HISTORY

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FIRST STEP TO 'FULL VICTORY'

COLD CASE
MURDER OF ÖTZI THE ICEMAN

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ÖTZI

INVESTIGATION:

In 1991 the body of a murdered man was discovered high in the Alps. Killed more than 5,000 years ago, studies of the Iceman haven't revealed who did it, but they have given rich insights into life in the Copper Age.

ROSA M. TRISTÁN

FROZEN IN TIME

The glacier of Haußlabjoch spans the Ötztal Alps where Ötzi's body was discovered in 1991. Using his mummified remains, Dutch artists Affens and Adrie Kennis created a 3D model of him (left), housed at the South Tyrol Museum of Archaeology in Bolzano, Italy.
Picture the scene: It’s early summer in the Alps. A bearded, middle-aged man haikes up a glacier, some 10,000 feet above sea level, close to the modern border between Austria and Italy. He is dressed practically to protect him from the cold and wet conditions in the mountains: warm trousers and a long cape, snowshoes, and a furry cap. The man’s right hand has a deep cut from a recent skirmish that is just beginning to heal. He stops to rest and eat. He thinks he’s found safety here, but he’s wrong.

The bearded man is unaware he is being followed. An enemy stands undetected a few feet away. Target in sight, he rocks an arrow, carefully aims, and fires. It is an excellent shot, plucking him in the back. The man falls to the ground and dies. His possessions lie scattered around him; his attacker does not take them, not even a valuable copper ax.

A Murder Inquiry
The bearded man rocketed to international fame after his body was discovered by two mountaineers on an Italian glacier in September 1991. Nicknamed Ötzi—for the region of the Alps where he died—scholars have been piecing together his story for almost three decades, looking for clues about not only his death but also his life.

Ötzi lived during the Chalcolithic, or Copper Age, some 5,300 years ago, a time that just precedes the building of the oldest part of Stonehenge in England. Since his discovery, Ötzi has become one of the most studied corpses in history. Because his body was so well preserved, scientists have learned much from it about health, diet, disease, and genetics during the Copper Age.

A remarkable amount about the Iceman’s body has been revealed because of advances in science. Samples of his DNA were taken from his pelvic bone in 2008, and his genome was sequenced. His genetic heritage was a common one for the period, born out of the great Neolithic migration that occurred from the Near East to Europe about 8,000 years ago. As far as scientists can tell, the descendants of such people long ago died out in mainland Europe. However, Ötzi still has living relatives. The DNA of many people on the Mediterranean islands of Corsica and Sardinia closely matches his.

Lying until 46, Ötzi was quite advanced in years for the time. He weighed just 110 pounds and stood around five feet three inches tall. His mumified body is shorter, as it shrank during the five millennia it spent frozen in ice. Tattoos covered parts of his body. Study of his tool kit and weapons reveals he was right-handed. He had brown eyes and shoulder-length dark brown hair. He had all of his teeth and very little body fat.

The studies have also revealed much about his health. In common with many fellow Europeans at the time, who had only recently changed to farming livestock, Ötzi was likely lactose intolerant and had a genetic predisposition to heart disease, which would have been exacerbated by a diet of fatty meat. The presence of the bacteria Borrelia burgdorferi in his blood shows that he suffered from Lyme disease, contracted through being bitten by an infected tick. He also suffered from gum disease, gallstones, and arthritis.

Ötzi’s possessions and clothes were also well preserved by the frigid environment on the glacier. Many of these items were made of materials that are unlikely to survive in temperate conditions, so these rare artifacts yielded new insights into Copper Age culture and technology.

Ongoing Inquiries
Despite the huge strides in fleshing out Ötzi’s life, researchers hope that more discoveries about him lie ahead. After the real circumstances of Ötzi’s death came to light in 2001, scholars began asking more questions about the society in which the Iceman lived. How common was physical violence and murder in this part of the Alps more than 5,000 years ago?

Scholars are also investigating more about Ötzi himself. His possessions may indicate what his occupation and social status were. Of particular interest is where Ötzi and his people originated and lived. The Alps may have been where he died, but archaeologists are still exploring if that region is where he lived most of his life.

The following sections of this article will explore in more detail what is known of the man whose death more than 5,000 years ago has captured the imagination of the modern era: the discovery of his body; the clues to his murder; his tools and weapons; his health; his origins; and the theories about his last days on Earth....
SCENE OF THE CRIME

On September 19, 1991, while descending the Fischnitze peak in the Otztal Alps, German mountaineers Erika and Helmut Simon stumbled across a human body protruding from the ice near the Austro-Italian border. They assumed it must be the remains of a mountaineer. Believing the spot to lie just within Austria, the Simons alerted the Austrian authorities, who also believed the body to be that of a disappeared mountaineer. In the course of freeing the corpse from the ice, a bone in the upper left arm was accidentally broken. The body was then transported by helicopter to the Austrian city of Innsbruck, where an autopsy was conducted.

AUTHORITIES observed the area where the man was found and noticed a number of ancient-looking items scattered around the scene. They deduced that this death was no recent Alpine accident, but something much older. Archaeologists, including Konrad Spindler of the University of Innsbruck, were called in. Spindler's team carried out the first studies of the man's body and determined that it was thousands of years old. The Iceman's age and his story generated huge public interest, and the press reported every detail. They even gave him a nickname: Ötzi, for the Otztal range where he was found. A survey concluded that Ötzi had been found on the Italian side of the border, so in 1998 his body was transferred to the South Tyrol Museum of Archaeology in Bolzano, Italy, where it remains today.

EMBEDDED IN ICE

After the body was found in September 1991, authorities wanted to move it before it attracted too much attention among the mountaineering community. Two South Tyrolian mountaineers, Hans Kammerlander (left) and Reinhold Messner (right), were able to view the site two days after discovery. Messner was one of the first to suspect that the body was much older than initially thought.
FOUL PLAY
CAUSE OF DEATH

The circumstances of Otzi's death were not immediately obvious to researchers. In 2001 Paul Gostner, a chief radiologist at the general hospital of Bolzano, made the startling discovery that earlier x-rays had not picked up a small wound in the upper left back. The injury showed no outward signs of healing, which meant Otzi sustained it around the time he died. Confirming the cause of death, subsequent scans revealed an arrowhead buried in his back. Science had uncovered a murder.

Forensic experts believe that the arrow entered his back, broke through the shoulder blade, severed the subclavian artery, and came to rest an inch from his lung. The Iceman would likely have experienced paralysis in his right shoulder and fallen to the snow in shock. Death from rapid blood loss would have occurred in a matter of minutes. The skull also bears evidence of injury, which could have been sustained when Otzi fell or if his attacker struck him in the head.

Otzi's body was found lying face down with the left arm stretched diagonally across the upper chest, a position that supported the theory of his death. It is likely he fell forward, which pinned his left arm under him. After the arrow found its mark, someone (perhaps his attacker or perhaps even Otzi himself) tried to remove the arrow but broke the shaft, which left the arrowhead in the body. Otzi perished in the snow—either from a final, fatal blow to the head or from hypothermia—and lay in this position until he was found more than 5,000 years later.

FATAL FALL

Gregory A. Harlin's watercolor for the National Geographic Society imagines Otzi's final moments on the Alpine glacier.

COLD STORAGE

Since 1998 Otzi has been housed at the South Tyrol Museum of Archaeology in Bolzano, Italy, in a specially constructed cold chamber (below) maintained at 21°F (-6°C) and 99 percent humidity to re-create conditions from the glacier. Visitors to the museum can see him and his chamber through a small observational window. Keeping his body below freezing has allowed many different scientific examinations. Researchers have carefully studied Otzi's hair, his skeleton, wear patterns on his teeth, parasitic eggs in his gut, numerous tattoos on his skin, the blood that ran in his veins, and even his last meal.

Wear and Tear

Otzi's joints all showed age-related damage, but his left thigh shows signs of being scavenged.
DEAD MAN'S POSSESSIONS

THE THINGS HE CARRIED

The objects found scattered near the body presented researchers with new clues about life in the Copper Age. His combination of weapons and tools, as well as the warm, strong clothing he wore, suggests he was headed on a long journey. Many objects were very worn with use, but one item was still being fashioned, which perhaps suggests he did not have much time to prepare for his journey. Some of the items are unique. His copper axe is the only one of its kind that has ever been found, and strongly suggests he enjoyed high status. Fixed to the haft with birch tar and leather straps, the copper blade was mined in central Italy. Scholars believe it would have been used to fell small trees and for combat.

TWELVE ARROW SHAFTS were found in his deerskin quiver, two of them with flint arrowheads. He was also carrying a long yew shaft, which appeared to be an unfinished bow. Two birch-bark containers were found, one with signs of charring and fragments of charcoal and leaves. This container suggests that Ötzi carried embers in order to quickly start fires.

ÖTZI'S ATTIRE was designed for warmth and dryness. His hat was made of bearskin and his cloak of goat and sheep hides. His footwear is the world's oldest known pair of snowshoes, made of deerskin stretched around a webbed frame of tree bark that could be packed with dried grass. If the grass became wet, then he could replace it with new, dry material.


COPPER AGE MEDICINE

THE VICTIM'S CONDITION

Aside from the fatal injuries on Ötzi's body, he appeared to be in good health before he died. Living until his mid-40s, he had reached a relatively advanced age for his time, and his body bore the signs of a lifetime of medical care.

The Iceman's joints show that he likely suffered from arthritis and back pain. Scholars found tattoos on Ötzi's skin, clustered in areas where he might have experienced symptoms. In 2015 new scans of the body mapped 63 tattoos across Ötzi’s body. Nearly all of them have been found on, or near, the joints or the lower back. The tattoos were drawn by making small cuts in the skin and injecting charcoal for the design. Some studies have found that the tattoos were related to an early form of acupuncture. Most are groups of horizontal or vertical lines, but there are also two crosses. Two groups of lines appear on the chest, perhaps in an attempt to alleviate his cardiac condition (arteriosclerosis).

Ötzi's body and analysis of his belongings also yielded medical insights. Among the objects found near his body was a fungus, Fomes fomentarius, known for its antibacterial properties. Traces of bracken fern were also found in his stomach, which was used to treat intestinal parasites. All of the evidence supports the notion that medical care was an important part of the Iceman's culture.

ANCIENT INK

For many years, only about 30 tattoos had been identified on Ötzi's body, but in 2015 this figure doubled after multispectral photography revealed many more. The two images (right) indicate their positions on the mummy.
COPPER AGE CLUES

ÖTZI'S ORIGINS

Analysis of Ötzi's bones reveals he spent one to two months a year in the mountains. Earth scientist Wolfgang Müller suggested that this finding is consistent with working as a farmer and herder, growing crops in the valleys, and spending the summer months in the Alps with flocks. Researcher Thomas Løy argued that the same evidence supports the case that Ötzi was a specialist mountain hunter, who became involved in a deadly turf war with other hunters.

Scientists have found other clues that point to his possible origins. The grains he was carrying were farmed, suggesting he lived in a farming community. The central Italian copper in his ax has led some researchers to suggest he was from farther south, but he could have acquired such an object through trade. Analysis of his bone revealed isotopic signatures consistent with the Alpine valleys, suggesting Ötzi was born and raised in the shadow of the mountains where he died.

HIGH AND LOW

The valley floor spreads beneath the Gaislachkogel in Austria's Ötztal Alps. For thousands of years farming had slowly spread through these valleys. By Ötzi's lifetime in the Copper Age, some communities had already become well established here, farming throughout the year, and herding in the high Alpine pastures in the summer.

THE COPPER AGE

The period when Ötzi lived is now known by historians as the Copper Age, which lasted through the fourth and third millennia B.C. Total dependence on stone tools was ending. Although the techniques to make bronze would not be widespread until the end of this period, farmers were transitioning to more sophisticated metalworking and making copper implements for the first time. Ötzi owned a pure copper ax, a very valuable tool for its time. The period saw refinement in ceramic-making techniques, and increased agricultural productivity thanks to the plow.

STATUS SYMBOLS

A stele from the Copper Age (c.3000 B.C.) from Italy is decorated with precise geometric designs and images of tools and weapons, including axes.
THE MURDER MYSTERY

ÖTZI'S LAST HOURS

Although historians now know an arrow brought about Ötzi's death, they are still putting together what preceded the attack. In 2005, a DNA analysis was conducted by an Australian molecular anthropologist, Tom Loy, which provided some valuable clues: Analysis of Ötzi's clothing showed evidence of blood from four other individuals, leading researchers to think he could have been in a fight a day or two before his death. His right hand was deeply cut, probably caused by contact with a pointed, sharp object. The skin had started to heal, which means the wound must have been sustained about two days before he died.

These clues have allowed researchers to piece together a theory of the murder: Ötzi had a confrontation with one or several men and climbed the mountain to flee from his enemies. Believing himself to be safe, he stopped near a glacier and lit a fire to cook a meal of red deer and ibex. Soon after he finished eating, the Iceman was ambushed and killed.

Science has revealed the murder method, but not the motive. The injuries on Ötzi's body do not give much indication as to why someone wanted him dead. Theft seems unlikely as a valuable copper axe and other weapons were left behind. Some theorize Ötzi had defeated an enemy in a skirmish a few days before his death. The loser, perhaps humiliated by the loss, followed Ötzi up the mountain to take revenge. As many answers as Ötzi's death has provided, this case may remain unsolved forever.

LAST SUPPER

Scientists thought Ötzi was a vegetarian until a 2018 study of his stomach contents (right) revealed a belly full of meat as well as traces of fern. The plant may have wrapped his food or may have been ingested for medicinal purposes.

ANCIENT AMBUSH

A modern painting depicts several assailants attacking Ötzi from behind; a theory of his murder. After the arrow has struck, the Iceman realizes that he has been shot. A moment later, struck with shock, he will pitch forward and fall, never to rise again.

MURDER WEAPON

The stone arrowhead that struck Ötzi was first spotted in his body in 2001. 10 years after the body was discovered, Ötzi's quiver contained arrowheads, but they were distinct from the one that killed him. Made of flint from an area about 30 miles away, Ötzi's arrowheads were of better quality than those of his attacker. Arrowheads were regarded as valuable objects, which makes it likely that the murderer tried to retrieve it from Ötzi's body after his death. It appears that the shaft broke and the arrowhead stayed in the body, where it would tell its grisly tale more than 5,000 years later.

FIND OF ÖTZI'S TOOLS SHOWING THE ENTRY POINT OF THE ARROW (SCANNED X-RAY)

SHAVE MARKS ON INJURED AREA