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## THE ICEMAN

On 19 September 1991 a couple from Heidelberg, Germany, were hiking high in the Tirolean Alps when they spotted what turned out to be a desiccated, yellow-brown human body lying at an altitude of more than 3,200 meters (10,500 feet) by the Similaun glacier in the Ötztaler Alps. At first believed to be one of the modern corpses that occasionally come to light in these mountains, the Iceman, Similaun Man, or "Ötzi," as the body was nicknamed, proved to be the oldest fully preserved human that has so far come down from prehistory.

Contrary to popular belief, Ötzi is not a mummy but a naturally preserved body. It was not preserved in a glacier but rather seems to have undergone the same process as did the frozen mammoths of Siberia, in that the buildup of ice in the sediments enveloping the body caused its preservation: the ice layers desiccated the soil and dehydrated the corpse. Unlike freeze-drying, which leaves an object intact, this process shrivels the body. The corpse was excavated very crudely, using ski poles, ice picks, and a pneumatic hammer. Nobody had any idea of its age or importance. Damage was caused, particularly to the left hip. It then was taken to Universität Innsbruck (Innsbruck University), Austria, and the many objects and garments later found in the vicinity were taken to Mainz, Germany, to be preserved. Precise measurements at the spot where the body was found proved that it had been lying 93 meters (305 feet) inside the Italian border. For this reason, on 16 January 1998 Ötzi was transferred to a permanent home in the new Südtiroler Archäologiemuseum (South Tyrol Museum of Archaeology) in Bolzano, Italy, where he is displayed today in a chamber with constant humidity and a temperature of –6°C (21°F), along with all his restored equipment.

The first assessment was that the Iceman's axe had a bronze blade and that the Iceman himself probably was about 4,000 years old. Subsequent examination, however, showed that the metal was almost pure copper, and radiocarbon dating of the body, of grass from the garments, and of artifacts placed the Iceman at c. 5,350–5,100 years ago, the Copper Age (Late Neolithic) in this region. The immense importance of the Iceman is that, for the first time, researchers are presented with a time capsule: a figure from the remote past together with his everyday clothing and equipment. This is in stark contrast to the vast majority of prehistoric human remains, which are in the form of skeletons or ashes or which, even when buried or mummified, are ac-

companied by specially chosen clothing and objects. Of course, organic materials—from which most ancient artifacts were made—normally disintegrate through time and thus elude the archaeologist completely. The Iceman's well-preserved and frozen equipment and garments have revealed an enormous amount of information about the tremendous range of materials that played a major role in prehistoric life—before this discovery, absolutely nothing was known of Copper Age clothing or perishable equipment in Europe.

For example, no fewer than eighteen types of wood have been identified in the Iceman's seventy artifacts. The articles include a flint dagger with an ash haft, or handle, in a woven grass sheath; an unfinished yew longbow; a deerskin quiver with fourteen arrows of viburnum and dogwood, only two of which were finished; an axe with a yew handle and a copper blade glued in place with birch pitch and leather straps; two sewn birch-bark containers that held what may be embers for starting a fire; a fur backpack with a frame of hazel and larch; a net of grass twine that may have been used for catching birds or small game; a short rod of linden with a fire-hardened piece of antler embedded at one end, probably used for working flint tools; two round pieces of birch fungus attached to leather slips, which are thought to have had a medicinal purpose; and a marble disk with a perforation at its center attached to a leather strip and a tassel of leather thongs.

Microscopic analysis of the tool surfaces showed traces of animal hair, blood, and tissue, suggesting that the Iceman recently had killed or butchered a number of animals, such as chamois, ibex, and deer. Deposits of large, partly cooked or heated starch grains on the axe blade, where lashed to the shaft, have led to the suggestion that one of his last acts was to repair or refit the shaft while eating porridge.

The Iceman's clothing comprised much-repaired leather shoes (with bearskin soles and deerskin uppers) stuffed with grass for insulation; goathide leggings and loincloth; a calfskin belt and pouch; a cape of woven grass or reeds of a type still worn by Alpine shepherds in historical times; a coat made up of pieces of tanned domestic goat hide sewn together with animal sinews; and a bearskin cap. Archaeologists are surprised that he was wearing nothing of wool, even though textile fragments

**Fig. 1.** A reconstruction of what the Iceman might have looked like before frozen on the Tirolean Alps. © South Tyrol Museum of Archaeology, Italy, www.iceman.it. Reproduced by permission.

are known from this period in Europe. Everything appears beautifully adapted to the Alpine conditions. Indeed, experiments with exact replicas worn or carried by a man following sheep in their transhumance, or seasonal migration, up through the snow have shown that the coat was warm, the longbow was invaluable as a climbing pole, and the copper axe also was very useful for climbing in snow. The Iceman's shoes proved to be a disaster—fragile, with no traction in snow and no resistance to water. Why, with his beautifully designed clothing and equipment, was he wearing such useless footgear?

### HOW DID HE DIE?

Ever since the discovery, much speculation has centered on the Iceman's identity and the cause of his death. It has been suggested that he was a hunter,

a shepherd (but he has no shepherding equipment), a metal prospector (because of traces of arsenic in his hair, perhaps from copper smelting), and, inevitably—following one fad in archaeology—a "shaman" (for which there is no evidence whatsoever). DNA analysis of his intestinal contents has revealed that his last meal consisted of red deer meat and possibly cereals and that earlier he also had eaten ibex. Pollen from the hop hornbeam in his stomach has shown that he died in late spring or early summer—probably in June. It is known from the pollen (which he inhaled about six hours before death), as well as from the specific kinds of flint in his equipment, that he came from the Katarinaberg area, to the south in Italy, where he doubtless inhabited a farming village.

The man was in his middle to late forties (quite old for the time) and dark-skinned. He stood about 1.57 meters (5 feet, 2 inches) in height and was of average build, weighing about 50 kilograms (110 pounds). He was not in good physical condition and clearly had lived a hard life. His lungs were blackened by the smoke from fires, he had hardening of the arteries, his teeth were worn (probably from coarsely ground grain) albeit free of cavities, his toes showed traces of frostbite, and some of his ribs had been fractured and then had healed. There are small tattoos, mostly short lines and a cross, at various points on his lower back, knees, ankles, and left wrist, which were made by rubbing charcoal into small cuts. These marks may have been therapeutic, being linked to the places where he clearly had arthritis, and speculation has even been made about ancient acupuncture methods.

Finally, one of his fingernails was recovered. (Like his hair, the nails had fallen off the body in the course of his preservation.) Dark lines in the nail revealed that he was prone to regular periods of severe disease or malnutrition (which affected nail growth) during the months before his death. Despite melodramatic published accounts that portrayed him as a desperate man, fleeing from a "pogrom" or massacre in his village, he actually appeared to be an already enfeebled person who perhaps had been caught by a storm on the mountain and succumbed to the elements. Even today sudden storms are all too frequent in this region and can find the most experienced traveler unprepared. The fact that the Iceman was naked, or almost naked, when he was found points strongly to hypothermia, a condition that makes one feel incredibly hot just before freezing to death, leading one to strip off clothing; this has been confirmed by analyses that indicate that his body had an elevated temperature at death.

A CT scan later showed something that earlier X rays had missed—the presence of what appears to be a stone arrowhead lodged in the Iceman's upper-left shoulder. A hole in the shoulder blade is thought by some researchers to be an entry wound, and a minute slit in his back is thought by some to be the external entry wound that never healed, although it could well be damage caused during the Iceman's manhandling at the time of discovery. Nevertheless, reckless speculation immediately began that he had been stalked and murdered or deliberately sacrificed by an archer. It has not been established that this arrowhead caused his death; if it did so, where is its shaft? After all, the Iceman's own arrows were preserved beautifully, so why did the shaft of this one disappear? Could it be something other than the vestige of an old hunting accident?

Two deep wounds also have been detected on his right hand and wrist, and it appears that something sharp penetrated the base of his right thumb, causing a serious injury not long before he died. These marks also have led to speculations about hand-to-hand fighting. If the Iceman was indeed defending himself, fighting for his life against a knife-wielding attacker, as has been suggested, then one would expect to find many more slash marks on his forearm or puncture wounds in vital areas of the body. In short, even after years of study, the Iceman is still presenting researchers with enigmas and surprises, and we still do not know how he died, let alone what his occupation was or why he was on the mountain.

Nonetheless, Ötzi unquestionably is one of the greatest archaeological finds of all time, a unique package of data about the life and culture of Europeans in the Copper Age. A tremendous amount has been learned from him and his equipment by using a wide range of scientific techniques. The Iceman also has become one of the most famous people in the world, visited by tens of thousands every year. Despite all the poking and prodding he has undergone at the hands of scientists, his remains are treated with great respect by the public. In the museum at Bolzano, one needs to mount a podium and

peer through a small window to see Ötzi, and the audio recording reminds the visitor that this is not a museum exhibit but a human corpse. Several other museums around the world have full-size reconstructions of the Iceman as he might have looked in life, complete with garments and equipment. Like many other finds with global appeal, the Iceman has made a considerable contribution to the popularity of archaeology. His greatest legacy undoubtedly is the vast amount of information he has provided from beyond the grave, information that, but for the sharp eyes of two hikers, might have been lost forever.

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## ARBON-BLEICHE 3

The site Arbon-Bleiche 3 is on the Swiss side of Lake Constance, within the territory of the modern village of Arbon. The site of the Neolithic lake-dwelling settlement lies a few hundred meters back from the present-day lakeshore. In Neolithic times the village was situated in a bay, near small inlets. Three excavation campaigns between 1993 and 1995 saw nearly half of the Neolithic village recovered, including remains of twenty-five houses plus two small storehouses. The entire village must have comprised about fifty houses. If we calculate about six to ten persons for each house, the population of the village would have ranged between three hundred and five hundred.

Based on samples from the house posts, dendrochronology gives exact dates for the settlement and helps trace its construction history. The first building work in the village began in the year 3384 B.C., when a single dwelling was raised. In the following year, only two more houses were built. More houses were constructed over the next few years, until the entire village had been completed. This settlement history makes it clear that during the construction of Arbon-Bleiche 3, part of the village community must have lived elsewhere, in another village.

In the year 3370 B.C., catastrophe struck as the entire village burned. Arbon-Bleiche 3 had existed only fifteen years and was never rebuilt. Thus, archaeologists were presented with a single-layer settlement containing material deposited over a very short time, making it easy to reconstruct the village plan. All the houses had been constructed using posts of white fir and arranged in separate rows with their long sides facing the lake. There also seems to have been one broad lane running toward the lakeshore. Some evidence suggests that the house floors were raised slightly above the ground.

From this period not much evidence exists for lake-dwelling sites and cultural developments in Switzerland, probably the result of climatic conditions that led to erosion of the deposited archaeological layers. Arbon-Bleiche 3 was preserved fortuitously by the presence of a nearby small river. Flooding from the river covered the remains of the destroyed village with a protective layer of sand.

The Pfyn culture predominated in the region of Lake Constance before the thirty-fourth century B.C. Its material remains are characterized by, among other things, ceramic pots with S-profile walls. After this time Horgen culture finds dominate at Late Neolithic sites. These ceramics look like