**Oetzi, the Iceman**

Ötzi the Iceman, Frozen Fritz, and Similaun Man are modern nicknames of a well-preserved natural mummy of a man from about 3300 BC (53 centuries ago), found in 1991 in the Schnalstal glacier in the Ötztal Alps, near Hauslabjoch on the border between Austria and Italy. The nickname comes from Ötztal, the region in which he was discovered. He is Europe's oldest natural human mummy, and has offered an unprecedented view of Chalcolithic (Copper Age) Europeans.

Discovery

Ötzi was found by ……………………………………………., on 19 September 1991. The body was at first thought to be a modern corpse, like several others which had been recently found in the region. Lying on its front and frozen in ice below the torso, it was crudely removed from the glacier by …………………………………using a small jackhammer (which punctured the hip of the body) and ice-axes using ………………..……… methods. In addition, before the body was removed from the ice, people were allowed to see it, and some took ………………………………. as souvenirs. The body was then taken to ………………… in Innsbruck where its true age was subsequently ascertained. However, during a press conference that was held, people were allowed to …………………………………………. As a result of this, ………………………. began to grow on the Iceman's skin.

Subsequent surveys in October 1991 showed that the body had been located 92.56 meters inside Italian territory. Since 1998 it has been on display at the South Tyrol Museum of Archaeology in Bolzano, Italy.

Scientific analyses of Ötzi

The body has been extensively examined, measured, X-rayed, and dated. ……………….……………………. have been examined microscopically, as have the items found with the body. In August 2004, frozen bodies of …..……………………………… killed during the Battle of San Matteo (1918) were found on the mountain of San Matteo in the Trentino region of Italy. One body was sent to a museum in the hope that research on how the environment affected its preservation will help to find out about Ötzi's past and future evolution.

The body

By current estimates, at the time of his death Ötzi was approximately ………… m (5 ft 5 in) tall, weighed about ……… kg (110 lb/7.9 st) and was about 45 years of age. When his body was found, it weighed 38 kg (84 lb/6.0 st). Because the body was covered in ice shortly after his death, it only partially deteriorated. Analysis of pollen and dust grains and the isotopic composition of his tooth enamel indicate that he spent his childhood ………………….………………………………., but later went to live in valleys about 50 km further north. Analysis by Franco Rollo's group at the University of Camerino has shown that Otzi's mitochondrial DNA belongs to the K1 subcluster of the mitochondrial haplogroup K, but that it cannot be categorized into any of the three modern branches of that subcluster.

Analysis of Ötzi's intestinal contents showed two meals (the last one about …………….. before his death), one of chamois meat, the other of red deer meat. Both were eaten with some ……….. as well as some ……….. and …………. .. The grain from both meals was a highly processed einkorn wheat bran, quite possibly eaten in the form of bread. There were also a few kernels of sloes (small plum-like fruits of the blackthorn tree). …………………… was used to examine his diet from several months before.

Pollen in the first meal showed that it had been consumed in a mid-altitude …………………., and other pollens indicated the presence of wheat and legumes, which may have been domesticated crops. The pollen was very well preserved, with even the cells inside still intact, indicating that it had been fresh (a few hours old) at the time of Ötzi's death, which places the event in the spring. Interestingly, einkorn wheat is harvested …………………………, and sloes in the autumn; these must have been stored since the year before.

High levels of both copper particles and arsenic were found in Ötzi's hair. This, along with Ötzi's copper axe which is 99.7% pure copper, has led scientists to speculate that Ötzi was involved in copper smelting.

By examining the proportions of Ötzi's tibia, femur and pelvis, Christopher Ruff has determined that Ötzi's lifestyle included long walks over hilly terrain.

This degree of mobility is not characteristic of other Copper Age Europeans. Ruff proposes that this may indicate Ötzi was a high-altitude shepherd.

Health

He apparently had whipworm (Trichuris trichiura), an intestinal parasite. During CT scans, it was observed that …………………………………… had been squashed when he had been lying face down after death, or where the ice had crushed his body. Also, it was found that his ……………………………………….. was missing, a natural process from his mummification in ice.

Tattoos

He had approximately 57 carbon tattoos consisting of simple dots and lines …………………….., behind ……………………, and on his right ……………... Using X-rays, it was determined that the Iceman may have had arthritis in these joints. Some scientists suggest that the designs might have been used to mark the passage from youth to manhood, or it has been speculated that they may be related to ………………………... .

Clothes and shoes

Ötzi's clothes were quite sophisticated. He wore a cloak made of woven ……………. and a vest, a belt, a pair of leggings, a loincloth and shoes, all made of leather. He also wore a bearskin cap with a leather chin strap. The shoes were waterproof and wide, seemingly designed for ………………………………; they were constructed using bearskin for the soles, deer hide for top panels, and a netting made of tree bark. Soft grass went around the foot and in the shoe and functioned like warm socks. The vest, belt, leggings, and loincloth were constructed of …………………………………….. sewn together with sinew. His belt had a pouch sewn to it that contained a cache of useful items: a scraper, drill, flint flake, bone arrow, and a dried fungus to be used as tinder.

A recent hypothesis by British archaeologist Jacqui Wood says that Ötzi's "shoes" were actually the upper part of snowshoes. According to this theory, the item currently interpreted as part of a backpack is actually the wood frame and netting of one snowshoe and animal hide to cover the torso.

Cause of death

Initially it had been believed that Ötzi died from …………………. …………………….. Later it was speculated that Ötzi had been a victim of a ritual sacrifice, perhaps for being a chieftain. This explanation was inspired by theories previously advanced for the first millennium B.C. bodies recovered from peat bogs, such as the Tollund Man and the Lindow Man. In 2001 X-rays and a CT scan revealed that Ötzi had an arrowhead lodged in one shoulder when he died, and a matching small tear on his coat. The discovery of the arrowhead prompted researchers to theorize Ötzi died of ……………………………….., which would likely have been fatal even if modern medical techniques had been available. Further research found that the arrow's shaft had been removed (when)..………………………, and close examination of the body found bruises and cuts to the hands, wrists and chest and cerebral trauma indicative of a blow to the head. One of the cuts was to the base of his ……………. that reached down to the bone but had not had time to heal before his death. Currently it is believed that death was caused by a ………………………………………, though researchers are unsure if this was due to a fall, or from being struck with a rock by another person.

DNA analysis revealed traces of ……………… from four other people on his gear: one from his knife, two from the same arrowhead, and a fourth from his coat. Interpretations of the findings were that Ötzi killed two individuals with the same arrow, and was able to retrieve it on both occasions, and the blood on his coat was from a wounded comrade he may have carried over his back. Ötzi's unnatural posture in death (frozen body, face down, left arm bent across the chest) suggests that theory of a solitary death from blood loss, hunger, cold and weakness is untenable. Rather, before death occurred and rigor mortis set in, the Iceman was turned on to his stomach in the effort to remove the arrow shaft.

The DNA evidence suggests that he was assisted by companions who were also wounded; pollen and food analysis suggests that he was out of his home territory. The copper axe could not have been made by him alone. It would have required a concerted group tribal effort to mine, smelt and cast the copper axe head. This may indicate that Ötzi was actually part of an armed raiding party involved in a skirmish, perhaps with a neighboring tribe, and this skirmish had gone badly. It may also indicate that he was ambushed or attacked by a rival tribe's raiding party on his way to deliver the axe. When the Iceman's mitochondrial DNA was analyzed by Franco Rollo and his colleagues, it was discovered that he had genetic markers associated with …………………………………………. . It has been speculated that this may have affected his social acceptance.