For more than 150 years, global warming has caused melting of glacial masses at the poles and, even more strikingly, in the Alps. In the high mountains, this phenomenon — which succeeded the cold period of the Little Ice Age (14th–19th centuries) — has exposed many areas previously covered by ice. It is estimated that between the middle of the 19th and the end of the 20th century, glacial surfaces decreased by 50% in the Alpine massif. Archaeological objects, some of which are several millennia old and preserved by freezing, are appearing in the open air. These finds are profoundly altering our understanding of the use of high-altitude passes and the life of communities outside inhabited areas.

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Glacial archaeological heritage in Switzerland: opportunities and risks

The last glacial maximum occurred about 25,000 years ago. Subsequent- ly, prehistoric communities re-colonised the Alps, using the resources available from the plains to the high mountains. These groups spread relatively quickly in areas above the upper limits of the forest to regions amenable to hunting and gathering, grasslands used by shepherds and their herds, and sites where raw materials could be extracted. High-altitude passes were regularly used for transport and movement from valley to valley. In deglaciated areas, mainly on the northern slopes of the mountains and above 2700 m, remains are emerging that bear witness to these activities, sometimes quite touchingly.

A «new» field of endeavour

At the end of the 20th century, following the accumulation of discoveries resulting from glacial retreat, steps were taken in several regions of the world to safeguard and study these remains. These efforts gave rise to a new field of research called glacial archaeology, which deals with a heritage threatened with short-term extinction: organic remains (wood, leather and textiles), preserved by ice for millennia, are suddenly being exposed to the open air and are at risk of rapidly degrading.

In the Alps, glacial archaeology is said to have been born in 1991 with the discovery of Ötzi, the Neolithic Iceman in Tyrol, the archaeological excavation of the discovery area and subsequently the organisation of a symposium, which was the prelude to a first major monograph in 1992. In one of the scientific contributions to that volume, Werner H. Meyer, archaeologist and professor of medieval history in Basel, detailed the discoveries made in Switzerland. Believing that the latter would continue to accumulate, he urged researchers not to delay in undertaking multidisciplinary cross-border approaches. In Switzerland, his appeal went unheeded until 20 years later, when, following discoveries on the Schnidejoch (Berne/Valais) and archaeological excavations carried out at the pass (2004–2007), research projects were launched in the Alps of Valais (2011–2014) and Graubünden (2015–2016), in parallel with rescue operations.

Glacial archaeology encompasses all periods from prehistoric to modern times. In addition to hunting gear and weapons, finds include items related to transport and travel in the mountains: snowshoes, gaiters, shoes, leggings, carrying equipment and pack saddles, as well as more distinctive pieces, including ornaments, coins and votive objects. In Switzerland, the oldest find comes from Graubünden: at an altitude of 2800 m

The first references to glacial finds were made by alpinists: an article in the English magazine Alpine Club, published in 1854, mentions the presence near the Theodul Pass (Valais/Italy, Valle d’Aosta) of remains of men and mules with their cargo. In the 1940s, Albert Nyfeler (1883–1969), a painter who lived in the Lötschental in Valais, collected many objects near the Lötschen Pass: wooden bows, Roman coins, crossbow bolts, fragments of leather, etc. Fifty years after they were retrieved, the bows were finally studied and radiocarbon dated to 2200–1700 BC. Even more recently, the Archaeological Service of Canton Berne has been collecting fragments of prehistoric bows, a container made of birch bark, etc. in the area. The «Theodul mercenary» (late-16th century) with his personal belongings were discovered in the summer of 1984 by Annemarie Julen Lehner and her brother Peter Lehner of Zermatt (Valais), who over the years collected many objects in the Lötschen area. The «Theodul mercenary» (late-16th century) with his personal belongings were discovered in the summer of 1984 by Annemarie Julen Lehner and her brother Peter Lehner of Zermatt (Valais), who over the years collected many objects and published some of them. In 1992, the «Porchabella Glacier shepherdless», a 20-year-old woman who disappeared at the end of the 17th century, was recovered. The most sensational discovery was made in 2003: at the Schnidejoch, hikers collected prehistoric objects that would be the source of major rescue excavations by Bernese archaeologists (2004–2007) and, later on, by their Valaisan colleagues (2007–2010). The hundred or so wooden, leather and metal objects collected are evidence of the passage of humans between 4500 BC and the early Middle Ages. It is generally worth noting that almost all of the discoveries were made by non-professionals and that collection was not always carried out with sufficient care to ensure proper preservation.

A heritage under threat
The artefacts released by melting ice are at risk of rapid degradation; this extremely fragile heritage, located in high mountains in sometimes inaccessible places, entails delicate and costly sampling operations. The preservation of these pieces and their restoration require the commitment of specialised personnel and substantial infrastructure, as evidenced by the Ötzi mummy. These finds are often located near passes and ridges, straddling a political border. In Switzerland, each canton is responsible for safeguarding the heritage located on its territory, and there are major disparities in the financial resources available for this type of undertaking. It would therefore be prudent to think seriously about coordinating efforts, not only within Switzerland but also in the border regions with Italy, Austria and France.

As mentioned previously, a few research projects have been initiated in Switzerland to identify the most vulnerable areas with in a territory currently covered by more than 900 km² of ice. From 2010 to 2014, a project supported by the Swiss National Science Foundation was carried out in the Valais Alps. Based on the least-cost-path principle, this work has made it possible to identify preferential routes through the massifs and to map the most critical locations from a glacial archaeological perspective. The theoretical routes established by geographers have been compared with...
Leandra Reitmaier-Naef, Thomas Reitmaier. «Cold ice: immensely valuable heritage.

and preserving this very fragile but immensely valuable heritage.

Non-archaeologists in locating, exhuming and preserving this very fragile but immensely valuable heritage.

Despite this pioneering work, the areas as affected by melting are so extensive that ensuring proper management of them seems impossible. The situation is urgent. In the Valaisan Alps, for example, global warming is expected to result in major glacial retreat; it is expected that by 2060, nearly 80% of the current surface will have disappeared. It is therefore essential to establish coordinated efforts between institutions that also involve the participation of non-archaeologists in locating, exhuming and preserving this very fragile but immensely valuable heritage.

References


Resümee


Résumé
Depuis plus de 150 ans, le réchauffement climatique provoque la fonte accélérée des glaciers. Dans les zones alpines, ce phénomène, qui succède à la période froide du Petit Âge Glaciaire (XIVe–XIXe siècle), a conduit à la découverte d’objets archéologiques en haute montagne, vieux pour certains de plusieurs millénaires. Souvent très fragiles, ils renouvellent en profondeur nos connaissances sur la fréquentation des passages de haute altitude et sur le comportement des hommes au-delà des zones habitées. Si, sur le territoire de la Suisse, les premières mentions de trouvailles glaciaires remontent au milieu du XIXe siècle, leur nombre a fortement augmenté à la fin du XXe siècle. Ce n’est qu’après la découverte spectaculaire faite en 2003 au Schneidejoch dans les Alpes bernoises que des interventions de sauvetage ont été entreprises avec, en parallèle, la mise en place de projets visant à mieux localiser les zones les plus sensibles. Il est à prévoir que d’autres trouvailles importantes vont survenir, en particulier dans des secteurs frontaliers; cela devrait inciter les instances en charge de la protection de ce patrimoine à s’associer et à coordonner leurs opérations. Au vu de l’étendue des zones à surveiller, une grande partie des futures découvertes sera le fait des randonneurs et utilisateurs de la haute montagne, nécessitant des actions de sensibilisation à large échelle et l’association des non-professionnels à ces opérations.