

2.1. THE RAW MATERIAL VARIABILITY IN THE MESOLITHIC SITE OF ULLAFELSEN (SELLRAIN, TYROL, AUSTRIA)

Résumé

Dans cet article seront décrites les différentes matières premières exploitées dans le site mésolithique d'Ullafelsen (Alpes Stubai, Tyrol). Le gisement se situe dans un contexte métamorphique de haute montagne (1869m d'altitude), dans lequel les roches appropriées à la taille sont presque totalement absentes. La seule exception est représentée par le quartz local de mauvaise qualité, qui a très rarement été utilisé en raison de sa fracture irrégulière. La plupart des artefacts a été réalisé sur des matières premières qui affleurent loin, voire très loin du site. Les matériaux lithiques ont été regroupés en quatre groupes principaux sur la base de leur provenance régionale. Un groupe d'artefacts a été réalisé sur des silex du Franconian Jura (Bavaria), situés à plus de 200 km vers le Nord. Un autre groupe est compatible avec les silex des Alpes méridionales qui affleurent dans la Val di Non (Trento, Italie), environ 120 km vers le Sud. Le troisième groupe comprend des radiolarites des Alpes Calcaires septentrionales moins appropriés à la taille et plus proches (30-50 km de distance vers l'Est). Le quatrième regroupe les artefacts en quartz, représentés par le cristal de roche métamorphique local de mauvaise qualité, récolté à 40-50 km au Sud-Est (Tauern). En général, on reconnaît une bonne concordance entre la provenance des matières premières et leur attribution culturelle, bien que cet aspect ne puisse être vérifié que sur de rares outils typiques. Parmi les silex du Franconian Jura, quelques éléments suggèrent une tradition beuronienne ; par contre on retrouve des pièces retouchées typiquement sauveterriennes parmi les pièces obtenues sur les silex des Alpes méridionales et le cristal de roche. L'attribution des silex des Alpes Calcaires septentrionaux, plus proches, reste douteuse. Différentes matières premières et différentes traditions sont représentées dans le même site au Mésolithique ancien dans les Alpes Stubai.

Abstract

In this paper the different raw materials exploited at the Mesolithic site of Ullafelsen (Stubai Alps, Tyrol) will be described. The site is situated in a high mountain (1869 m) metamorphic context almost completely free of suitable rocks for knapping. The only exception is represented by the local bad quality metamorphic quartz, which was only seldom used because of its irregular fracture. Most of the artefacts have been made with raw materials cropping far or very far from the site. The lithic materials have been grouped in four main groups on the basis of their regional provenance. A group of artefacts have been realized with Franconian Alb cherts (Bavaria), more than 200 km far to the north. Another group of artefacts is compatible with the Southern Alps cherts cropping in the Val di Non (Trento, Italy), around 120 km straight line to the south. The third group comprehends less suitable and nearer (30-50 km far, to the east) Northern Calcareous Alps radiolarian cherts. The fourth group encloses the quartz artefacts; these are represented by the bad quality and local metamorphic quartz and by the high quality rock crystal that was collected 40-50 km to the south east (Tauern). There is a general concordance between the raw materials provenance and their cultural attribution, even if this is visible only in few typical artefacts. Among the the Franconian cherts some elements suggest a Beuronian tradition whilst among the Southern Alps cherts and the rock crystal there are typical Sauveterrian tools. The attribution of the closest Northern Calcareous cherts is more doubtful. Different raw materials and different cultural traditions are represented in the same site in the lower Mesolithic of the Stubai Alps.

Keywords: Ullafelsen, Mésolithique, matières premières, Sauveterrien, Beuronien

1 – Introduction

The Lower Mesolithic site of Ullafelsen is situated 1869 m high in the Fotscher Valley, Stubai Alps, Tyrol. The site was excavated from 1995 to 2004 by a team of archaeologists from the University of Innsbruck under the direction of Prof. Dieter Schäfer. Its geological setting is characterized by the presence of metamorphic rocks, mainly micaschists and gneiss, without any siliceous raw materials suitable for knapping. On the other hand the petrographic variability of the lithic industry of Ullafelsen is very high. This evidence strongly contrasts with the complete local absence and with the immediate surrounding scarcity of lithic resources that the natural environment offers. Since the beginning of the studies it was clear that most of the raw material were brought to the site from other areas. Understanding the provenance of the lithic materials constituted a basilar work to interpret the dynamics in Early Mesolithic in a wide area comprised between northern Italy, Tyrol and lower Germany.

2 – Description of the assemblage

The Ullafelsen lithic assemblage consists of almost 8.000 artefacts. Most of them are small or very small (few mm) and have not been yet studied. The following data derive

from the study of a sample of 2347 artefacts bigger than 1 cm (perimeter). They were collected during the excavations till present day (2012) carried on. We can observe the following proportions:

- A. Jurassic cherts from the Frankonian Alb: n = 502 (21,4 %)
- B. Cretaceous flints from Southern Alps (northern Italy): n = 699 (29,8 %)
- C. Jurassic radiolarian cherts from Northern Limestones Alps: n = 799 (34,0 %)
- D. Quartz artefacts from the Central Eastern Alps: n. 347 (14,8 %)

A – Jurassic cherts from the Frankonian Alb

Two different groups of artefacts have been recognized (Bertola and Schäfer, in press; Bertola and Schäfer, 2011).

Group 1. The artefacts show whitish cortexes locally covered by calcite concretions impregnated with oxides. The chert was probably gathered in secondary deposits. The color and texture of the cherts are inhomogeneous. Dark grey colors alternate with whitish and beige. The texture shows laminations and bands, also discontinuous, providing the chert a marbled texture. Generally the laminas are thin, with a rectilinear or curvy pattern. The degree of silicification is variable. Most of the artefacts are made from slightly silicified nodules. Ivory white colors appear mainly in the outer parts. The fossils are generally poorly preserved and hardly visible. Calcispheres, sponge spicules, crinoid articles, few radiolarians and small algal nodules are visible mainly around the cortex and in the more silicified specimens. The morphological characteristics visible on the cortex of the artefacts allow the conclusion that the chert was available in the form of nodules as well as beds.

Group 2. This group is smaller (23.4%) than group 1 (76.6%). It includes litotypes that can be compared with the geological specimen from Abensberg–Arnhofen. They are generally more silicified than group 1. Some of them show the characteristic greyish and whitish horizontally striped texture, others are more homogeneous. The bands are never numerous and always subordinate. They are usually rectilinear, but sometimes show a sinuous pattern. They show, more or less clearly, a micro-laminated aspect; the laminas are often discontinuous and caused by microbial mats. Often the laminated layers alternate with graded bioclastic horizons. One can easily identify crinoid fragments, numerous sponge spicules (mostly monoaxone, some triaxone), calcispheres and poorly preserved radiolarians. Some mainly spherical ooids of few millimetres in size, with whitish and opaque textures, are also present. Benthic foraminifers and pelagic bivalves are less common. The geological referring blocks are assumed to be chert beds. In the Franconian Alb there are many other Jurassic chert outcrops of a similar age. However they are not characterized by the same banded feature typically associated with thin tabular morphology. This kind of chert is described as the most typical variety of the Abensberg-Arnshofen group.

The groups of artefacts described can be attributed with high certainty to the upper Jurassic cherts from the “Plattenkalke” of southern Franconian Alb. A number of indications support this hypothesis: firstly, the macroscopic features of the samples (color, structure, cortex) and secondly, the study of the characteristic microfacies that revealed the fine algal lamination alternated with graded and bioclastic horizons.

B – Cretaceous flints from Southern Alps

A group of artefacts, totally extraneous to the local geological context, is compatible with flint outcrops situated on the southern slope of the Alps (Val di Non, Trentino, Italy). Thanks to the identification of the micropaleontological associations (planktic foraminifera), well preserved for a great part of the samples, it was possible to place the flints from a chronologic / stratigraphic point of view. The chronological interval represented is rather narrow: from Albian to Turonian. Through the study of the

petrographic / textural characteristics of the flints, it was possible to ascribe the lithotypes to the Scaglia Rossa and the Scaglia Variegata formations (Bertola, 2011a). The distribution concerning these two formations is rather vast and includes a large portion of north–east Italy. The nearest (about 120 km, straight line) outcrops to the site of Ullafelsen are localized in the Non Valley which is the area where the pelagic Mesozoic series of the South Alpine basin reach the further north latitudes. The research and the comparisons have focused around this area immediately from the start. Numerous and aimed field excursions allowed to study and describe different geological outcrops and to collect several flint samples both from the primary and secondary deposits. Thanks to a full-bodied reference lithic collection, well representing the variability of the flints in Non Valley, I carried out a comparison with the artefacts of Ullafelsen. It was not necessary to extend the comparison to other areas. Immediately it was possible to exclude more southern provenance areas (Baldo and Lessini chains) as the Ullafelsen collection lacks some very characteristic flint types from older formations such as Biancone (lower Cretaceous) and Calcari Grigi (Jurassic). The Biancone flints, in particular, are the more abundant ones in the South Alpine outcrops and also the more used in the local prehistoric contexts (Mesolithic as well) given their high quality characteristics. From a geological / structural point of view, the Non Valley has particular characteristics because throughout the Mesozoic it kept a relatively high position compared with other more southern and eastern areas and this greatly conditioned the depth and distribution of the formations. In particular, the Jurassic / lower Cretaceous formations (Calcari Grigi, Rosso Ammonitico, Biancone) are very condensed or absent. The Ullafelsen artefacts association parallels the natural availability of lithic resources of the Non Valley with respect to: a) the narrow chronological interval represented; b) the lack of flint types which are very characteristic of the outcrops situated more towards the south. The analysis of the morphological characteristics of the artefacts preserving natural surfaces demonstrate that the flint was collected from debris at the foot of rocky walls (33.1%), residual soils (54.7%) and torrent pebbles (13.2%). The flint was introduced in little rounded blocks or tabular slabs as big as 8 cm x 6 cm at maximum, often tested or partially flaked. The Adige Valley seems to have been the preferred way for these movements or long distance exchanges.

C – Jurassic radiolarian cherts from Northern Limestones Alps

Here are grouped the artefacts realized with cherts that belong to the sedimentary sequence of the Northern Limestones Alps and can be considered local, even if they are absent in the surrounding of the Ullafelsen site. Even if several sub-categories have been created, we can refer all the artefacts to two geological formations: Ruppolding (upper Jurassic: the red lithotypes) and Chiemgau / upper Allgäu (middle Jurassic: the gray and green lithotypes) (Bertola, 2011b). In some areas (Jurassic basinal sequences) these two formations stay directly in contact and it is easily possible to collect all the cherts previously described. In Tyrol (but extended also out of the region) the main important basinal area was represented by the Eiberg basin, elongated W to E for about 200 km. During 2010 and 2011 several field excursions in the Northern Limestone Alps were finalized to sample cherts comparable to the Ullafelsen artefacts. The investigated area was comprised between the Lechtal Alps to the west and Kufstein to the east. The better and widest chert outcrops have been sampled in the area between the eastern Karwendel and the western Rofan (Achensee valley and surroundings). The following comparisons of the samples with the artefacts confirmed the strong analogies. We have clear evidences that the provisioning area of the “local cherts” was placed near the lake Achensee, around 40-50 km east / north east of Ullafelsen. This area, easily accessible along the Inn valley, till now represent an important way to the Bavaria. Maybe the groups bearing the Bavarian cherts provisioned also in this area. Other chert types (there are several types cropping in the Northern limestone Alps, from Triassic to Cretaceous) have been totally ignored also because of their bad quality. Their total absence however suggest that people provisioned in some defined areas and with some defined chert types.

D – Quartz artefacts from Central Eastern Alps

The quartz artefacts can be divided in two categories.

1. Rough quartz lenses forming into the gneiss sequences. This kind of quartz is quite common in the metamorphic environment of the central Alps, as well as in the surroundings of the Ullafelsen site. It is a very bad material for knapping which was seldom used. 25 artefacts were realized with this material.
2. Rock crystal. This kind of quartz is absent in the surroundings of the Ullafelsen site. It was a material particularly researched for its flaking suitability, even if difficult to find. It grew inside fissures mainly in the inner parts of the whole Alps, along the central axis. Nearby the Ullafelsen site the area with the richest and bigger minerals is the Zillertal Alps, belonging to the Tauern Window, situated 40-50 kilometers east of the site, near the border with Italy. A study confirmed the compatibility of the Ullafelsen artefacts with the minerals of this region even if other provenance areas cannot be excluded (Niedermayr, 2011). 322 artefacts were realized with this material.

DISCUSSION

In early Holocene times probably different Mesolithic groups frequented the site of Ullafelsen. We have the evidences of the passage of people bearing and flaking southern Franconian cherts, distant 200 km or more to the north. The Lower Mesolithic of the Altmühl and Danube river valleys belongs to the South German *Beuronian* lithic tradition. We also have a group of flints coming from northern Italy, around 120 km to the south, where in the lower Mesolithic a different tradition, the *Sauveterrian*, developed. Significant intercultural contacts between the two areas should be taken into consideration.

Bibliography

- BERTOLA S. (2011a) – The flints of Southern Alps (Non Valley, Italy) provenance found in the mesolithic site of Ullafelsen (Sellrain, Tyrol). *In: D. Schäfer (ed) Mensch und Umwelt im Holozän Tirols, Band 1*, Philipp von Zabern, Darmstadt, Deutschland.
- BERTOLA S. (2011b) – Northern alpine radiolarites in the lithic assemblage of the Ullafelsen. *In: D. Schäfer (ed) Mensch und Umwelt im Holozän Tirols, Band 1*, Philipp von Zabern, Darmstadt, Deutschland.
- BERTOLA, S. & SCHÄFER D. (2011) – Jurassic hornstones from the Kelheim district (Bavaria, Germany) in the Lower Mesolithic assemblage of Ullafelsen. *In: D. Schäfer (ed) Mensch und Umwelt im Holozän Tirols, Band 1*, Philipp von Zabern, Darmstadt, Deutschland.
- BRANDNER, R., LOTTER, M., GRUBER, A. & ORTNER, H. (2011) – Exkursion E2a - Rofengebirge.- *In: Gruber, A. (ed.) Arbeitstagung 2011 „Geologie des Achenseegebietes“*. Geologisches Kartenblatt 88 Achenkirch, 199-224, Wien (Geologische Bundesanstalt).
- BERTOLA, S. & SCHÄFER, D. (*in press*) – Silex raw materials from the Kelheim district (Bavaria, Germany) in the lithic assemblage of the Lower Mesolithic site Ullafelsen (Tyrolean Alps, Austria). Publication in honour of W. Weißmüller.
- GWINNER, M.P. (1978) – *Geologie der Alpen : Stratigraphie, Paläogeographie, Tektonik*. 2. Aufl. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung.
- NIEDERMAYR, G. (2011) – Mineralogische Untersuchungen an Quarzartefacten aus dem Bereich des Ullafelsens im Fotschertal, Stubai Alpen / Tirol, Österreich. *In: D. Schäfer (ed) Mensch und Umwelt im Holozän Tirols, Band 1*, Philipp von Zabern, Darmstadt, Deutschland.
- SCHÄFER, D. (2011) – Das Mesolithicum-Project Ullafelsen – Landschaftlicher Rahmen und archäologische Befunde. Arbeitsstand 2009/2010. *In: D. Schäfer (ed) Mensch und Umwelt im Holozän Tirols, Band 1*, Philipp von Zabern, Darmstadt, Deutschland.

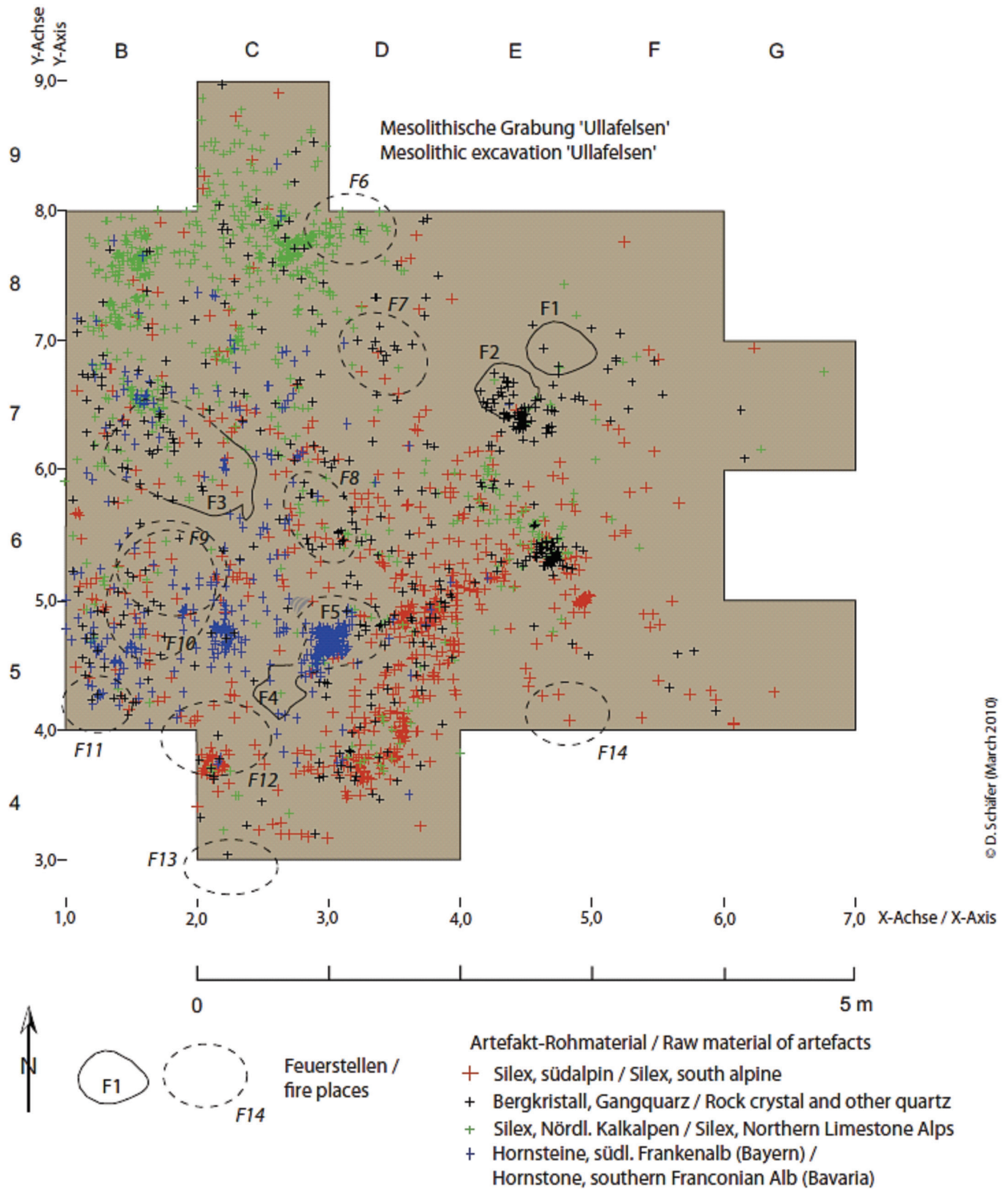


Figure 1 – Spatial distribution of the Ullafelsen different raw materials categories of artefacts. Cretaceous Southern Alps flints: red; Northern Calcareous Alps cherts: green; Franconian Alb cherts: blue; Central Alps quartz: black (from Schäfer, 2011).

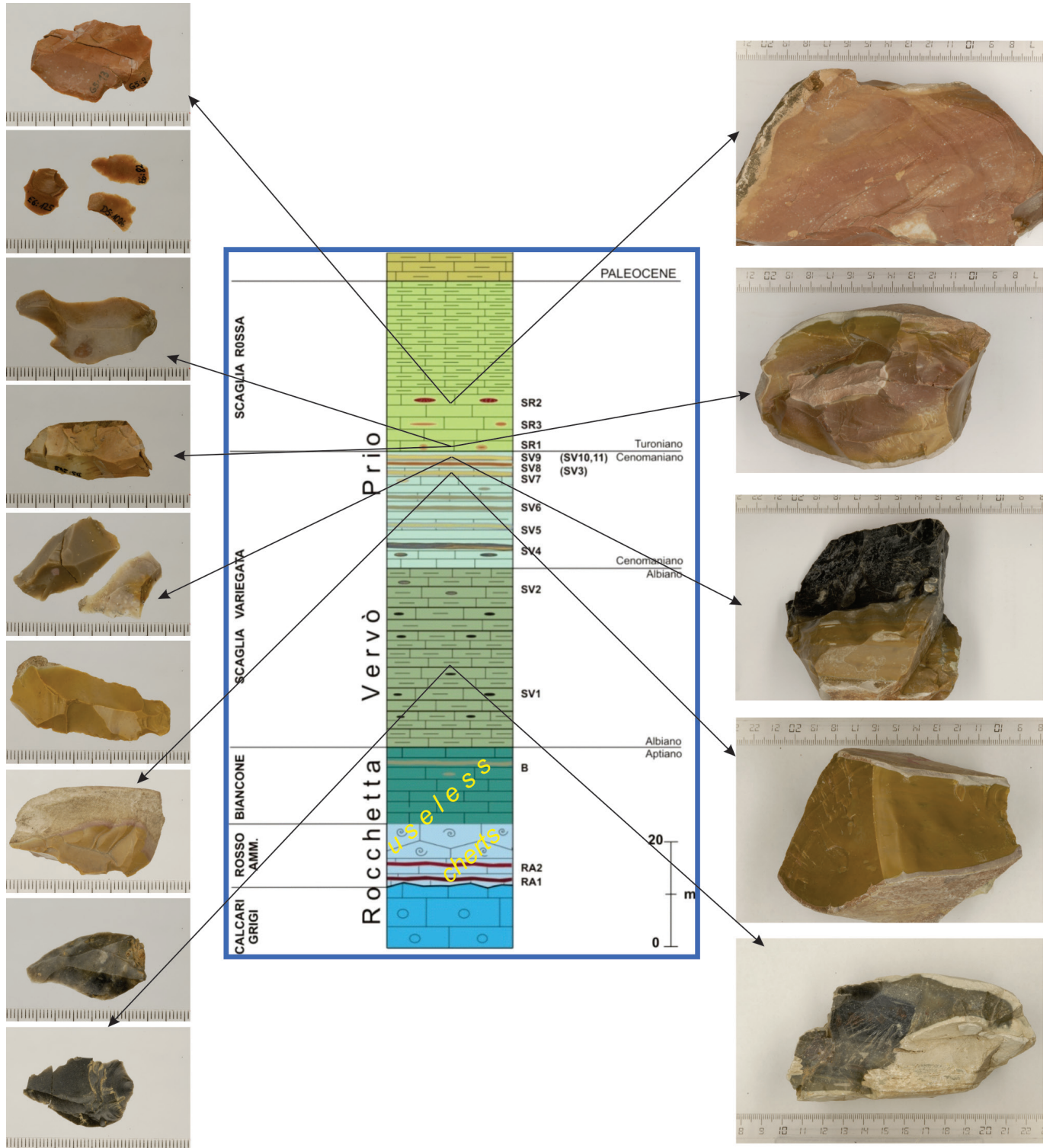


Figure 2 – The Southern Alps (Val di Non) cherts: comparison between geological (right) and archaeological (left) samples.

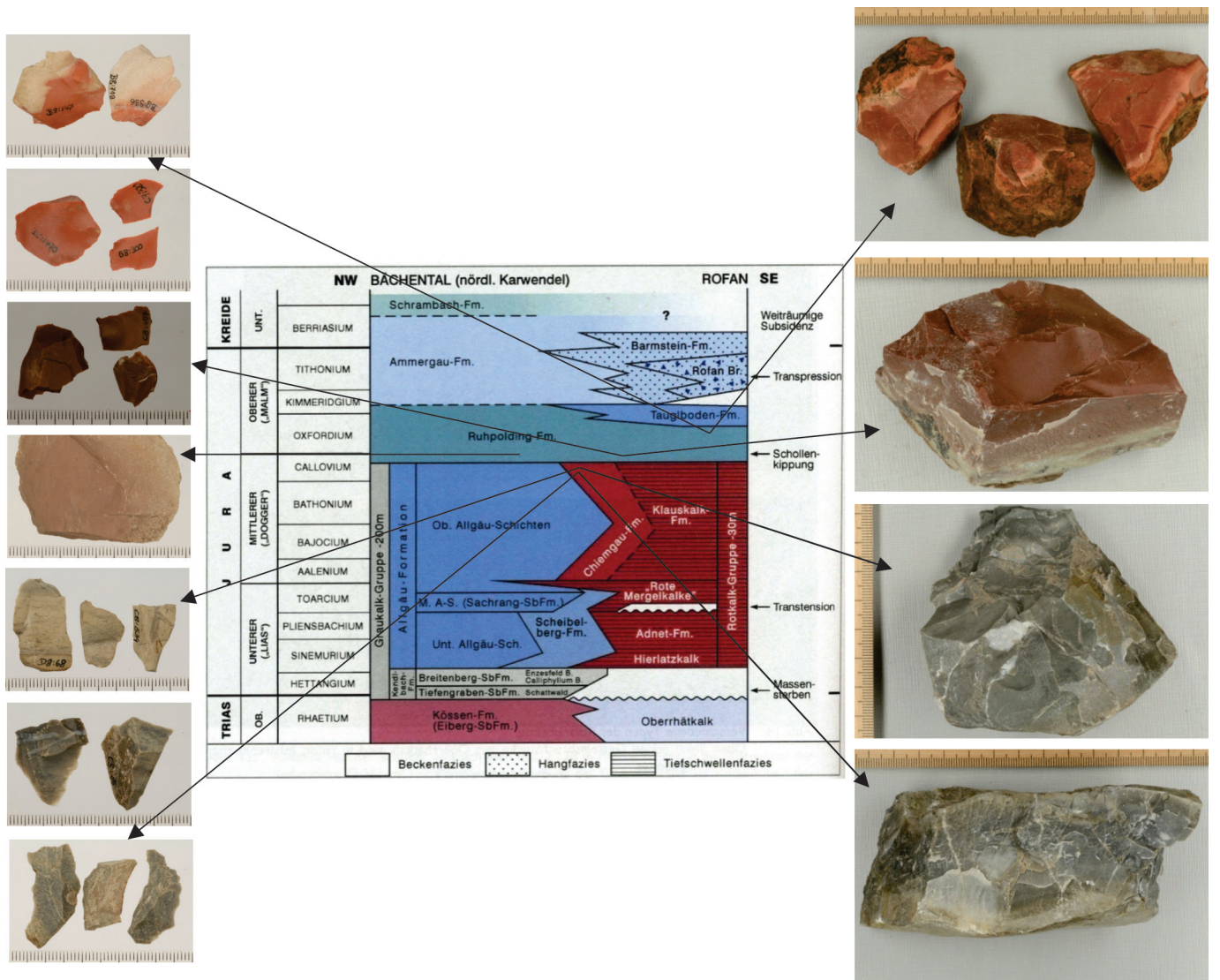
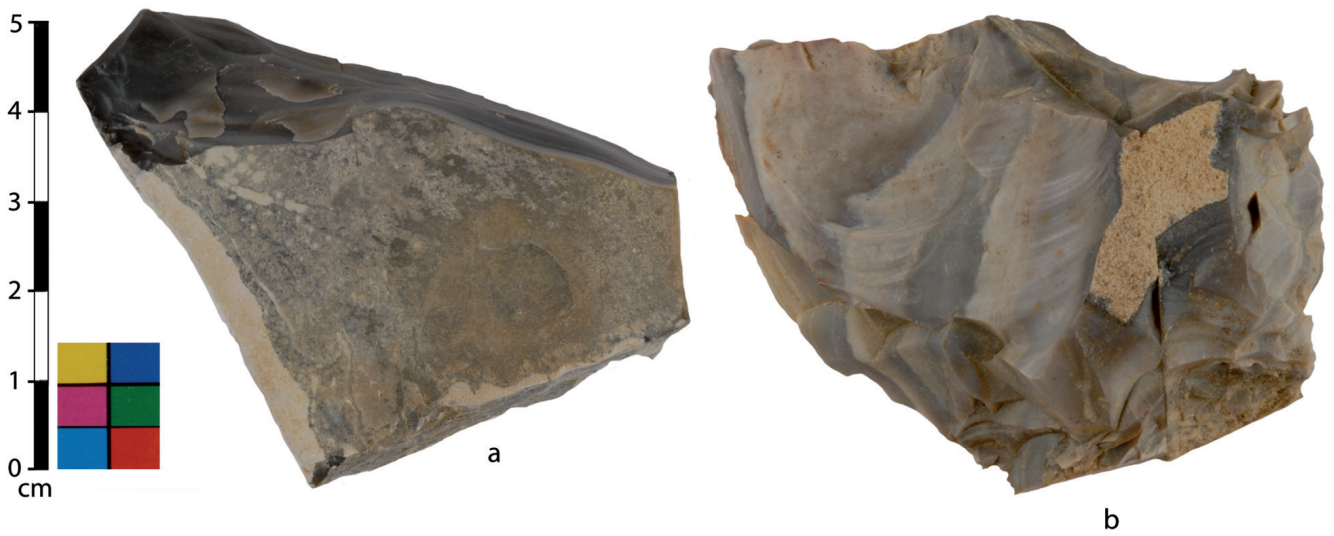


Figure 3 – The Northern Calcareous Alps cherts: comparison between geological (right) and archaeological (left) samples (map from Brandner & Gruber, 2011).



Figure 4 – The Franconian Alb cherts: comparison between geological (bottom) and archaeological group 2 (up) samples (from Bertola & Schäfer, 2011).



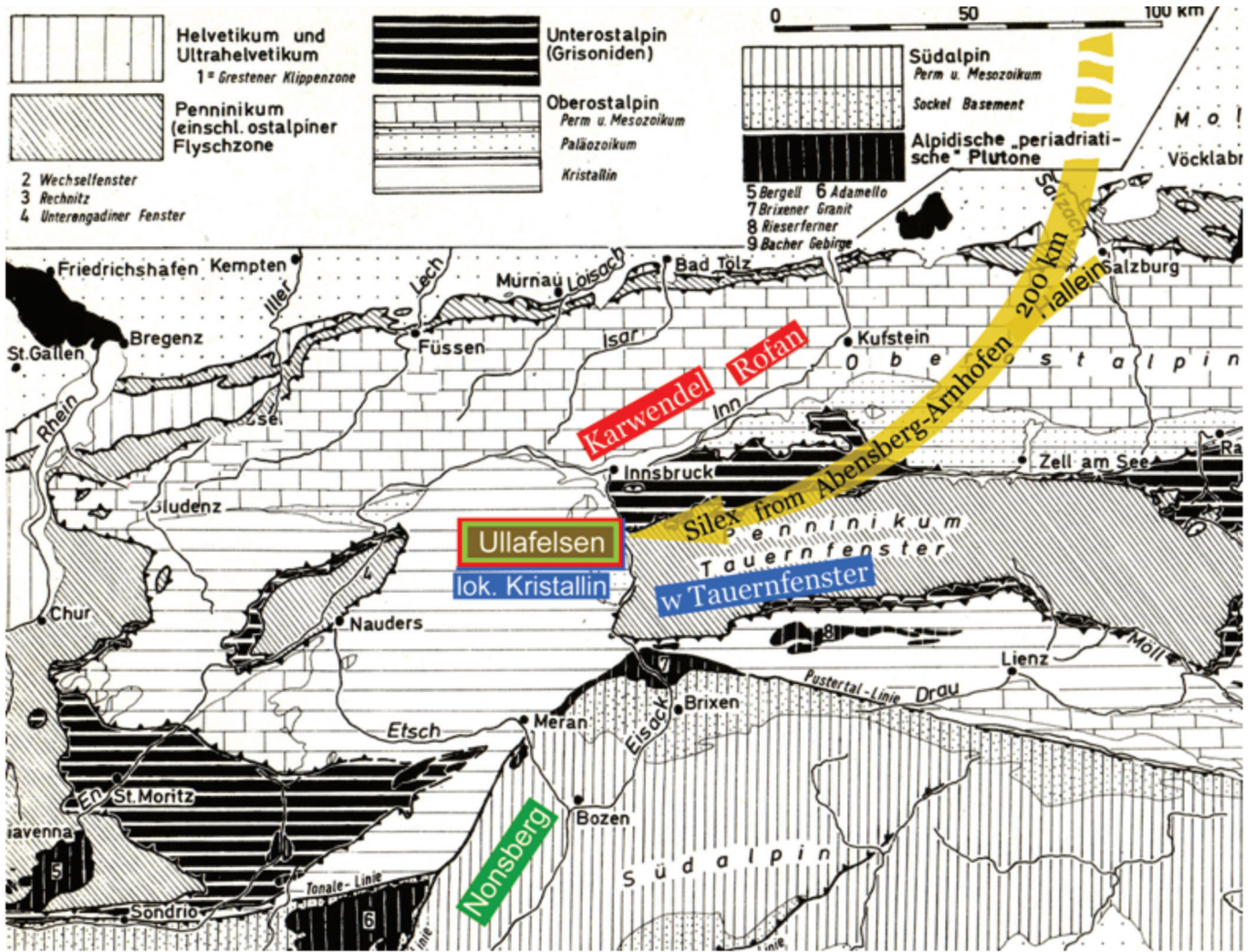


Figure 5 – The Eastern Alps geological context and the localization of the raw material sources of the Ullafelsen artefacts assemblage (map from Gwinner, 1978).