EARTH 3rd Group meeting / workshop Team 1

"UNDERSTANDING LOCAL DIVERSITY: FROM ROUTINE PRACTICE THROUGH TO TIMES OF CRISIS AND TRANSFER"

Brig, Valais (Switzerland)
Oberwalliser Mittelschule (OMS) St. Ursula
5th of July – 9th of July 2007

View from the rye/saffron fields at Mund direction Brig and the Simplon pass route. Foto: S. Jacomet

EXKURSION GUIDE AND BACKGROUND INFORMATION

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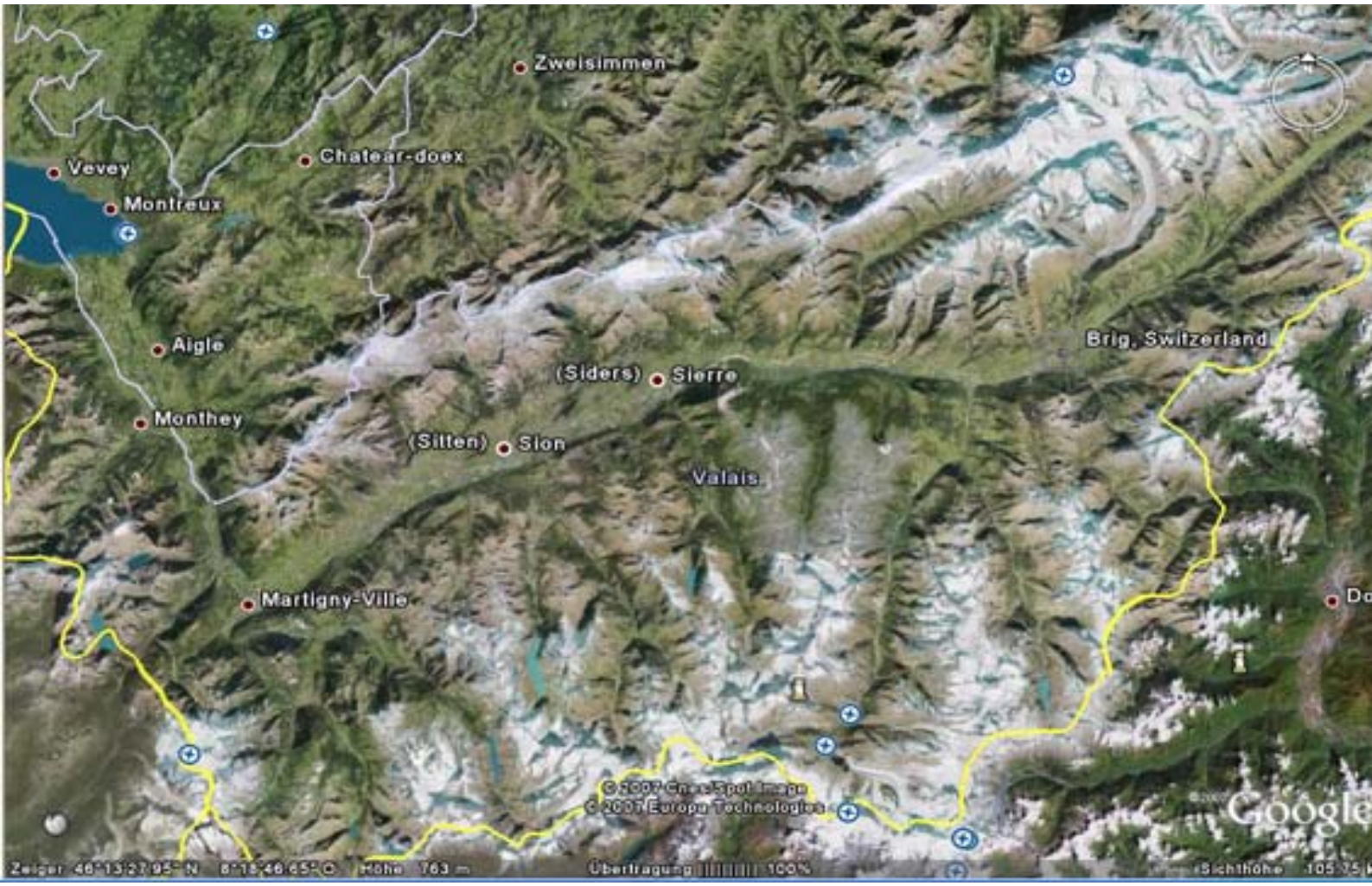

1 Vegetation, especially the Valais rock steppe

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Introduction, General Overview

The vegetation in Valais is marked by various factors. In particular, the climate[1] is important; in the inner alpine dry valleys the average annual temperature is around 1 degree warmer than in the western and northern outer valleys (around 9°C between 500 and 600 m). The inner alpine dry valleys (Fig. 1) receive without exception much less rain in comparison to the southern and northern outer areas, with an average annual precipitation between 450-550 mm. The climate is of a continental type (with cold winters and very hot summers). In addition the soil formation and the altitude zones also differ.

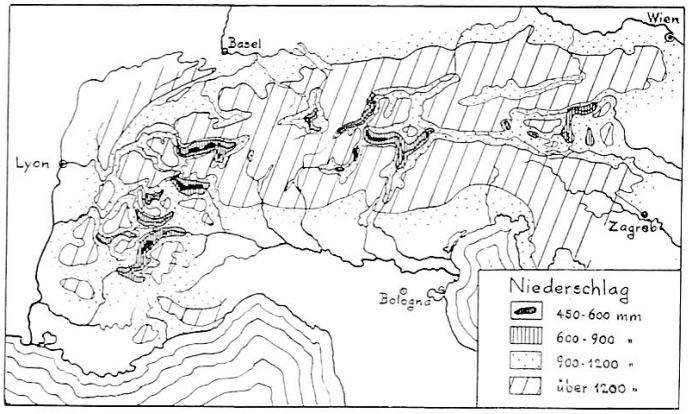

Abb. 2: Niederschlagsverteilung im Alpenraum (z. T. nach DE MARTONNE 1946)

Fig.1: The inner alpine dry valleys;

= extremely dry

The different altitude zones are marked by different vegetation types, so they can also be called vegetation zones. Going from low level upwards, there are these following zones[2]: colline, montane, subalpine, alpine and snow-patch. These are mostly also defined by different plants. The lower altitudes are naturally mostly forested, below 1000 m with dry oak woodland (*Quercus pubescens*) or pine trees (mostly *Pinus sylvestris*). There are, however some exceptions. Areas which are poor in woodland in the forest zone are rock walls, stone rubble waste dumps, avalanche paths or places where because of local climatic conditions (mostly connected with edaphic factors) no trees can grow. In the climatically very dry central Valais (from the Follatères in the west to Brig in the east) such locations are occupied by rock steppe vegetation.[3]

In the subalpine belt trees like larch (*Larix decidua*), spruce (*Picea abies*) and arolla pine (*Pinus cembra*) are the most important taxa. The timber line which marks the upper boundary of the subalpine belt is situated around 2300 m asl[4]. Above this line tree-free altitudinal vegetation like alpine meadows appear.

Another important factor is the human being. With the appearance of agriculture and stock farming from the Neolithic period (in the central Valais from 5500 cal BC., see chapter 3.), increasingly open plant communities have grown, like arable fields, orchards and vineyards (since the Roman period), meadows, managed woods (above all in the colline and montane zones; see chapters 4 and 5). But also the subalpine belt was strongly influenced by human impact and the timberline lowered.

[1] J. Braun-Blanquet 1961, 7-20.
[2] http://www.berge2002.ch/exp/enc/living/ecosystems/hoehenstufen.html: colline: up to 700 m; montane: up to 1300 m; subalpine: up to 1800 m; alpine: up to 2500 m.; snow patch: more than 2500 m. Altitudes may vary depending on geographical position.
[3] M. Kühn 1991, 13.
[4] Ph. Werner 1994, 27.

Fig. 2: Rock steppe on a hill near Raron.

Fig. 3: View up to the valley, from Raron

Valais rock steppe[5]

The steppe or rock steppe, although the last expression is not quite correct because the steppe vegetation is not bound to rock subsoil, is the driest habitat in Switzerland (Fig.'s 2 and 3). The dryness is not only climate-controlled, as it also depends on the slope inclination and the soil quality (flattish stony ground cannot retain rainwater well).

The rock steppe plant communities are found on soil waste dumps. There the snow does not remain lying long, so that very early in the year - from February-March - the first spring flowers appear (for example, *Adonis vernalis*, *Pulsatilla* species etc.). Thanks to higher precipitation during this season and the trickling meltwater, the steppe soil in very early spring remains moist for a long time. In the summer however it is very hot and dry. For resisting to the heat the steppe plants developed different strategies (very small fine or long narrow shoots, hairs or also many-branched roots resist the summer heat). The former lead to a minimum evaporation, the latter allows a maximum water uptake from the ground. Another possibility is of water storage in the shoots, so these are thick and fleshy in succulents, such as *Sedum* and *Sempervivum*. In autumn, the steppe seems nearly dead and brown, however, various flowering plants are still found also in this season.

Two kinds of rock steppe vegetations are distinguished, a more "open" one and a more "closed" one. The loose and open rock steppes show a covering of only low-growing plants. Stones and rock cover most of the ground surface[6]. The closed rock steppes, on the other hand, have a thicker plant cover, b because the soil is more fine-grained.[7]

Three different phytosociological associations are involved in the composition of the Valais steppe vegetation[8]:

1) Erdflechtengesellschaft (lichen community) (*Fulgension*)

2) Plant community with succulents and annuals: *Sedo-Scleranthion* alliance, typical are:

Potentilla argentea (Fig. 4)

Veronica verna (Fig. 5)

Sedum rupestre ssp*. montanum*

Scleranthus perennis (Fig. 6)

Herniaria glabra

Draba nemorosa,

This community grows on earth-poor, stony and dry raw soils

[5] Ph. Werner 1994, 52-67.
[6] Here are found, above all, small-grown plants.
[7] D. Maselli 1990, 58.
[8] J. Braun-Blanquet 1996, 164.

Fig. 4: Potentilla argentea

Fig. 5: Veronica verna

Fig. 6: Scleranthus perennis

3) Southwest alpine dry grasslands (*Stipeto-Poion carniolicae* alliance); six associations are distinguished:

Ephedreto-Artemisietum vallesiacae

Stipeto-Koelerietum vallesianae

Brometo-Pulsatilletum montanae

Jasioneto-Festucetum vallesiacae

Brachypodieto-Astragaletum exscapi

Festuceto-Pulsatilletum halleri.

Some important species of the *Stipeto-Poion carniolicae* alliance are [9]:

Stipa capillata
Stipa pennata s.l. (Fig. 7)
Artemisia vallesiaca
Fumana ericoides (Fig. 8)
Fumana procumbens
Potentilla cinerea
Ononis pusilla
Pulsatilla montana

During our excursion on Friday 6th of July (and maybe also on Sunday 8th) we will see some of these plants.

Fig. 7: Stipa pennata

Fig. 8: Fumana ericoides

[9] M. Kühn 1991, 14.

Origin of the steppe flora[10]

Most species of steppe flora in Valais have not survived from the last ice age *in situ* because almost the whole of the landscape was covered by ice. However, certain ones might have survived on mountain slopes free of snow. These ones, which were better adapted to extreme climatic conditions, could have spread out from there after the ice age. Others may have immigrated in several waves, after and also during the ice retreat from about 15,000 years (cal.) B.P. (see chap. 2). These migrations were done by the wind and animals, from places of origin in the areas which remained ice-free during the glacial maximum (around 20'000 BP cal.), such as central and eastern Europe and the Mediterranean area. The Valais (and other inner alpine) steppes therefore show a relict vegetation, of which typical kinds (as well as the typical species) are very rare in central Europe and exist only in special locations (thus, for example, in the other inner-alpine dry valleys like the Engadine in SE-Switzerland, the Vintschgau in Southern Tyrol (N-Italy), the Aosta valley in NW-Italy or the Briançonnais in the French Alps (see Fig. 1). We find similar steppe societies extensively only again in central Asia.

The steppe and human beings[11]

For a long time it was not clear whether the Valais steppes had always been free of woodland. For the most extreme and driest locations in the central Valais this might apply. However, the areas of steppe were strongly expanded by humans and their animals, namely by grazing with sheep and goats (certainly since the Neolithic period), as well as by periodic fires, thus preventing large areas of steppe vegetation from being colonised by undergrowth, young down oaks or forest pine.

Today, more and more scrub can be seen in the steppe locations (above all, *Juniperus sabina*), because they are no longer regularly grazed. A big problem is also increasing development and the continual expansion of the vineyard areas. The area of the steppes is restricted more and more and the isolated islets between the vineyards are sprinkled with fertilizer and poisons. The originally so typical and widespread vegetation which was also closely coupled with its original use as a minor pasture disappears visibly. Only by suitable nature conservation measures will one succeed in reviving them.

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Source of the Illustrations:

1: Braun-Blanquet 1961, 3.

2: Foto Stefanie Jacomet.

3: Foto Stefanie Jacomet.

4:http://ftp.funet.fi/pub/sci/bio/life/plants/magnoliophyta/magnoliophytina/magnoliopsida/rosaceae/potentilla/argentea-2U.jpg

5:http://www.funet.fi/pub/sci/bio/life/plants/magnoliophyta/magnoliophytina/magnoliopsida/scrophulariaceae/veronica/verna-2b.jpg

6: http://flora.nhm-wien.ac.at/Bilder-P-Z/Scleranthus-perennis.jpg

7:http://131.130.57.33/cvl/bilder/impress/WEB/Bilder/Donau_HainbBerge/Stipa_pennata_HundsheimerBerg_8712.JPG

8: http://micologia.net/g2/albumsg2/album398/Fumana_ericoides_de_Carles.highlight.jpeg

[10] Ph. Werner 1994, 63-65.
[11] Ph. Werner 1994, 66.

2 Vegetation History since the last Glaciation

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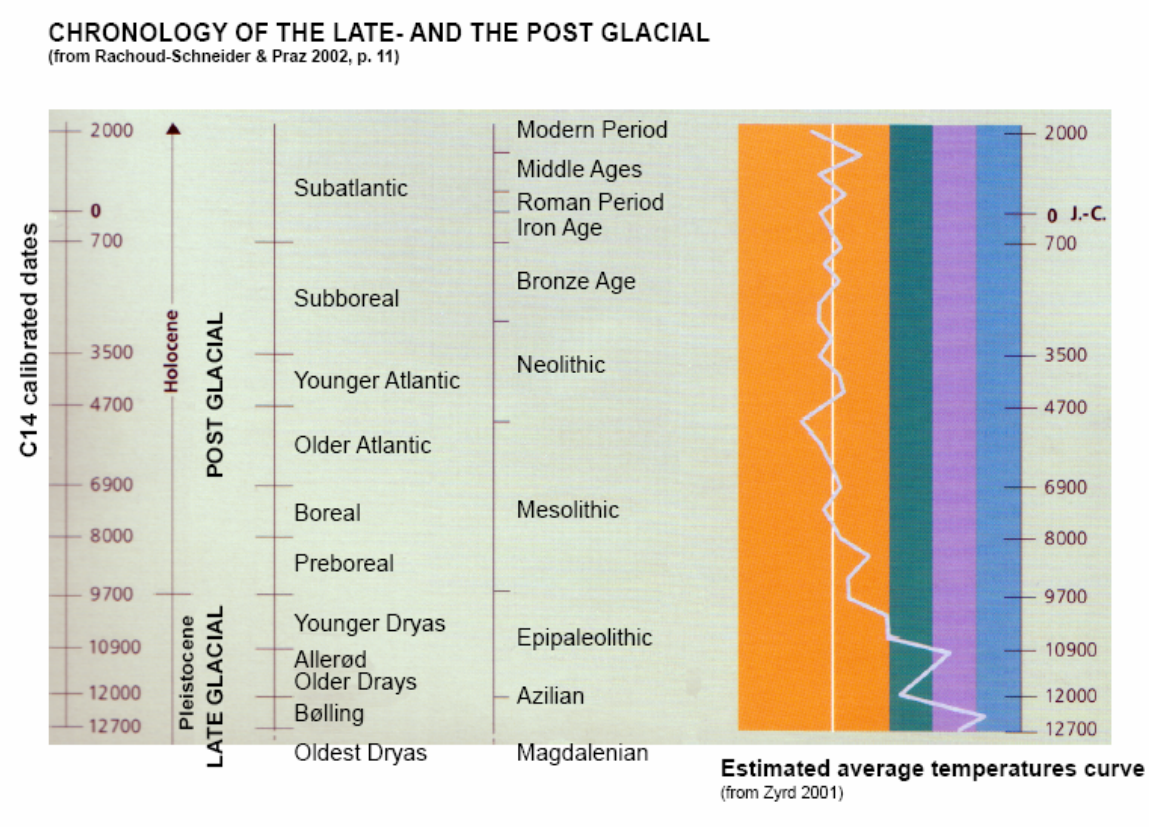
Introduction

The chronology of the Late- and Post Glacial period is mainly based on pollen analysis. Each of the local pollen zones, called "biozones", is characterized by a specific assemblage of pollens (see Fig. 1).

During the last, the Würm (or Weichselian) Glaciation, and until 13,500-12,500 cal. BC, the Alpine massif was inaccessible to humans. Archaeological evidence of human presence in the Valais region starts at the beginning of the Holocene, e.g. from the Preboreal (Epipaleolithic and Mesolithic) onwards. The Neolithic period, along with the arrival of the first farmers in the Valais, corresponds to the Atlantic period as well as the first part of the Subboreal. The Bronze Age lies within the second part of the Subboreal, whereas the Subaltantic biozone stretches from the Iron Age to the present.

Fig. 1:



The Late Glacial (Pleistocene) (see Fig. 2)

Oldest Dryas (ca. 17,000 – 12,700 cal. BC)

From to 18,000 to 16,000 cal. BC, the melting of the Rhône glacier opens a land surface of calcareous and poor soils, which are quickly colonized by herbaceous vegetation. This vegetation is characterized by heliophilous and steppe plants, such as sagebrush (*Artemisia*), rock-rode (*Helianthemum*), plants of the goosefoot family (Chenopodiaceae) and grass family (Poaceae). In this late glacial “tundra” / steppe also several dwarf shrubs existed, like joint-fir (*Ephedra*), juniper (*Juniperus*) and small willow (*Salix*).

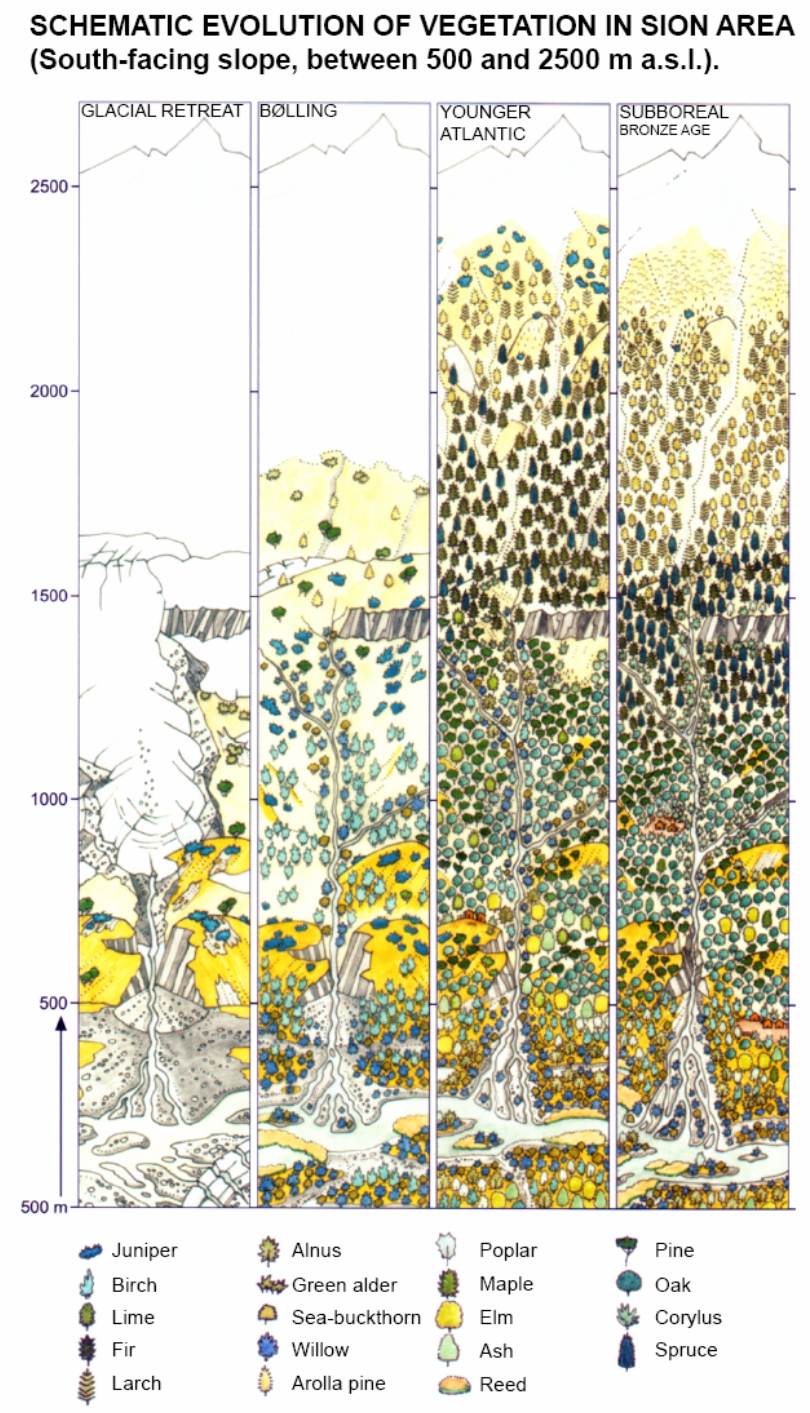
Bølling (ca. 12,700 – 11,950 cal. BC)

This period shows a climatic improvement, with the temperature reaching values as high as today's. The temperate climate enables the first growing of bushes of juniper and sea-buckthorn (*Hippophaë rhamnoides*), and initiate the development of birch (*Betula*) and pine (*Pinus*). As a result, we have the formation of groves and extremely open forests. At higher altitudes, the poorly-developed alpine lawns changed to meadows with various flowering plants.

Older Dryas (ca. 11,950 – 11,750 cal. BC)

This very short period, about two centuries, is characterized by a marked climatic deterioration, with an increase of herbaceous species, especially sagebrush combined with a marked decrease of birch (*Betula*).

Fig. 2 (from Gallay 2006)



Allerød (ca. 11,750 – 10,940 cal. BC)

Open forests of scots pine (*Pinus sylvestris*) replaced the birch forests and colonized also the slopes up to 1,800-1,900 metres a.s.l. In some places arolla pine (*Pinus cembra*) appears.

Younger Dryas (10,940 – 9,700 cal. BC)

This phase is characterised by a strong and long regression of the former vegetation. The comeback of sagebrush, plants of the goosefoot family, joint-fir and shrubs like juniper and sea-buckthorn is made at the expenses of pine and birch forests. As the weather becomes cooler and cooler, the timberline drops and forests become more open again. More humid climate, lead to an increase of wet meadow taxa, tall-herb communities and, at higher altitudes, to the development of a larger variety of herbaceous species.

The Post Glacial (Holocene)

Preboreal (ca. 9,700 – 8,000 cal. BC)

A fast increase in temperature has a positive effect on the vegetation and the forests dominated by pine spread once again. Forest species such as hazel (*Corylus*), oak (*Quercus*), elm (*Ulmus*) and lime (*Tilia*) are to be found again between 600 – 800 metres a.s.l. Birch colonizes more humid soils along rivers and lakes. At higher altitudes, the growing juniper represses heliophilous herbaceous plants and reforestation takes place. At the same time, Alpine lawns rich of various herbaceous species develop again, very fast.

In almost 700 years, the forest timberline composed by scots pine, larch (*Larix decidua*), arolla pine and birch reaches 2,000 metres a.s.l.

Boreal (ca. 8,000 – 6,900 cal. BC)

In the lower valleys, ash (*Fraxinus*) and poplar (*Populus*) appear and deciduous forests become denser. As a result, pine forests are held back, and they grow only on sunny slopes at higher altitudes, where also larch and fir (*Abies alba*) can be found. The rather continental and dry climate of the Valais enhances the presence of oak trees. At the same time, riverbank forests with poplar and willow (*Salix*) become more and more common in the plains.

Older Atlantic (ca. 6,900 – 4,700 cal. BC)

This period is characterized by a climatic optimum. The vegetation is dominated by pine and pubescent oak forests in the plains; and by dense mixed deciduous forests, around 700-800 metres a.s.l. Beech (*Fagus sylvatica*) started to appear and fir reaches higher altitudes on northward Alpine slopes and in the Bas-Valais.

As far as we know, the first farmers settle in Sion (Sitten) around 5,500 – 5,000 cal. BC (see chapter 3). At this time we can see the first signs of deforestation and crop cultivation in pollen diagrams from Lake Mont d'Orge near Sion.

Younger Atlantic (ca. 4,700 – 3,400 cal. BC)

Human activities increase and influence the vegetation from the plains to the timberline. For example, spruce (*Picea abies*) shows massive expansion between 3,900 and 3,700 cal. BC due to climatic change and human impact. Green alder (*Alnus viridis*) also spreads near the timberline for the same reason.

Subboreal (ca. 3,400 – 800 cal. BC)

At this time forests change massively. Oak groves become more diversified deciduous forests, including ivy (*Hedera helix*) and holly (*Ilex aquifolium*). Spruce colonizes the northern and southern slopes of the Valais. In altitudinal areas, larch and arolla pine grow nearly up to the timberline, at the expense of scots pine distribution. In the Bas-Valais, fir groves decrease, while beech groves increase. From 2,500 cal. BC, cultivated areas occur more often. During the Bronze Age, high-altitude pastures cause the timberline to drop, and the slash and burn activity leads to a further development of spruce and green alder.

Subatlantic (ca. 800 cal. BC – present)

Deforestation caused by human activities such as crop cultivation, pasture and metallurgy, increases considerably from the Iron Age onwards. The last oak groves disappear. In the mountains, spruce groves suppress fir forests and arolla pine continues to regress. The timberline drops until it reaches the present level of 2,000-2,300 metres a.s.l. On cleared surfaces, green alder and larch extent spread. Hemp and rye, walnut and wine grape are introduced in the Valais, by the Romans. After a climatic optimum from the 8th to the 13th centuries, a significant climatic deterioration follows, between 1300 and 1850; this period is also called the “Little Ice Age”. Climatic changes from the Middle-Ages to the present have little influence on the natural vegetation, in comparison with the devastating effects caused by human activities.

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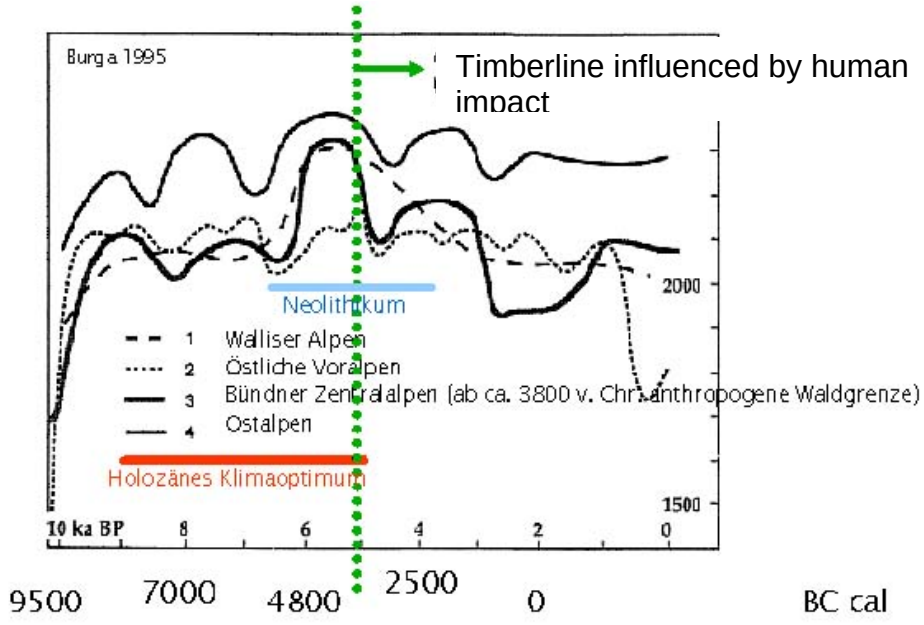
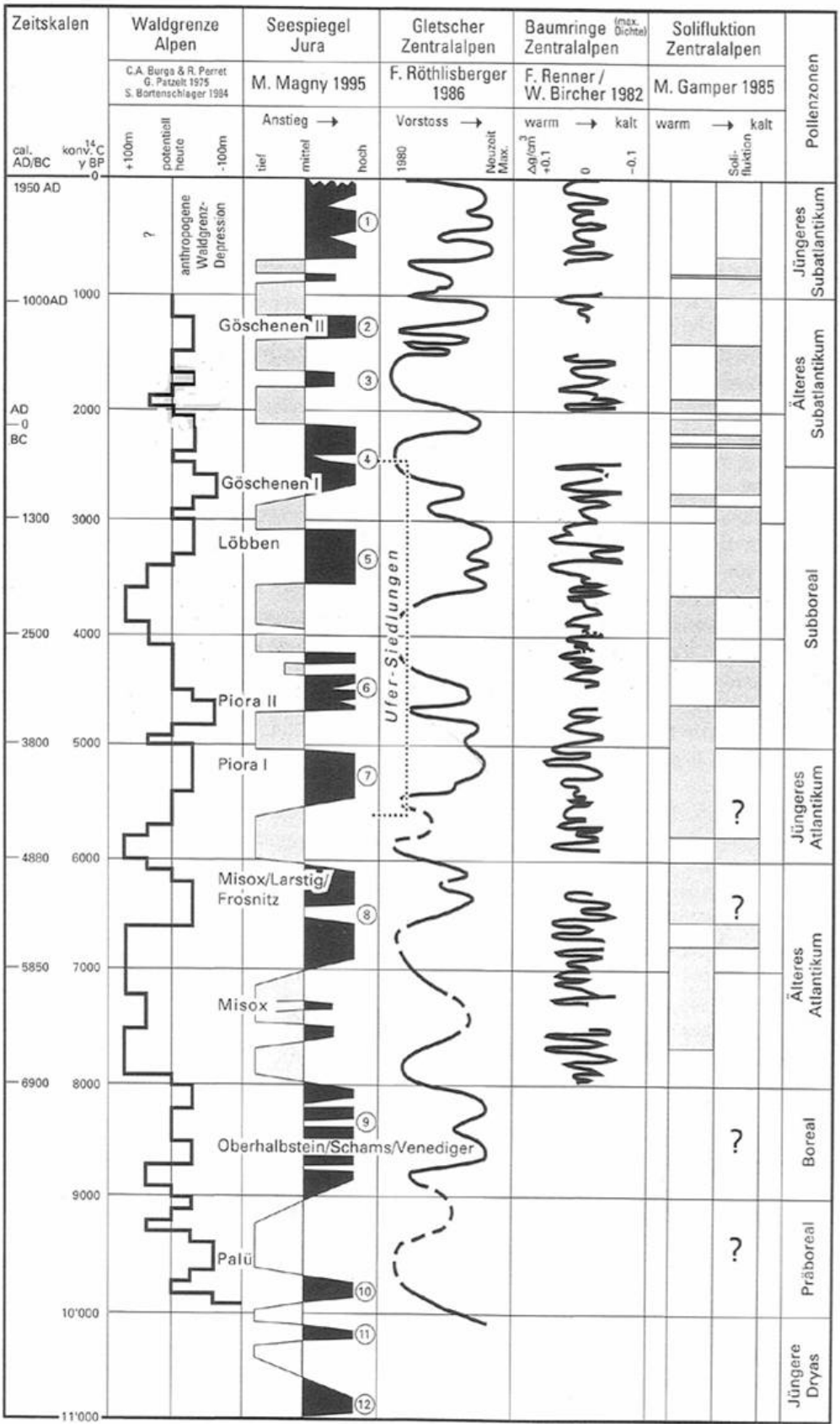
Annex1 : Timberline oscillations in the Swiss Alps during the Holocene.



Annex 2: Climate Oscillations in the Alps since the Late Glacial (from Burga & Perret 1998)

timberline lake levels glaciers wood densities solifluction



3 The Mesolithic and Neolithic in the Valais

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Palaeolithic and Mesolithic

During the whole period of the Palaeolithic, there are no traces of humans, their artefacts or settlements in Valais. Either because there were none, or because they could not be found due to the erosion partly caused by the glaciers. The glaciers started retreating around 12,500 BC cal (see chapter 2). Nevertheless, the environment was still rather hostile, and there were at least another two advances of glaciers during the Late Glacial. The first occured at the end of the Older Dryas, the second around 10,000 BC, during the Younger Dryas. Moreover, the Chablais (the lowest and westernmost part of the Valais) had been flooded by the Lake Geneva during almost the whole of the Late Pleistocene, what complicated the colonisation of the Middle Valais. The closest archaeological site to Valais at that time (around 10,000 BC) is near Villeneuve at Lake Geneva, somewhat more to the west (Fig. 1). There, archaeologists discovered a site that had been frequented by Magdalénien hunters- gatherers who lived at the lakeside.

Fig. 1: Younger Palaeolithic. Localisation of important sites in Switzerland and adjoining countries. 77 Scé (Grotte du), Villeneuve VD.

Around 9,500 BC cal., the Holocene commenced. The colonisation of Valais was now possible due to the climatic amelioration. The glaciers remained in the higher regions above ca. 1500 m asl[1] (see chapter 2).

The first proven Mesolithic settlement in Valais was a rock-shelter, Châble-Crois, close to Vionnaz (in the western part of Valais; Fig. 2). It was excavated between 1980 and 1986. It dates back to around 8,000 BC cal. and was seasonally occupied for several centuries. Due to the location, archaeologists see a connection to the people living around Lake Geneva (more to the west).

The archaeological remains were well preserved because of a quick sedimentation under the rock-shelter and a constant, humid environment of the ground. During the excavation, more than 16 t of sediment were investigated and almost 28,000 silices and more than 30 kg bones were found.

The oldest layers in Châble-Crois date back to the early Mesolithic around 8,500 to 8,000 BC cal. They are followed by a second series of layers dating to 8,000 and 7,500 BC cal. Some flint nodules and pierced molluscs are of Mediterranean origin and point to contacts along the whole of the Rhône valley. Finally the uppermost layers date to the end of the 7th millennium BC cal. Archaeologists

1 Das Wallis vor der Geschichte- 14000 v. Chr. -47 n. Chr., Sitten Kantonsmuseum (1986), 64-72 .

assume that hunting was one of the most important daily activities. This may be the reason that mainly scrapers were found in the flint artefacts.

Fig. 2: Mesolithic. Localisation of important sites in Switzerland and adjoining countries. 17 Château d'OEx VD; 95 Vionnaz. Collembey-Muraz VS.

Use wear studies showed, that the tools were mostly used for chopping up meat and bones, and working leather and wood. The bones are very well preserved. The preferred prey of the hunters was deer, ibex, wild boar, badger, fox, wildcat, marten, squirrel, beaver, trout and grey heron[2].

Another interesting fact is that the site contains the oldest Mesolithic cremation burial in Central Europe. The bones were found in a small cavity in a layer of the early 8th millennium BC cal. and could be clearly determined as human. They most certainly belonged to an adult person whose sex remains unknown. All the evidence together shows a complex death cult[3].

Another Mesolithic site in Valais is Alp Hermettji close to Zermatt (just below the flanks of the famous Matterhorn; not on Fig. 2). It lies 2,600 m above sea level on a terrace sheltered by a rock face. The site is linked to the important route from the Aosta valley to Valtournanche, via the Theodulpass (3301 m asl!), Col d'Hérensa nd and Eringertal to the Middle Valais. The site was excavated in the years 1985, 1993, 1996 and 1997 and 22 m^2 were surveyed. The lower layer contained 17 hearths that could be radio carbon dated to between 7,900 and 1,500 BC cal (Middle Mesolithic to Moderntimes) while underneath is glacial till with no human traces. The Mesolithic people used mainly larch (*Larix*), pine (*Pinus*) and Swiss stone pine (*Pinus cembra*) as firewood.

The majority of the stone artifacts found (93%) were made of rock crystal, probably originating from the Upper Valais and some were made at the site. The function of this settlement during the Mesolithic is still unknown; but it is possible the settlement was a safe camping place along the route to the Aosta-valley ora seasonal site for summer-hunting in higher altitudes [4].

To sum up we can say that there are some scarce traces of the Mesolithic in the Valais. The cultural setting seems to be related to the Sauveterrien that spread along the Rhône river. Between the Mesolithic and the Neolithic is a gap of human settlements of 500 years, but we are dealing probably more likely with missing evidence rather than with no people in Valais at all[5].

Neolithic

The **Early Neolithic (Néolithique Ancien Valaisan)** in Valais started around 5,500 BC cal. with the settlement Sion-Planta in the Central Valais (Fig. 3). This is so far the oldest Neolithic site in Switzerland and is more than 1,000 years older than the first lake-shore settlements. In Sion-Planta, also domestic animal remains were found. The geographical origin of these Early Neolithic is not certain, but many archaeologists think it is related to the Bocca Quadrata Culture in Northern Italy (

2 Die ersten Menschen im Alpenraum von 50000 bis 5000 vor Christus. Ausstellungskatalog, Sitten 2002, 164-169.
3 Die ersten Menschen im Alpenraum von 50000 bis 5000 vor Christus. Ausstellungskatalog, Sitten 2002, 111-113.
4 Die ersten Menschen im Alpenraum von 50000 bis 5000 vor Christus. Ausstellungskatalog, Sitten 2002, 170-173.
5 Das Wallis vor der Geschichte- 14000 v. Chr. -47 n. Chr., Sitten Kantonsmuseum (1986), 69.

because e.g. of the flat bottom of a pot found there). The Early Neolithic therefore reached the Valais probably over the alps.

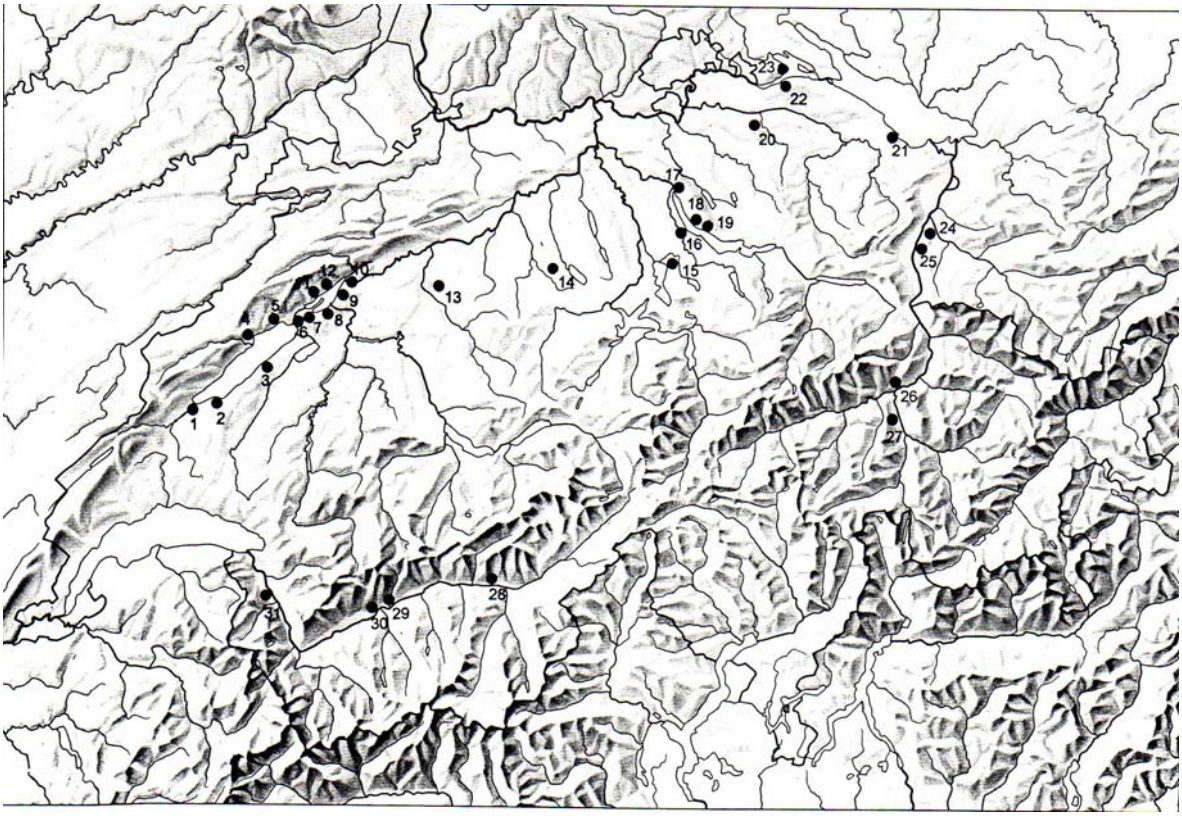

Fig. 3: Neolithic settlements in Switzerland, that gave useful archaeozoological results. 28 Raron-Heidnischbühl; 29 St-Léonard Sur-le-Grand-Pré; 30 Sion Petit-Chasseur, Sion Sous-le-Scex, Sion Saint-Guérin,Sion Planta, Sion Tourbillon; 31 Collombey-Barmaz.

The **Middle Neolithic (Néolithique Moyen 1)** dates from 4,750 to 4,000 BC. There is almost no knowledge of that time except that the caramic style resembles the Bocca Quadrata Culture in Italy. One layer with pottery in Sion-Sous-le-Scex (Fig. 3), in the Central Valais, could be dated back to 4,500 to 4,100 BC cal. Important is the fact that this horizon is contemporaneous with a stone cist of the Chamblandes type (Fig. 4).

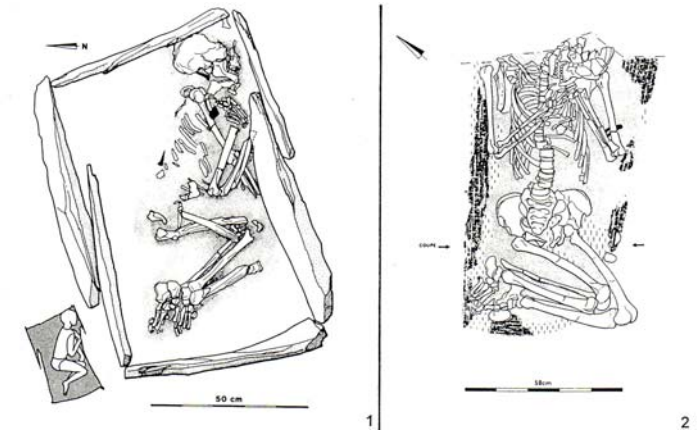

Fig. 4: Stonecists of the type Chamblandes, before 4000 BC cal. 1 Sion-avenue Ritz, tomb 11; 2 Sion-chemin des Collines, tomb 10, wooden coffin.

This form of burial was formerly thought to be linked to the younger Cortaillod Culture, but its origin is clearly older.

Between the **Earlier** and the Late/Final Phases of the **Late Neolithic** (Néolithique Récent/ Final; 3,350- ca. 2500 BC; no direct datings available) is still a gap of 650 years with no human evidence; this is astonishing because during this period the lake shores north of the Alps were settled densely (it is the period of the Horgen (and related) Cultures).

The chronology of this period in the Valais is exclusively based on the necropolis of Sion-Petit-Chasseur with its famous dolmen (Fig. 5). The first phase of construction belongs to the so called Saône-Rhône culture and is followed by three phases of the Bell Beaker Culture. During the whole occupation of the necropolis, the people erected anthropomorphic steles where two different styles are

visible. The first is characterized by the depiction of triangular daggers of the type Remedello (a Late Neolithic Culture in Northern Itlay, to which also the famous Iceman is connected). It belongs to the earlierSaône-Rhône phase and ends during the first Bell Beaker occupation. The second appears during the Bell Beaker phase and lasts till the early Bronze Age. [6, 7].

The Neolithic in the Valais - like in many other parts of Europe - ends with the Bell Beakers around 2,500 to 2,300 BC cal. It is well documented at the site Petit-Chasseur 1[8].

To sum up, there is a very rich Neolithic occupation in the Valais, starting very early, around 5,500 BC. The Early (but also some of the Later) Neolithic reached the Valais over the Alps, from the South. Only our knowledge of the Central Valais, mostly around Sion, is quite good, from the other parts hardly anything is known.

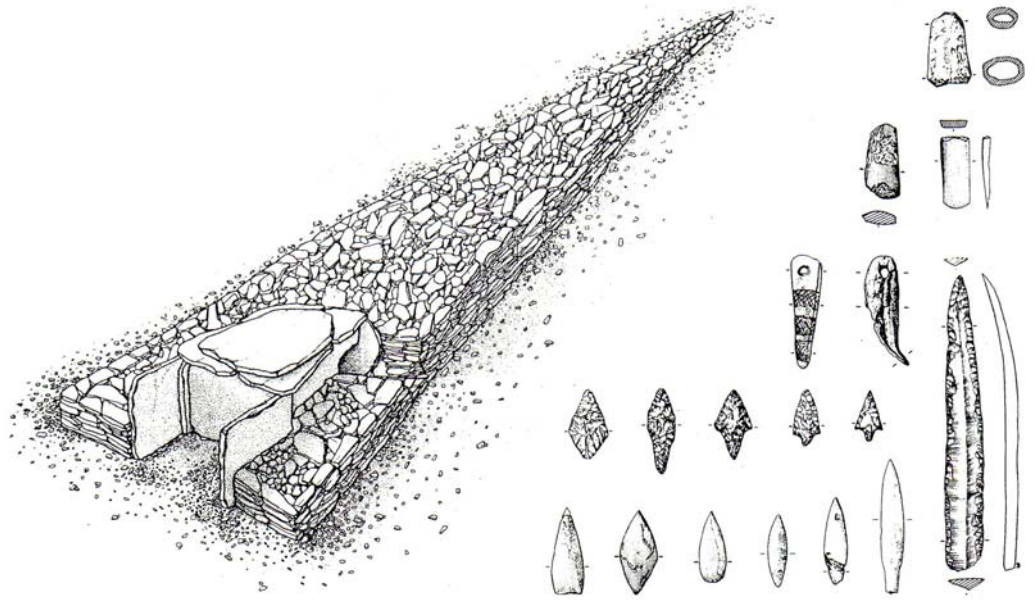

Fig. 5: Sion Petit-Chasseur III, dolmen MXII, reconstruction and burial objects of the burial chamber.

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Source of figures

Fig. 1: Le Tensorer J.-M. (wissenschaftliche Leitung) (1993): SPM, Die Schweiz vom Paläolithikum bis zum frühen Mittelalter : Bd I : Paläolithikum und Mesolithikum. Verlag SGUF, Basel, Fig. 61, 154.
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7 Article: D. Baudais et al., Evolution du néolithique de la région sédunoise (valais central), 75-81.
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4 The Bronze Age and the Iron Age in the Upper Valais

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The Bronze Age

The period from 2300 to 800 BC (cal) was characterized by the continuous increase of human settlements.[12] This is evidenced in the many findings of tombs, traces of settlements and sacrificial deposits in the lakes and along the mountain passes.[13] This development is considered to have been a consequence of the increasing north-south trade exchanges and the growing interest in the mineral resources of the Alps. The newly-developing skills in metallurgy led to a widespread search for copper deposits. At the same time the economic value of the alpine pastures (2000m asl high or more) increased with the development of the “alpine Mehrstufenwirtschaft” (ie. the varied usage of the different altitudes by means of seasonal wanderings, summer farming) in the following Iron Age.[14]

In the Bronze Age the hitherto not heavily used altitudes became attractive for human settlements and an economic factor. Through clearing additional areas for stock farming and agriculture were made available. The usage of the turnwrest plough facilitated the expansion of the areas under cultivation, which at the same time led to a progressive stabilization of the population. Agriculture and livestock breeding gained more importance as a basis of life.[15]

Among the few settlement remains we have many findings of animal bone remnants. The few wild animal remains and the remains of domestic animals, bigger ones like pigs (the most frequently found) and cattle as well as smaller ones like sheep (the most common) and goats, suggest that the importance of hunting decreased while livestock-breeding increased.[16]

Natural Environment

The Bronze Age covers the second half of the Chronozone Subboreal. For the vegetation history see chapter 2; or glacier history see Annex 2 in chapter 2). During the early Bronze Age, until around 1500 BC cal, climate was favourable, and the mountain passes may have been more walkable than today. Around 1500 BC, at the beginning of the Middle Bronze Age, there was a massive climatic deterioration, causing glacier advance (the so called Löbben oscillation). After 1250 BC cal climate became again warm and dry. Around 800 B.C. cal the Subboreal (and also the Bronze Age) ends with another strong climatic deterioration, the Göschenen I oscillation.[17]

The Early Bronze Age and the Rhone Culture (2300-1550 BC cal) (stages BzA1 and BzA2)

The immigration of the Bellbeaker people influenced developments in the culture of the Valais, in particular because they had already mastered the exploitation of copper ore (see also chapter 3). The advanced metal-processing technology in combination with the locally existing rural way of life (which still showed some Neolithic traits) led to the development of the Rhone culture. One of the expansion sentres of the Rhone culture was the Valais. The material culture is characterized by weapons such as daggers with a triangular blades that were decorated with herringbone patterns or longitudinal ribs and attached either to massive handles or handles with intermediate layers (similar to those found in the Aunjetitz culture in Eastern Central Europe; Fig 2). Important forms are jewellery such as needles with hammered and engraved wheelheads shaped in oval, rhombic or lobed forms (Fig. 1), and bangles made of sheets engraved with triangles, as well as tools such as spatula axes and axes of the type Roseaux. Typical pottery are mugs with abundant engravings and big-barreled clay pots with relief decoration.[18]

[12] Antonietti (1986), 93
[13] Hochuli et al. (1998), 20-22.
[14] Antonietti (1986), 93.
[15] Antonietti (1986), 98.
[16] Bocksberger (1964), 13 und Hochuli et al. (1998), 178-185.
[17] Antonietti (1986), 94; Burga & Perret 1998.
[18] Antonietti (1986), 96.

Fig.'s 1-3 Objects from the Rhone culture: 1. needles with wheelheads (Sion, Drône), 2. daggers of the beginning of the Middle Bronze Age (Bex VD, Fully), 3. bangles with engraved triangles 2000-1800 BC (Loèche). For location of the sites, see map at the end of this chapter.

1. [Gallay 2006, 253, Fig. 256]

2. [Gallay 2006, 251, Fig.255]

3. [Gallay 2006, 241, Fig. 244]

Middle Bronze Age (1550-1250 BC cal) (Stages BzB, BzC1 and BzC2)

Judging from the very rare findings we have, it seems there was a decrease in the population during this time. This may have been a result of the deterioration of the climate during the Löbben oscillation (see Annex 2 in chapter 2) Such theories must be regarded with prudence, however[19]. The lack of settlements can also be a result of enhanced erosion.

Contacts to Italy seem to have been very rare. A few findings in the altitudes and an amount of depot findings indicate the usage of the mountain passes.[20]

Fig.4. Reconstruction of a Late Bronze Age workshop for the processing of bronze. [Gallay 2006, 217, Fig.212]

Late Bronze Age (1250-800 BC cal) (BzD and Hallstatt A and B)

In the earliest phases of the LBA (Bronze D and Hallstatt A1) we only have a few scattered single finds without any obvious coherence.[21]

After 1000 BC, a new burial custom spread throughout Western Europe. This culture has been named Urn Field Culture (Bronze Age stages Hallstatt A2 and B) and is characterized by cremations in combination with the usage of burial urns. However, in the Valais there are almost no cremations. The cultural influences were apparently able to spread without suppressing the already existing traditions

[19] Antonietti (1986), 96.
[20] Antonietti (1986), 96.
[21] Antonietti (1986), 98.

and cultural characteristics.[22] The Valais maintained cultural exchange to the Swiss midland and Northern Italy.[23]

The Iron Age

This period is characterized by the increasing importance of iron metallurgy (see Fig. 5) over bronze metallurgy (Fig. 4; which was still used, especially for jewellery). Iron metallurgy was mostly used for the fabrication of weapons and tools.[24] We also find a few items in silver.[25]

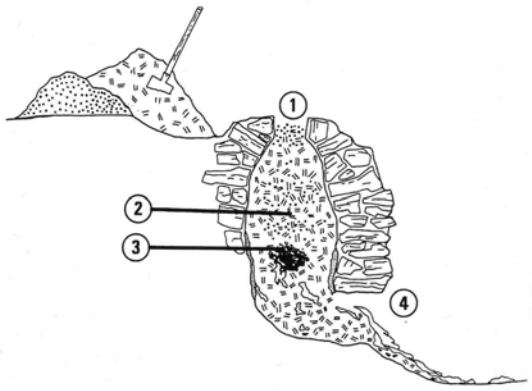

Fig. 5. Schematic diagram of a bloomery furnace; 1. mineral ores and charcoal, 2. reduction of iron oxides through the gasses of the fire, 3. accumulation of metal, 4. draining of slag. [Müller et al. 1999, 174, Fig. 74.2.]

Our knowledge of the Iron Age in the Valais is limited due to the fact that most of the findings come from burial sites and not from settlements.[26] There is, however, one important exception: the settlement Brig-Glis Waldmatte[27], excavated 1987 – 1999 (rescue excavation due to road construction). 5000 m^2 of the 2 ha site were investigated. The settlement began around 600 BC and was inhabited until the Early Middle Ages (see chapter 5). In total, 150 buildings were found. There were also storage buildings. The buildings were erected on artificial terraces (for more details see chapter 5). Preliminary archaeobotanical results suggest cultivation of mainly millets (broomcorn and italian millet; *Panicum miliaceum, Setaria italica*). Besides, there was many barley, oats and larger amounts of pulses (*Vicia ervilia, Vicia faba, Pisum sativum*), as well as *Vitis* (wild? cultivated?). In the middle of the Iron Age the fabrication with the turntable found a common use.[28]

Economically and culturally the Iron Age was characterized by wide-range trading over the mountain passes (still along the North-South Axis). The mountain passes of the Upper Valais like the Simplon and the Albrun-Pass show a systematic use (for their location see map in the Annex at the end of this chapter)**.** The mentioned settlement of Brig-Glis Waldmatte has to be seen in connection with these routes. To the end of the Late Iron Age, the Latène period we also have a deepening of the relations to the Roman world of Northern Italy, the province Gallia Cisalpina and the region of the Transpadana. Reciprocal relations are evidenced in the findings of characteristic Valais materials in Italy (but also in other Swiss regions)**.** Despite all of this the Valais still kept a conspicuous autonomy in fabrication techniques, in the ornamentation motifs, the burial rites as well as, more generally, in the acclimatisation to the alpine environment.[29]

With the annexation of the whole area by the Romans in the campaign of 16-15 BC the Romans gained control over the Valais.[30]

[22] Antonietti (1986), 98.
[23] Hochuli et al. (1998), 130.
[24] Antonietti (1986), 112.
[25] Müller et al. (1999), 183.
[26] Antonietti (1986), 112.
[27] SPM 3, Müller et al. 1999, 322.
[28] Müller et al. (1999), 187-192.
[29] Antonietti (1986), 112-113.
[30] Antonietti (1986), 122.

Natural Environment

The Subatlantic chronozone (see chapter 2) begins with the Iron Age. This period is characterized by strong human impact and there are many hints on clearings all over the Valais (see chapter 2). In the lowlands, the last big oak woods were being overexploited and thus partially destroyed. In the subalpine zone the silver fir (*Abies alba*) was replaced by the common spruce (*Picea abies*). Already since the beginning of the second millennium BC cal there was also a noticeable decrease in the number of arolla pine (*Pinus cembra*) forests, so that around 1000 BC cal this very valuable tree could only be found in limited areas. The timber line that had been lowered by human influence since the Neolithic (by several 100 m) reached its present level.[31]

The Early Iron Age (Hallstatt C and D)

The findings of this period are very poor in the Upper Valais, and the finds of the settlement of Brig-Glis Waldmatte are not yet published. We have almost no really indicative findings that would allow us to come to conclusions about the continuity from the Age of Bronze to the Iron Age, specifically about the agricultural methods used or the iron mining. The metal jewellery and the few weapons collected mostly accidentally or unsystematically from tombs do not provide a sufficient basis for any concrete conclusions. Beyond this, the cultural changes that are considered to be typical for the transition from the Bronze Age to the Iron Age in the rest of Europe, such as the change of the burial customs (from urn graves to inhumation graves) are for the most part hard to follow up due to the absence of good and reliable excavations. The findings are more concentrated in the middle of the Valais, whereas we have very few located in the altitudes of the Upper Valais and the tributary valleys, like Binn, St.Niklaus, Leukerbad, etc.[32] (map see Annex at the end of this chapter).

To the rare he early Hallstatt (C, 800-650 BC cal) finds belong antenna-handled daggers[33] (Fig. 6).

Fig. 6. Antenna-handled dagger (Sion) [Gallay 2006, 272, Fig.274]

During the late Hallstatt (D, 650-450 BC cal) the finds indicate on the one hand clear connexions to the North,on the other contacts with the South. Indigenous to the valley of the Rhône and very characteristic are bangles with fine transverse ribs and circle ornaments located at the slightly thickened endings are. Furthermore, the etched concentric circles were a highly popular element of ornamenation in the native metal industry.[34]

The Late Iron Age (Latène-Period)

Fig. 7. Typical Valais bangles. [Gallay 2006, 317, Fig. 350]

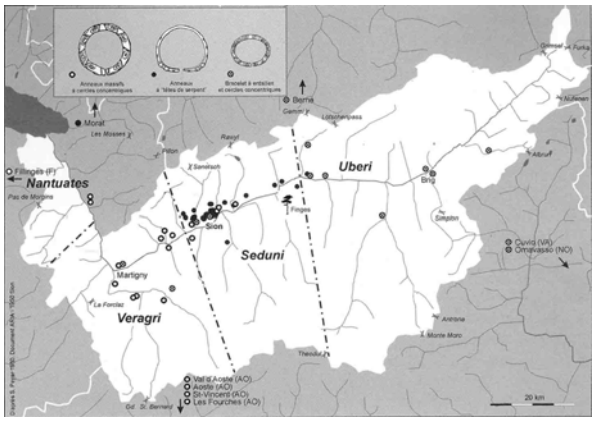

Fig. 8. The distribution of the Valais bangles [Gallay 2006, 317, Fig. 351]

The archaeological material comes mainly from single (stray) findings but thanks to some closed complexes a chronological classification was possible. Like in the early Iron Age there are influences from the North, the Swiss midlands, visible (especially the western part), and from the southern border

[31] Antonietti (1986), 112 und Müller et al. (1999),112.
[32] Antonietti (1986), 113.
[33] Drack (1957), 31.
[34] Antonietti (1986), 114.

of the Alps in combination with local creations. Travel over the alpine passes continued.[35] The fashion in bangles shows a development. Especially the Valais bangles (Walliserringe) are very characteristic of this period (Fig.'s 7 and 8).

Early Latène Period (LT A-B, 450-280 BC cal)

We cannot say much about the development of settlements but the burial customs seem very special. As in many parts of the Celtic territory the deceased were buried in flat graves. Additionally, the graves were covered with stones; stones were placed particularly behind the head and on the pelvis (this tradition can be traced even to the early Roman = Augustan era). Among the indigenous creations the ribbon-shaped bronze bangles are very interesting. They are localized in the Upper Valais and seem to be really local products.

Also particular to the Upper Valais are the massive silver bangles; Fig. 9) with strongly stamped motifs or hollow bumps at the ends (as found in Nax and Siders). Typical hints on southern vonnexions are imported objects such as Sanguisuga brooches or Certosa brooches from the Ticino[36]; Fig. 10).

Fig. 9. Silver bangles from Central Wallis (Sierre, Levron, Lens) [Gallay 2006, 306, Fig.333]

Fig. 10. Broches type Sanguisuga (left) and type Certosa (right) (Zeneggen)[Gallay 2006, 308, Fig.336]

Middle Latène Period (LT C, 280-150 BC)

Also in this period we have a continuity of indigenous trinkets. For instance there are now more massive bronze bangles ornamented with circular patterns in combination with deep lines that flank small notches[37]. Again, southern influences are visible, for ex. by the existence of gyroscopic jugs, the "vasi a trottola", from the Southern Alps (Fig. 11). As in the Swiss midlands, glass bangles appear now in the Valais.[38]

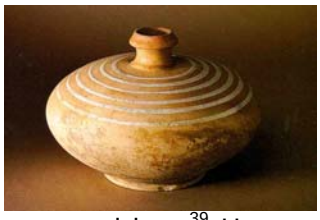

Fig. 11. Vasi a trottola (Sembracher) [Gallay 2006, 313, Fig. 344]

Late Latène Period (LT D, 150-15 BC)

In this period we still observe many local creations like heavy bronze bangles with deeply embossed circular patterns that were worn on the arms and legs.[39] However, imported black-glazed pottery from the lowlands and brought over the alpine passes into the Rhone valley shows a progressive alteration in the lifestyle habits in the direction of a certain "Romanisation".[40]

The Romans described 4 Celtic tribes that occupied the region of the Valais (from West to East; Fig. 8): the Nantuates (Chablais), the Veragri (Martigny), the Seduni (Central Valais) and the Uberi (Upper Valais). We also find evidence for coinage (mostly silver or gold coins) that distinguish themselves clearly from those produced in the Swiss midlands.[41]

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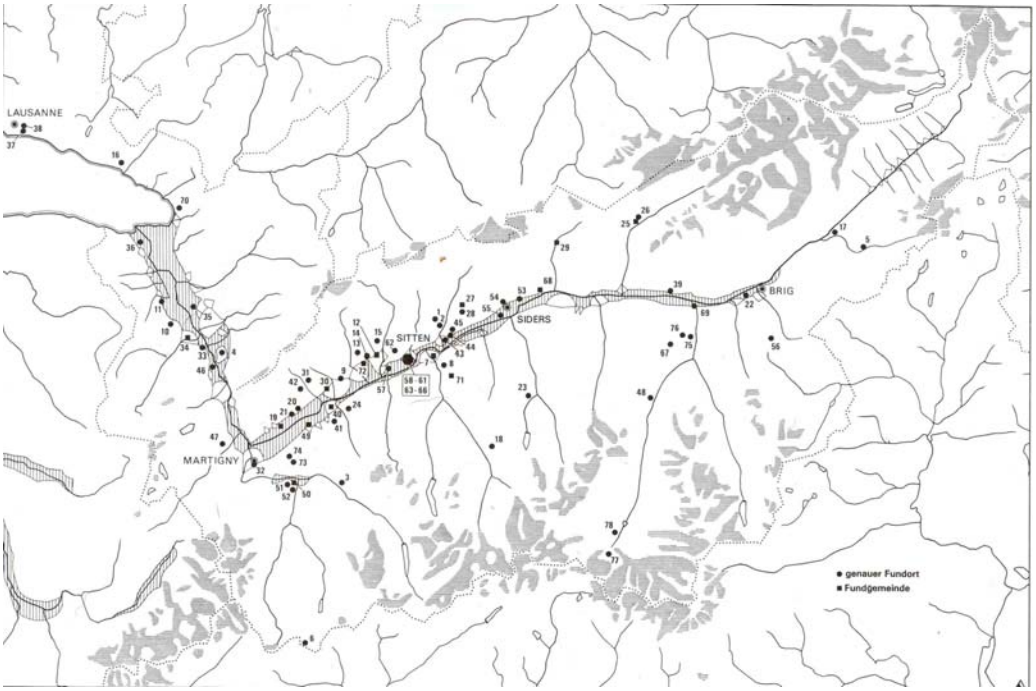
Annex: Map and list of Bronze and Iron Age Findings in the Valais [Antonietti (1986), 256-257]



KARTE DER IM KATALOG VORKOMMENDEN FUNDORTE
(o. n. O.: ohne nähere Ortsangabe)

1. *Ayent, les Places*
2. *Ayent, Zampon Noale*
3. *Bagnes, Villette, les Dzardis*
4. *Bex VD, See von Luissel*
5. *Binn, Schmidigenhäusern*
6. *Bourg-Saint-Pierre, Grosser St. Bernhard*
7. *Brämis, o. n. O.*
8. *Brämis, Erbioz*
9. *Chamoson, les Lumères*
10. *Collombey-Muraz, Barmaz*
11. *Collombey-Muraz, Abri von Vionnaz*
12. *Conthey, o. n. O.*
13. *Conthey, Rapes d'Aven*
14. *Conthey, Roulin*
15. *Conthey, Sensine*
16. *Corseaux VD*
17. *Ernen, Binnachern*
18. *Evolène, Cotter*
19. *Fully, o. n. O.*
20. *Fully, Beudon*
21. *Fully, Mazembroz*
22. *Glis, Heh Hischi*
23. *Grimentz, o. n. O.*
24. *Isérables, Mayens de Crêtaux*
25. *Kippel, o. n. O.*
26. *Kippel, Betzlerfriedhof*
27. *Lens, o. n. O.*
28. *Lens, La Bouilletaz*
29. *Leukerbad, o. n. O.*
30. *Leytron, o. n. O.*
31. *Leytron, Ovronnaz*
32. *Martigny*
33. *Massongex, o. n. O.*
34. *Monthey, o. n. O.*
35. *Ollon VD, Saint-Triphon, Le Lessus*
36. *Port Valais, o. n. O.*
37. *Pully VD, Chamblandes*
38. *Pully VD, Pierra Portay*
39. *Raron, Heidnischbühl*
40. *Riddes, o. n. O.*
41. *Riddes, les Bellochays-Villy, Mayens de Riddes*
42. *Saillon, Mayens de Tchou, la Combaz*
43. *Saint-Léonard, Les Bâtiments*
44. *Saint-Léonard, Crête des Barmes*
45. *Saint-Léonard, Sur-le-Grand Pré*
46. *Saint-Maurice, Altstadt und Abtei*
47. *Salvan, rochers du Planet*
48. *Sankt Niklaus, o. n. O.*
49. *Saxon, o. n. O.*
50. *Sembrancher, o. n. O.*
51. *Sembrancher, Crettaz-Polet*
52. *Sembrancher, Les Fourches*
53. *Siders, Bernunes*
54. *Siders, Muraz*
55. *Siders, Piney*
56. *Simplon, Hopschensee*
57. *Sitten, Châteauneuf*
58. *Sitten, chemin des collines*
59. *Sitten, rue de Conthey*
60. *Sitten, avenue de la Gare*
61. *Sitten, rue de Lausanne*
62. *Sitten, Montorgesee*
63. *Sitten, Petit-Chasseur*
64. *Sitten, Planta*
65. *Sitten, Sous-le-Scex*
66. *Sitten, Saint-Guérin*
67. *Törbel, Bönigsee*
68. *Varen, o. n. O.*
69. *Visp, o. n. O.*
70. *Villeneuve VD, le Scé du Châtelard*
71. *Vernamiège, o. n. O.*
72. *Vetroz, o. n. O.*
73. *Vollèges, Le Levron*
74. *Vollèges, Pas du Lin*
75. *Zeneggen, Heidenegg*
76. *Zeneggen, Kasteltschuggen*
77. *Zermatt, Theodulpass*
78. *Zermatt, Hubelwängen*

5 Settlement history of the Upper Valais from the Roman period to the Middle Ages (15 BC – ca. 1200 AD)

Simone Zurbriggen, Student, Faculty of Arts, Phil I, Basel University

Roman period (15 BC – end of the 4th c. AD)

By 15 BC the Romans had incorporated the Valais region into their Empire. Around that time, new urban centres developed in the lower part of the Valais (approximately west of Sion, Fig. 1: 12) next to the main transit route over the Grand Saint Bernard pass (Fig.1). From Lake Geneva to the area of Sierre and Leuk, we have remains of some *villae rusticae* (farms). They were built on the bottoms of the valleys or a little above. These *villae* may have belonged to big landowners and were heavily influenced by Roman culture. In the upper part of the Valais, the Oberwallis (roughly east of Sion), no important changes emerged from the Roman rule (Fig.1). The settlements in were mostly continuously inhabited since the early Iron Age (8th/7th c BC) or even earlier, and usually there is almost no noticeable Roman influence there.

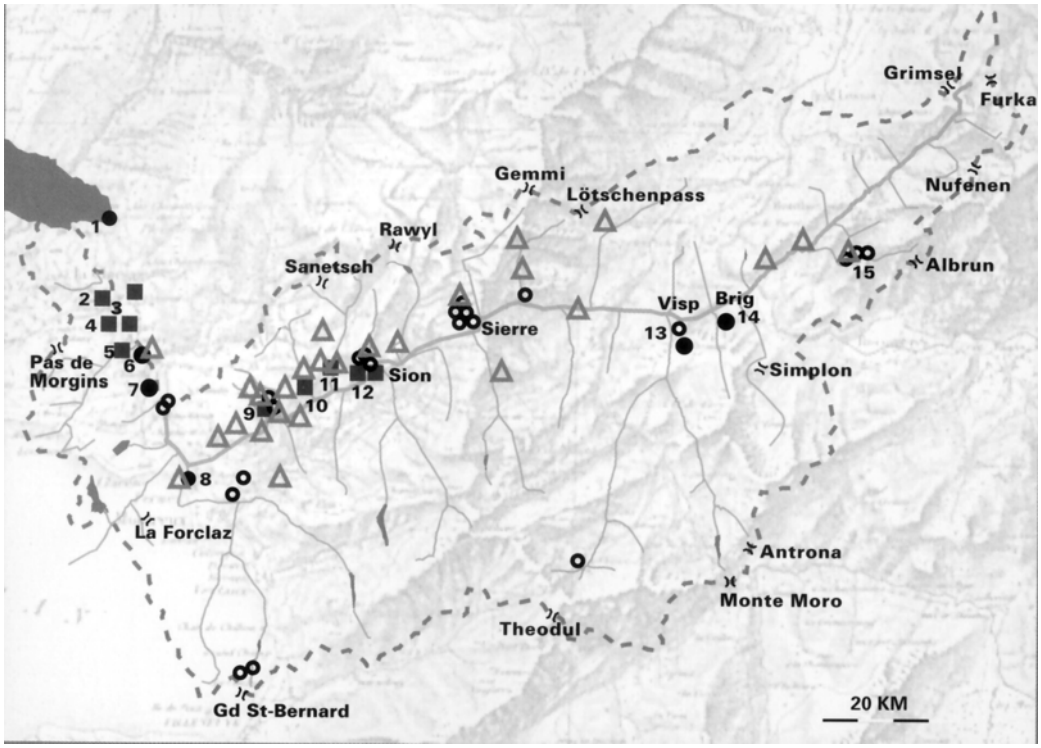
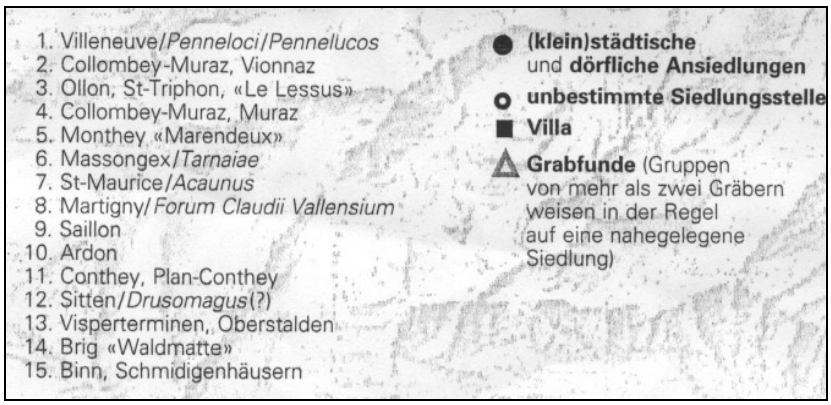


Fig. 1: Roman settlements in the Valais/Wallis. (Vallis Poenina 1998, p.65)



The problem with settlements in the Upper Valais is that very often the settlement itself has not been found and excavated, but one can see from strayfinds that a settlement must have existed somewhere nearby. One reason why many settlements cannot be found is that the villages today are very often still in the same place.

The most common kinds of finds indicating the former presence of a settlement are cemeteries or single finds. An important example is the cemetery of Schmidigenhäusern in the Binn (between 1341 and 1547 m asl., Fig. 1: 15). With its 50 tombs it is an indication of a village which must have been the largest in the valley. But there are many other places in which tombs or single finds such as coins etc. have been found. These are located mainly along the routes leading over the passes out of the Valais (see Fig. 1). A route to the South is indicated, for example, across the Albrun pass, which means in the area between Naters and Fiesch and in the Binn valley. Some remains in the valleys of Visp (Vispertäler) and in the area of Zermatt indicate the existence of settlements and the crossing of the Theodulpass in the direction of the Aosta valley. Important connections to the North were from Leuk over Leukerbad and then across the Gemmipass or from the Lötschental across the Lötschenpass (see Fig. 1). Some of these passes may be over 3000 m high, making it necessary to cross glaciers.

The only settlements found in the upper Valais are those of Oberstalden and Brig-Glis (Waldmatte; Fig. 1: 14). In Oberstalden, foundations made of dry stone walls, hearths and layers with finds were found from a village, which was built on terraces in a slope. Its structures, very similar to the village of Waldmatte near Brig which has been excavated to a large extent from 1988 until 1999 as a rescue excavation, due to road building (Fig. 2.)

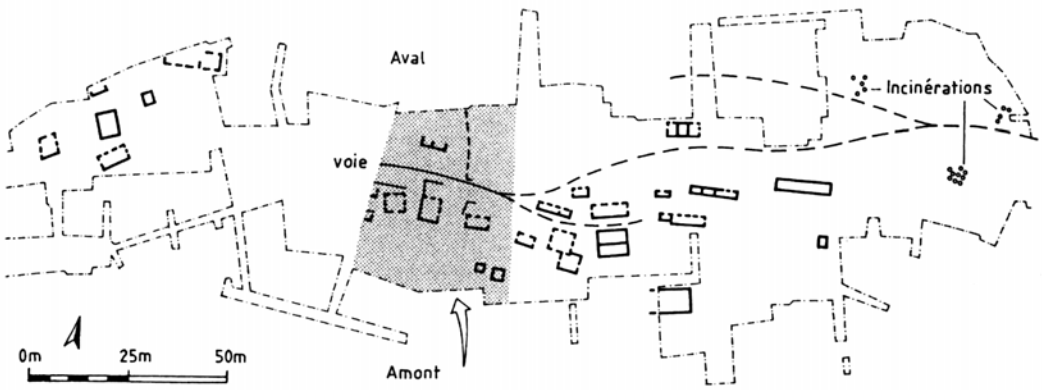


Fig. 2: Map of the settlement Brig-Glis/ Waldmatte (2nd - 3th cent. AD), drawing by A. Henzen. (Paccolat 1998)

The settlement of Waldmatte is very important because of its large size, its greatest area in the Roman period is thought to have been about 3 or 4 ha, and the fact that it has been inhabited continuously from the early Iron Age (see also chapter 4) until the early Middle Ages. More than 100 houses spread over several terraces have been found. They were mainly built as half-timbered buildings. Their manner of construction, shows that it was not influenced by Roman techniques. There were several changes in the orientation of the buildings and in the use of the terraces during the occupation. The first stage of construction was to dig some earth from the higher part of the slope and put it on the lower part to form a kind of terrace that would serve as a foundation. 2 main types of houses can be distinguished: 1) houses with earthen floors, 2) houses with a wooden floor made of planks raised some distance from the ground. Only one of the buildings in Waldmatte was built in the classical Roman style, which means that it had walls made of bricks, a mortar floor and plastered walls. It is thought to have had a religious function.

The inhabitants in the settlement of Waldmatte lived primarily by agriculture and stock farming. They also had trade relations with the south since the early Iron Age, probably via the route over the Simplon pass, which is still of importance today (see Fig. 1) but the trade diminished during the Roman period. The reason for this loss of importance was because the new main route for transit was transferred by the Romans to the lower part of the Valais, across the Grand Saint Bernard pass, with Martigny (Octodurus) as the main town.

Late Antiquity and the early Middle Ages (5th – 9th c AD)

In late Antiquity people continuously lived in the village of Waldmatte and a similarity can also be assumed for villages in the side valleys. We know very little of the life of people in the time between

the 6th and the 9th century AD. They built their houses mainly of wood and that is why we have little evidence of them. Only in Oberstalden have some buildings of the 7th and 8th century been preserved.

The facts are somewhat different for sacred buildings. The churches were built of stone and for that reason their remains are in a much better condition, as we can see in the new founded parishes in Glis and Sierre-Géronde (see Fig. 1). With time these parishes became more and more influential.

Middle Ages (9th to 14th c AD)

From a political point of view, the Valais was a part of the Kingdom of Burgundy since 454 AD and the administration was in the hands of the bishops. In 999 the last king of Burgundy gave the Valais to the bishop of Sion as a fief.

Some time before 1000 AD the Alemanni – German speaking people - found their way into the upper Valais from the North. Some of them came from the Haslital (Bernese Oberland) into the Goms by crossing over the Grimsel pass, others entered on the routes across the Gemmi or Lötschberg passes (see Fig. 1). The areas in which they settled used to be only temporarily occupied before the arrival of the Alemanni. The new settlers lived there now in single farmsteads and small hamlets and lived mainly by stock and dairy farming.

From the 12th century the Simplon pass became important again for trade and politics, because it was the shortest connection between Milan (Italy) and the Champagne (France). This new importance influenced the development of the villages and towns along this trade route. The main cities of Brig/Naters, Visp and Leuk developed in the 12th century, and also some fortified castles were erected by the barons of Raron in Raron and by the barons of Turn in Niedergesteln. But this increase in prosperity lasted only until the collapse of the northern French markets in 1320 and unrest in northern Italy.

The rapid population growth, which of course caused a shortage of land, migrations began, the *Walserwanderungen* (Fig. 3). Those Alemanni who stayed in the Valais, are called *Walliser*, the others who left the valley again we call *Walser*. These migrations took place between the end of the 12th century and the transition of the 15th to the 16th century.

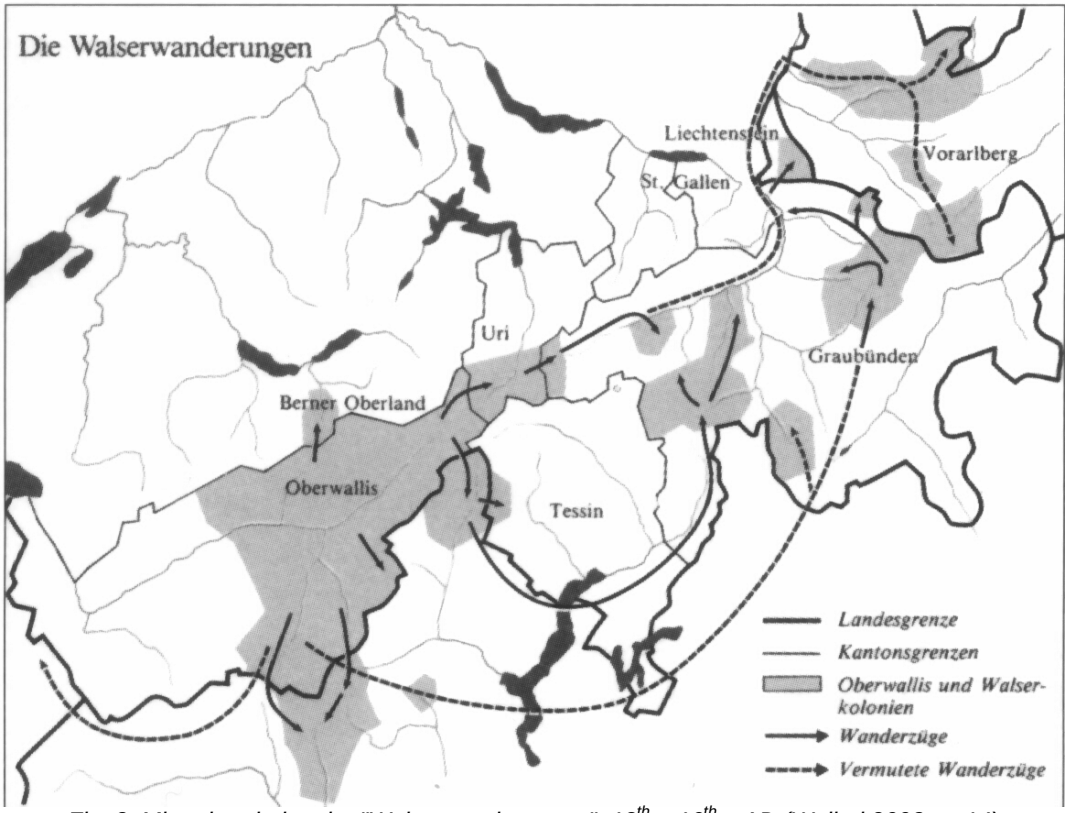


Fig. 3: Migration during the "Walserwanderungen": 12th – 16th c AD (Waibel 2003, p. 14)

The direction of these migrations was mainly eastwards, but also to the south (see Fig. 3). New settlements of the Walser can be found, for example, in the valley of Aosta (northern Italy), in Ticino

(southern Switzerland), in Graubünden / Grisons (southeast Switzerland), Vorarlberg (western Austria) or in Lichtenstein (see Fig. 3). It was mainly the lords who were interested in the foundation of these settlements, because they hoped to get additional income from rents. In addition they saw of consolidating their claim to power. It was not difficult to find some voluntary colonists in the Valais because of the bad situation there. Furthermore, the migrants often got better rights (*Walserrecht*), if they agreed to leave the Valais and settle somewhere else: they were personally free and had the right to a free hereditary loan and an autonomous administration of their commune. As a return service for these rights, they had to pay an annual tax and had to fight for their lord in times of war. The Walser usually settled in single farmsteads, which at first were located above the tree line. They lived mainly by Alpine farming. A characteristic of the *Walser* is their language – the *Walserdeutsch* – which still connects all of them.

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6 Erschmatt: The Change in the "traditional" man-made landscape over the last 100 years

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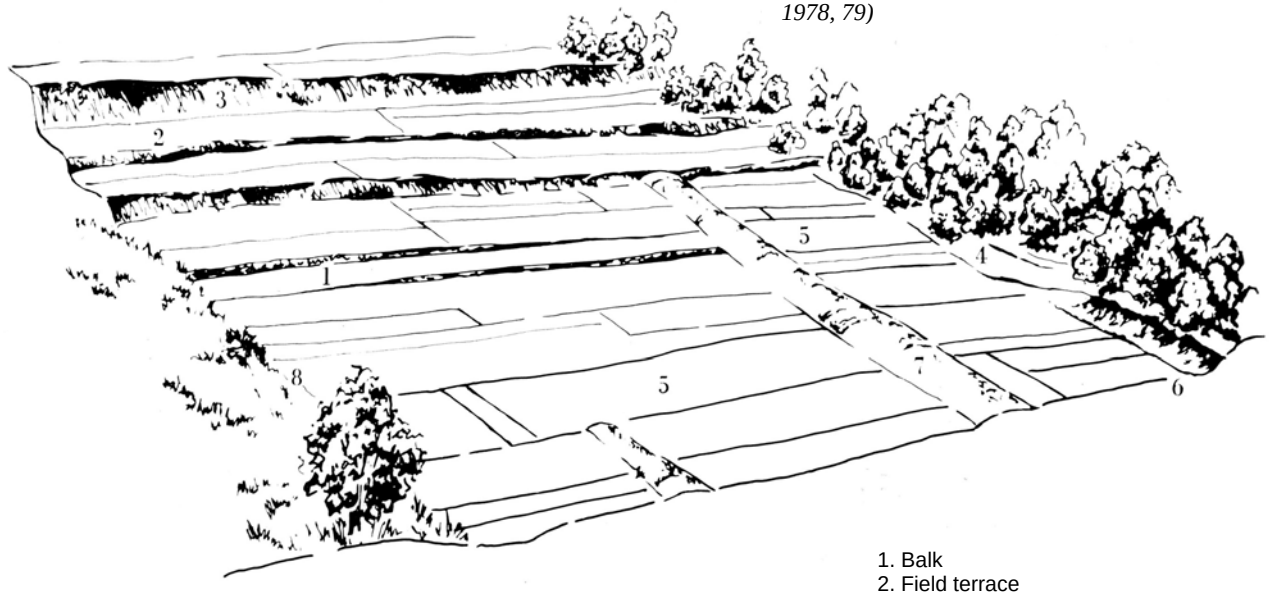
As an example, we will look at the "traditional" man-made landscape of Erschmatt in the Central Valais (excursion of Sunday, 8th of July). This village is located on the southern slope of the Rhone Valley at an altitude of 1200 meters asl. The "traditional" agricultural landscape consists of very small-scale fields (Blockflur), due to the division of properties. The agrarian land comprises small fields on the terraced slopes and grasslands irrigated by bisses (irrigation channels; see chapter 10) around the village. The subsistence economy came to an end in the 20th century. The inhabitants of Erschmatt became "backpacker peasants" who earned their living as workers in the Rhone Valley but still cultivated their land. The association "Pro Erschmatt" tries to preserve the traditional landscape. Thanks to this, traditional cereal varieties and a rich segetal flora is still preserved to some extent.

"Tradition" and Change

The term "traditional" implies that there is a "modern" opposite. In addition, it gives the impression that there was no historical change before modernity. However, this is not the case. The state of the man-made landscape termed "traditional" is a pre-industrial one from the 18th century on. Because change has occurred ever since, use of a static concept is not pertinent. In the following, therefore, the term "man-made landscape of the 18th century" will be used because from then onwards, reliable data are available. Since 1900, the man-made landscape has changed again in a dramatic way.

Fig. 1: Morphological forms of agriculture (Ewald 1978, 79)



Characteristics: Field terraces and bisses

The landscape consists of many terraced fields which are bordered by stepped balks (Fig. 1). In addition, the parcels of grassland are limited by water channels of the bisses (Fig. 2; for the *bisses* see chapter 10). The terraces were originally made to provide slightly more flat areas for agriculture. These fields were worked with an ard and hoed. Because there is still a gradient the farmers left green strips between the parcels. The vegetation in them stopped the soil from sliding further down the slope. Layered arrangements of stones substituted the fields. The process of erosion, but also of sedimentation, is increased by the *bisses* which carry fertile silt to the stony slopes. If the water runs over a parcel, sediments are deposited mostly in the lowest part of it. In Erschmatt, the water comes not from a glacier but from a spring and, in springtime, from snowmelt. Because the climate is dry, the success of agriculture and haymaking is strongly dependent on the weather.

The village of Erschmatt with its old wooden storage houses (granaries) built during the last two centuries lies on the flattest part of the slope and is surrounded by fertile soils, irrigated by *bisses*. This is a man-made landscape which still exists, even if the symbiotic way of life between landscape and inhabitants is lost today.

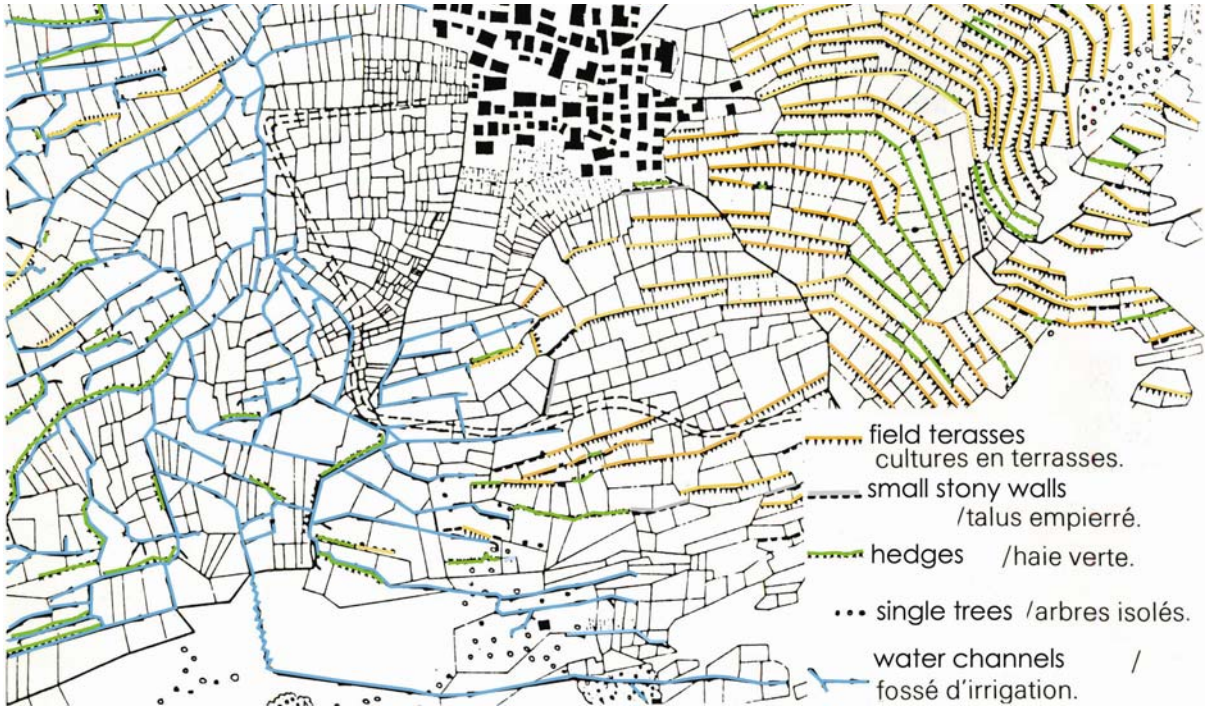
History

The largest extent of small (mostly rectangular) parcels in Erschmatt was in the 18th and 19th centuries, when the two-field crop rotation system (Zweizelgen-Brachwirtschaft) was in use. Every year winter rye was changed with a period of fallow on the two "Zelgen". The year of fallow was to keep the soil moist and – as a consequence - provide fertility. The fields were rarely irrigated or fertilized. While they were close to the village, the grassland was farther away.
In the 20th century, many fields changed into grassland, so that in the 1980s only 5% of the terraces were still in use. It is not so much cereals but vegetables which are now cultivated near the village. Grassland is used where it is possible to irrigate. On the rest of the open slopes, natural vegetation overgrows the terraces, and bushes develop. The terraces are still visible on the slopes.

Division of property as a result of inheritance

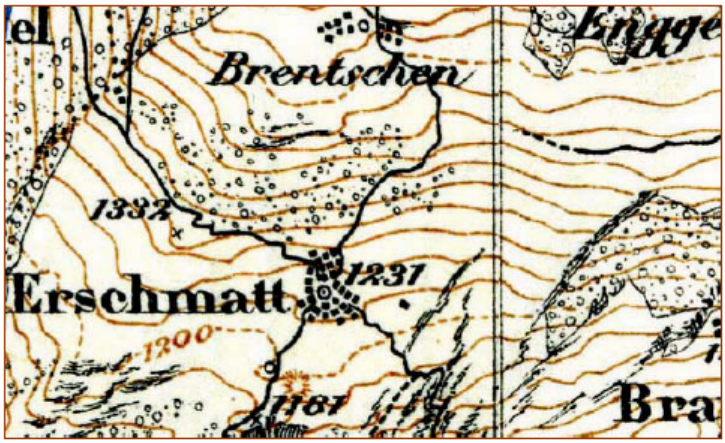
Because of the inheritance system, the cultivated land has been divided into many very small parcels. Until the present time, there has never been a consolidation of properties. Such block-like meadows can only be used when cultivation is intensive. It is not efficient enough for farmers today, so, since 1980 there have not been any full-time farmers working them. Due to the hot and dry climate, the forest takes over the open slopes very slowly. On topographical maps from 1910 to 2005, this process

Fig. 2: Parcels around Erschmatt in 1966 (Schwarz 1985, 54)
On the western site bisses irrigate the grassland. On the eastern side, the field terraces have no irrigation system.



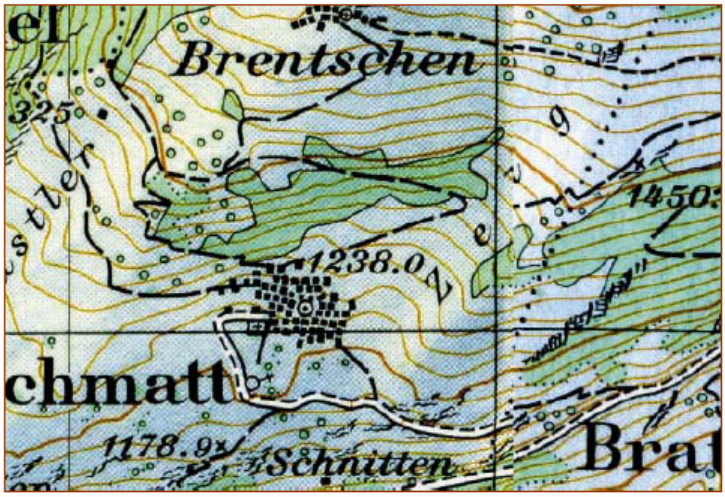
can be observed very clearly (Fig. 3). We have to consider that the earlier maps may not be as detailed as the more recent ones.

Fig. 3



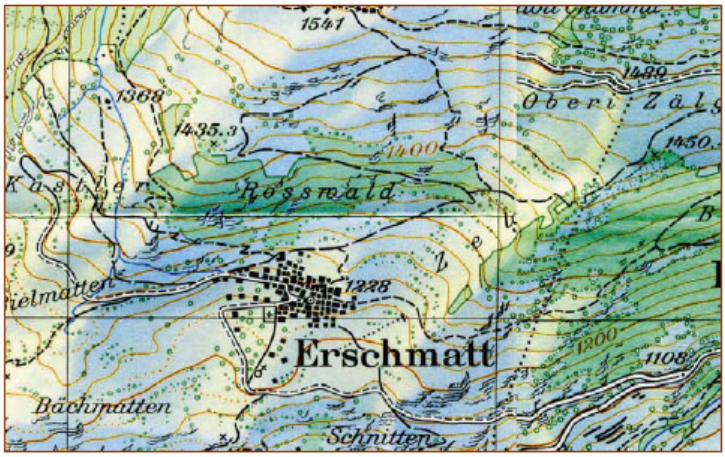
1910:

Open slopes with nearly no bushes on the stepped balks,
no connected forest above,
only food paths,
settlement with chapel



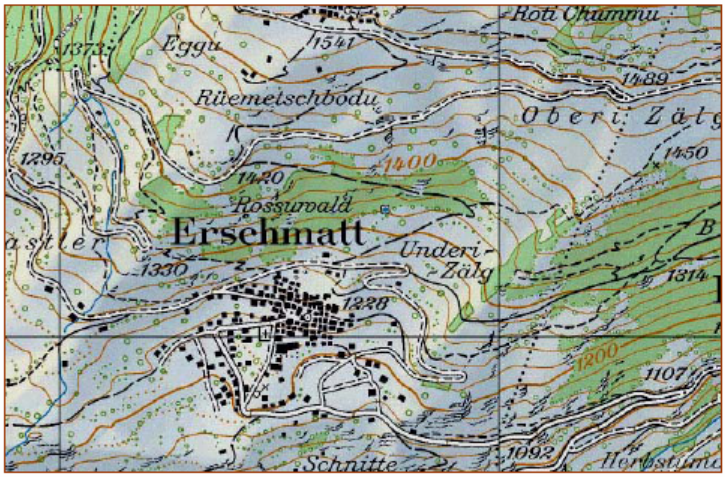
1959:

Open slopes with few bushes on the stepped balks,
"Zelg" = two-field crop rotation
"Schnitten"= grass land for hay,
connected forest above,
road to the village,
settlement growing,
church



1966-1978:

Open slopes with bushes on nearly all the stepped balks,
"Rosswald"= hoses' forest becomes larger,
bisse leading to cultivated land,
"Bächmatten"= grassland with ditches,
road increases to cultivated land,
growing settlement



1993-2005:

Slopes covered regularly by bushes but no further increase,
reservoir above village,
one channel of bisse vanished,
more roads,
growing settlement

Association "Pro Erschmatt" and the "Sortengarten" (species' garden)

In the 1980s the association "Pro Erschmatt" was founded to preserve and reorganise the man-made landscape of the village.

Goals:

- The man-made landscape should be protected by preservation of the irrigation system (*bisses*) and intensive land use of the field terraces again. As a result of that, the ecological and cultural values can be protected.
- Increase of efficiency of agriculture. Good yields could make full-time farming attractive again.

Proposed solutions

- Cultivate varieties on field terraces which can support the extreme habitats, conditions of ownership and land-use methods: feedgrain and older varieties, herbs, spices and vegetables. One should also try to change land use to alternating field/fallow with organic cultivation.
- Enlarge the irrigation system so that more of the old terraces can be used again. A part of these parcels could be changed into grassland. Flat parcels at high altitudes could be used as rangeland.
- Provide husbandry and partnership between all farmers of the village for common stables, enclosure, food production and use of machines.
- Request subsidies from the Valais region government and Swiss state government.
- Protect the old wooden granaries and *bisses,* but also the dry steppic vegetation (Walliser Felsensteppe, see chapter 1) in nature conservancy zones.

The richness of the man-made landscape and its importance for nature and humans

Fig. 4: Erschmatt and its terraced fields 1980ies (Schwarz 1985, 55)

Stepped balk in terraced fields with small stone walls:

Nature: Ruderal vegetation, pioneer vegetation, flora of dry habitats, habitat for insects, small mammals, reptiles, birds etc.

Humans: Stepped terrain, limitation of parcels, not cultivated but used for wild plants, more moist soil, protection against landslides

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Maps of SwissTopo

7 History of plant cultivation in the Valais

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Unfortunately, archaeobotanical research in Valais is fairly scanty and all the data available come from one excavated village, namely Brig-Glis, Waldmatte (see chapters 4 and 5). However, this site only contains anthropogenic layers from the Iron Age and the Roman period. Therefore, archaeobotanical investigations before the Iron Age are basically absent (resp. not published). At Brig-Glis, Waldmatte, a storehouse was investigated and some archaeobotanical analyses carried out[42]. The house contained large amounts of barley. In addition, millet (*Setaria italica*), different vetches (mainly *Vicia ervilia*) as well as small quantities of broad bean (*Vicia faba*), pea (*Pisum sativum*) and wheat were found. During the Iron Age, oat appears sporadically. With the Romans some basic changes occurred. During this time, the cultivation of vine (*Vitis vinifera*) begins, and also different fruit-trees and the walnut-tree (*Juglans regia*) were cultivated. There is also evidence that wine was also produced and not only imported during Roman time.

The rye: From the first cultivation up to the AOC rye bread

Fig. 1 and 2: Freshly baked rye bread.

Rye (*Secale cereale*) is the latest common grain and does not count to the antique varieties of grain[43]. Rye often appeared in prehistory as a "weed" in wheat or barley fields and was probably domesticated late (maybe as a secondary grain). In Switzerland the first traces of rye appear in the Bronze Age. Indeed, these traces do not probably represent a domesticated form, but a “weed-rye”. In Switzerland, larger amounts of rye appear with the Romans. Traces of rye however, were found in outside the Alps (thus not in Valais). But this could be perhaps a research gap and not a real lack of rye in the Alpine region. The oldest bigger rye stock in Valais is known from the cloister *Saint Maurice* and dates back to the early Middle Ages[44]. Written sources mention rye bread (*Panum sigalinum*) for the first time around 1000 AD, and by1500 AD, rye bread was commonly used. Interestingly, those days, rye bread was the bread of the poorer social classes. Today, by contrast, it is sold as a speciality, and since the year 2000, it carries the AOC label (http://www.walliserroggenbrot.ch/de/index.htm). Since 2004, the Valais rye bread has become a protected entity. Rye bread has a rustic and strong taste; traditionally it is mixed with sour dough and it maintains itself fresh for several weeks (-months). In fact, it is believed that in the past rye bread was baked only twice a year: at Christmas and in August. Typically, the rye is sowed between August and October (depending on the altitude). There is also a summer variety of rye, which is normally sown from April to May and harvested from middle June to middle August.

Fig. 3: Land Rye of Valais on the „Brigerberg“. One of many different rye varieties.

Fig. 4: An old woman is harvesting a rye field in traditional way with a sickle.

[42] Mermod, O. (2004), 49 – 54.
[43] Brigger, R. (2004), 1.
[44] About 800 AD; Archaeobotanical Laboratory Basel, unpublished data.

After one season, the fields are usually left uncultivated for a year to regain fertility[45]. The fact that rye became the most important grain in Valais is not a coincidence. Its success is due to its high level of adaptability to harsh environments. Contrary to other crops such as wheat and barley, rye tolerates dryness, cold and not very fertile soils. Thanks to its flexibility, the rye can be grown also at higher altitudes. The highest fields of rye in Switzerland, and presumably also in Europe, are those above Zermatt (2,100 meters a.s.l.[46]).
Since the 1960s the surface of agricultural land in the Valais decreased considerably and arable land was transformed to pastoral land or woodland. Old grain varieties have disappeared or became rare. In the species' garden centre of Erschmatt (www.sortengarten.ch; see also chapter 6; excursion of 8th July), dozens old varieties of wheat, barley, rye and also other plants are grown, so that their survival can be guaranteed. Also, in the confederate research institution of Changins, thousands of grain cultivars are kept in a genebank and archived (www.acw.admin.ch/aktuell).

Fig. 5 – 7: This picture sequence shows very clearly the decrease of fields in the last 13 years above Leuk (Brentjong).

The saffron of Mund (excursion evening of 7th of July)

The saffron (*Crocus sativus*) belongs to the family of the *Iridaceae* and is an onion plant (a Geophyte). The flower is composed of 6 lavender-violet petals[47]. The original home of the saffron is unknown. It is nevertheless assumed that its provenience was the high mountains of the Cashmere, where it was already cultivated 3'500 years ago. Its cultivation reached Greece around 300 BC and subsequently spread to Italy and Spain. In Switzerland the saffron cultivation began in 14th century AD. Basel and the region around Geneva were important areas of saffron cultivation (in Basel there is a saffron guild even today). At the end of 14th century, the cultivation began in Valais too. Unfortunately, saffron growing has been decreasing since the beginning of the 20th century, and it has now almost disappeared. One exception is the saffron of Mund[48].

Fig. 8: A saffron field in Valais.

Fig. 9: A saffron blossom.

Fig. 10: The stigmas of saffron.

In Mund the saffron onions are dibbled at about 18 to 25cm in depth, after the rye harvest in August. Then, in September, the rye is sawn over the buried onions. Other examples of sowing or planting collectively are not possible (e.g. the potato over saffron – the potatoes' deep roots will destroy the saffron). The saffron endures neither extensive fertilising nor excessive watering. In Mund the blossoms of the saffron are collected between mid October and the mid November. The blossoms of a

[45] Carlen, Ch., Vonmoos, R. (2001a), 89 – 104.
[46] The field were unfortunately given up 2 years ago, due to decease of the old man who worked it.
[47] Agten, N. (2001a), 141 – 150.
[48] Jossen, E. (1989), 187 – 213.

single plant last only a few days, so they must be harvested as fast as possible[49]. The stigmas are then detached from the blossoms and dried. Just immediately before the use the stigmas should be ground to powder. In the first part of the 20th century, 5 kg of saffron were picked in Mund every year. After the strong decline during the early and mid 1970s, an initiative committee as well as a saffron guild were founded in 1979. Between 1981 and 1984, about 20'000 saffron onions were imported from Kashmir and cultivation in Mund restarted (www.mund.ch/mund/mundersafran). For 1 kilo of saffron, about 120'000 blossoms are required. Saffron is used as a spice and also for the coloration of food. In the past, saffron was also used as a medicine. If consumed in high quantities, however, the saffron has the effect of a drug and can be lethal.

Other traditional cultivated plants in Valais

Potatoes (*Solanum tuberosum*) have been a very important component of the Valais land economy since the end of the 19th century[50]. At the beginning, they were grown only over small areas, up to 2'000 metres a.s.l. In the early 20th century, various varieties of potato were cultivated in larger areas (slopes and valleys). The *Lötschentaler* potato was, and still is, quite popular. From the 1940s, the local potato was replaced by 'modern' species. Similar to the potatoes, there were also various kinds of broad bean. The broad bean (*Vicia faba*) has always been a very important and rich in proteins food, which was often mixed with wheat[51]. Many families had special field beans with various varieties, which still exist today, e.g. the *Törbjer great bean*. However, with the development and expansion of the villages, the cultivation of beans decreased obviously.

Fig. 11: Potatoes of Lötschental.

The species' garden of Erschmatt (Excursion on Sunday, 8th of July)

The garden of Erschmatt (*http://www.sortengarten.ch; Fig. 12*) is situated above Leuk (1'200 metres a.s.l). It is an important element for the preservation of the biological diversity[52]. A range of rare species of plants are grown in the garden regularly and protected from extinction. The cultivation of old varieties in Erschmatt is a mix between preservation *in situ* (at the original place) and *ex situ* (for example in the genebank of *Changins*). The main focus lies, mainly, on grain like rye, barley and wheat, but also various potatoe- and field bean-varieties are grown. The garden was founded by the agronomist *Peter Züblin* and the Association of Swiss Alpine Homeland (*Verein Schweizer Bergheimat*) in 1985. Today, the garden is lead by *Roni Vonmoos-Schaub*, with the support of the foundation *Pro Specie Rara* (www.prosecierara.ch) which has the patronage of the garden, the Federal Office for agriculture and the *Loterie Romande*. The garden co-operates closely with other organisations, which look after the biological diversity of cultivated plants in Switzerland. The garden has been represented in the *SKEK* (Swiss committee for the preservation of cultivated plants), since the foundation of that committee (*http://www.cpc-skek.ch*).

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[51] Agten, N. (2001b), 159 – 178.
[52] Vonmoos, R. (2001), 179 – 184.

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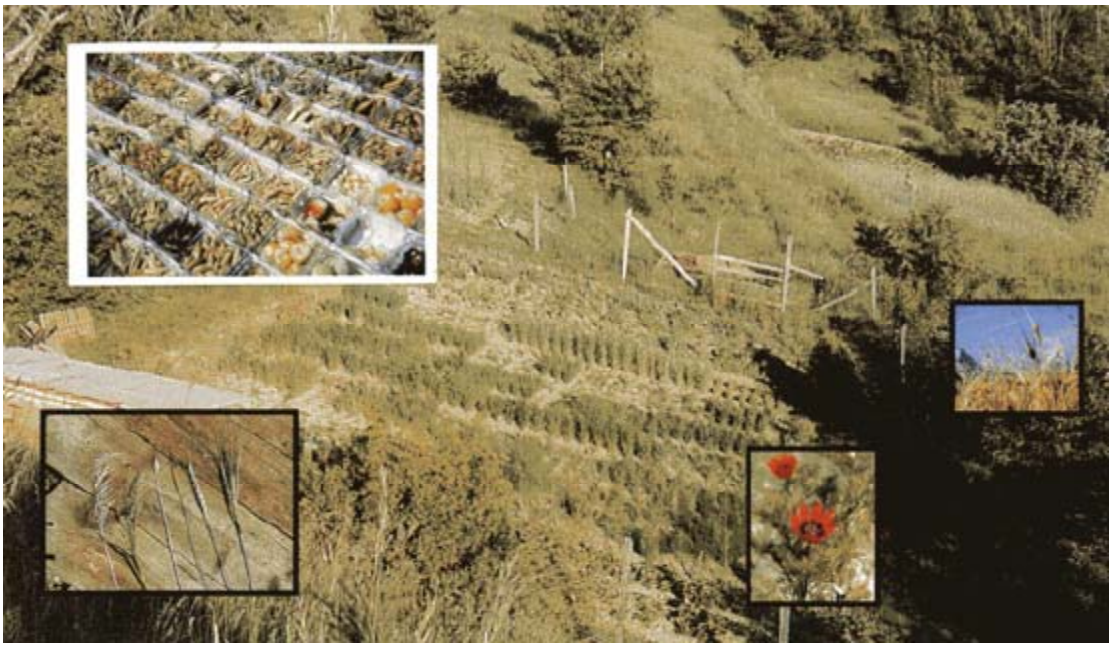

Fig. 12: The species' garden of Erschmatt. On small fields, rare varieties of cultivars are grown, to save their existence.

Picture credits

Fig. 1: Agten, N. *et al.* (2001), 117.
Fig. 2: Agten, N. *et al.* (2001), 106.
Fig. 3: http://fr.puratos.be/Images/appl_traviata_010106016_tcm112-13889.jpg
Fig. 4: www.lepaindenosancetres.com/photos/small11.jpg
Fig. 5 – 7: Agten, N. *et al.* (2001), 116.
Fig. 8: Agten, N. *et al.* (2001), 141.
Fig. 9: Jossen, E. (1989), 184.
Fig. 10: Jossen, E. (1989), 205.
Fig. 11: Agten, N. *et al.* (2001), 153.
Fig. 12: Agten, N. *et al.* (2001), 182.

8 The History of Viticulture in the Valais

David Brönnimann, undergraduate student, Ba in Prehistory and Archaeological Science, Basel University

First traces of wine

Wild vine (*Vitis vinifera* ssp. *silvestris*) is indigenous in the whole Mediterranean area and also in parts of the Middle East. It was originally a wood-inhabiting liana and its domestication probably occurred in the Levant around 5'000 or 4'000 BC. The viticulture started in the Aegean Sea around 3'000 BC and, brought by the Greeks and Phoenicians, reached the West-Mediterranean in the 1st Millennium BC. Archaeological evidence shows that in Switzerland, the grapes of the wild vine were collected in the Neolithic as well as in the Bronze Age. Grape pips (dated from 3'900 to 2'000 BC cal) were indeed found in different wetland settlements of Lake Neuchâtel and Lake Geneva. Today, wild vine is only found near Martigny in the Valais[53]. Amphorae full of wine reached the northern Alpine region (either going over the Alps or through the Rhône Valley) already in the Iron Age. As an example, wine amphorae from Marseille were found in the Iron Age oppidum of Châtillon-sur-Glâne (Canton Fribourg, ca. 500 BC). Finally, the Romans imported not only amphorae with wine but also grapes.

Fig.1: Wild vine (vitis vinifera ssp. silvestris) is very rare in Middle Europe.

This is proven by the numerous grape seeds found in different settlements. The question, when exactly the first vine was grown in Valais, is difficult to answer. In different Roman anthropogenic layers of Brig-Glis, Waldmatte (see chapters 5 and 7) and Brig (M. Desfayes, 1989), numerous grape seeds were found (261 pieces[54]). Unfortunately, no absolute dates of the Roman layers with grape seeds are published. Because in these layers not only seeds, but also berry stalks, charcoal of vine wood as well as vine pollen were found, one may assume that with the appearance of the Romans, the wine and the grapes were not only imported, but that wine was also produced in some suitable places. This theory is supported by written sources, which state that in some occupied area, wine was produced. We may therefore assume that wine production in Valais started with the Romans.

The traditional viticulture in Valais

The traditional viticulture and the grape processing in Valais are closely linked to the rural nomadism, which was still widespread in the 19th century[55]. In those days, the viticulture had more value than today. The wine production was intended, primarily, to personal use and not for trading purposes. Thus wine was not a main acquisition, but a "by-product" of the people.

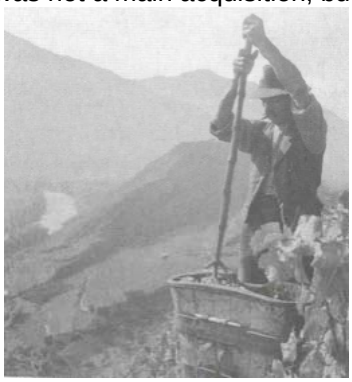

Fig. 2: The harvested grapes were crushed on location.

Fig. 3: The grapes were transported in Brenten (on the left) or leather bags.

Vine was only an addition to the usual agricultural goods (like milk products, rye, potatoes etc.). The grapes were harvested in October and were carried to the valley in "Brenten" (wooden containers which were carried on the back) or in leather bags (Fig. 3). The grapes were then crushed to produce wine. In the village below, the harvest was stored in barrels in the cellar, where they were left to ferment. While the grapes were being fermented, farmers performed other tasks suck as: rye sowing,

[53] Desfayes, M. (1989), 164.
[54] Mermod, O. (2004), 49 – 54.
[55] Zufferey-Périsset, A.-D. (2002), 13 – 20.

potatoes picking etc. Thus fermenting was a necessary time bridging structure within the farmers' activities. The grapes were finally pressed (wrung out) from November to January. The first drawn-off juice is usually the best wine and is called "*Vorlass*". The fermented grape mass ("*Maische*") was carried in "*Brenten*" to the winepress. Winepresses were often communal and belonged to a co-operative and were used by several families. The Pressing of the grape mass was strenuous: two to four persons were employed and the whole lasted all night[56]. The pressing process has to be done carefully; not too much pressure should be put on the grape mass. Wine extracted from this process is of lower quality than the "*Vorlass*". However, he is substantially better preserved, because he contains more tannic acids. That's why the "*Vorlass*" was often mixed with the press wine. As pointed out above, the wine was initially consumed only within producing families; it was commercialized and sold only later on in the 20th century.

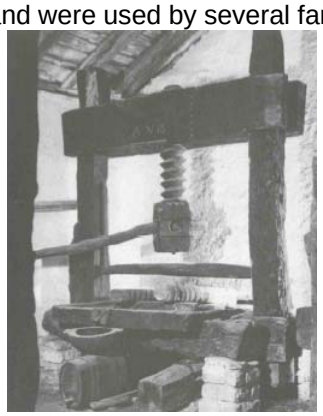

Fig. 4: Winepress; built in 1790 from Loc, above Siders.

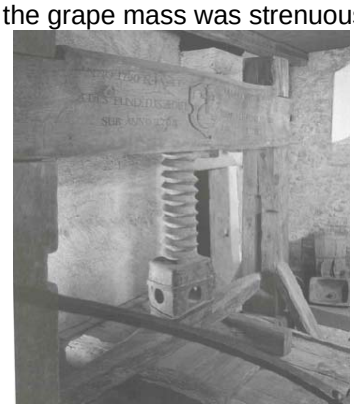

Fig. 5: Wooden winepress from Siders, built between 1760 and 1764.

Old Valais vine sorts (in particular the „Heida grape")

The cultivation of red grapes is a phenomenon of the 20th century and an adaptation to the changed drinking customs (above all, to the changed drinking customs of the consumers outside of Valais). Today, in Valais more than 60 different types of grape are cultivated[57]. One of the oldest and best-known grapes is the *Heida* grape, better known than "*Savagnin blanc*". The name ("*Heiden*" = heathen) points out to the fact that it could be very old. In fact, the "Heida" was probably imported in pre-Christian time by the Ligurians. In particular, the Heida-vineyard above Visperterminen is quite famous (Fig. 7). This is the highest (attitude wise) vineyard in Europe (1'200 metres a.s.l.) According to Stebler [58] "a long time ago", vine was grown even at higher altitudes (2'200 m a.s.l.). Together with the *Heida* we find other old vine sorts in Valais, such as the *Lafnetscha*, the *Gwäss* (germanized name for „*Gouais blanc*"), and the *Himbertscha*. Amongst the red sorts grape we have the "*Eyholzer red*" and also the "*Cornalin*".

Fig. 6: Heida grape.

The change of the viticulture in the 20th century

Wine production in the Valais changed in many ways during the 20th century. The commercialisation of the wine began with the introduction of big automatic hydraulic winepresses[59]. The wine became an export product and lost his role as a by-product of the farming families. The change in the Alpine agricultural practise (the disappearance of the nomadism) transformed, at the same time, the wine production. For instance, today, white grapes do not undergo the fermentation process anymore, but are pressed straight after crushing them, whereas the red ones are let to ferment for a few days, and finally pressed too. It is believed that because the nomadism of the Alpine farmers disappeared and many farmers devote themselves exclusively to the viticulture, the fermenting phase of several weeks disappeared too.

[56] Zufferey-Périsset, A.-D. (2002), 33 – 35.
[57] Charlen, C., Chanton, J.-M., Pont, M. (2001), 75 – 84.
[58] Stebler, F. G. (1901), 12.
[59] Zufferey-Périsset, A.-D. (2002), 38 – 47.

Fig. 7: The Heida-vineyard above Visperterminen is on 1'200 m a.s.l.

Fig. 8: A modern hydraulic winepress.

Along with the commercialisation and the change of the production, another factor, which changed the wine production in Valais radically, appeared. In 1906, the vine pest contaminated the vines in Valais. Many vineyards were destroyed or affected very badly. As a result all plants had to be improved (grafted) with American vines, which were immune to the vine pest. With this process, which lasted till 1950, a whole innovation of a vine population occurred. Thus many old vine sorts disappeared and were substituted with new ones. Today, these are *Pinot Noir*, *Chasselas*, and *Gamay*, and they form 85% of the Valais' vines. The selection of just these sorts was also due to the changes of drinking preferences. In fact, this transformation developed from the Swiss Mittelland, which was the most important export area for the Valais' wine. Here, we could also observe a change from white to red wine consumption. The old Valais sorts of vine became less common during the 20th century. Today the most currently old sort of grape is the *Heida* grape, which, among wine connoisseurs, is known as the pearl of the Valais' wines. The red *Cornalin* has also entered the wine-list recently.

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Fig. 1: www.teutsch.ch/weinbau/images/image002.jpg
Fig. 2: Zuffrey-Périsset, A.-D. (2002) 14.
Fig. 3: Zuffrey-Périsset, A.-D. (2002) 19.
Fig. 4: Zuffrey-Périsset, A.-D. (2002) 22.
Fig. 5: Zuffrey-Périsset, A.-D. (2002) 24.
Fig. 6: Agten, N. et al. (2001) 77.
Fig. 7: Agten, N. et al. (2001) 87.
Fig. 8: www.weingut-spurzem.de/kelter/jpg.

9 Segetal Vegetation in the Central Valais region, with special emphasis on the fields of „Ried-Biela-Termen“ near Brig /excursion on the 6th of July 2007

PhD Annekäthi Heitz-Weniger (IPNA, Basel University) and Caroline Heitz (Graduate student in Prehistory, Faculty of Arts, Basel University)

Origin of the Segetal Vegetation

Indigenous plants: Apophytes

Only a part of the segetal vegetation has its origin in the indigenous flora. It is mainly the light-loving species of dry steppic grassland („Walliser Felsensteppe”; see chapter 1) which find ideal growing conditions on the open fields and therefore multiply quickly. Depending on the methods of land-use, very different life conditions arise. Since industrialization, the plough (or ard), hoe and sickle were replaced by mechanical agriculture. As a consequence, the segetal flora changed completely.

Immigrant plants: Archaeophytes and Neophytes

Many species were brought in - on purpose or not - by humans together with cultivated (domesticated) plants (mainly cereals). This process had already begun in the Neolithic. The **archaeophytes** continued migrating in until the end of the Middle Ages**,** that is, until ca. 1600 AD (after the discovery of the new world). Later immigrants are called **neophytes** and at least some of them come from overseas. The archaeophytes have their origin in Eastern Europe and Asia Minor. They have no chance of surviving in the natural vegetation, but in places like fields worked by humans, this is possible.

Particularities of the Segetal Flora in the Valais

Originally, the Central Valais with its the (sub-)continental climate did not have a particularly rich segetal flora, probably due to its topographic isolation (it is surrounded by high mountain chains). Nowadays, it seems to be rich, because in other regions it has already been diminished by mechanical agriculture (Fig. 1). Today, the richest regions in the Valais are Brentjong near Leuk, Erschmatt and Termen-Bielen near Brig. The former large field systems near Visperterminen almost totally disappeared. Compared with the dry Central Valais, the segetal flora in the cold-humid Upper Valais (Obergoms; NE of Brig) on soils rich in silicate is poor.

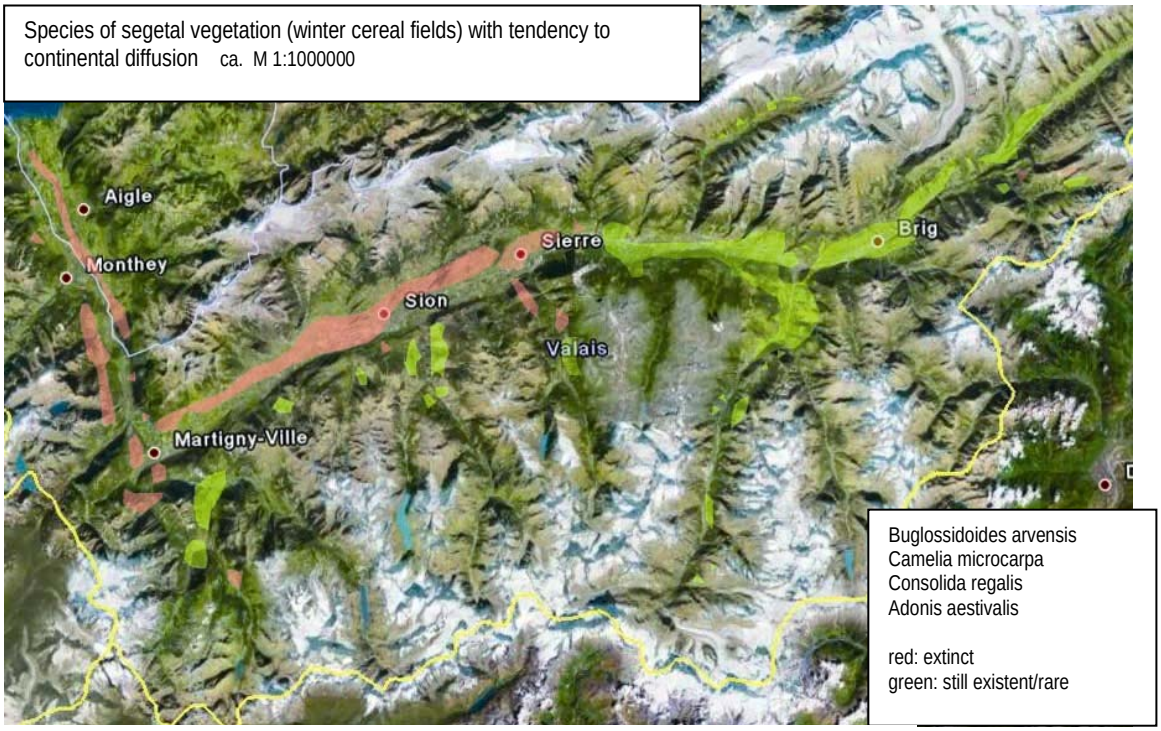


Fig.1: (based on Waldis 1987, Abb. 21)

Factors favouring the segetals (the weeds):

- Hand-sowing of cereals: irregular seed with enough open soil in between
- Self-sowing of the plants' own seeds, no industrialised cleaning
- No use of herbicides
- Cultivation of winter crops
- Fallow every 1 to 2 years for enrichment of seed deposits

The segetal vegetation society varies according to altitude, soil (quantity of clay in it) and methods of land-use. With focus on the fields of Bielen (which we will visit on the 6th of July in the afternoon); in the following, the effects of different land-use methods are discussed.

Fig. 2: Winter crop fields in Ried-Bielen-Termen: Rye and segetal flora 1997/2002. Fotos A. and Ch. Heitz.

Methods of land-use

Winter crop fields

Sowing in early autumn, harvest in late summer, extensive culture (*how about „cultivation"?)*
Dry soil, not irrigated, the higher the steeper, far from the settlement
Mountain area, 400-1600 m, Bielen 900 m
Cultivated plants: mostly rye, rarely spelt or winter-sown barley
Weeds: Ideal conditions for winter-annual species (short dormancy, plants which germinate under cold conditions), but also summer-annual species

Fields of summer crops (cereals and other)

Ploughing and sowing in spring, hoeing and care, harvest in late summer
Area with good water supply due to irrigation
Fertilization with dung: good nutrient supply
Cultivated plants: lower altitudes; grapevines; mountain regions: summer-grown barley, potatoes, horse bean
Weeds: plants which can germinate throughout the year, summer annuals, plants which germinate under warm conditions. Pioneer plants with large seed production and longevity of seeds in soil.

Advantages and disadvantages of weeds

Advantages	***Disadvantages***
Protection from strong sun exposure and erosion	Competition with cultivated plants
Rooting (improvement of the soil)	Nutrient predators
Food for beneficial organisms	Alternate host for parasites
Natural enrichment of nitrate due to Fabaceae	Contamination of the harvest because of weed seeds (for ex. Agrostemma)
Indicators for soil quality	
Gene pool	
Esthetic value	

Conclusion: a comparison

Traditional fields

They are located in places where the crops grow well naturally. Cultivated plants and segetals form a stable life-association close to nature. The weeds do not compete strongly the sown cereals. But there is a competition between different weed species.

Fields of intensive land-use

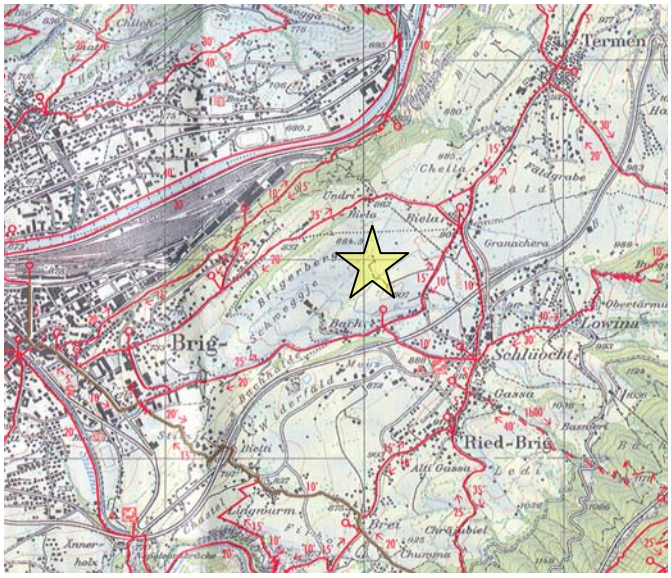
They are located in places where fertilisation and irrigation are necessary (the habitat is basically not well suited for a field). This fact favours nitrophilous weeds what leads to competition between cultivated plants and weeds. Use of herbicides becomes necessary which destroys the soils and leads to resistance. Remains of pesticides and enrichment of nitrate in the harvest are the consequence. Ruderals spread instead of segetals: Chenopodiaceae, Amaranthaceae and Paniceae (*Setaria*) dominate. Often, only one species is present and is highly destructive. The diversity of segetals, plant families and floral colour has vanished.

Species diversity

The diversity has not been reduced in the last 50 years: Waldis (1987) concludes, that there are as many neophytes as extinct species. If this is still the case in 2007, the situation should be analysed further.

Appendix: list of weed-species for „Biela“

Location: Biela near Brig; altitude: 900 m asl, lime-rich soils (Bündnerschiefer, this is a sort of schist or shale) in subcontinental climate (based on Waldis 1987 and own observations). The lists are not complete, they show a selection. Typical are the pontic-pannonian floral elements.



Location of the fields

The fields with winter grain are richer in species than those with summer grain: In winter grain there are a lot of weed-species from summer grain but less vice versa.

Legend:
w-a: Winterannuals (plants which germinate under cold conditions),
s-a: Summerannuals (plants which germinate under warm conditions),
y: plants which can germinate throughout the year, geo: Geophyte,
Apo: Apophyte, Neo: Neophyte
! remarkable species

A. Weed-association of winter grain: Caucalido-Adonidetum

Weed-species of winter grains

Species	***Life forms***	***Chorology***
Adonis aestivalis !	w-a	Arch
Adonis flammea !!	w-a	Arch
Agrostemma githago !	w-a	Arch
Ajuga chamaepitys	y	Apo
Anthemis arvensis	w-a	Apo
Bromus commutatus	w-a	Arch
Buglossoides arvensis	w-a	Arch
Bunium bulbocastanum	geo	Neo
Centaurea cyanus !	w-a	Arch
Convolvulus arvensis	Geo	
Delphinium consolida	w-a	Arch
Euphorbia virgata		Neo
Fallopia convolvulus	s-a	
Galeopsis angustifolius	w-a	
Lathyrus tuberosus	geo	Arch
Melampyrum arvense	w-a	Arch
Neslia paniculata !	s-a	
Nonea pulla !	w-a	Neo
Odontites verna	w-a	Arch
Papaver argemone !	w-a	
Papaver rhoeas	w/s-a	
Ranunculus arvensis	w-a	
Scandix pecten-veneris !	w-a	Arch
Thymelaea passerina !	w-a	Arch
Valerianella dentata	w-a	Apo/Arch
Veronica hederifolia	w-a	
Veronica triphyllos		
Vicia pannonica !	w-a	Neo
Vicia villosa (=dasycarpa)	w-a	Arch
Viola arvensisi	y	

Agrostemma githago (Waldis 1987)

Weed-species of summer grains

Anchusa arvensis	s-a	
Chenopodium album	s-a	
Euphorbia helioscopia	s-a	
Galium spurium	w/s-a	
Lamium amplexicaule	y	
Thlaspi arvense	s-a	
Veronica polita	y	

Viola arvensis
(Waldis 1987, XVIII)

Widespread species

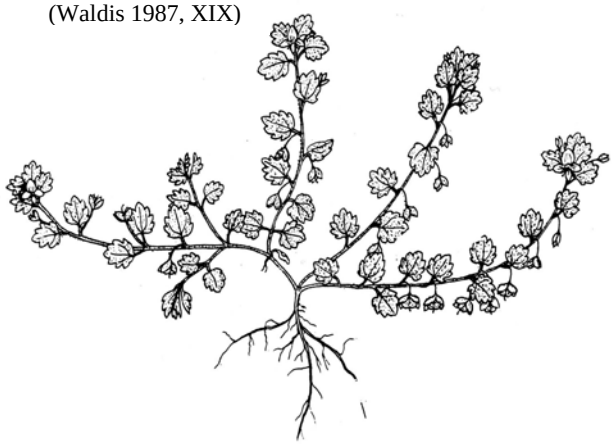
Alyssum alyssoides	s-a	Apo
Muscari comosum	geo	Apo
Holosteum umbellatum	w-a	Apo
Myosotis arvensis	w/s-a	
Anagallis arvensis	s-a	
Setaria viridis	s-a	

B. Weed-association of Summer Grain: Setario-Veronicetum politae

Weed-species of summer grains

Aethusa cynapium	s-a
Amaranthus retroflexus	s-a
Anagallis arvensis	s-a
Atriplex patula	s-a
Chenopodium album	s-a
Chenopodium hybridum	s-a
Euphorbia helioscopia	s-a
Geranium pusillum	Y
Lamium purpureum	Y
Papaver rhoeas	w/s-a
Setaria viridis	s-a
Sinapis arvensis	s-a
Solanum nigrum	s-a
Stellaria media	Y
Veronica polita	Y

Veronica polita
(Waldis 1987, XIX)



Wed-species of winter grains

Buglossoides arvensis	w-a
Centaurea cyanus	w-a

Widespread species

Convolvulus arvensis	Geo	
Equisetum arvense	Geo	Apo
Galium aparine	Y	Apo
Galium spurium	w/s-a	
Lapsana communis	s-a	Arch
Medicago lupulina	Y	Apo
Myosotis arvensis	w/s-a	
Ploygonum aviculare	s-a	Apo
Sonchus arvensis	Geo	Apo ?
Viola arvensis	Y	

C. Especially thermophilous segetal plants

A stony, open and south exposed field on the lime rich schist/shale (Bündnerschiefer) leads to a special segetal flora with *Ajuga chamaepitys, Chaenorrhinum minus* (pioneer, vine), *Minuartia rubra* (apophyte of dry steppic grassland) und the very rare species *Polycnemum majus* (in summer grains, neophyte).

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10 Man-made watercourses: The Valais *bisses* (to be visited on 6th and 8th of July)

Caroline Heitz, graduate Student in Prehistory, , Basel University and Dr. Annekäthi Heitz, Scientific collaborator, IPNA, Basel University

The man-made watercourses – carved in the slopes or suspended as wooden channels on rock faces - are evidence of the struggle against the aridity in the Valais. To conquer the obstacle of the terrain, different construction systems were used. The bisses are at least 1000 meters long and carry 15 litres of (mostly) glacier water per second. These irrigation systems are hundreds of years old and still in use today.

Through collective work, the owners of the slopes and water rights constructed the bisses. Distribution systems channel the water to the grassland according to the water rights. The guardian called the „Sander" (who cleans sand from the system) was responsible for maintaining them, once the bisses were in use.

Terms and their etymology

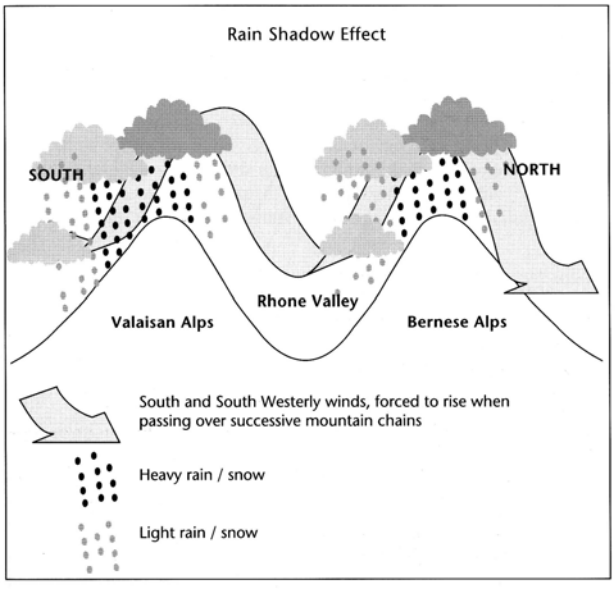
Bisse (Central Valais)
Raise, Bisse (Lower Valais)
Suone,
Wasserleite,
Wasserfuhre (Upper Valais)

Each region has a different name for its watercourse:
The German term ***Suone***, ***Suon*** or ***Süe*** could have its origin in the Indo-Germanic root ***su*** or ***assu*** meaning **water** (Turkish, Sanskrit) or **goddess** (Hittite).
The French term ***bisse*** may come from the patois ***bis***, which basic form is ***bief***, meaning ***bièvre***, beaver. ***Bief*** are also called the little courses leading water to the mill. We will use the term ***bisse*** because it's understandable in German, French and English.

Climate

The Valais is an intra-alpine dry valley („inneralpines Trockental"): It is oriented east-west and therefore protected from rain by the Valaisan Alps in the South and the Bernese Alps in the North, both over 4000 m high. The Rhone Valley is dry and hot with a steppic vegetation (see chapter 1) Two main factors are responsible for this special local climate:

a. The main valley and the lower parts of the south-exposed slopes lie in the rain shadow of the mountain chains (Fig.1).
b. The south-exposed slopes are oriented to the sun, nearly straight into the sun rays. This causes higher evaporation (Fig.2).



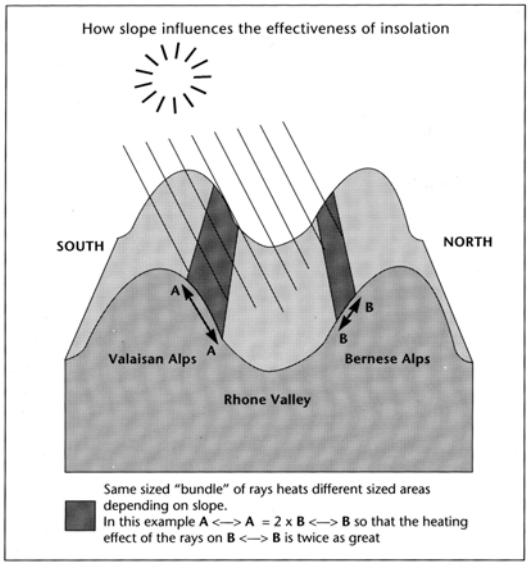


Fig. 2 (Bratt 1995, Fig. 3)

There is a high diversity of micro-climates. The driest and hottest region is the Cenral Valais. So the irrigation systems are most extensive between Sion and Visp. The balance of rainfall and evaporation is negative: there is a 300-liter water shortage per square meter in summer.

The Origin of the bisses

Valaisan legend: Die Wasserleitung aus dem Bietschtal

„Die Ausserberger führten das Wässerwasser über abschüssige Abgründe aus dem Bietschtal nach leiggern. Aber bei jährlichen Ausbesserungen der Wasserleitung kamen so viele Männer ums Leben, dass es zwölf Witwen gab. Die reiche Familie Jakobner warf ihr ganzes Vermögen hin zum Unterhalt der Wasserleitung und verarmte vollständig. Seither ist die Wasserleitung eingegangen.“ (Josef Guntern (Hg.): Walliser Sagen, Olten 1991, 216)

The earliest written sources on *bisses* are from the 12th century. They talk about the renewal of *old bisses* or *pagan bisses.* A Valaisan legend tells about the bisse *„Chänilwasser“*(1361 AD) which was replaced by the *„Niwärch“*(1362 AD), an 8,5-km long *bisse* in a tunnel. It goes from the Baltschieder Valley to the village of Ausserberg. The archaeologist Pierre Morizot thinks that the pagans mentioned must be the Romans. There are similarities in the construction mode of irrigation systems in the Danubian basin and the mountain area of Algeria. It's interesting that the roman troops based in the Alps in the 1st and 2nd century AD were recruited from exactly these areas.

The Valaisan historian Pierre Dubuis supposes the origin of the *bisses* to be in the 12th century. Written sources on water rights are known from this period. He explains the construction and diffusion of the irrigation system as follows:

- **12th century AD: global warming and population growth, the first *bisses:*** About1300 AD, the Valaisan population reached its first maximum. Agriculture was mainly based on winter grain, which needs little water. The rising importance of sheep-farming and cattle-breeding already required irrigation of grassland.
- **1349 AD: Black Death and population decrease, animal husbandry:** The Valaisan population decreased by 50%. In the 1360s and 1370s, animal husbandry was encouraged. Therefore, fields were turned into grassland. The irrigation problem was solved through the construction of new *bisses*.
- **1500 AD: Consolidation of the *bisses*:** The never-ending conflicts over water caused a consolidation in most Valaisan communities. Conflicts were mediated by the bishop or a bailiff.
- **17th century AD: cooling down of climate and stagnation in *bisse* construction:** Of the 87 bisses, whose date of construction is known, only 18 were constructed between 1500 and 1800.
- **19th century AD: Population growth again, global warming, upgrading of the *bisses*:** The melt-down of glaciers started. The price for cereals dropped. Boom in the export of dairy products and cattle. More fields were converted into grassland, which lead to the construction of longer *bisses* (in Saxon1876, the longest *bisse* of the Valais was built, extending 32,8 km).
- **1929 AD: The state provides an improvement program:** Pumps and metal channels were used for the first time. *Bisses* were also used to irrigate vineyards and gardens. Therefore, more investigations into the *bisses* were made after the Second World War.
- **1970s / 1980s: Waste of many *bisses:*** Reduction in intensive agriculture and the use of sprinklers makes the *bisses* unnecessary.
- ***In 1993***, 190 *bisses* (over 760km) still existed in the Valais. 165 of these are still in use. Nowadays they serve also as a tourist attraction.

Construction and maintenance

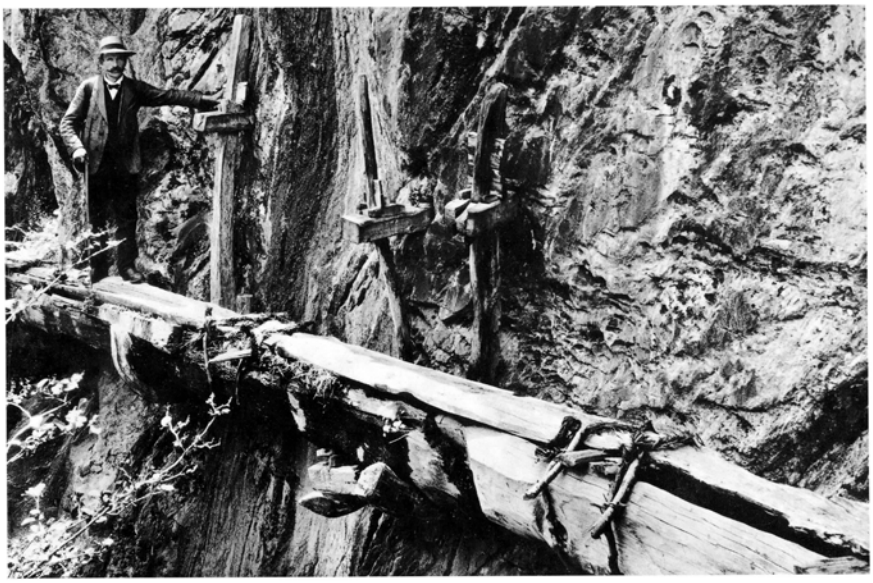
There are several techniques for channeling the mineral-rich glacier water to the grasslands. It is always an adaptation to the terrain. Here we can only discuss the most important types.

1. **Channels carved in the slope.** The easiest way is to carve a channel in the soil or flat rock. The ground can be covered by planks and the walls sealed up by stones and a walkway for the guard runs alongside (Fig. 3).
2. **Hollowed-out trunks**.

This technique is handy for smaller *bisses* to cross steep rock faces. It is used mainly in the Upper Valais. Several channels are telescoped and carried by wooden or metal hucks, mortised into the rock. The planks covering the channel are used to walk on (Fig. 4).

Fig. 3: Bisse as channel in a slope

Fig. 4 Bises made from hollowed-out trunks



10.

For the **construction of the channels,** men and material were let down on a rope over several meters. When this was impossible, a plank was pushed out into the void, either from the last piece of solid ground or from the last fixed timber. The other side was loaded with stones as a counter-balance. The workman sat astride it. A hole was made by hammer and chisel to fix the next support timber. The channel was built on top. This dangerous work was some-times carried out by those who had been condemned to death.

3. **Channels made of planks or poles.** These can carry more water than the trunk channels. They lie on bars mortised on the sides and bottom. They are carried by supports. The holes were plugged with leaves, moss and mud. Planks on the outside of the channels were used as a walkway (Fig. 5).

4. **Tunnel with channels.** Since the 17th century, dynamite was used. The steep rock face could be bored into and the *bisses* constructed inside, which was much safer than the channels outside. Short tunnels and galleries protected the *bisses* in couloirs and rifts from avalanches and land slides.

The *bisses'* water flowed into a distribution system, a wooden box. It had as many calibrated gaps as there were owners of water rights. The gaps could be closed with trough planks when there was no need for water. With large *bisses*, the water flows successively in several distributors until it has reached all the grassland on a slope (Fig. 6).

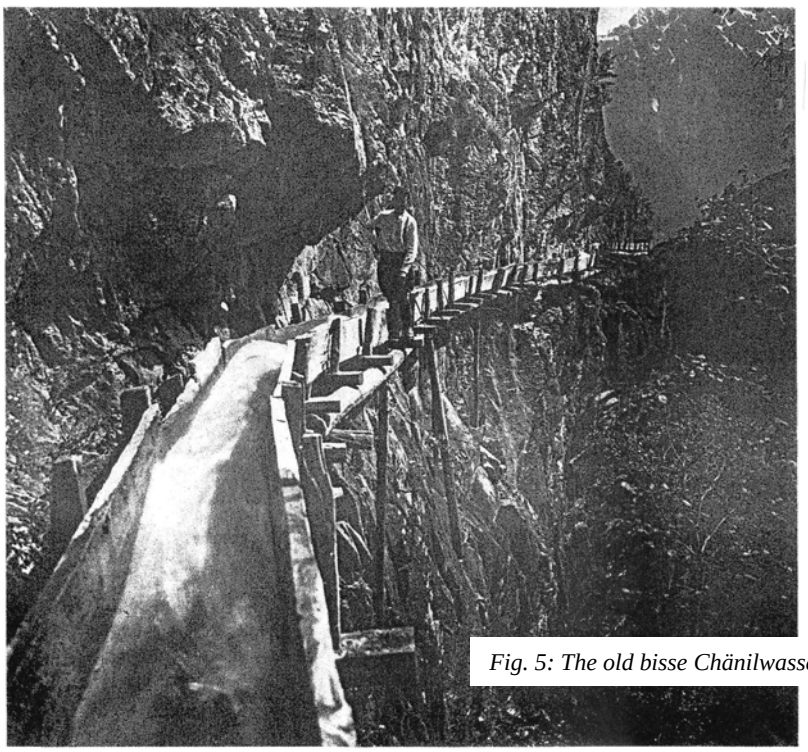


Fig 15: Bitscherin. Flowing 160m below and parallel to the Riederin, this suon carried water out of the Massa gorge to Bitsch-Mörel. The walk-way consisted solely of the protruding ends of the support beams of the channel. *(Photo: I. Mariétan)*

Watering: Meaning and use of the bisses

Twice or three times a month during the summer season, the grassland is watered for 20 days. The *bisses* mark the upper and lower boundary of a parcel of land. On the upper *bisse*, several drains are attached which conduct the water on the grassland. When the water has flowed down the slope and reached the lower boundary of the parcel, it is collected again by the *bisse* below. There, distribution by drains on the parcel below starts again and so on until the whole slope is irrigated.

Fig. 5: The old bisse Chänilwasser in the Baltschieder Valley (Papilloud Fig. 10)

The *bisses* with their glacier water carry sand and silt which deposits soil on the slopes.

Thus, mineral-rich and fertile soils developed over hundreds of years. The irregular irrigation lead to a diverse flora which ensured a good quality of hay.

Along their way from the water-collecting point to the grassland, the *bisses* lose about ¼ of their water. Thus, along the slopes in which the *bisses* are carved, green spaces gradually arise.

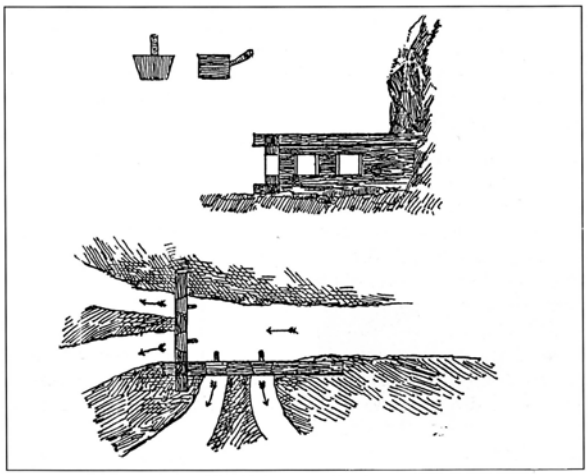


Fig 27: 4-way distributor.

Fig. 6: The distribution system, a wooden box, with calibrated gaps (from Bratt 1995, Fig. 27)

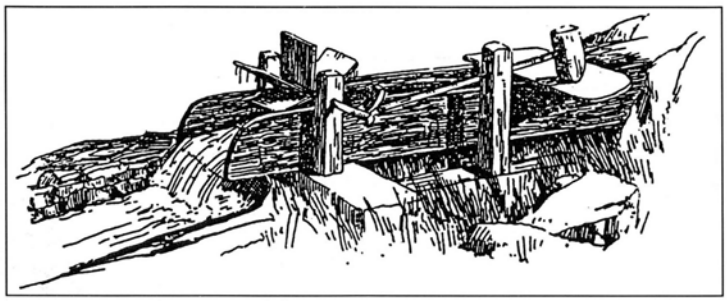


Fig 25: Water-hammer: the device for making an audible signal – the blows of the crank-operated hammer on its sounding-board – to indicate that the flow of the bisse had not been interrupted.

Fig. 7: Water hammer (Bratt 1995, Fig. 25)

Some pictures of the old bisse system at Biela. Fotos S. Jacomet

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11 Traditional farmhouses and buildings in the canton of Valais (to visit on 8th of July, but visible several times)

Elisa Schumpf, undergraduate student, Ba „Prehistory and Archaeological Science“, Basel University

The residential house (dwelling house)

Traditionally, the dwelling-houses (Fig. 1) and farm-houses are built of wood, on a stone foundation. The predominant timber used in construction has always been larch. If protected from damp, it may last for centuries. Silver fir and spruce have also been used, but their wood is significantly less durable. Usually, the timber was cut in the woods directly above the construction site, in order to facilitate its transport.

Interior

All traditional Valaisan houses are built following a sort of standard “blueprint”. In their most basic shape they consist of two rooms: the kitchen and a chamber. Often this shape is not really recognizable any more, as new rooms were added, or the pre-existing ones partitioned.

Fig. 1 A dwelling-house in the canton of Valais

Construction

In most regions of the Valais, log construction (*Blockbau*) dominates. Towards the western part, more and more elements of pillar construction (*Ständerbau*) appear. In the Upper Valais log houses are found almost exclusively.

There are two types of log building technique: one, using round logs, and the other with squared logs. For the first type, mostly unprocessed logs are used (just the bark being removed). For the latter, the logs are brought into a square shape with hatchets and saws before being used for building. In general the second technique was chosen, because it guaranteed sufficient insulation and density. The simpler method is today used only for buildings not used for living in.

Fig. 2: A typical log construction building

Before beginning with the construction of the house, a foundation consisting of loose rubble or stones without much mortar is built up. In the case of dwellings, this foundation would often be covered with plaster (made of limestone), making the original structure virtually invisible from the outside. The function of the stones is to prevent the wood from touching the ground and absorbing water, as that would lead to rapid decay. The cavities between the timber balks are filled with moss, achieving an excellent insulation.

The individual timbers, connected by dowels, should, if possible, reach over the entire length or width of the house. Considering that the maximum length of the wood used in construction is set by nature, it follows that the size of the house is also limited. The average room therefore measures about 5 x 5 metres. For bigger constructions, the carpenters need to either fit together various smaller pieces or use longer logs, which are obviously more difficult to transport and work on.

In the Chablais, the most westerly part of the Valais, the log construction (*Blockbau*) technique disappears gradually, so the pillar construction (*Ständerbau*) and the half-timbered (*Fachwerk*) buildings appear more often.

The same principle applies for both: a framework of timber balks as a sustaining structure, if needed filled with rubble and limestone. In general, nevertheless, the half-timbered building is extremely

uncommon. The biggest advantage of the pillar construction building is that it requires less building material, an issue that has been considered especially for more recent constructions.

Fig. 3: A kitchen with its fireplace, built with stone

Stones were integrated in the construction not only as a protection against dampness, but also against fire. Up to fifty years ago, a fire was constantly burning in an open fireplace, creating the constant risk of fires. This was diminished by covering the surrounding walls with bricks, and later by building the entire structure of fireproof materials (Fig. 3).

Another customary practice is that of building covered walls (*Mantelmauer*). In this case, the core of the house consists of wood, but in some places a stone wall is built up against it. In the eventuality of a fire, this construction would offer more protection than a wall of wood alone. In some cases, the covered wall can be explained as a custom imported from Italy.

A further characteristic element made of stone is the roof. It protects the house from the weather conditions. The shape of the roof is usually a saddle roof with a shallow pitch. It is covered with shingles or slabs. These are not attached, but usually just laid on the roof and possibly sometimes weighted down. The moderate pitch of the roof allows the snow to pile up there during the winter, adding to the efficacy of the heat insulation.

A striking feature of the traditional houses is the presence of often very elaborate decorations on their facades (Fig. 4). Due to the fact that a building may have various owners, these may be quite diverse, as every owner can decorate his part according to his own taste. Decorations may allow a rough dating of the building (for details, see bibliography). In the interior of the house there can also be decorations, sometimes even dates. In the picture an example of a very old house in the Lötschental is shown. On a balk in the parlour, this rosette was found with the date above it.

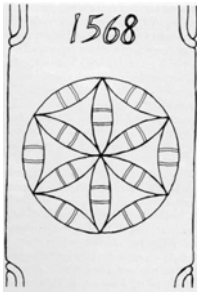

Fig. 4: Decoration and dating

The other farm buildings

In the Valais cattle farming was (and still is) only possible because the pastures reach far up into the mountains. The distances and the altitudes forced a part of the population to live away from the villages for long periods of time and to live “on the road”. Little hamlets originated as an assortment of stables and some rough lodgings.

A very common construction in these hamlets, at a certain distance from the main villages, was the “stable with barnyard”. To efficiently raise cattle and for the storage of hay, such a building was essential. The stable can be isolated or form a composite building with the barnyard. The hamlets were used every year until the hay ran out and the herdsmen had to move on with their cattle.

In the surroundings of villages, and especially in the dry areas of the central Valais, up to an altitude of 2000 metres, cereals were grown, usually rye, along with potatoes and different sorts of vegetables (see chapter 7). For their storage, barns and storage buildings were built. It is significant, that in the Valais there was a rather strict distinction between the two.

The barn

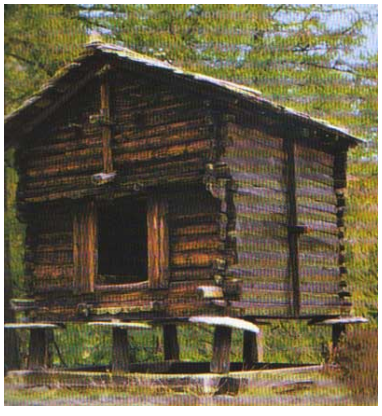

Fig. 5: A typical barn, called „Stadel“

The barn (Fig. 5) is generally used to store the crops after the harvest until November. It is well ventilated to keep its contents cool and dry. It is vital that the moisture in the cereals does not exceed 13-14%!

Outside the settlements barns are usually not too big, usually about 3x3 metres square, and are shared by various holders. Every farmer owns various barns, or parts thereof, to avoid having to gather the harvest from distant fields to one single place. If the barn

Fig. 6: Post with stone plates

stands close by the village it is usually bigger, and it forms a unit with the storage building (see below).

Barns are built with log construction and stand on a dry stone wall. To protect their precious content from pests, they may also stand on posts with round stone plates on top. This way, the bottom of the building is also kept well aerated.

In the barn we also find the threshing place, the so-called *Tenn.* There, in November, the sheaves are threshed and the grain put into sacks. The straw remains in the barn until it is used as fodder and bedding for the animals during the winter. The grain is subsequently carried down to the valley to await its further processing in the storage building.

Since in recent times hardly any rye is being produced at altitude any more, most barns are now being used for storing hay.

The storage building

For an untrained person it is almost impossible to distinguish the barn from the storage building. Nevertheless, the storage building possesses a different internal structure and is of a much more solid construction. It is carefully assem-bled with squared logs carefully fitted together, to prevent moisture and pests from gaining access. Most of them are near the villages, but far enough away so as not to be damaged in case of fire.

Fig. 7: A typical storage building, called „Speicher“ (granary)

Like the barns, the storage buildings may also have multiple owners. A storage building has, however, different compartments and separate entrances for each individual owner.

Besides crops, a storage building has space for cheese, meat and bread, as well as candles and valuables, such as dresses, jewellery or important documents. How important a storage building was is shown by the precise arrangements and the embellishing decorations. They were, in effect, “safes”, and were accordingly equipped with locks and heavy doors.

Fig. 8: A storage building with 4 doors – perhaps for 4 different owners

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12 Fondue and Raclette - Two Swiss Gastronomic Specialties made of melted cheese

Manuel Kammermann, undergraduate Student, Faculty of Arts, Basel University and Stefanie Jacomet

Introduction – History of Cheese Production on Summer Farms

Fondue and Raclette are typical Swiss meals made from malted cheese. They are made from mountain cheese of Swiss origin. In the past they have been manufactured exclusively from raw milk (Raclette exclusively in the Valais during the summer months, on the summer farms).

Fig. 1: A typical summer farm in the Alps, here an example from the Bernese Oberland (Alp Suls). Foto: S. Jacomet. On the right side a typical old cattle breed from the Valais, an Ehringer cow (from http://www.bettmeralp.ch/ graphics/fototagebuch/601_l.jpg).

Raw milk Raclette cheese is usually ripened at 11°C for at least 90 days. As the popularity for the Raclette-cheese and therefore the demand for this cheese increased because of catering trade, Raclette cheese is being now produced from raw and pasteurised milk during the whole year in the lowland regions (there is such a factory near Brig, too). At present, Raclette is the most important semi-hard cheese in Switzerland and belongs, besides Emmentaler and Gruyère, to the most often manufactured cheese varieties with a volume of 11600 t per year (year 2000; after Klantschitsch et al. 2000). For the Fondue mainly Gruyère is used with and admixture of other cheese varieties (see below). Gruyère is produced in the Fribourg Alps.

But how old are these dishes? The history of Fondue and Raclette is closely related to the history of diary farming in the Alps, on the summer farms. Since the middle ages we know from historical sources that summer farming and cheese production were important (Fig.'s 2 and 3), but summer farming is surely much older. Already in Neolithic times there are clear hints for trips of man and livestock to higher altitudes in the Alps (see e.g. chapters 2, 3).

Fig. 2: Cheese production at a summer farm in the region of Gruyère (Fribourg, 15th century. (Musée d'Art det d'Histoire, Fribourg (painting on glass)

In the Swiss Alps, producing of fatty cheese with lab-ferment, was introduced somewhen in the 15th – 16th century, from Italy (in the Grisons around 1530; Schilling 2005 and citations there, p. 16 ff.). From Central Switzerland there are archaeological (including archaeozoological) hints on summer farming and production of lab-fermented cheese from the 15th century (see Obrecht et al. 2003, especially chapter 11 about animal bones, p. 180 ff.).

This cheese was mainly exported. Also one of the most important incomes of the monastery of Engelberg, in Central Switzerland,

Fig. 3: Production of cheese and butter, 1548. Schweizer Chronik des Johannes Stumpf. Archiv Schweizerische Käseunion, Bern. From: Schweizerische Käseunion 1991

was the trade with livestock and cheese[60]. However, only from around the 17th century onwards it is possible to have more precise ideas about the traded quantities. One of the most famous traders was the Valaisan Kaspar Jodok von Stockalper (1609-1691): His palace we will see every day in Brig when walking to our conference place (see Annex 1). In the year 1666, 1400 pounds of cheese were transported from the valley of Engelberg to the Valais and Northern Italy.

Fondue (Swiss Cheese Fondue)

Some basics…..

The word „Fondue" derives from the French verb „fondre" meaning „to melt". Fondue is typical Swiss meal including melted cheese, white wine, a bit of starch and brandy (Kirsch) as well as spices like nutmeg, pepper and garlic (see Schweizerische Käseunion 1966). The tartaric acid from the wine acts as chelating agent.

Fondue is eaten out of a so called „Caquelon", a special fire-safe pot made usually of ceramic. For keeping the cheese warm it is put onto a "Rechaud", a sort cooking apparatus with a burner. Bite-sized pieces of white bread are pierced onto a long fork which then will be dunked in the Caquelon with rotary movements. When the bread is soaked with cheese it will be eaten directly off the fork. Be attentive otherwise you will burn up your mouth! Slowly, at the bottom of the Caquelon a layer of roasted or slightly burnt cheese is formed. In some regions this is eaten too, at the end, as a sort of delicacy.

Eating Fondue it is very important to keep an eye on the bread. There is a custom to become punished when the bread-piece is lost. Such punishments may be singing a song or pay a bottle of wine. This is meant to amuse the other people at the table.

With a Fondue it is recommended to drink a white wine or a black tea. At the end (or also during the meal….) a brandy, mostly cherry-flavoured, is taken ("Kirsch"). This should help to digest the rather heavy and fatty meal. Because the meal is hot and heavy "indigenous" people in Switzerland eat Fondue only during the winter-month (and we tend to be amused about tourists eating fondue in the summer….!).

Needless to say that there are several ways of preparing a Fondue (see Schweizerische Käseunion 1966), but the most known one is called „moitié-moitié". This is French again and means "half-half". This expression means that the cheese is mixed in a ratio of fifty percent „Freiburger Vacherinkäse" (Vacherin cheese from the Fribourg Alps) and fifty percent „Greyerzerkäse" (cheese of Gruyère, also from the Fribourg Alps). But of course it is also possible to make Fondue with other full-fatty cheese from the summer farms.

This is the base recipe of Fondue "moitié-moitié":

Mix 400g cheese of Gruyère, 400g Vacherin cheese, 1 (or more….) clove of garlic, ca. 4 teaspoons of starch and 3-4 dl dry (and maybe a bit sparkling) white wine. Put it on the stove and let it melt while stirring the mass. Add 1 teaspoon lemon-juice, 20ml Kirsch (a cherry brandy) and spices as pepper and nutmeg. Then put it on the Rechaud and eat it with white bread, cut into bite-sized pieces. For 1 person usually 200g of cheese is needed. Ready mixtures can be bought in every shop, in fresh state or as ready mixtures already including wine etc. ("Fertigfondue").

History of Fondue

It is difficult to say since when Fondue exists, but one assumes that it was invented by the herders on the summer farms. They had to live on what they had. That was mainly cheese and bread. Fondue is very nutritious and because of that an ideal meal for hard working people.

Fondue is seen as Swiss national dish only since the 1950ies when the Swiss army grabbed it into the cookbook. The soldiers took the recipe home and therefore it spread very fast.

[60] http://www.schaukaeserei-engelberg.ch/texte/geschichte-de.html

Raclette

The Raclette, from the French verb „racler“ for „to scrape” or “to shed“ is, beside Fondue, one of the Swiss national dishes which are made of melted cheese. Raclette cheese has to possess specific properties such as no fat separation as oiling off, proper break off of the melted body and the perception of toughness, but no rubberiness like chewing-gum, in the mouth (see Eberhard et al 1988, cited in Klantschitsch et al. 2000). Raclette cheeses from raw or pasteurised milk show significant sensory differences. In general, cheeses made from pasteurised milk are considered milder whereas raw milk cheeses develop a more intense flavour. “Insiders” prefer Raclette made of raw milk-cheese produced on a summer farm! Raclette is a typical specialty of the Upper Valais. However, the producers failed to get an AOC label for it.

Raclette Valais

According to the traditional art of the Valais, a half loaf of fine melting cheese (Gommer[61] Käse) is hold near to a fire until it begins to melt. The melting part then is scraped on a plate. Since the fifties Raclette is not anymore generally made at a fire. There are special electric ovens for the table, the so called „Racletteofen“. It found its way not only into Swiss dining rooms. Those classic electro-tableovens are basically composed of a heater coil in a horizontal or leant case, a holder for the cheese and an apparatus for adapting the height. The cheese is clamped in the holder and is brought under the heater coil. This has the dame effect as the fire, it melts the cheese. Ideally, the cheese should become brown to a certain degree. Then, the cheese loaf is removed from the heater coil, and the melted part of the cheese is scraped on a plate with a special knife, the so-called „Raclettemesser.

History of the Preparation of Raclette Valais

until approx. 1955: Raclette on open fire; no especial technical devices. The half of a cheese loaf was laid on a wooden board, with the cutted area against the fire.

1955-1965: Electric devices with quartz-pipes (for half loafs). The heat source was placed above the cutting area (top heat). First approaches of operating comfort (cheese holder, height adjustment).

from 1965: Electric devices with resistance of Inox (todays heating coils) for half loafs. Advancing operating comfort (no touch of cheese needed). Increasing variety of devices (quarter loaf to multiple half loafs).

from 1970: Electric devices with little pans for the individual preparation of portioned cheese. Combination with grill of iron sheet, cast iron or stone. Beginning breakthrough as bulk product. Start of internationalization (like Belgium, Netherlands, Luxembourg, France and Germany).

from 1980: Introduction of gas devices for half loafs

from 1990: Developing and introduction of devices with alcohol (low heat) for individual preparation of Raclette.

Since the 80ies: Raclette grill: Since a while but less traditional there are also ovens for the table which allow to melt panes of cheese. For that there is a horizontal heater coil on a round framework (top heat). Beneath there is place for several little pans. Over the heating coil there is a plate which can be used as a grill. The pans are located / put underneath the heating until the cheese has melted.

The advantage of these devices is that one can put vegetables or other inserts which can be cooked au gratin. Indeed it is not as “romantic” anymore as with open fire, but everyone can sit at the table and have fun together.

[61] Gommer comes from Goms = the uppermost part of the Valais, NE of Brig until the Rohne Glacier / Furka Pass. This is the “core region” of Raclette-cheese production.

As *side dishes* one eats cooked potatoes („Gschwellti“ in Swiss German), sour cucumbers, pickled onions, mustard fruits and so on. Different varieties of cheese were developed, for example with garlic, pepper or paprika.

History of Raclette

The first written mention of Raclette was as „Bratkäse“ (Bratchäs) in a written source from a monastery in the Middle Ages, from the cantons Obwalden and Nidwalden in Central Switzerland. There is a legend that one of the dairymen on the summer farms once has eaten Fondue with potatoes and so the Raclette was invented. But this is not proven and is told as a legend.

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A summer farm in the Bernese Oberland (Lauterbrunnental), Alp Schwand. Foto S. Jacomet

Pig barn at Alp Schwand: pigs were kept on the summer farms from ca. the 15th century onwards, they were fed with thy by-product’s of the la-fermented cheese (so called “Schotte”). See Hüster Plogamnn, in Obrecht et al. 2003. Foto S. Jacomet

Annex 1 : The Stockalper Palais in Brig

Unter Kaspar Jodok Stockalper (1609-1691) avancierte Brig als Sitz von Stockalpers Wirtschaftsimperium zu einem der führenden Orte des Oberwallis. Der Handelsherr entwickelte eine rege Bautätigkeit und liess entlang des Weges über den Simplonpass mehrere markante Gebäude errichten. In der Briger Altstadt entstand der barocke Stockalperpalast, eines der bedeutendsten Gebäude des Ancien Régime in der ganzen Eidgenossenschaft.

Fig. 1: The Stockalperpalais in Brig.

Im Jahre 1948 ging der baufällige Palast in den Besitz einer Stiftung über. Nach Beendigung der Renovation (1961) hielten die Behörden Einzug ins Gebäude, in dem überdies ein Kellertheater, eine Kunstgalerie sowie ein Museum Platz fanden. Heute ist die Museumsausstellung im Rahmen einer Schlossführung zugänglich, bei der auch der Burgersaal mit Originaltäfelung aus dem 17. Jahrhundert, die Schlosskapelle, der sogenannte Rittersaals mit der Ahnengalerie der Familie Stockalper und der Dreikönigssaal zu sehen sind.

Fig. 2: Baron Kaspar Jodok von Stockalper in Adelspose reitend.

Im Jahre 1991 wurde im Museum anlässlich des 300. Todesjahres Stockalpers eine neue Ausstellung verwirklicht, die den grossen Walliser Handelsherrn und Politiker und seine Zeit thematisiert.

Insbesondere ist der Werdegang Kaspar Jodok Stockalpers dargestellt, der seit seinem 20. Altersjahr die damals übliche Ämterleiter hochkletterte. 1670 wurde Stockalper Landeshauptmann und hatte damit das höchste politische Amt im damaligen Wallis erreicht. 1678 erfolgte sein Sturz. Die Zeit bis 1685 verbrachte er vor allem im angrenzenden Italien, seine letzten Jahre in Brig.

Auch der Werdegang Stockalpers als Kaufmann setzte in den 1630er Jahren ein, als er den Verkehr über den Simplonpass wieder in Schwung brachte. 1647 hatte er das Salzmonopol inne; Salz war nicht nur als Lebensmittel, sondern auch als Konservierungsstoff ungeheuer wichtig. Zusätzlich dehnte Stockalper seine Geschäfte auch auf andere Gebiete aus: Er war Teilhaber oder Besitzer an einem halben Dutzend Bergwerke, als Soldunternehmer liess er einheimische Soldaten anheuern und vermietete sie in französische Kriegsdienste. Weiter war er im Metallhandel tätig und im Kreditwesen, ab 1639 hatte er auch das Transitmonopol am Simplonpass inne.

Stockalper war ein typischer Vertreter des aufstrebenden Unternehmertums im 17. Jahrhundert - in 50 Jahren steter und "cleverer" Aktivitäten erwirtschaftete er ein Vermögen von umgerechnet über eine halbe Milliarde Schweizer Franken.

Öffnungszeiten

Mai bis Oktober: Dienstag bis Sonntag stündliche Führungen ab 9:30-16:30 Uhr.
Im Mai und Oktober findet die Führung um 16:30 Uhr nicht statt.

Museum Stockalperschloss, Alte Simplonstrasse 28, 3900 Brig, 079 412 27 77, www.brig-glis.ch

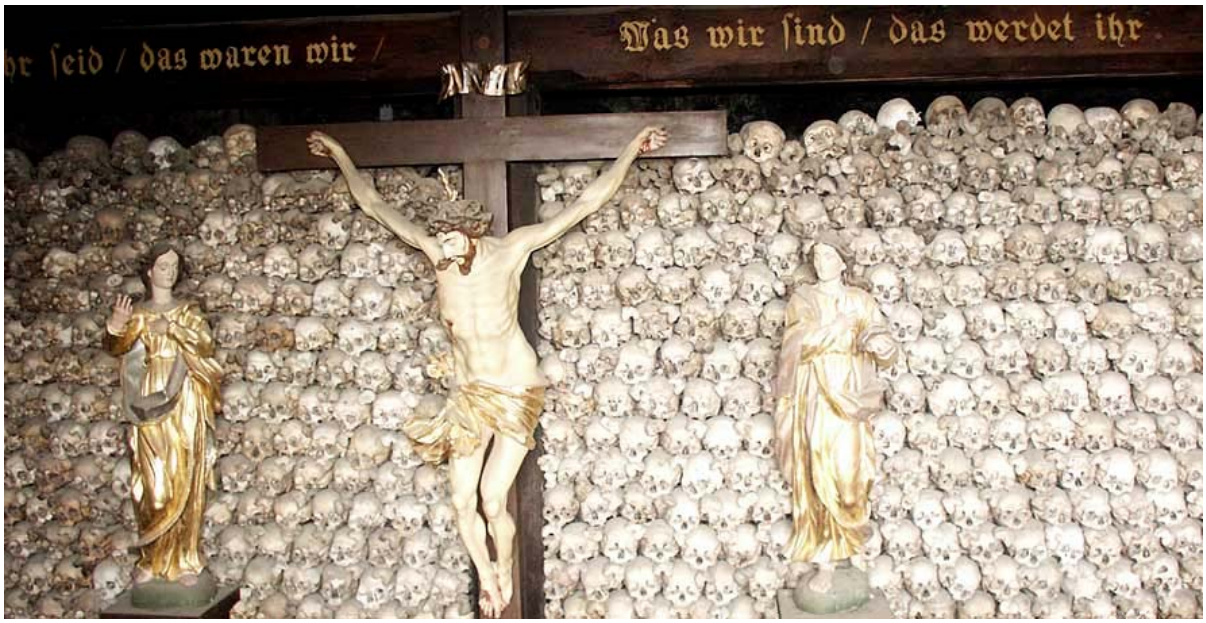
Leiter: Arthur Huber, Alte Simplonstrasse 28, 3900 Brig, arthur.huber@brig-glis.ch

Annex 2: The Beinhaus – Naters

The Beinhaus is located south of the church in Naters. It was built in 1514 by Ulrich Ruffiner. It contains over 30'000 skulls (and other bones). From outside you can see very well the impressive wall of skulls. In front of the wall, there are some statues of Jesus Christ and saints. On the inscription you can read:

Was ihr seid, das waren wir;
was wir sind, das werdet ihr.

in my bad english that means:
what you are, we were
what we are, you will be



THE END