altitude climbing. But for many climbers, it had been the last mountain they had climbed. They've been buried by avalanches or swallowed by crevasses. But now the mountain is spitting back their bodies.

Climbers in 2015 at an elevation of 18,491 feet, had come across a head poking out of the snow. It was a mummified climber, a member of a Mexican expedition hit by an avalanche on November 2, 1959. Some climbers fell near the Chimichco ridge, their bodies frozen in an icy time machine, only to re-emerge 56 years later. When archaeologists starting digging up the body, they discovered another body. Still evident was the rope connecting the bodies, and remnants of a red sweater. At the same time, another body was found at 16,900 feet on another side of the mountain. The body was only wearing a suit inappropriate for a freezing climb. Scientists believe the body may have been thrown from a small plane that crashed on Orizaba in 1999.

Viking Artifacts

As the ice is melting in Juvfonna, Norway, scientists have discovered hunting gear made from reindeer they believe was used by the Vikings. The artifacts are being found littering the edge of a melting Juvfonna ice field. Scientists are finding hundreds of artifacts! In Norse mythology, Jotunheimen Mountains were the home of ice giants. Now scientists are finding what the ice giants of lore used in their daily lives. Specialized hunting sticks used to drive reindeer, bows and arrows, and leather shoe remnants have been found in the area. They date back as far as 3,400 years ago. Using GPS positioning of each of the items found, scientists are able to calculate that the Vikings drove the reindeer using the specialized sticks that had a piece of wood attached to the end of the stick by string, so the wood flapped about. The Vikings stood about 6.5 feet apart from each other and the noise of the drivers and their flapping wooden sticks pushed the reindeer towards the hunters.
The Frozen Inca Children

In 1999, at a 22,000 foot summit of Mount Llullaillaco, a volcano in Argentina, three Inca children were discovered entombed on the frigid mountaintop for 500 years. Their frozen bodies were among the best preserved mummies ever found, with internal organs intact, blood still present in the heart and lungs, skin and facial features mostly unscathed. The cold and dry thin air mummified the bodies. They froze to death as they slept, and 500 years later still looked like sleeping children, non mummies. The children were called the "Los Ninos" or "the children." They have been CT scanned, x-rayed and biopsied for DNA. The cloth, pottery and figurines buried with them have been thawed and preserved. But the bodies are kept in freezers. Only one mummy has been on display. The 15 year old girl was exhibited for the first time. The children were sacrificed as part of a religious ritual, known as capacocha. They walked hundreds of miles to and from ceremonies in Cuzco and were taken to the summit of Llullaillaco and given chicha (maize beer) and once were asleep, placed in underground niches, where they froze to death. It was an honor to be chosen, and only beautiful, healthy, physically perfect children were chosen. Inca beliefs state that the children did not die, but joined their ancestors and watched over their villages from the mountaintops like angels. One of the children was a 6-year old girl that had been struck by lightning sometime after she died, resulting to burns on her face and upper body and clothing. Both the 6 year old girl and the 7 year old boy next to her had elongated skulls, created by head wrappings when they were a baby. A sign of high social status, possibly even royalty. DNA tests revealed the children were not related, and CT scans showed that they were well nourished and had no broken bones or injuries. The 15 year old girl had a sinus infection as well as a lung condition called bronchiolitis obliterans. Possibly a lung infection.

The mountains around this discovery are home to at least 40 other burial sites from ritual sacrifices. But native people want their bodies to be left where they lay. Only as the snow continues to melt, more bodies will appear.
Engaging Questions!

1. Climate change (Global warming) is melting and retreating major glaciers around the world. It is having such a negative effect on the planet, but at the same time revealing amazing ancient artifacts. What are your thoughts about this?

2. Do you think they will continue to find ancient artifacts going back further in time?

3. Will scientist be able to learn more about our ancient ancestors by the discoveries being made from the melting ice?

4. Do you think any items will be recovered that may change what we know about our history?

5. Should bodies discovered in the melting ice be left where they were found or should scientists be allowed to remove and study the bodies?

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