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Stone Axe Studies III

Edited by Vin Davis
Mark Edmonds

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During the 5th and 4th millennia BC, the Neolithic extraction of stone around Mont Viso and in the Mont Beigua massif in the north Italian Alps resulted in the production of large polished axeheads in eclogite, omphacitite, jadeitite and amphibolite – raw materials which were not only rare but which also have remarkable mechanical and aesthetic properties. These axeheads circulated around western Europe over great distances and in particular, between the Alps, the Atlantic and the North Sea.

Among these Alpine jades, research suggests a tendency for different raw materials to be represented in different geographic areas. Axeheads and other items made from dark-coloured rocks from the family of eclogites and omphacitites tend to predominate in north Italy and southern France. By contrast, light-coloured and often translucent rocks of the jadeitite family predominate in the Paris Basin, in Germany and in Great Britain and Ireland.

This paper documents the manufacture, circulation and deposition of different types of Alpine axeheads over time. More specifically, it discusses observed trends in relation to variability in the supply of raw materials and finished objects, the nature of regional traditions and long-distance transfer, and ultimately, the changing significance of axeheads as socially valorized artefacts.

Abstract

Eclogite or jadeitite: The two colours involved in the transfer of alpine axeheads in western Europe

Pierre Pétrequin, Alison Sheridan, Serge Cassen, Michel Errera, Estelle Gauthier, Lutz Klassen, Nicolas Le Maux, Yvan Pailler, Anne-Marie Pétrequin, Michel Rossy
Introduction

During the 5th and 4th millennia BC, the Neolithic extraction of stone around Mont Viso and in the Mont Beigua massif in the Italian Alps resulted in the production of large polished axeheads in eclogite, omphacitite, jadeite and amphibolite – raw materials which were not only rare but which also have remarkable mechanical and aesthetic properties. These axeheads circulated around western Europe over distances up to 1700 kilometres as the crow flies, and in particular between the Alps, the Atlantic and the North Sea. This phenomenon involved not only Alpine jades (a term which will be used to cover the various rock types listed above) but also variscite and fibrolite from Spain; groups of artefacts made of all three materials have been found within the giant tumuli of the Carnac region. There can be little doubt that this phenomenon corresponds to the contemporary Chalcolithic production of objects of copper and gold in east-central Europe.

Among these Alpine jades, the authors have recognised the presence of different raw materials in different areas. Axeheads and other items made from dark-coloured rocks from the family of eclogites and omphacitites tend to predominate in north Italy and southern France, while light-coloured and often translucent rocks of the jadeite family predominate in the Paris Basin, in Germany and in Great Britain and Ireland. We shall analyse the manufacture, circulation and deposition of Alpine axeheads in terms of the chronological evolution of individual axehead types; variability in the supply of raw materials and finished objects; the choice of axehead types in the process of long-distance transfer; and finally by interpreting axeheads as socially valorised artefacts.

When Alpine axeheads first started to circulate in a westerly direction, from the end of the 6th millennium, the people who manufactured utilitarian workaday axeheads of Alpine rock used a variety of stone types, mostly eclogites and amphibolites. The use of jadeite and omphacitite seems to be limited to the production of small and particularly hard tranchet axeheads and stone rings. This episode of production is contemporary with the Early Neolithic cultures in the southern Piedmont, with the Cardial and with the Villeneuve-Saint-Germain (VSG) Culture. During the first half of the 5th millennium the use of eclogite, omphacitite and amphibolite continued to predominate; at the same time we see the emergence of remarkably large adze-heads, reaching a length of 35 cm in the case of the Bégude type. The people who produced these axe- and adze-heads can be identified as the inhabitants of the arc-shaped area around the foot of the Alps in Italy, and also communities on the French side of the Alps. In Italy, there are clear links with the Square-Mouthed-Pottery (Vases à Bouches Carrées, VBQ) Culture, while in France the identity of the producing groups is harder to discern; they may belong to a pre-Saint-Uze Cardial tradition.

Shortly before the middle of the 5th millennium, there was a complete inversion in the criteria used for the choice of raw material. From this point, jadeite dominates archaeological finds to the west of the Alps as far as the Gulf of Morbihan, being used for up to 95% of all the axeheads. In contrast, northern Italy – and especially the plain of the river Po – seems to have been excluded from the transfer of large jadeite axeheads which extended elsewhere to the maritime fringes of Europe, reaching Britain, Ireland and Germany just before or around the end of the 5th millennium. The Piemontese axehead producers, with their hands-on access to the source areas of the jades, seem to have privileged the transalpine diffusion of axeheads in a north-westerly direction, well before the Saint-Uze and the Chasséen Cultures. In the course of these transfers from Italy to Brittany, certain kinds of axeheads would be selected – the large, thin Durrington type and the Puymirol type – and then, at a distance of 500 kilometres from the source areas, some of these would be re-polished to change their shape to that of the Altenstadt-Greenlaw type. When the axeheads arrived in the Gulf of Morbihan, 1000 kilometres away from the source areas, a good number would then be repolished a second time, to produce axeheads of the Tumiac and Carnac types.

Such activities directly inform the social interpretation of the large axeheads of Alpine jades in Western Europe (excepting parts of northern Italy, where other rituals and other socially valorised objects seem to have been in use). In the symbol-system in use during the Middle Neolithic to the west of the Alps, certain jade axeheads would be diverted from their primary function as tools for felling trees and working wood and treated instead as sacred objects, to be deposited at certain specific points in the landscape or in the tombs of exceptional individuals, as in the Carnac region. The immense importance of these axeheads in religious rituals is amply demonstrated here and elsewhere on the southern coast of Brittany,
where representations of axes figure, along with other ritual-related signs, on massive stelae. Furthermore, certain of the Alpine axeheads that had been repolished in the Morbihan, the so-called ‘Carnac’-style axeheads, were re-injected into the circulation system, to travel towards north-west Iberia, Germany, the Alps, Italy and Croatia, in some cases travelling as far as 2500 kilometres (in the case of the axeheads found in Croatia and southern Italy, for example). These ‘returning’ Alpine axeheads of Carnac type would have been accorded exceptional social value, and along the routes travelled, one finds imitations made in locally-available rocks. This re-diffusion would appear to have been accompanied by a spread of religious and ritual concepts that originated in the Morbihan and which gave rise to the large, shaped and decorated stelae that occur in the Auvergne, in Burgundy, in western Switzerland and in Valais, close to the heart of the Alps.

History of research

The petrography of the thousands of Alpine rock axeheads that circulated across Western Europe from the end of the 6th millennium BC to the mid-3rd millennium BC, was first studied by Alexis Damour in 1865. It was his analysis of axeheads that defined the use of the mineral jadeite, and identified a probable source in the Mont Viso massif, 70 kilometres south-west of Turin (Damour 1881). These Neolithic axeheads in fine-grained rare rocks that are particularly dense, tough and resistant, are hard to work, and that take a long time to saw and polish, demonstrate remarkable mechanical and aesthetic properties. It is not surprising that elsewhere in the world, in the highly stratified societies of ancient China and Mesoamerica where nephrite-jades and jadeite-jades have been used, they have been associated with religious and temporal power, and with the notion of immortality.

In western Europe, the origin of eclogite, omphacite and jadeite in the Italian Alps was soon confirmed by the work of Giovanni Battista Traverso (1898, 1901, 1909) on axehead roughouts from the region of Alba (Cuneo, Piedmont, Italy), and by that of the geologist Secondo Franchi (1904). It was Franchi who identified potential source areas at the foot of Mont Viso and, in particular, the omphacites and jadeites of the the Bule Valley, and in the massif of Mont Beigua, to the north-west of Genoa. It was quickly realised that the axeheads made of these materials had a special status: often translucent, catching the light of the sun, these magnificent polished objects, large and small, circulated in Europe over considerable distances. By 1878 Damour and Leopold Heinrich Fischer had recognised examples in Brittany, a thousand kilometres from the potential source areas, and Denmark, 1200 kilometres away (Fischer 1880; Meyer 1882). The idea that these Neolithic Alpine axeheads had held an exceptional value and social significance was confirmed by these long distance movements, which echoed those of Guatemalan and Chinese jades. The geographical distribution of axeheads made of less prestigious stone, by contrast, rarely extended beyond the regional in scale, travelling only 200–250 kilometres as the crow flies (Pétrequin et al. 1995).

Thus, it appears that all the elements of the research into Alpine axeheads were already in place at the dawn of the 20th century. But to progress matters further, what was needed was fine-grained chronological information, typologies of axehead development and examination of the cultural context of the findspot: these were not attempted until the 1970s. In the meantime, the idea that axeheads could have come from the Alpine interior was virtually abandoned by prehistorians, despite the fact that axeheads were often being discovered there as isolated finds. The interest in Alpine axeheads was coming from geologists and petrographers, who were applying sophisticated techniques of analysis. The initial thrust of this work was an exemplary study by William Campbell Smith of the Alpine axeheads of Britain and Ireland (Campbell Smith 1963, 1965, 1972), followed by the work by Valerie Jones et al. (1977) and Alan Woolley et al. (1979). The techniques of determination through petrological thin sectioning, X-ray diffraction, specific density and microprobe analysis were subsequently adopted on the Continent, with the work of Pierre-Roland Giot (1965) in Brittany, of Charles-Tanguy Le Roux et al. (1974, 1980) in the Loire Valley, of Monique Ricq-de Bouard (1996) in the Midi of France and of Claudio D’Amico et al. (1995, 1997, 2000a and b, 2003, 2006) in north Italy.

All these archaeometric approaches led to the improved mineralogical and petrological characterisation of various Alpine jades. They also revealed the immense geographical extent of the distribution of these precious axeheads across western Europe, as far as the Low Countries (Schut et al. 1987), Catalonia (Ricq-de Bouard 1996), southern Italy (Leighton & Dixon 1992), Austria (Prichystal & Trinka 2001), Croatia (Petric 1995) and Slovakia (Spisians et
al. 2005; Hovorka et al. 2008). However, with the adoption of these sophisticated and highly specialised analytical techniques, it would appear that the archaeologists rather lost sight of the archaeological questions. With most studies, the chronological factor was neglected, despite the fact that the phenomenon of Alpine axeheads was a spanned an estimated 2000 years. It is as though the social, cultural and technical evolution of Neolithic societies was regarded as negligible, and it was generally assumed (except with the work of Ricq-de Bouard, 1996) that any such evolution was gradual. Research on raw material sources in the Alpine interior was completely neglected. It seems as though it was assumed that fine-grained eclogites, massive omphacitites and large blocks of jadeitite were to be found in all the torrent-beds and all the moraines across the Alpine arc from the Val d’Aosta in the north to Mont Beigua in the south-east. The published maps of geological prospections that feature in the petrographic studies of axeheads certainly imply that this was the case (Compagnoni et al. 1995; Fedele 1999; Ricq-de Bouard 1996; Ricq-de Bouard et al. 1990).

These strictly petrographic studies, undertaken outside the context of archaeological concerns, naturally led to an extremely simple (and western-orientated) interpretation: Neolithic people would have selected thin, flattish cobbles from among the moraines and torrent beds leading down from the high Alps, where Alpine jades would be well represented. After a rapid initial roughing-out using a hard hammer, these cobbles would be pecked and polished, in order to feed into the down-the-line exchanges emanating from the Piedmont.

Certain of these axeheads, the long and remarkably polished specimens, would have been regarded as prestige goods, as ‘ceremonial’ axeheads. Equally, according to this view, the especially high incidence of jadeitite axeheads in certain regions of Europe, and the similar preponderance of axeheads made from eclogites and omphacitites in other parts of Europe, reflected ‘cultural choices’ (D’Amico et al. 2003). This term lacks heuristic value and explains nothing because it fails to take into account the historical trajectories of the societies in question. (Regarding technical choice and cultural choice with regard to axeheads, see Lemonnier 1986; Pétrequin 1993a; and Pétrequin et al. 2006a.)

Finally, these interpretations were generally accepted by the scientific community which had delegated all responsibility for axehead studies to specialist petrologists. The remarkable exhibition, organised in 1996 at the Museum of Turin, and its fine accompanying volume The Ways of Green Rocks (Venturino Gambari 1996), constitutes the culmination of this phenomenon. It would now appear that the principal point of interest in this monograph was its bringing together of a large number of roughouts and polished axeheads from north Italy, many of which had not been published before or were dispersed in small articles that are hard to access in libraries. It seems that the results of petrographic approaches were not taken into account in that volume.

Axeheads, fieldwork and the social sciences: Programme JADE

In parallel with these strictly specialist petrological approaches, two of us (Anne-Marie and Pierre Pétrequin) began, in 1984, to develop ethnographic models based on the systematic study of the last agricultural communities in New Guinea to produce and use polished stone axe- and adze-heads. The aim of this work was to understand the technical and social system of these objects in its entirety. In other words, the approach encompassed not only the study of production and polishing, but also considered the modalities of circulation, of transfer, of exchange and gift-giving; the use of these objects, ranging from their employment as workaday tools to their deployment as symbolic objects in compensation payments; the attribution of social standing to these items, and the religious rituals relating to (or involving) them (for a summary of this New Guinea work, see Pétrequin & Pétrequin this volume and also Pétrequin et al. 1993b; Pétrequin et al. 2006d).

A whole series of new ideas regarding the interpretation of the technical and social system of polished stone axeheads has emerged from these ethnographic investigations. These allow us to develop alternative working hypotheses to those of simple, conventional logic (that is, the sacrosanct Western notion of ‘common sense’). We are not seeking to make like-for-like comparisons between the populations of 20th/21st century New Guinea and Neolithic Europe; we are all too aware of the dangers of undertaking such strict comparison-making. Rather, we are attempting to test indisputable patterns that have been observed in contemporary New Guinea against the evidence from the past. By applying models constructed using these insights – especially regarding the exploitation of primary sources of rock, where
the abundance of material permits both large-scale production and the transfer of technical knowledge through apprenticeship – we rapidly succeeded (from 1989) in discovering large quarries of pélite-quartz and of nodular schist in the southern part of the Vosges massif (Pétrequin et al. 1995). Some 30,000 such axeheads have been petrologically identified, and they are found in the east of France, Switzerland and south-west Germany. We created a typological seriation, collated information about finds from culturally and chronologically-diagnostic contexts, and systematically mapped the distribution of finished axeheads, roughouts and working debris. It was clear, however, that one could not understand this system of production and distribution (which dated to the 5th millennium and the beginning of the 4th) without taking into account other phenomena – in particular the circulation of large Alpine axeheads between the Alps and the Morbihan – and without applying a kind of reasoning that is rooted in ethnology and in the social sciences. Thus, our regionally-based interpretation of the Vosges quarries of Plancher-les-Mines (Haute-Saône) and Saint-Amarin (Haut-Rhin) took into account higher-level hypotheses that pertained to the whole of western Europe (Pétrequin et al. 1995:103–20). In other words, we had to call upon the phenomenon of the long-distance transfer of ‘ceremonial’ Alpine axeheads in order to account for the social conditions that applied to the regional production of axeheads in the southern Vosges. This study launched the idea that Alpine axeheads could be regarded as a bell-wether, showing how societies functioned during the 5th millennium. Around the same time, Serge Cassen, along with Christine Boujot and Gérard Bailloud, developed the hypothesis that the Gulf of Morbihan, on the southern coast of Brittany, was where the earliest megalithic architecture in Europe emerged (in the form of giant mounds, carved stelae and alignments of standing stones). Within the belief system that was expressed in these monuments, and among various ‘object-signs’ that were carved on the stelae such as the crosse (throwing weapon shaped like a hockey stick) and the cachalot (sperm whale), the Alpine axehead played a prominent role as a particularly significant object, at least from the middle of the 5th millennium (Boujot & Cassen 1992; Bailloud et al. 1995; Cassen 2000). Furthermore, a symmetry between Carnac and the Gulf of Morbihan on the one hand, and Varna on the other, was seriously envisaged.

The foundations for a collaboration with Cassen et al. were rapidly established in 1996 and a small team was formed to undertake a general study of Alpine axeheads across western Europe. This involved a systematic typological and chronological review of all axeheads longer than 14 cm (in order to avoid the examples that had been re-used as tools or reshaped at a much later date). The idea of creating a general map of the various types of Alpine axehead had already been proposed by Pierre-Roland Giot (1965) but without success, because it soon became clear that this would be a colossal undertaking. Our initial small team was soon joined by Michel Roissy, who undertook to examine the petrological thin sections of raw material samples from the Alps (Pétrequin et al. 2006c). From 2000, Michel Errera added his expertise in the field of spectroradiometric analysis, a technique that is totally non-destructive and cheap to undertake and which had not hitherto been used to analyse prehistoric artefacts. The use of this technique, along with the reading of petrological thin sections, the measurement of specific gravity and X-ray diffraction (XRD) analysis (the last undertaken at Laboratoire GeaDue in Bologna, by Massimo Ghedini and Claudio D’Amico), proved to be extremely useful in comparing axeheads with raw material samples, in particular as far as jadeites are concerned (Errera et al. 2006, 2007, 2008; Pétrequin et al. 2005, 2006b). It is clear that if we had not used the non-destructive technique of spectroradiometry, museum curators would not have allowed us to analyse their axeheads, bearing in mind the damage inflicted on certain very beautiful examples over the last 40 years through sawing, breaking off or coring pieces to make thin sections.

Other colleagues joined the team: Christophe Croutsch undertook a study of the techniques of sawing Alpine rocks in Switzerland (2005); Lutz Klassen brought his knowledge of the earliest use of copper and gold in Europe and was in charge of gathering material from Germany and Denmark (Klassen 2000, 2004); Alison Sheridan and Yvan Pailler covered Brittany, Great Britain, Ireland and the
Channel Islands (Pailler 2007; Pailler & Sheridan 2009); Guido Rossi, Eugenia Isetti and Patrizia Garibaldi covered Liguria (Gaggero et al. 1993); Nicolas Le Maux (2007) and François Giligny dealt with the Paris Basin, Ramon Fabregas Valcarce (1982), and Arturo De Lombera Hermida and Carlos Rodriguez Rellán covered Spain and Portugal. Finally in 2007, this team – which started off as a completely informal grouping – was formalised as part of a Programme “Blanc” of the Agence Nationale de la Recherche, under the name ‘JADE’. Estelle Gauthier joined this multi-disciplinary group as a GIS specialist, responsible for the mapping of material sources that were exploited during the possible to discover the location of all the raw these spectacular results, it has still not yet been tinging to detach thermal flakes. Notwithstanding b). The blocks had been exploited using fire-set (Pétrequin 2008, the first evidence for the Neolithic Mary or secondary positions, in the Mont amphibolite was found in the Mont Viso massif – Anne-Marie and Pierre Pétrequin undertook twelve consecutive seasons of field prospection in the high Alps, in order to establish a representative collection of raw material samples. (To date, this reference collection comprises over 2000 specimens.) This systematic, valley by valley prospection led, in 2002, to the discovery of the first free-standing boudins (blocks shaped like a blood pudding) of jadeitite, in either primary or secondary positions, in the Mont Beigua massif. Thereafter, in June 2003 and June 2008, the first evidence for the Neolithic exploitation of blocks of jadeitite, eclogite and amphibolite was found in the Mont Viso massif (Pétrequin et al. 2005, 2006b and c, 2007a and b). The blocks had been exploited using fire-setting to detach thermal flakes. Notwithstanding these spectacular results, it has still not yet been possible to discover the location of all the raw material sources that were exploited during the Neolithic. Many more years of prospection will be necessary to cover the Mont Viso and Mont Beigua massifs, let alone any other source areas.

Research into Alpine axeheads is therefore currently situated within well-defined parameters. It is very different from the research that had previously been undertaken, which had focused on isolated axeheads, on regional mineralogical studies, or on creating typological classifications within a geographically-restricted area (Thirault 2004). This previous work had not related the axeheads to the source areas that were exploited, nor had it considered the conventions of the reduction process as revealed clearly in the axeheads themselves. In theory, thanks to the standardised recording undertaken by Programme JADE, it is now possible to approach the study of Alpine axeheads on a Europe-wide scale (while not ignoring their regional peculiarities), examining every aspect from the high-altitude extraction and working of the raw material to the deposition of axeheads in a hoard or an exceptional grave, or planted in the ground at the foot of a stela, on a mountain col, or in a wetland context. It would appear that this research tool finally provides us with the best way to test the hypotheses that are thrown up by the social sciences, by ethnoarchaeology (and here let us not forget the conceptual power of the discovery of the quarries on Mont Viso) and by experimentation. The rest of this contribution will attempt to demonstrate this through several examples.

**Jadeitite versus eclogite: myth or reality in the choice of colours**

In a preliminary study (Pétréquin et al. 2002), we observed the considerable variety in the Alpine eclogites, omphacitites and jadeitites used to make the large Neolithic axeheads. This variability can be seen with the naked eye (Fig. 1) and is confirmed through petrological analysis; indeed, this variability makes it difficult to determine the precise origin of these rocks on the basis of thin sections or XRD analysis. (See, for example, Ricq-de Bouard 1996; and Compagnoni et al. 1995, 2007). Equally, we observed that in certain parts of Europe, notably southern France and Italy, large axeheads made of dark-coloured eclogite/omphacitite (and also, probably, several dark green fine-grained jadeitites that have otherwise been labelled ‘chloromelanite’) are in the majority, whereas in the Paris Basin and Britain and Ireland, by contrast, axeheads of eclogite/omphacitite are in the minority and light green and generally

Fig. 1. Examples of large, intensively polished axeheads of Alpine rocks. The great typological diversity implies a long chronology of production, covering most of the 5th millennium and part of the 4th.
Eclogite or jadeite: The two colours involved in the transfer of alpine axeheads in western Europe

PEYRIAC-DE-MER (Aude, France) Jade 2008-814

CARNAC / SAINT-MICHEL (Morbihan, France) Jade 2008-511

LATERZA (Italy) Jade 2008-1264

MONTREDON (Aude, France) Jade 2008-755

WROOT (Grande-Bretagne) Jade 2008-78

LANGSUHR (Germany) Jade 2008-255
translucent jadeites predominate. The boundary between these two patterns falls on either side of a notional line between Geneva and Le Havre, with Brittany and the Loire Valley constituting an exception, having a roughly equal number of dark- and light-coloured axeheads. Furthermore, by large this opposition seems to correspond to different typological groupings, with southern axehead types being made predominantly of eclogite/omphacitite and northern types being made predominantly of jadeites.

These observations, which were based on the examination of 600 large axeheads, were not entirely new, even though the number of axeheads investigated far surpassed those of previous studies. On the basis of examining several museum collections, Edouard (M.) Desor (1873) had already remarked upon this difference in colour and texture between the Alpine axeheads found in Germany and Belgium on the one hand, and in the south of France on the other. Working with a similarly small number of axeheads from Britain and the Continent that belong to museums in Britain, but this time having much more detailed mineralogical information to hand, Woolley and his colleagues (1979) reached the same conclusion, noting a global opposition between southern axehead types (long, narrow, thick-sectioned and dark green in colour) and northern types (broad, thin and light green in colour).

Thus, these three studies produced near-identical results, whether they were based on macroscopic examination, as in Desor’s work, or on petrological, mineralogical and/or compositional analysis (Woolley et al. 1979; Pétrequin et al. 2002). An initial and tentative explanation was offered in the last two studies, proposing that different quarries had been exploited. At the time when these studies were undertaken, no Neolithic working sites had yet been found, although several groups of rough-outs had been found on the periphery of the Mont Beigua massif (Traverso 1898, 1901, 1909; D’Amico et al. 2000, 2006; Venturo Gambari 1996).

In a synthetic study of axeheads of Alpine rock in Italy and elsewhere in Europe, D’Amico et al. (2003) offered an alternative view. Having analysed a large set of small axeheads from Italy (from petrological thin sections and XRD analyses) and small sets of axeheads from France and Luxembourg (by macroscopic examination), the authors adopted a view that contrasted with that put forward in the three other studies: “The general trend of an increase in jade implements with respect to eclogites, gradually moving away from the sources, is a clear cultural selection already noticed in Italy… Clearly, the importation strategy is here prevalently oriented towards obtaining ritual/prestige objects of exotic materials, possibly made more precious by their long-distance provenance and therefore even aesthetically more selected (more jades than eclogites)... Many problems remain open and any conclusion should be considered premature, due to still insufficient petroarcheometric studies on stone axes. For instance, there is an apparent discrepancy between the preliminary data reported here and the Geneva–Le Havre line (Pétrequin et al. 2002) dividing areas with prevalent ‘eclogite vert foncé’ and with prevalent ‘jadeite verdâtre saccharoïde’.”

These two positions are contradictory, not only in the nature of the observations but also in the interpretation of spatial variability. One proposes an opposition between dark- and light-coloured rocks, probably associated with different types of axehead (and consequently with an evolution over time); the other rejects this idea of an opposition even though it emphasises the cultural selection of light-coloured rocks over dark-coloured rocks and notes an increasing use of the former with increasing distance from Italy, towards the Atlantic coast of Italy, ignoring the chronological dimension. The fact that the first position is based solely on the examination of large axeheads, whereas the second is based on large and small axeheads, might indeed lead to certain distortions. However, this cannot account for the opposition. Now, with the Programme JADE database at our disposal (comprising over 1600 records as of November 2007), it is easier to examine the picture more clearly at a pan-European scale.

**Alpine quarries and Europe-wide distribution patterns**

The map showing the overall distribution of axeheads made from all the Alpine rock types (eclogite, omphacitite, jadeitite, amphibolite and nephrite) across Europe (Fig. 2) allows us to see clearly, and at a glance, its geographical patterning and extent. This remarkable concentration in western Europe contrasts with zones where Alpine axeheads are rare or totally absent: Spain, the Iberian peninsula and east-central Europe. In these areas, the ways in
which society functioned and rituals were conducted relied upon other ways of indicating status and power and other objects, such as the pottery of Serra d’Alto in Italy, copper and gold in the region of Europe that was the first to experience the Chalcolithic (Pétrequin et al. 2002; Klassen 2000; Klassen et al. forthcoming a). There also seem to be blank areas and gaps within the area where the axeheads circulated: among other examples, the lacuna in the mountainous region of central France may be explained in terms of the nature of the soil and the limited opportunities they offer for cereal growing (excepting the Limagne and the Puy Basin). However the large blank zone between the Pas-de-Calais and Lorraine is harder to understand; it corresponds in part to the major battlefield areas of the two World Wars and it may also reflect the relative paucity of research in that region.

As for the most important concentrations of axeheads, these correspond closely to the exploitation areas on Mont Vico and Mont Beigua, where our prospections have found
Fig. 3.
The Neolithic exploitation on Mont Viso.

Top: the source area on col Barant at Bobbio Pellice (2400 m above sea level); the blocks exploited by fire-setting are located on the crest towards the front.

Bottom: roughouts and hammerstones from the quarries of Barant and Vallone Bule at Oncino.

Photos and information: Anne-Marie and Pierre Pétrequin.
thousands of roughouts (Fig. 3). These new discoveries overturn the previous distribution maps of axeheads in the high Alps, which had suggested that there had been very little extraction during the Neolithic, particularly on Mont Viso.

The second remarkable concentration is to be found on the southern coast of Brittany, in particular around the Gulf of Morbihan, which constituted an exceptional area of attraction for Alpine axeheads and for beads and pendants made from Iberian variscite (Cassen et al. 1999; Herbaut 2000; Herbaut et al. 2004). We shall return to this area.

At the broadest scale, it is clear that the circulation of large Alpine axeheads away from the source areas did not occur with the same intensity in different directions (which would have been the case had the social distance between Neolithic communities been the same: Pétrequin et al. 2003b). In contrast, with the exception of north Italy, the majority of Alpine axeheads are to be found on the other side of the Alps, in the direction of Brittany, Scotland and Denmark. Such an asymmetrical distribution indicates that different social circumstances obtained in different areas, and this needs to be explained: such differences might be able to account for the marked differences in the petrological composition of assemblages in north Italy and in the rest of western Europe (D’Amico et al. 2000b, 2003).

All the evidence suggests that the large Alpine axeheads had a relatively minor social value in the Po plain, close to the source areas of the raw material. Similarly, downstream from Turin, the majority of ground stone tools were made from low quality eclogite, from relatively soft omphacite schist, from coarse-grained jadeitite-quartz, in very laminated amphibolite and in serpentinite, while objects made from true, high quality jadeitites are rare (e.g. at the working site at Rivanazzano: D’Amico et al. 2006). However, this spectacular map runs the risk of giving a false impression, because it represents a palimpsest of all the large axeheads, irrespective of their chronological position within the period c 5000–3000 BC. Nothing in this document allows us to determine whether the circulation of large axeheads took place in the same manner and at the same time throughout Europe, or indeed whether the same types of axehead or the same relative proportion of materials used were involved in all the areas of Europe in question over these two millennia.

Eclogite-omphacitite and jadeitite in Europe

This general distribution map of large Alpine axeheads in Europe (Fig. 2) which compacts data spanning around two millennia, masks the use of different materials. So, to assist our proposition that we can oppose dark-coloured and light-coloured axeheads, we propose to use two complementary maps (Fig. 4, top). At the left of this illustration we have grouped the axeheads made from eclogite and omphacitite. Their distribution covers the whole of western Europe, but the zone of densest concentration lies in northern Italy and southern France, with a northern limit falling roughly in a line between Berne in Switzerland and Rouen in France. The general tendency seems to be a circulation away from the Alpine quarries in the direction of the Gulf of Morbihan, following two routes: the Saône valley; the southern part of the Paris Basin and the lower valley of the Loire; the lower valley of the Rhône, Languedoc, the Bordeaux region and the lower valley of the Loire. In each case, the Gulf of Morbihan seems to be the point of attraction for these large Alpine axeheads made of dark-coloured rocks.

At the top right of Fig. 4, a second map shows the distribution of axeheads made from light-coloured rocks of the jadeitite family. Once more, the distribution extends over the whole of western Europe, but with a far denser concentration aound the Gulf of Morbihan, in the Paris Basin, in Germany and in Great Britain. A southern edge to this distribution can be traced between Berne and Caen, with the Gulf of Morbihan once more being the exception, having a large number of these jadeitite axeheads.

There is always an element of uncertainty inherent in some macroscopic identifications. The same may have also been true in the past; Neolithic people did not have at their disposal any other means of identifying polished jaditeitites beyond the fact that the stone is much tougher than other Alpine rocks. However, what can be said with some confidence is that there is an evident opposition between a southeaster part of Europe dominated by dark-coloured axeheads and a north-western part dominated by light-coloured axeheads. There is of course a degree of overlap between these two distribution areas, which probably correspond to the principal route along which axeheads travelled from the Italian Alps to the Morbihan, via the Saône, the Morvan, the centre of the Paris Basin and the Loire Valley. The concept of a progressive cultural ‘selection’ of
Eclogite or jadeite: The two colours involved in the transfer of alpine axeheads in western Europe

Fig. 4. Map, at the scale of western Europe, showing that the distribution of axeheads of dark-coloured alpine rocks (mainly from the family of eclogites and omphacitites, top left) contrasts with that of axeheads of light-coloured rocks (above all jadeitites, top right).

Most of these axeheads result from open-air exploitation of raw material sources at the foot of the Mont Viso massif, at Vallone Bûlé (bottom left) and at Chiot del Porco (bottom right); the products from col Barant (Fig. 3, top) and of the Mont Beigua massif seem to be less well represented.

Cartography by Estelle Gauthier; photos: Pierre Pétrequin.

jadeitites along the course of the transfers from Italy to the Atlantic fringe of Europe (D’Amico et al. 2003) cannot therefore be sustained, given the overall distribution of the large axeheads.

In the extraction areas of Mont Viso (Fig. 4, bottom) one finds that fine eclogites, omphacitites and jadeitites belong to the same geological zones. Occurring as boudins and as blocks enveloped within a kind of ‘purée’ of soft, pasty serpentinite, these three types of rocks can coexist within several dozen metres of each other, with each block having its own specific history within the metamorphic process (Compagnoni et al. 2003, 2007; Pétrequin et al. 2007a). Given this variability in the geological process that gave rise to these rock types, there is consequently a considerable variability in eclogites, omphacitites and jadeitites in the primary source areas (namely Viso/Vallone Bûlé, Fig. 4 bottom left, Viso/Vallone Porco, Fig. 4 bottom right, Viso/Barant, Fig. 3, top; and Pontonvrea in the massif of Mont Beigua: Pétrequin et al. 2006c).

The trial excavations undertaken in September 2007 at Oncino/Bûlé/Circle of Blocks (Pétrequin et al. 2008b) showed that, amidst the hundreds of cubic metres of flakes and broken roughouts created by hard hammer knapping, pieces in eclogite/omphacitite were far more common than those in jadeite. However, the way in which the raw material was worked differed according to the raw material used. In effect, in Vallone Bûlé and Barant, the length of the broken roughouts made of eclogite is often in excess of 10 cm and can be as long as 20 cm; in contrast, the length of broken jadeitite preforms and of the majority of flakes is most frequently less than 5 cm. In these high-altitude working areas, this different composition of the debitage tends to show that jadeite was of higher value than the other rocks that were exploited. Consequently, preforms and roughouts in jadeitite – even those of quite small size – must have been systematically taken down into the valley to be hammered, ground and polished, while the norms of abandonment meant that the other rocks, of lower value, were more wasteful of the raw material. In other words, large roughouts of eclogite would be rejected as soon as a crack or an imperfection was spotted in the raw material (Fig. 3, bottom left). Thus, the selection of raw materials, and in particular of jadeite, probably informed the nature of the exploitation of the blocks and the preparation of the roughouts. This raw material selection was facilitated by the fact that each of these rocks reacts in a different way to the blow of a hammerstone and that thin flakes of translucent jadeite often have a characteristic luminous pale green colour.

**Typo-chronological evolution of the relationship between eclogite-omphacitite and jadeite**

In attempting to resolve the problem of the opposing distributions of dark-coloured versus light-coloured rocks (Fig. 4, top), we propose to introduce two variables: the typological classification of the axeheads and the chronological evolution of types. We have demonstrated elsewhere that the formal variability of large Alpine axeheads (of which several examples are shown in Fig. 1) could relate to a long-term chronological evolution (Pétrequin et al. 1997, 2002). An initial typological classification allows us to identify the principal types of large axehead in terms of their overall shape, the shape of their blade and their shape in cross-section (Pétrequin et al. 1997, 2002). Each of these types has been given a name corresponding to the findspot of the first axehead to be thus identified (e.g. Bégude, Bernon, Puymirol: Fig. 5). A chronological ordering was then proposed, based on the study of hoards and funerary assemblages, comprising between two and (in the case of the tumulus of Tumiac at Arzon, Morbihan) 18 examples containing more than one type of axehead. Another way of identifying chronological changes was to observe the successive transformations in the shape of an axehead as it underwent several episodes of repolishing (e.g. to convert an Altenstadt type into a Puy type). This typological seriation was then placed within a chronological order by taking into account the examples that had come from dated or datable contexts (e.g. through association with stone disc-rings, with pottery, or with radiocarbon or dendrochronological dates).

Figure 5 presents our current state of knowledge of the chrono-typology of Alpine axeheads. It differs significantly from our earlier versions (in particular Pétrequin et al. 2002) because the classification has had to be revised each time a new hoard of axeheads has been registered in the Programme JADE database. The version published here, which presents the average dates along the axis linking the Alps with the Morbihan, may have to be amended in the light of new data. Nevertheless, it demonstrates the complexity of typological evolution, while at the same time allowing us to identify when, during the period between
4800 and 3700 BC, certain types of axeheads appeared, reached their peak of use and then declined along this Alps – Morbihan axis.

Out of a total of 1600 large axeheads included in the JADE database, 966 have had their precise petrographic composition identified (i.e. through spectroradiometry and/or other techniques) or have been identified macroscopically by at least one member of the team. Thus, we can now calculate the percentages of jadeitite use for each of the types of Alpine axehead, and hence the intensity of use over time, since we have an idea of the chronological position of each type (Fig. 6). Because the relationship between the use of eclogite/omphacite/jadeitite in North Italy seems to differ from that seen in the rest of western Europe (e.g. D’Amico et al. 2003), we have split our presentation into two columns in order to show this difference. The left hand column corresponds to 118 large axeheads in Italy, and the right hand column to 848 transalpine examples.
corresponding roughly to the rest of Europe between the Alps and the Atlantic.

The criteria used in the choice of raw material for the large axeheads allow us to demonstrate that there were indeed significant differences between North Italy and the rest of Europe. In Italy, large jadeitite axeheads are not common and show just a small increase over time, from around 15% to 21% (according to the JADE database). In contrast, on the other side of the Alps, jadeitite is abundant, and with some types of axehead (e.g. Tumiac and Altenstadt-Greenlaw) comprises as much as 96% of all specimens. Furthermore, there seems to be a chronological logic in the changing use of jadeitite over time. At the beginning of the 5th millennium only around 28% of axeheads are made of this material, whereas by around 4500 BC the total has risen to an average of 95%. By the beginning of the 4th millennium it had fallen, stabilising at around 50% of all axeheads. This trend, of an increasing then
decreasing use of jadeitite, can be interpreted in terms of a changing pattern of exploitation: from its initial use, it became the preferred rock type and was extracted until the sources became progressively exhausted. At the same time, it is likely that this rarest of materials was accorded an increasing social value, and was then subject to a kind of progressive disaffection as other types of socially valorised objects came to be used. The overall pattern of raw material use can be summarised, then, as follows:

- At the beginning of the 5th millennium, networks became established through which axeheads and other items circulated. These involved a wide range of rocks – we may think in terms of an exploratory phase of raw material use – with eclogites and omphacitites being the commonest rock types in use. These slightly laminar rocks are better suited to the manufacture of long narrow axeheads (like those of the hoard at La Bégude-de-Mazenc, Drôme, for example: Thirault 1999) or to ring-discs (Rossi et al. 2008) than is jadeitite;
- Around the middle of the 5th millennium: we see the apogee of the use of jadeitite, culminating in the ‘Carnac phenomenon’ of monumental tombs, standing stones and rituals around the Gulf of Morbihan;
- Subsequently, the relative depreciation and devaluation of jadeitite, and a renewed increase in diversity of raw materials used, in particular in the frequent use of serpentinites.

This gradual diminution in the use of jadeitite could illustrate an adaptation of the norms of exploiting the raw material sources, with the best rocks becoming increasingly hard to find. Furthermore, during the second half of the 5th millennium, the technique of sawing blocks using thin pieces of wood (with crushed quartz and water) began to develop; this technique allowed the optimum number of axeheads to be obtained from each block that was exploited (Pétrequin et al. 2002; Crousch 2005).

The introduction of typology and chronology into our line of reasoning has therefore allowed us to explore in detail the question of the relationship between dark- and light-coloured Alpine rocks. This has highlighted the dynamic nature of raw material selection at the high-altitude extraction sites and in the villages in the valleys where large axeheads were produced.

Three different axehead types

Three different episodes of Alpine axehead production can help to clarify matters. We shall compare, at the scale of western Europe, the distribution of Bégude type axeheads, the oldest type according to our typo-chronology, made mostly of eclogite-omphacite-amphibolite, with that of axeheads of the family Altenstadt-Greenlaw (which are partly contemporary with the high point of axehead production and which are predominantly made of jadeitite), and finally that of Puy type axeheads (the most recent type, made from a variety of materials comprising eclogite, omphacite, jadeitite, serpentinite and amphibolite).

Bégude type polished axeheads

During the first half of the 5th millennium, Bégude type axeheads, which are in fact long adze-heads which would have been hafted in an elbow-shaped haft, have a distribution that is what one would expect to see for workaday tools that are more or less heavy-duty (Fig. 7), namely:

- Two very important concentrations of roughouts, coinciding with Mont Viso and, to a lesser extent, the Beigua massif; the latter supplying north Italy with products of mediocre quality;
- A large, even area of distribution, centred on the raw material sources, extending in all directions up to 250 km away; the valleys of the Saône and Rhône form the western limit and the Alpine arc and the Apennines form the northern and southern limits;
- Two very important hoards comprise ten axeheads (at the eponymous site of Bégude-de-Mazenc, Drôme, France) and seven at Villach/Kanzianiberg (Austria), which lie at the western and eastern confines respectively of the distribution pattern for users of Bégude-type axeheads. The location of these hoards encourages us to interpret them as having had some particular social significance;
- Beyond 250 km from the source area there are a few isolated examples (sometimes associated with ring-discs of jadeitite or serpentinite). These attest to transfers via the north and the south of the Massif Central, as far as the Gulf of Morbihan, where they are found in the giant Carnac-type tombs, often in the form of long blades that have been thinned down by repolishing. Clearly they had obtained a different status, as socially-valorised objects: the polished tool had been turned into an ‘object-sign’;

Cartography by Jonathan Desmeules and Estelle Gauthier, using Programme JADE data collected by Pierre Pétrequin.
As for the very rare Bégude type axeheads found in Germany and Denmark, it may be that these were individual specimens that had been treasured over a very long time and deposited during the 4th millennium (Klassen et al. 2005).

The distribution of Bégude type axeheads, dating to the first half of the 5th millennium, conforms well with a pattern of distribution observed in a few cases in New Guinea, in particular the glaucophanite axeheads of the Wang-Kob-Me quarries (Pétrequin et al. 2002). Here there were one or two epicentres of production; an even distribution of products among the users of these workaday tools (the Wano and Moni linguistic group); and a few isolated outliers that signalled the existence of long-distance circulations, where the technical function of the tool was abandoned as the objects took on a purely social function. The examples found furthest away from the source were attributed to the world of status-marking, rituals and religion (among the Yali and Una groups).
Culturally, the producers of Bégude-type axeheads certainly belonged to the Square-Mouthed Pottery (V.B.Q.) Culture in Piemont and to Cardial tradition groups in the valleys of the Rhône and Saône. The intermediaries in the movements towards Brittany were the Villeneuve-Saint-Germain (V.S.G.) and the Cerny Cultures in the south of the Paris Basin, and the recipients in the Morbihan area on the south Brittany coast were the early Castellic Culture.

Finally, we should point out that the famous representation of the hafted axehead on the stele that was subsequently re-used as the capstone of the Table des Marchands at Locmariaquer (Morbihan) shows in fact two stages of carving: the earliest is an axehead of Bégude type, which was then refigured in order to portray a large axehead of Altenstadt-Greenlaw type (Cassen forthcoming).

Altenstadt-Greenlaw and Chenoise type polished axeheads
Just as the Table des Marchands carving showed that the Altenstadt-Greenlaw axehead post-dated the Bégude type, our typological seriation of large Alpine axeheads (Fig. 5) has shown that the Altenstadt-Greenlaw and Chenoise types are indeed later than the Bégude type – at least in the Morbihan.

Let us remember first of all that these two typologically close groups had been the subject of long-distance transfers and had reached the Carnac-type tombs from the middle of the 5th millennium. In these tombs, they often take the form Tumiac-type axeheads, which are Alpine examples that had been thinned down and had their shape modified by repolishing in the Morbihan; their blades are expanded. The ongoing spectroradiometric analyses of Michel Errera have shown that for all these types of axehead, the known sources of jadeitite (and probably also some other Alpine sources that have not yet been located) were used. The variants of this rock from Mont Viso include jadeitite with lawsonite crystals, jadeitite with zircons and jadeitite with garnets ‘floating’ in atolls; those from the Beigua massif include jadeitite-quartz and glaucophane jadeitite. In total, Alpine jadeitite was used for over 90% of all the axeheads of these types that we have studied (Fig. 6). This implies that, in contrast to the earlier raw material choices taken by the makers of Bégude-type axeheads, there had been an intensive selection of potentially usable Alpine rocks in order to obtain the beautiful light-green translucent jadeitites. It remains to be discovered how this selection was effected:

at or close to the sources, or in the course of their transfer towards the north and west?

The distribution (Fig. 8) is radically different from that of Bégude-type axeheads and is full of surprises. Some characteristic traits are as follows:

[*] Axeheads of Altenstadt-Greenlaw and Chenoise type, corresponding to the apogee of the long-distance circulation of Alpine axeheads, have been found as far away as northern Scotland, some 1700 km away as the crow flies from the Beigua massif;
[*] The diffusion took place solely in a northern direction (to Germany), a north-westerly direction (to the Paris Basin, Great Britain and Ireland) and a westerly direction (to the Morbihan);
[*] No roughout of Altenstadt-Greenlaw type is known among the thousands of broken roughouts found in the Alpine extraction areas of Mont Viso. Indeed, the only roughout for this kind of axehead is the partly-sawn block that was found, at Lugrin (Haute-Savoie), ritually deposited at the foot of a large erratic block (Pétrequin et al. 2008);
[*] This type of axehead is practically absent from North Italy and rare in its initial area of diffusion to the north-west of the Alps, which extends up to 500 km (on average) from the jadeitite sources;
[*] Most axeheads in the Altenstadt-Greenlaw corpus have been found, either as individual finds or in hoards, at distances between 500 and 1700 km as the crow flies from the source areas.

To summarise: axeheads of Altenstadt-Greenlaw and Chenoise type are essentially made of Alpine jadeitite (from Viso and Beigua, these source areas being separated from each other by 100 km). No roughout has been found in the high Alps – not even at Alba, a very important working site at mid-distance between Viso and Beigua. These types of axehead are rare up to at least 500 km from the quarries; in contrast, these remarkable objects were accumulated in considerable numbers beyond this limit of 500 km and up to the Atlantic margins of Europe. This distribution pattern is wholly atypical of the Neolithic – the only phenomenon that approaches it is the accumulation of copper objects in Denmark, the copper coming from Austria (Klassen 2000; Klassen et al. forthcoming a) – and which bears no resemblance to a classic ‘down the line’ circulation (Clarke 1968; Renfrew 1975).

The hypothesis that seems to us to fit the
evidence best (but which might not necessarily be correct, after all) is based on the following observations:

* There was no production of roughouts specifically for axeheads of Altenstadt-Greenlaw and Chenoise type;
* Since we can be certain that these axehead types are definitely made from jadeitite from Viso or Beigua (among other possible sources), these axeheads must have resulted from the transformation of roughouts that had been created in the high Alps but which have been described, in our typology, as being of neighbouring types;
* The only known roughout, from Lugrin, is a block of Viso jadeitite that has been partly sawn in half to produce, on one side, an axehead of Altenstadt-Greenlaw type and on the other, a Durrington-type axehead. This fact allows us to recognise that these two types are linked not only chronologically but also from a typological and technical point of view;
* Therefore, Altenstadt-Greenlaw and Durrington belong to the same typological and technical family. This has been confirmed by the co-occurrence of the two types in the hoards at Büßleben (Thuringia, Germany) and Glenluce (Scotland), for example; similarly there are numerous isolated finds of Altenstadt-type axeheads that still show the ancient section of the Durrington type, as in the polished axehead of Römhild (Thuringia);
* Returning to the exploitation areas in the Alps, roughouts for Durrington type axeheads, obtained from blocks by fire-setting, are very numerous. Most are of eclogite-omphacite; jadeitite examples are in the minority.
Taking these observations into account, we propose that there was an initial selection of some roughouts and axeheads of Durrington type (which had been produced at the source areas and shaped in the nearby valleys, as at Alba: Traverso 1898, 1901, 1909) by people living in the axehead-producing villages of Piedmont. This was undertaken in order to send selected examples across to the other side of the Alps, to communities who would use them both as tools and as status symbols. (By contrast, the Square-Mouthed Pottery Culture communities seem scarcely to have used axeheads as markers of status; there, short axeheads predominate, even in graves: Bernabo Brea et al. 2006.) A second process of selection took place at a distance of over 500 km from the source areas; this time, the particularly large and thin jadeitite specimens were singled out. A simple repolishing of the blade, in order to make it straighter, to conform with the criteria of northern axeheads (Pétrequin et al. 1998), would have produced an axehead of Altenstadt-Greenlaw type. In a similar manner, the Chenoise type would have been the product of a reshaping of axeheads of Puymirol type, for example. (For all these types, see Fig. 6.) This would account for the gap in the distribution of Altenstadt-Greenlaw and Chenoise type in the area between the Alpine sources and the line at 500 km to the north-west of the Alps.

This hypothesis gains support if one compares it with the situation in the Gulf of Morbihan, where a good number of Alpine axeheads, particularly in jadeitite, were thinned down and reshaped, ending up with an expanded blade and, often, with a perforation (Fig. 1). This reworking was done in order to create an original, local type, the Tumiac type. This process of transforming an Alpine axehead into a ‘Carnac-type’ axehead would seem to have been demonstrated perfectly clearly (Pétrequin et al. 1998; Herbaut 2000). Furthermore, we can strongly suggest – from the predominance of light and translucent jadeite among Tumiac type axeheads – that these Carnac-type axeheads were made in the Morbihan by re-working Altenstadt-Greenlaw axeheads.

Thus, along the route of the long-distance transfers from the Alps to the north west, one can perceive a series of transformations of certain Alpine axeheads that were undertaken in order to respond to the desires of elites to create new forms that were original and difficult to imitate – in particular the Carnac-style axeheads with expanded blades.

A comparable ethnographic example in New Guinea may be cited: the quarries of green schists and amphibole schists at Wang-Kob-Me were exploited by the Wano who hardly ever used these rocks to make everyday tools. Instead, they sent thin tablet-shaped pieces and very long roughouts to the Dani, who live at a distance of over two weeks’ march from the quarries. The Dani then worked on the roughouts and polished them for a long time to create objects (ye-yaoo) to use in compensation payments. Further away still, the same large objects in this magnificent green stone figured among the sacred objects (ye-pibit) among the Yali and the Una (Pétrequin et al. 1993b, 2006d).

Polished axeheads of Puy type

With the Puy type of axehead, which made its appearance in Chasseen contexts at the end of the 5th millennium, it seems that Alpine axehead production was in progressive decline (Fig. 6), while the range of Alpine rocks used shows an increasing diversity (eclogite, omphacite, amphibolite, jadeitite, serpentinite, greenschists). The pattern taken by the long-distance movement of Puy-type axeheads – which includes examples found in Great Britain, which must date to the period when the flow of Puy axeheads was already retreating (Fig. 9) (Pétrequin et al. 2008b) – the opposition between the north (Altenstadt family) and the south (Bégude family) is at its strongest.

Since roughouts for Puy type axeheads are clearly present in the extraction areas of Viso and Beigua, the origin of their production (and their producers) seems to be a straightforward matter. Production probably included the movement of some raw blocks, in order to be sawn, to the region of Pinerolo (for which see, for example, the assemblage from Balm Chanto at Roretto: Nisbet et al. 1987) and also to Savoie (at Sollières-Sardières, Les Balmes, Thirault 2004). At a Europe-wide scale, the distribution of these axeheads has a distinctive character: there seem to be clusters of finds, fairly regularly spread along the axes of transfer (which passed along the south of the Massif Central, the Paris Basin and the Rhine Valley). The number of axeheads does not seem to diminish with distance from the source and one can suggest, without a great risk of being wrong, that these axeheads played an important social role even though they are less spectacular-looking than the axeheads of the second half of the 5th millennium (cf. Fig. 7).
Sacred axeheads

Let us return to our initial premises. There are two opposing hypotheses concerning the distribution of dark-coloured (eclogite, omphacite) and light-coloured (jadeitite) Alpine rocks in western Europe over the course of the 5th millennium and the beginning of the 4th. The first (of Pétrequin et al.) proposes a partial north-south opposition between these two families of Alpine rocks – one that corresponds, in all probability, to different historical trajectories (i.e. population and cultures of the Danubian tradition in the north, and of the Mediterranean tradition in the south: see, in particular, Pétrequin, Cassen et al. 1998, 2002). The second hypothesis, belonging to D’Amico, Starnini et al., tends to deny this opposition and these historical trajectories. Instead it favours a process of progressive, down-the-line type selection of jadeitite axeheads, from the Alpine source areas to the most distant users, noting that their number increases with distance from the source areas. Thus, it is through ‘cultural
choice’ that the rocks that are the toughest, translucent and of pale green colour (jadeite) came to be selected in north-west Europe.

The results of Programme JADE can be used to test these two hypotheses. They show that there is some truth in both, but that neither is sufficient to account for the complexity of the dynamic of production, circulation and use of the large Alpine axeheads, or of the social processes that underlie this complexity. The general south-north opposition between dark-coloured and light-coloured axeheads has been confirmed; it is likely that this relates to different historical trajectories, linked to the establishment of Neolithic currents of movement at the end of the 6th millennium. But this opposition is equally chronological in nature, with the high point in the use of jadeite falling around the middle of the 5th millennium in Brittany and the Paris Basin (before passing on to Great Britain, Ireland and Germany), at a time when highly stratified societies had emerged. In particular, around the Gulf of Morbihan, certain individuals would have held exclusive control over religion and rituals; Alpine jade axeheads would have occupied an important place in this system of belief and practice, among other signs of power (Pétrequin et al. 2009).

Thus, it is due to their ‘consecration’ into the world of power, of the sacred and of supernatural forces that the polished axeheads, mostly of jade, achieved such a far-flung distribution, reaching 1700 km as the crow flies from their area of origin and crossing different languages and cultures on their way. (For the fullest development of this concept, see Pétrequin et al. 2009.) This suggests a certain sharing of ideas and of social functioning in the Morbihan, in the Paris Basin, in Great Britain and Ireland and in Germany.

The point at which the selection of axeheads – and in particular, the preferential selection of those of jadeite – was made in order to fulfil a social (religious) need came at 500 kilometres’ distance from the source areas. It is for these social reasons that axeheads of Durrington type (essentially of light-coloured jadeite) were chosen beyond this 500 km point, in order to modify their form (into the Altenstadt type). Yet further away, at 1000 km from the Alps, these axeheads which no longer bore any resemblance to their North Italian ‘ancestors’ were once more transformed, in both shape and thickness, in order to create the famous, and in several cases exquisite, Carnac-type axeheads (in particular the Tumiac type).

But the story does not end there. The Gulf of Morbihan region had been the epicentre, around the middle of the 5th millennium, of a new system and new vocabulary of belief, expressed in terms of stones set up to point towards the heavens, of alignments of menhirs, of stelae, carved images (Shee Twhog 1981; Le Roux 1985; Cassen 2000, 2007), gigantic tumuli and sacred objects such as the Alpine axeheads. Over the course of the second half of the 5th millennium, the influence of the Morbihan rituals began to be felt elsewhere, in the interior of Continental Europe (Cassen 2000; Pétrequin et al. 2006a; Klassen et al. forthcoming a,b) and in north-west Spain and Portugal. The Carnac-type axeheads found here and there in western Europe allow us to follow the expansion of this ‘reflux movement’ (choc en retour) as far as Germany, Switzerland and even as far as southern Italy (Zimmermann 2004) and Croatia (Petric 1995). These Alpine axeheads, which became Breton axeheads in the Gulf of Morbihan, have specific characteristics such as expanded blades or perforations close to the butt.

Along the length of this ‘inverse trajectory’ towards Germany and the Alps, these sacred objects were imitated in local materials (Fig. 10): flint in the case of the area around Paris (as shown in an example from Paris) and in the Sénonais (Fontaine-la-Gaillarde), linked to the extensive exploitation of mined flint; flint once more in north-east Switzerland, in Alsace and in the Pays de Bade, with Type Glis (Lausanne) (Speck 1988; Pétrequin et al. 1995); alpine serpentinite and nephrite in Switzerland and in south-west Germany for the axeheads of Type Zug, with their perforated butt (Uerschauen) (Pétrequin et al. 2006a). Furthermore, elsewhere in Europe there were also copies in fibrolite in Spain and Portugal, of Type Cangas, once more with a perforated butt (Fabregas Valcarce et al. 1982; Cassen 2000).

Finally, there is another story that could be told about the Neolithic societies in western Europe during the 5th and 4th millennia, which concerns the use of particularly rare ‘objects’ whose significance has not been given its due importance here. The tools and the hypotheses developed by Programme JADE have, however, allowed us to create solid keys that can be used to unlock further secrets regarding these axeheads of alpine jades and their late imitations. They also permit us to pass beyond the traditional kind of reasoning that focuses solely on petrography and mineralogy, and to integrate the results into the world of social sciences and into issues relating to the functioning of societies.
Imitations of Alpine axeheads made in local rock types. From the end of the 5th millennium, as the production of Alpine axeheads and the selection of jadeite at high-altitude source areas was on the wane, there appeared imitations in local rocks.

These copies in flint (Paris, Fontaine-la-Gaillarde, Lausanne) or in serpentinite (Uerschauen) were, above all, copies of Carnac type axeheads – that is to say, axeheads that had been repolished in and around the Gulf of Morbihan and re-injected into the transfer of axeheads back towards the Alps and towards Germany.

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Bibliography


Compagnoni, R., Ricq-de Bouard, M., Giustetto, R. & Colombo, F. 1995. Eclogite and Na-pyroxenite stone axes of southwestern Europe: a preliminary


D'Amico, C., Starnini, E., Gasparotto, G. & Ghedini, M. 2003. HP meta-ophiolites (eclogites, jades and others) in neolithic polished stone in Italy and Europe Periodico di Mineralogia, 73, 17–42.


