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STUDI DI ARCHEOLOGIA PREISTORICA

11

PREDICTING PREHISTORY  
PREDICTIVE MODELS AND FIELD RESEARCH  
METHODS FOR DETECTING PREHISTORIC CONTEXTS

Giovanna Pizziolo Lucia Sarti (eds)

Proceedings of the International Workshop  
Grosseto (Italy), September 19-20, 2013

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## WORKSHOP PROGRAM

*Thursday 19 September*

Opening Session

*Lucia Sarti* - Welcome to delegates

*Giovanna Pizziolo* - Introduction to aims and organisation of the Workshop

### SESSION 1: THEORY AND PERSPECTIVES

*Juan Manuel Vicent Garcia* - Theoretical remarks on predictive models in Landscape Archaeology

*Anita Casarotto, Giovanni Leonardi* - Predictive modeling for the study of prehistoric contexts: two possible levels of applicability

*Nicholas Vella* - Looking at land and sea: predicting and identifying prehistoric activity in a small Mediterranean island group

Discussion

### SESSION 2: NEW OPERATIONAL DESIGNS AND APPLICATIONS

*Stefanie Rogers* - Least cost path analyses in the Pennine Alps

*Hans Peter Blankholm* - Fifty-nine sites in six days: Macro-Level predictive modeling of early Stone Age pioneer settlement locations in Varanger, Norway

*Ezra Zubrow* - Predicting the Unpredictable, Structuring the Unstructurable, Constructing the Unconstructed

Discussion

### SESSION 3: MODELS AND INTERPRETATIONS

*Maurizio Cattani* - Predicting Landscape: resources, sustainability and strategic planning in the Bronze Age

*Philippe Curdy* - Models of prehistoric settlement in the Upper Rhone Valley (Western Swiss Alps)

*Raffaella Poggiani Keller* - Predicting prehistory in Lombardy

Discussion

*Friday 20 September*

### SESSION 4: PREDICTIVITY, FIELD SURVEY STRATEGIES AND “GOOD PRACTICES”

*Andrea Pessina* - Predictive and preventive archaeology for prehistoric contexts: a perspective from above

*Martijn Van Leusen* - Detecting unobtrusive pre- and protohistoric remains in the Raganello Basin: recent experiences and results from the Rural Life Project

*Pierluigi Rosina* - Geoarchaeological investigations applied to fluvial terraces archaeological sites in Central Portugal

*Giovanna Pizziolo, Nicoletta Volante* - Landscape changes and site discovery potential: predictive criteria and field survey strategies for prehistoric contexts

Discussion

Field Trip: Parco Regionale della Maremma - Alberese (Grosseto). Scoglietto and Spaccasasso Caves and Sasso delle Donne

### ORGANIZATION:

Dipartimento di Scienze Storiche e dei Beni Culturali - University of Siena

Interuniversity Research Centre for the Study and Promotion of Prehistoric Cultures, Technologies and Landscapes - University of Siena

### SUPPORT:

Scuola di Dottorato in Beni Culturali e Storia Medievale - University of Siena

Scuola di Dottorato in Scienze dell'Antichità e Archeologia - University of Siena

Master MAP Master in Archeologia Preventiva - University of Siena

Dipartimento di Storia, Archeologia, Geografia, Arte e Spettacolo (SAGAS) - University of Florence

Museo e Istituto Fiorentino di Preistoria “P. Graziosi”, Florence

# PREHISTORIC SETTLEMENT EVOLUTION IN THE UPPER RHONE VALLEY (WESTERN SWISS ALPS): AN UPGRADED VISION

*Philippe Curdy\**

**Abstract** - During the 20th century, the evolution of prehistoric settlements in the Upper Rhone Valley, from the source of the Rhone River to the Lake of Geneva's eastern banks (Switzerland), became evident as a result of numerous excavations and research projects. In 1983, the first theoretical model for the Mesolithic, Neolithic and Early Bronze Age periods was published by A. Gally. At the end of the 1990's, this model was developed to include all of prehistoric time (ca 9,500-15 BC). From the year 2000 to 2012, small surveys and excavations confirmed the hypothesis of a gradual colonisation of vegetation belts from the plain (collinean belt) to the alpine zones over 2,000 m in relation to the evolution of agro-pastoral practices. After the end of the last Ice Age, Mesolithic hunters-gatherers seemed to have colonized the Rhone Valley in a south-north direction, over the mountain passes connecting northern Italy to the Rhone Valley and a western route by Lake Geneva and Swiss Midlands. It is presumed that early Neolithic culture spread to Valais following these south-north journeys. The Bronze Age reveals a strong demographic development. Later on, mountain passes seem to have played a more important role and the alpine communities profited from their location between south and north-alpine Europe. The economic management of the production zones can be seen as an attempt to control the differing altitude levels over time, cumulating in the Iron Age, with the first graveyards and permanent settlements in middle altitude. This was understood to indicate an economic organisation of the region which generally remained until recent times, at least in certain regions of the Rhone Valley.

## **Introduction**

In mountainous regions the use or economic exploitation of the land is determined by the level of difficulty associated with its particular environmental characteristics. It is well known that vegetation depends directly on altitude and climatic conditions, as well as their evolution over time. Uneven topography leads to the partitioning and terracing of vegetation zones. Thus, the production potential of each altitude range varies significantly amongst these zones. Throughout history, alpine populations demonstrated their capacity to deal with these altitudinal restrictions. This paper updates and modifies various explanations presented in a former paper (Curdy 2007).

The study area is focused on a specific intra-alpine zone, the Upper Rhone Valley (Cantons of Valais and Vaud, Switzerland). It covers the area between the source of the Rhone (Rhonegletscher) to Lake

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\*Valais History Museum, Canton du Valais, Rue des Châteaux 14, 1950 Sion, Switzerland; [philippe.curdy@admin.vs.ch](mailto:philippe.curdy@admin.vs.ch)

Geneva's eastern banks (Fig. 1). It includes the main Rhone Valley as well as its side valleys, most of which run perpendicularly to the Rhone river. Deep side valleys characterise the southern banks of the river and lead to the principal alpine passes of the Lepontine and Pennine Alps (from east to west: Albrunpass, Simplonpass, Monte Moropass, Theodupass, Col Collon, Fenêtre de Durand and Col Grand Saint-Bernard). Conversely, on the north side of the valley of the Bernese Alps, very short and steep side valleys - except the Lötschental - lead directly toward various mountainous passes (from east to west: Grimselpass, Lötschenpass, Rawyl, Schnidejoch, Sanetch and Pillon).

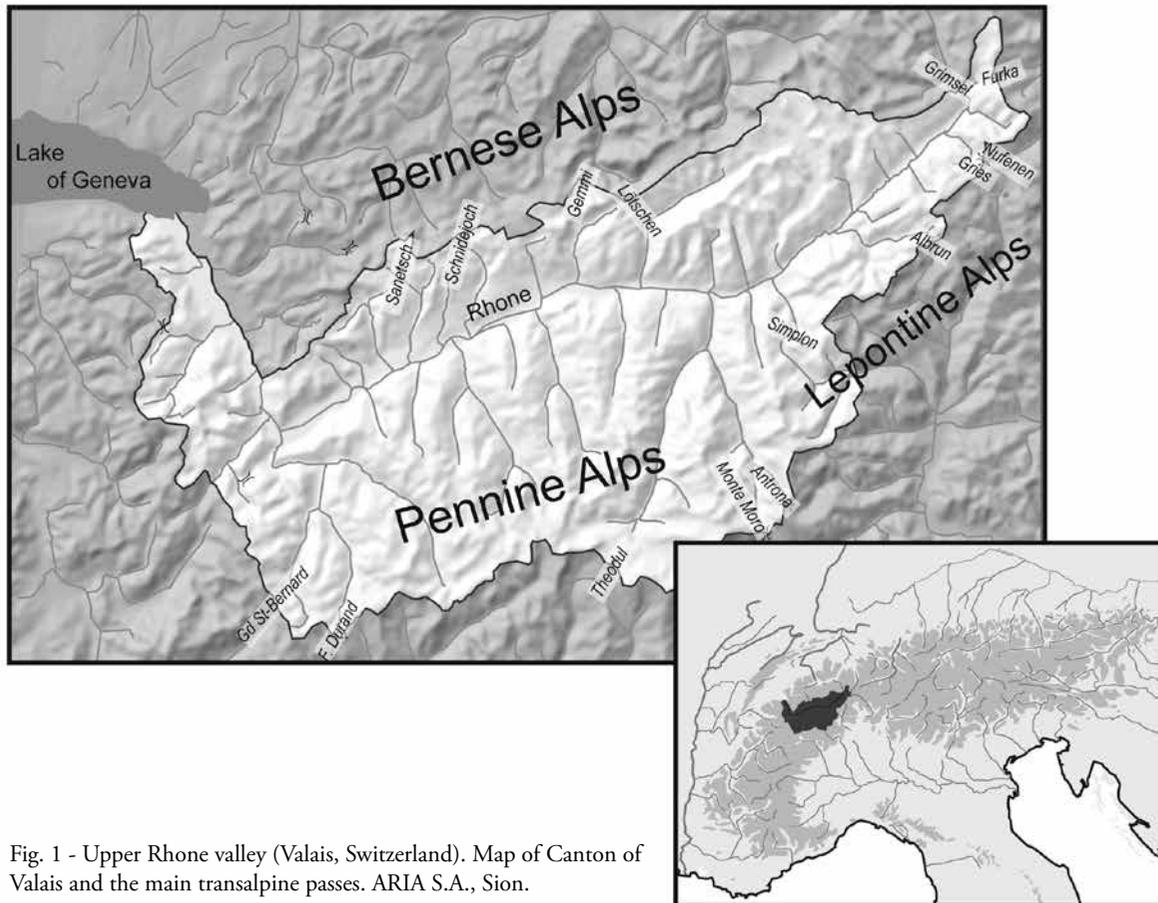


Fig. 1 - Upper Rhone valley (Valais, Switzerland). Map of Canton of Valais and the main transalpine passes. ARIA S.A., Sion.

### Agro pastoralism and vegetation belts

Until the middle of the 20th century, many agro-pastoral communities in the Upper Rhone Valley adopted a particular practice called *remuage* which illustrates how the economy could be adapted to alpine environments (Loup 1965). This practice, which in reality is a vertical seasonal nomadism, is characterized by the movement of human groups between the bottom of the valley and the upper slopes. Either all or a part of the community travel with their herds to summer pastures and live in temporary settlements (Mayens) depending on seasonal farm practices (Fig. 2 and Fig. 3).

Many side valleys are thus characterized by the presence of “traditional” permanent villages situated in middle altitudes and not at the bottom of the valley. It is important to know when these permanent villages were first settled in the 1.000-1.400 m belt (mountainous belt). In Valais, the first prehistoric pastoral practice was recognized to have started between the middle and end of the 6th millenium BC (Early Neolithic). As stated above, the practice of *remuage* is considered to be directly related to livestock and is characterized by the position of economic centres (villages) in middle altitudes and not on the valley bottom. The question is to determinate whether the practice of *remuage* began in this region during the Neolithic or more recently.

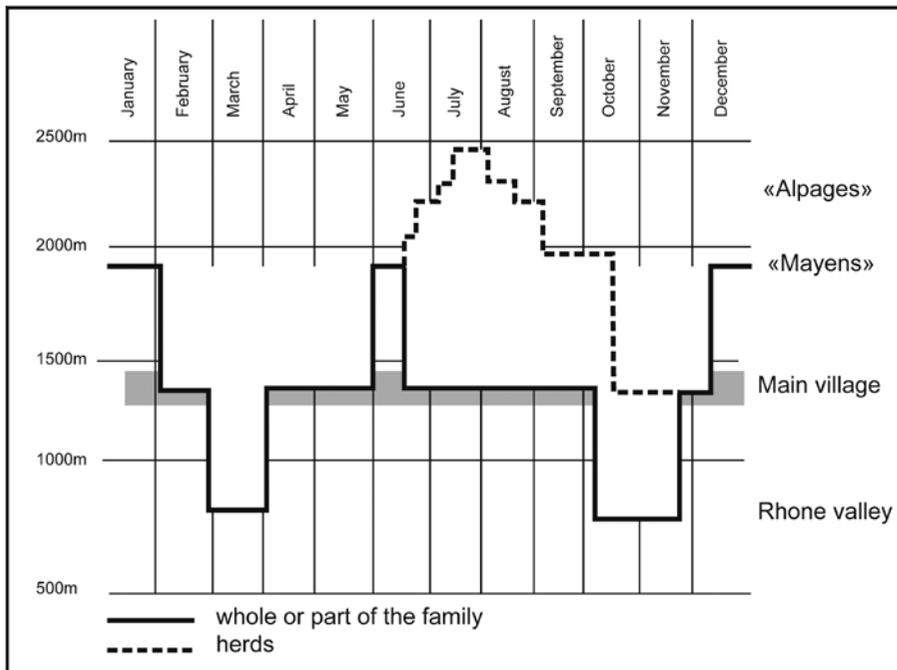


Fig. 2 - Diagram of family movements around 1940. The center of the economic area is the village of Mission at 1,400 m (after Gyr 1994, resumed).



Fig. 3 - *Remuage* in Valais. Moving to the *alpages* at the beginning of the 20th century. Médiathèque Valais, Ch. Krebsler.

## The models of prehistoric settlement

### 1983. A first prehistoric settlement model

The Rhone Valley has been a focal point for archaeologists since the beginning of 20th century. Professor Marc-Rodolphe Sauter summarized the prehistory of this region during the middle of 20th century (Sauter 1950, 1955, 1960). Alain Gally was the first to propose a settlement model in relation to the specific alpine bio-geographical zones (Gally 1983, 2011). Gally's model was restricted to societies considered to be self-subsistent (Mesolithic, Neolithic and the Early Bronze Age; Fig. 4). The objective was to attempt to interpret the types of activities and therefore, the types of archaeological structures located within each altitude range (zones of specific use) and for each period. Accordingly, the first permanent buildings in the middle altitudes ought to date the earliest to around the end of the Neolithic or the beginning of Bronze Age.

Based on this theory, a systematic field survey programme was organised in an attempt to test this model. Between 1985 and 1987, three sampled characteristic zones were studied (Baudais *et al.* 1990). It should be noted that at the beginning of the project there was only one known Mesolithic settlement in the region which was located at the Collombey-Muraz, Vionnaz. It is a small rock shelter situated at approximately 400 m altitude on the border of the plain (Pignat 2002). To overcome the lack of archaeological information in this study region, Gally took into account archaeological data from other alpine areas with similar geographical characteristics like Trentin/Alto Adige (Northern Italy, Kompatscher and Kompatscher 2007). During this 1985-1987 survey, no Mesolithic sites were located in Valais. This is most likely due to the fact that prospected surfaces covered very large areas at high altitudes -which normally have very few rock shelters- and, that the zones situated between 1.000 and 1.600 m a.s.l. were frequently covered by dense forest.

The survey did however lead to the discovery of several new Neolithic settlement types located on difficult to access hills in the upper limit of the collinean belt (around 900-1.000 m a.s.l.). In contrast to the traditional and well known Neolithic

Vegetation belt	Upper Rhone valley and side valleys				
	Early Mesolithic	Late Mesolithic	Neolithic	Late Neolithic Early Bronze Age	Middle - Late Bronze Age
nival					
alpine	seasonal camp		pasture forest clearing	pasture forest clearing sopper ores	pasture forest clearing copper ores
upper subalpine					
lower subalpine	hunting camp	seasonal hunting camp	pasture forest clearing	main settlement agriculture forest clearing cereals copper ores	main settlement agriculture forest clearing cereals copper ores
montaneous	seasonal camp				
collinean	residential camp	residential camp	main settlement agriculture forest clearing cereals	main settlement agriculture forest clearing cereals	main settlement agriculture forest clearing cereals

Fig. 4 - Upper Rhone valley (Valais, Switzerland). prehistoric settlement model from Gally (after Gally 1983, translated).

habitations built in the immediate vicinity of the Rhone Valley, these new settlements were located at the bottom of the mountain belt. Above 1.800-2.000 m a.s.l., some temporary sites were found, dated from the Neolithic to the Bronze or Iron Age (Baudais *et al.* 1990). This project highlighted a substantial density of Neolithic occupations in the collinean belt and on the lower limit of the mountain belt. The subalpine and alpine belts were also occupied beginning in the 5th millenium BC (Middle Neolithic) and the alpine grasslands were probably first used for livestock (Curdy, Chaix 2013).

Beginning in 1993, several planned excavations were organized by the University of Geneva in the collinean belt near the town of Sion and by the Swiss National Museum in high altitudes at the Alp Hermettji near the foot of the Matterhorn (Gallay 2011). The most unexpected results included the discovery of the second Valaisian Early Neolithic settlement (dated ca 5.300 BC) at 900 m elevation (Mazurié de Kéroualin 2003), and the first evidence of a Mesolithic hunting camp at high altitude at Alp Hermettji (Curdy *et al.* 2003).

#### *A new settlement model (2007)*

In 2003 a project between Switzerland and Italy was organised (cross-border INTERREG III project under the scientific control of the Archaeology Museum of Valais, the Archaeology and History Museum of Vaud and the Ferrara University, Crotti *et al.* 2004). This field survey research programme concentrated on the areas around the Simplon pass (Simplonpass 2,006 m a.s.l.) and the Albrun pass (Albrunpass 2,409 m a.s.l.) on the Italian-Swiss border. During these field surveys, a large amount of evidence for Mesolithic, Neolithic and Bronze Age occupations at high altitudes were discovered (Fig. 5). Thus, proving that in the Rhone



Fig. 5 - Simplon Pass. Archaeological excavation (2003-2005) on a Mesolithic and Neolithic open air settlement at 2010 m a.s.l. History Museum museums, Ph. Curdy.

Valley like in other alpine countries, seasonality of the economy of hunters-gatherers, and in particular the location of the so-called “hunting camps” near lakes and in shelters at the foot of cliffs in altitude, existed (Di Maio 2007, Curdy *et al.* 2010). These last results were integrated into a settlement model presented in 2007 (Curdy 2007, see below Fig. 6). Paleobotanical research conducted during this project indirectly confirmed the use of high altitude pastures for

livestock since Neolithic times, with an increase during the 3<sup>rd</sup> millenium BC (Di Maio 2007). More recently, from 2009 to 2011, prospections were organised in the Grand Combin region (Val de Bagnes), in relation to a project of the systematic registration of stone building ruins in the alpine zones above the upper limit of the forest (*ITRES* project, Taramarcas, Curdy 2013). The survey revealed new high alpine settlement evidence dated from the Mesolithic to the Iron Age and other rock-shelter camps dated from Roman and Medieval times.

### An updated view of prehistoric settlement evolution

The integration of the most recent results has increased the precision of the hypothesis presented in the 2007 settlement model. In fact, between 2007 and 2012, more than 90 new dated sites were discovered during excavations or planned surveys (Tab. 1). The updated data have the same spatial limits and elevation ranges as those proposed in 2007:

- the collinean belt (<900/1.000 m a.s.l.),
- the mountain belt (900/1.000 - 1.400 m a.s.l.),
- the lower sub-alpine belt (1.400 - 1.900/2.000 m a.s.l.),
- the upper sub-alpine belt (1.900/2.000 - 2.400 m a.s.l.),
- the alpine belt (above 2.400 m a.s.l.).

Archaeological finds were distributed into four categories:

- 1) settlements (hamlet, open air or under rock shelter settlements, etc.);
- 2) burials or necropolis;
- 3) ritual deposits including sanctuaries or dated engraved rocks (menhirs, etc.);
- 4) isolated finds without context.

The figure shown in the 2007 model is reinforced by these new data (Fig. 6).

	Mesolithic	Neolithic	Bronze Age	Iron Age
Alpine belt	seasonal camps	seasonal camps pasture...	seasonal camps pasture...	seasonal camps pasture...
Upper subalpine				
Lower subalpine	seasonal camps			«permanent» settlements graves
Mountain belt			specialized sites	
Collinean belt	«residential» sites	«permanent» settlements graves	«permanent» settlements graves	«permanent» settlements graves

Fig. 7 - Upper Rhone valley (Valais, Switzerland). Model of the evolution of the main economic territories in prehistoric times. After Curdy 2007, modified.

GRAVE	<=800	801 1000	1001 1200	1201 1400	1401 1600	1201 1400	1601 1800	1801 2000	2001 2200	2201 2400	>2400	TOTAL
Mesolithic	0											
Neolithic	25	1										26
Bronze Age	43	5			2							50
Iron Age	74	13	10	19	14	1						131
Roman period	57	13	6	26	16	2						120

RITUAL	<=800	801 1000	1001 1200	1201 1400	1401 1600	1201 1400	1601 1800	1801 2000	2001 2200	2201 2400	>2400	TOTAL
Neolithic	2											2
Bronze Age	1	1										2
Iron Age	1										1	2
Roman period	8				1						2	11

SETTLEMENT	<=800	801 1000	1001 1200	1201 1400	1401 1600	1201 1400	1601 1800	1801 2000	2001 2200	2201 2400	>2400	TOTAL
Mesolithic	2							1	1	1	1	6
Neolithic	43	4						1		2	1	51
Bronze Age	33	8	4	2	1		1		2		2	53
Iron Age	34	3	8	3	1			2	1		1	53
Roman period	84	3	7	3	2					1		100

UNDEFINED	<=800	801 1000	1001 1200	1201 1400	1401 1600	1201 1400	1601 1800	1801 2000	2001 2200	2201 2400	>2400	TOTAL
Mesolithic	3							2	2			7
Neolithic	19	3	1	1	1		3				3	31
Bronze Age	43	5	4	4	1	1		1	2		4	65
Iron Age	43	3	1	7		1	1	1			3	60
Roman period	71	11	14	15	8	1	3	3	3	3	11	143

Tab. 1 - Canton Valais. Altitudinal distribution of archaeological finds (state 2015, database of Archaeological Service VS).

### *Mesolithic*

There is evidence of Epipalaeolithic (12.000-9.500 BC) activity in the Swiss Alps from after the end of the Last Glacial Maximum however these instances are located outside of the study region discussed in this paper (Crotti 2008; Crotti and Bullinger 2013). The earliest human occupation in this study area is more recent and stems from the Early to Middle Mesolithic. The majority of these finds were concentrated above the treeline which correlates to the locations of field prospection which was more recently systematically organized in the zones above the treeline. This could also be due to the fact that between 2003 and 2012, all the emergency archaeological operations were situated in low altitudes, mostly conducted with less attention, and therefore make Mesolithic occupations difficult to identify as these instances are often discrete. In summary, the picture shown in the Upper Rhone Valley confirms what is seen in other alpine areas. The indices of Mesolithic occupation in the collinean belt are only attested in the Lower and Central Valais (Colombaroli *et al.* 2012). The lack of Mesolithic indications in middle altitude hinders the precision of the seasonal movements between presumed residential base settlements and high altitude hunting camps.

## Neolithic

The Neolithic (5.500-2.200 BC) is currently well known in Valais (110 spots, Tab. 1). New emergency excavations show a relatively dense occupation along the entire valley up to the vicinity of the sources of the Rhone river (region of Brig, Meyer *et al.* 2011). The majority of the sites are restricted to the plain and the collinean belt. Neolithic graves/necropolis do not exceed 900/1.000 m in elevation and are concentrated in the collinean belt, which fully corresponds to the position of the villages (Fig. 7). This confirms the extension of the economic territory based on the exploitation of natural resources in the collinean and in the bottom of the mountain belts. Although few in number, but nevertheless present, the settlements located at high altitude can be related to the seasonal use of alpine pastures for livestock. More recently, palaeobotanical analysis of macrorests found in habitations reveal a new phenomena (Martin, Lundstöm-Baudais 2013, Martin 2015): cultivated crops and pulses were the main resources and gathered plants were very scarce, in contrast to the findings observed in other alpine regions like the French Alps (Martin *et al.* 2007). Furthermore, in Valais, not a single identified wild plant is related to middle altitude, confirming the use of two distinct economic territories restricted to the collinean belt for agriculture and livestock and alpine belt for livestock, hunting activities or the extraction of primary resources like rock crystal, etc.

The discoveries made in Schnidejoch Pass -a forgotten pass which delivered many wooden artifacts, textiles, leather etc.- illustrates the importance of the passes not only in relation to trade between populations situated on the both sides of the Alps, but also with transhumance of ovine and caprine

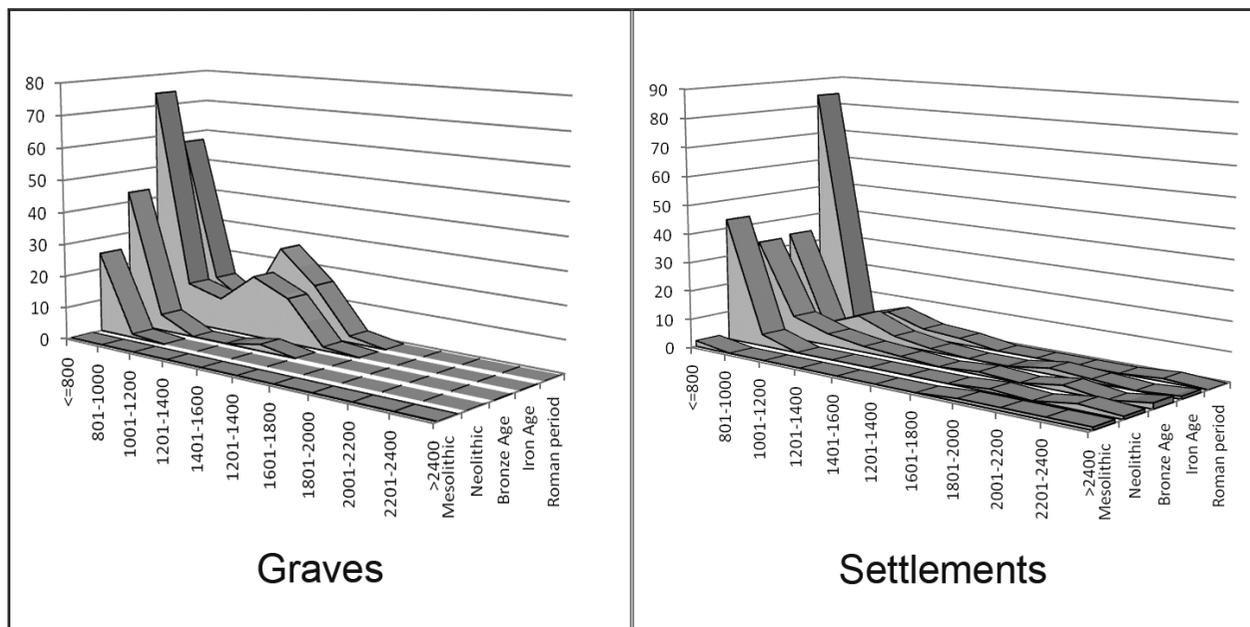


Fig. 7 - Upper Rhone valley (Valais, Switzerland). Distribution of settlements and graves by period and height range (state of knowledge 2012).

(Hafner 2015). The movement of herds had also been proposed as a factor in determining the first arrival of Neolithic communities into the Upper Rhone Valley (Curdy *et al.* 2003).

### *Bronze Age*

For the Bronze Age (2,200-800 BC), 170 finds are confirmed. From this period onwards, there is an increase in the number of finds related to the mountain belt; although the majority are unspecified, many are hillfort type settlements, mainly dated to Middle or Late Bronze Age such as the Zeneggen Kasteltschuggen at 1.600 m a.s.l. or Fully Chiboz, at 1.200 m a.s.l. (Benkert *et al.* 2010). Surprisingly, no burials have been found apart from a unique case in Saint-Luc, located at 1.600 m a.s.l. (Sauter 1950). These fortified settlements appear to be related to metal production or to the control of copper mines or transalpine passages (Benkert *et al.* 2010). As previously mentioned, many block shelters were used during the Bronze Age at high altitudes. The presence of ritual deposits, a traditional practice for the Bronze Age, is well demonstrated in Valais (but mostly marked as undefined in Tab. 1). The Bronze Age finds from the Schnidejoch and Lötschenpass or from other high altitude passes confirm the increase of contact throughout the Alpine range (Hafner *in press*).

### *Iron Age and Roman period*

The Iron Age is also well represented in the region with 246 finds. For this period, the traditional separation between Early Iron Age (800-450 BC) and Late Iron Age (450-15 BC) is often delicate, due to the large uncertainty in the typo-chronology of artifacts. This regrettable lack of precision increases the difficulty in connecting archaeology with some important historical events like the Celtic migrations at the beginning of the 4th century BC through the Alps.

In Valais, the relative frequency of finds in middle and high altitudes confirms a clear evolution compared to the beginning of the Bronze Age. It appears that during the Iron Age the alpine population's economic territory covered the middle altitudes. In the Late Iron Age (450-15 BC), burials/necropolis have been located up to 1,400-1,600 m a.s.l., many of which have been located in large side valleys or the most easterly part of Valais (Goms). Settlements, although fewer than burials, have also been located at this altitudinal range (Fig. 7). According to the hypothesis that there is a relationship between burials and permanent settlements, the first permanent location of human communities in the mountains, more specifically in the lower subalpine belt, seems to have occurred during the Iron Age. We presume that changes or advancements in farming practices allowed this colonization to take place, perhaps due to the introduction of cereals which were better adapted to these belts (Jacomet, Schibler 1999). Looking beyond the Iron Age, the situation appears to have stabilised during Roman times (347 finds), with even more settlements in middle altitudes (Fig. 7; Paccolat 2003).

## Conclusions and discussion

Recent archaeological finds confirm the presence of Mesolithic camps in the Rhone Valley and at high altitudes. This is the first proven human colonisation after the Late Glacial Maximum (Fig. 6). In the Neolithic period, the first agro-pastoral communities used two complementary and separate economic zones: the plain (agriculture and livestock) and high altitudes (livestock). It is suggested that there were permanent settlements in the Rhone Valley. The mountain belt does not appear to have provided any economic contribution. The Bronze Age is characterized by a slight change: the first occupations begin to appear in the mountain belt. In this middle altitude, the habitations may have had particular functions, perhaps in relation to the control of mountain passes or copper deposits. The Iron Age confirms the rise in altitude of habitations and seems to correspond with the first real permanent settlement of communities in middle altitude. The situation appears to have stabilised during Roman times, with even more settlements in middle altitudes. That could have partially led to the management of all vegetation belts from the plain to the upper slopes for the first time. This could have facilitated, at a much later date and under different economic circumstances, the practice of *remuage*. However, archaeologists must admit that it is actually impossible to specify or prove the existence of complementary economic activities between the lower settlements and those of the sub-alpine belt, as can be shown by *remuage* economies in more recent times.

The transalpine passes of the Bernese, Pennine and Lepontine Alps played an important role in the prehistoric colonisation and occupation of the Rhone Valley. First, it seems that the passes south of the Rhone Valley were used at least from the Mesolithic by hunter-gatherer groups coming from the south. The characteristics of the first Neolithic in Valais indicates the same route was used. Effectively, the oldest retrieved ceramics reveal characteristic types which are specific to the northern Italian Early Neolithic (Mazurié de Kéroualin 2003). During the Bronze Age, but even more in the Iron Age, the growth of the trade along these transalpine routes strongly influenced the communities who occupied the Upper Rhone Valley (Curdy 2010)<sup>1</sup>.

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<sup>1</sup> I wish to thanks Stephanie Rogers for the translation and comments.

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