The politics of supply: the Neolithic axe industry in Alpine Europe

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By examining their rock sources and mode of manufacture, the author offers a new interpretation for the Neolithic polished axe blades found in the western Alpine region. The dominant examples were made from rock extracted on the Italian side of the Alps (eclogitic) and finished in workshops on the French side. These first appeared as large blades with symbolic status, as part of the Neolithic expansion in North Italy. By the middle Neolithic the blades were reduced in size, but enjoying their widest distribution, creating a cultural zone on the left bank of the Rhône, more than 200 km from their source. In the late Neolithic, although the zone of influence was still large, the eclogites in the Rhône Valley were giving way to more local rock sources and copper. The fluctuations in this supply are interpreted as reflecting the varied political relations of Alpine communities.

Keywords: Neolithic, Western Alps, axe blades, eclogite

Introduction

The circulation of certain high status artefacts as a reflection of organised production and supply is an important aspect of the Neolithic period (Binder & Perlès 1990). A good example of such an artefact is offered by the polished stone blades serving as axe heads or adzes which are found throughout the European Neolithic. Such artefacts are seen as having a high economic, social and symbolic value, as attested by their occurrence in contexts of discard as well as in ritual deposits (graves or hoards). Most studies of axe blades in Western Europe emphasise the petrographic characterisation of tools as a key to their provenance in particular rock sources (Ricq-de Bouard 1996; Le Roux 1999). However, the next agenda is to reveal the social consequences of these distributions (Pétrequin *et al.* 1997, 1998, 2002; Pétrequin & Pétrequin 1993). To understand the connections between the sources, mode of manufacture and geographical distribution of the polished blades, on the one hand, and the functioning of the societies which used them, on the other, it is essential to try and integrate every available fragment of archaeological information (Bradley & Edmonds 1993; Jeudy *et al.* 1995; Pétrequin & Jeunesse 1995).

In the Western Alps, three variables characterise the system represented by the axe blades: the provenance of rock extracted, the mode of manufacture and the find spots of raw materials and finished products. The dominant rock sources are the *eclogites* of the Italian

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Alps, and important patterns are provided by both the location of workshops and the eventual destination of their products. On the basis of a study of more than 2000 polished blades (Thirault *et al.* 1999; Thirault 2001a, b), I offer here a summary review and a provisional interpretation of the supply system which seems to be emerging over the Neolithic period, particularly as it relates to the area of the Rhône–Saône rivers.

Distribution of axe blades made in different fabrics

Alpine metamorphic rocks which outcrop in the Western Alps and the Apennines constitute a substantial source of resilient rock which was widely exploited during the Neolithic period (Compagnoni *et al.* 1995; Ricq-de Bouard 1996; D'Amico *et al.* 1995, 1998; D'Amico 2000). The metamorphic metabasites, especially eclogites, jadeitites and glaucophanites, have a shock-resistant character particularly useful in an axe. *Eclogites* outcrop in the Alps massif and valleys, on the Alpine Piemontese slope, in the Swiss Valais and in the Ligurian-Piemontese Apennines (Voltri group). Glacial and alluvial transports also formed substantial secondary deposits in Liguria, Piemonte, in the Val d'Aosta and in the upper Rhône valley above Lake Léman (Ricq-de Bouard 1996). In subsequent analyses I propose to include axe blades made of jadeite pyroxene (*jadeitites*), with the *eclogites* since there appears to be little difference between them from an archaeological point of view (Thirault *et al.* 1999).

Petrographic and mineralogical analysis of axe blades found in and around the Western Alps demonstrates that the area of use of eclogites extended far beyond the outcrops (see Figure 1; the production areas (i.e. extraction areas) are marked in black in Figure 2, and the area of natural outcrops (following Deville *et al.* 1992) is marked by hatching in Figure 3). Within a radius of 200km from the alpine eclogite outcrops, this family of rocks is used in a ratio which is never less than 50 per cent, and often exceeds 75 per cent (Figure 1; Ricq-de Bouard 1996; Compagnoni *et al.* 1995; Thirault *et al.* 1999; D'Amico 2000). In the extraction areas, the ratio sometimes reaches 100 per cent.

Other kinds of rock exploited in the axe industry have distributions which are peripheral to that of the eclogites (Figures 1 and 2). In Western Provence, tool production from pebbles in metabasites belonging to the blue-schist facies (*glaucophanite*) has been noted by Ricq-de Bouard (1996). In Haute-Savoie, ultrabasites (serpentinites and chloritites) and metabasite rocks of a non-alpine facies (epi- and mesozonal facies) are used, with a ratio that can exceed 50 per cent on Lake Léman's southern shores, always in areas where outcrops are located (Thirault *et al.* 1999). In Valais, a rock (unidentified to date) which we name '*valesian rock*' is frequent in central Valais sites (more than 50 per cent), and is also present in the upper and lower Valais sites. This rock probably originates in the metamorphic series of the Valais, since its use is not attested outside of this area. In the inner Alps, especially the Balm'Chanto site in Roreto, *serpentinites* have a limited area of distribution (Nisbet & Biagi 1987).

Further afield, other zones of supply have been noted, featuring rocks deriving from the Massif Central: amphibolites and basalts in the Ardèche basin (Ricq-de Bouard *et al.* 1998), fibrolites from the upper valleys of the Loire and the Allier (Masson 1977), meta-andesites from Forez (Masson 1977), amphibolites (actinolites) from southeastern Burgundy (Ricq-de Bouard & Antipolis 1996). Strongly marked distributions in other fabrics only exist at distances of more than 200 km away from the eclogite outcrop: for example, in the Vosges,

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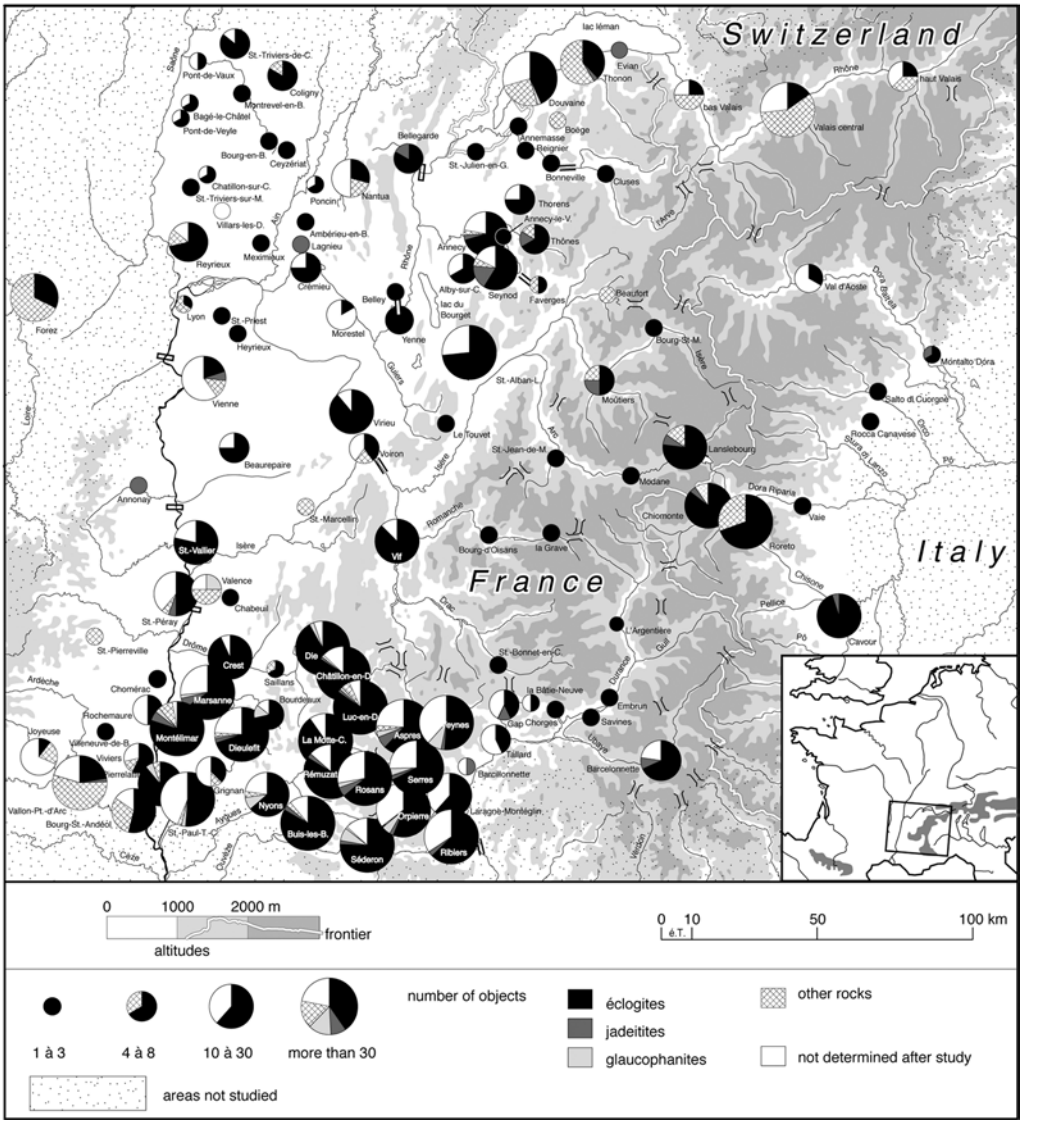

Figure 1. Spatial distribution of axe blades using Alpine rock sources, showing relative numbers of examples using different fabrics.

especially with the pelites of Plancher-les-Mines (Pétrequin & Jeunesse 1995; Jeudy *et al.* 1995; K in Figure 2) and in Rouergue, with the Requista cinerites (Servelle & Vaquer 2000; J in Figure 2). By the same token, each of the non-alpine fabrics is only represented by a few examples in the Rhône basin and scarcely at all beyond it.

The indications are that eclogite axe blades, at least on the western slopes of the Alps, marked out a zone within which few other distributed fabrics found a place, and the general direction of supply was transalpine, from east to west (Figures 2 and 3).

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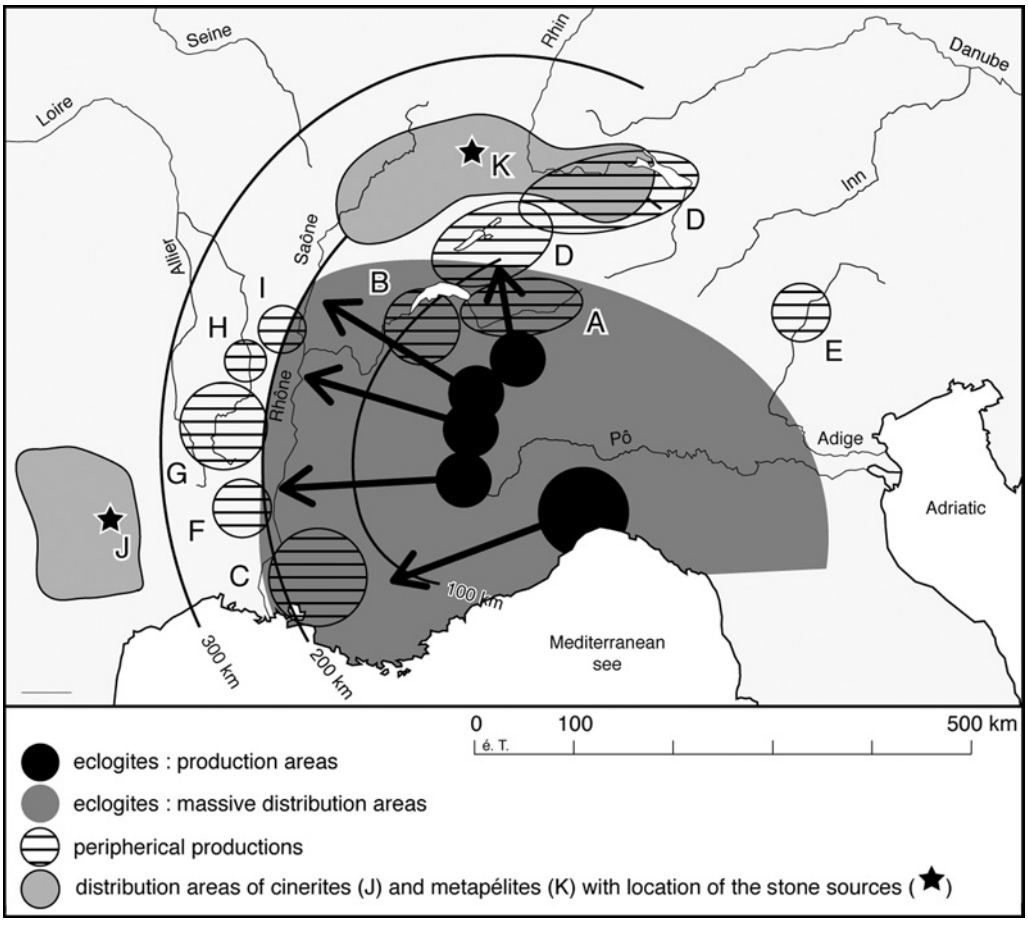

Figure 2. Schematic distribution of axe blades, showing the zones dominated by particular fabrics. Black and grey areas: eclogite. A. "valesian rocks". B. Morainic rocks used in the Léman basin. C. Glaucophanites (pebbles of the Durance). D. Serpentinites and other morainic rocks. E. Serpentinites. F. Several rocks of the Ardèche basin (amphibolites, basalts, etc.). G. Fibrolites. H. Meta-andesites. I. Amphibolites (actinolites). J. Cinerites (Requista quarries). K. Pelites (Plancher-les-Mines quarries).

Systems of supply

The overall system of supply is on a grand scale. The analysis examined the quantities of artefacts relating to different stages of manufacture: rough-outs, flakes from knapping and tools used for shaping whetstones, pecking stones, hammerstones at each of the different sites. This showed that, while some fabrics were extracted and used locally, others were carried as raw material or rough-outs, and as finished products (Figure 3).

Three kinds of working site can be defined for axe-blade production from eclogite, together implying an extended operation with a lengthy line of supply. On the outcrops themselves, sites of extraction and of rough-hewing remain unknown but the setting of some working sites in valleys close to outcrops suggests that materials were taken from near at hand. In the Piemontese Alps, eclogite was worked at a number of places not on an outcrop

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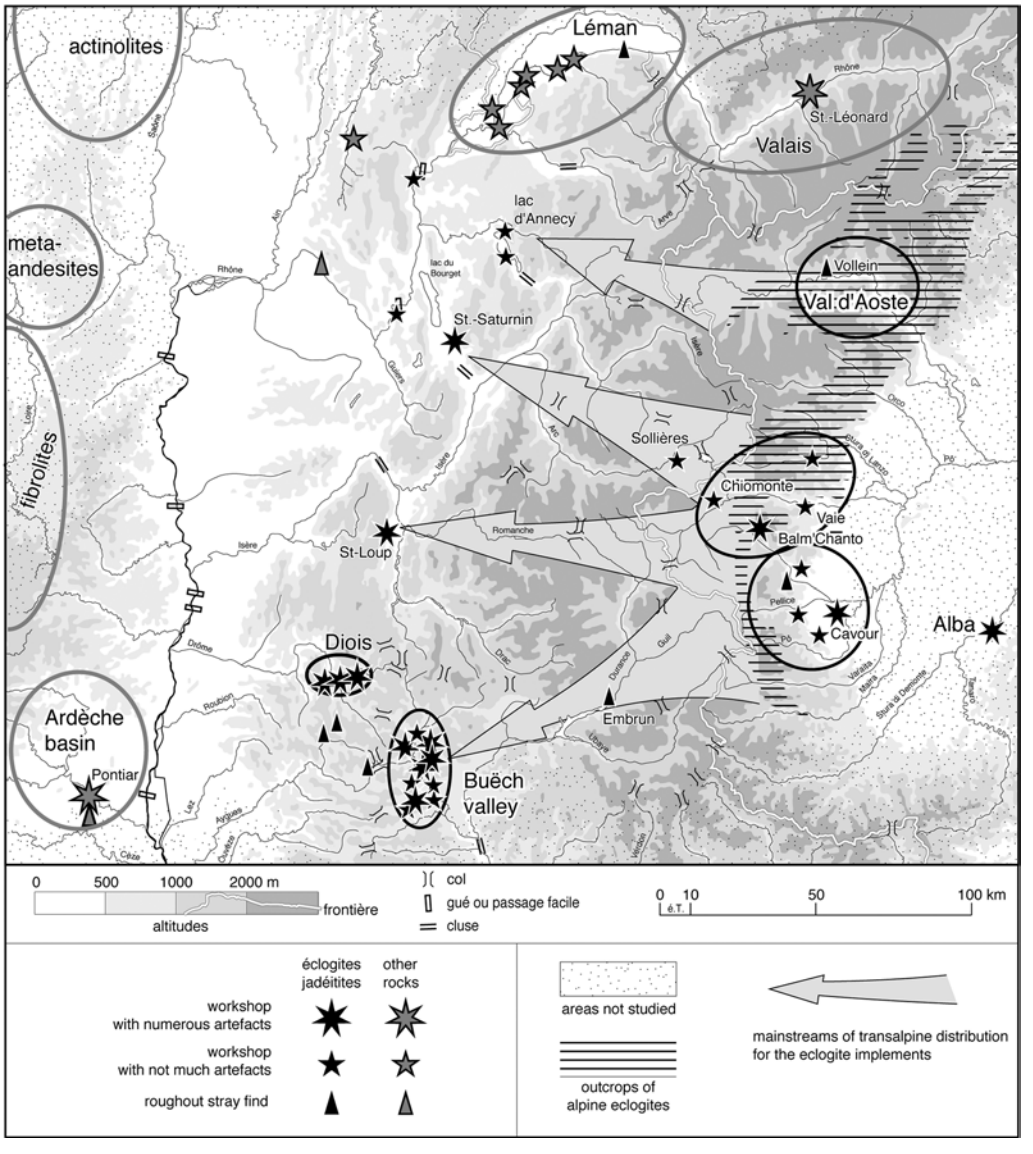

Figure 3. Supply structures: relationships between extraction sites and workshops for eclogites and other fabrics. Spatial structuration of the axe-blade productions in the Western Alps and the Rhône basin. Possible outcrops of eclogite reported from Deville et al. (1992).

but not more than 30km away from it. These were situated in valley mouths (Rocca di Cavour: Zamagni 1996a), in valleys (the Rumiano shelter in Vaie: Bagolini & Biagi 1977; Bertone & Fozzati 1998; La Maddalena in Chiomonte: Delcaro 2002) or on the slopes (Balm'Chanto in Roreto: Nisbet & Biagi 1987). In the French Alps, documentation is still partial, but the scarce discoveries show that rough-outs in eclogite were circulating across the mountains. In Haute-Maurienne, the site of Les Balmes in Sollières revealed a small

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assemblage of unfinished polished blades, rough-outs and pecking stones, most of which were in eclogite.

Further west, there is a ring of sites located from 100 to 140km away from the Piemontese outcrops. Moving from south to north in Figure 3, we have identified important groups in the Buëch basin, a tributary of the Durance, in the Diois at the confluence between the Drôme and the Bez above Die (Beeching & Brochier 1994); these include the outstanding sites at Les Terres Blanches in Menglon (Müller 1930) and Les Clapiers and Vallieu on the commune of Recoubeau. To the north are the sites of Saint-Loup in Vif (Bocquet 1969; Beeching 1999) and Saint-Saturnin in Saint-Alban-Leysse (Rey 1999). Many of these sites are perched in high places, overlooking river confluences or plains. Each of them is documented by excavation or surface collections and the assemblages feature pecking and polishing on rough-outs in alpine eclogites. The presence of small pecking stones which reuse broken rough-outs is a constant trait which has its equivalent on sites located around the Apennines (*Brignano Frascata*: D'Amico & Starnini 1996; Zamagni 1996b, *Alba*: Venturino Gambari & Zamagni 1996, *Gaione*: Bernabò Brea *et al.* 1996, *Arene Candide*: Starnini & Voytek 1997).

The way that production sites relate to the sources is thus not linear and does not show a regular fall-off with distance. Piemontese sites attest production close to extraction, which is not surprising. But the sites on the French side show that rough-outs may be distributed over great distances before being finished. The location of production sites and their dominant positions in the landscape indicate a wish to control routes which cross the foothills of the Alps and pass over cols, and thus presumably control also the movement of rough-outs carried along them over some 150km of mountainous terrain.

By contrast, the spatial organisation of the peripheral alpine production in other fabrics seems to be relatively local. For the glaucophanites, production sites are identified in the lower valley of the Durance – for example La Fare in Forcalquier, Les Lauzières in Lourmarin and near Manosque (Lazard 1993 and personal communication). On Lake Léman, half of the documented littoral sites produced axe-blade rough-outs in different kinds of local metabasites and ultrabasites. The 'valesian' rocks also have an area of use centred around their source in the Grand Pré in Saint-Leonard. These local industries thus belong to a different kind of supply system to that of the eclogites.

Modes of production

These differences are accentuated by the modes of production. A number of working techniques may be recognised (knapping, sawing, pecking and polishing), and although later working can erase earlier, it is reasonable to use them to define five main types of product found on sites. These are described in Figure 4. The first three (A, B, C) are shaped over a long time; the pecking and polishing techniques either complement one another or are mutually exclusive in order to obtain tools which can be very sophisticated. The A type corresponds with a typical picture of polished blades shaped by a long pecking process that tends to give an oval section and a triangular form. Four sub-types (A1-4) can be distinguished, which vary from no polishing (except on bevels) to an all-over polishing. The B type combines pecking on sides and polishing on faces. Shapes obtained are quite

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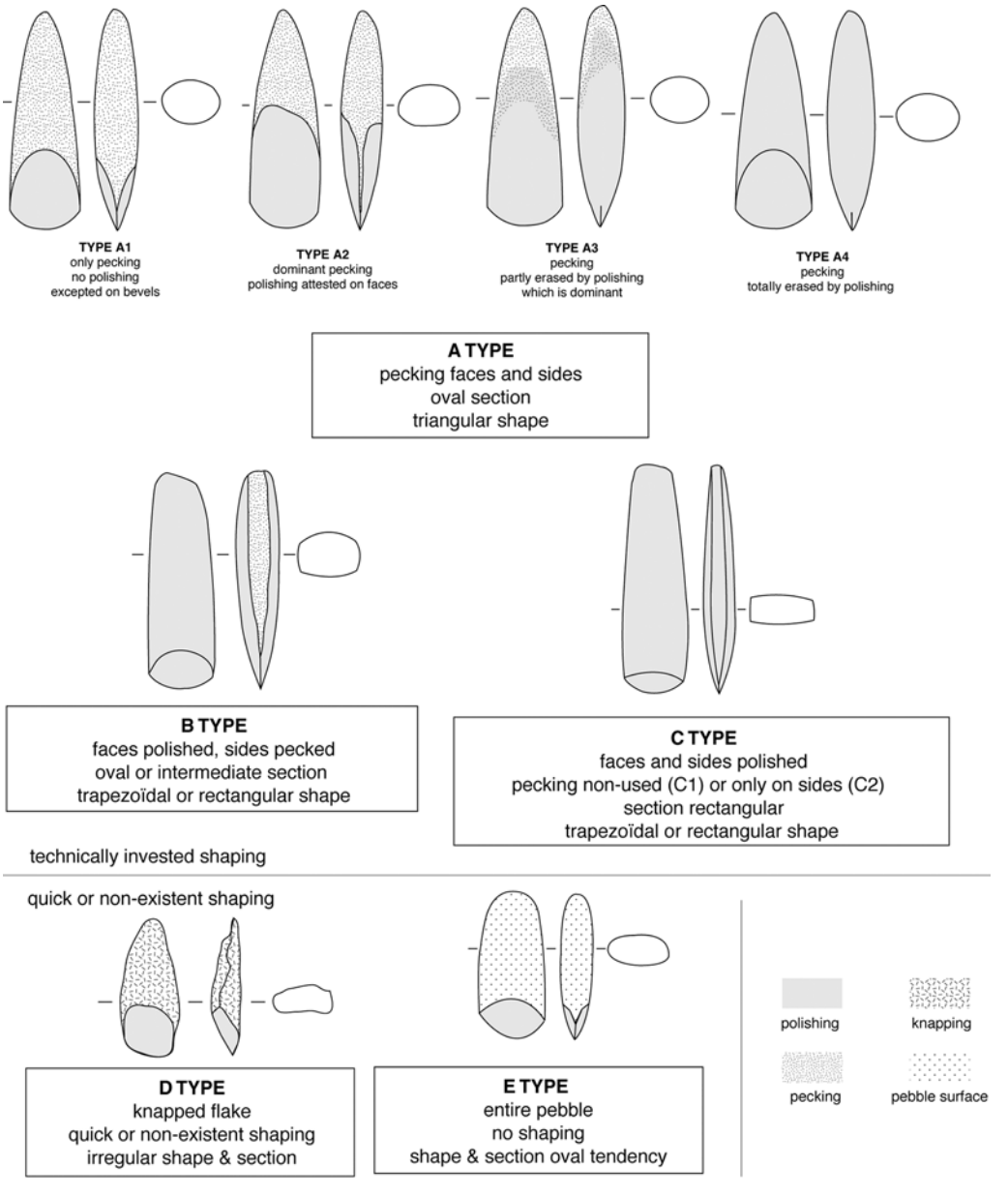

Figure 4. The five main form types of the alpine axe blades.

trapezoidal or rectangular, with sections almost oval that are sometimes a little rugged. The C type is shaped by polishing, used as a sole technique or combined with a marginal pecking on the sides. Sections are quadrangular; shapes have a trapezoidal or a rectangular face. The two last types, which are unusual, are the result of an almost non-existent shaping, except on bevels. Because of this, the blank determines the object shape. The D type includes knapped

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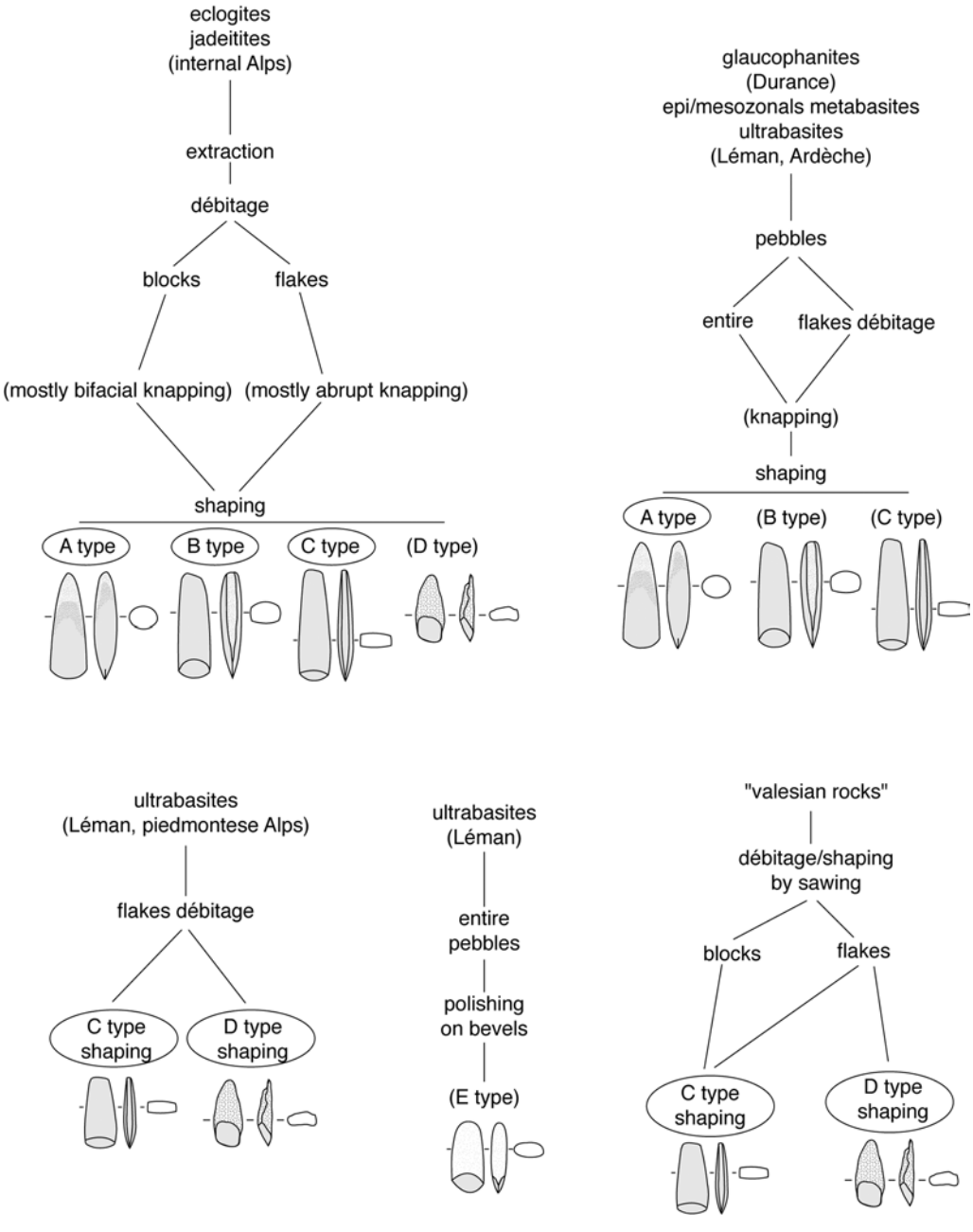

Figure 5. Five types of manufacturing process preferred for different rock types. Ringed types: most common types; types between brackets: rare types.

and irregular flakes shaped by a slight bevelling on sharp. The E type, anecdotal, gathers entire pebbles, not knapped and slightly bevelled.

The correlation between these formal types and the rock they are made from allows us to define four main processes for manufacturing alpine polished blades (Figure 5). The most

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complex manufacturing process is the one used for alpine eclogites. It begins with extraction, then a rough knapping which produces rough-outs in the form of large detached flakes, with lower and upper faces more or less even, flat and parallel or bulkier blocks. Pebbles or pebble flakes are rare for eclogite. Blocks are then knapped by a bifacial and touching mode, whereas flakes are mostly shaped by an abrupt knapping and a little touching. Then the object is shaped according to the A, B and C types, sometimes the D type.

The schemes of manufacture used for other fabrics are technically less complex especially in acquisition and first-shaping stages. With regard to glaucophanites, epi/mesozonal metabasites and ultrabasites, blanks are always pebbles (when they can be identified). Whole ones are used entirely or in the shape of detached flakes. Then they are sometimes knapped before shaping, mainly in the case of the A type, rarely to the B and C types. Ultrabasites of Lake Léman and those used in the inner Alps (Balm'Chanto site) can also use detached flakes, which are then shaped according to the C and D types. On Lake Léman, ultrabasites are very occasionally used in the form of whole pebbles, slightly bevelled (E type). Lastly, 'valesian' rocks are produced according to a specific process, combining detaching with sawing which is often repeated, that produces blanks polished according to the C or D types.

There is some correlation between the production processes and the dimension of finished objects. Only eclogites can exceed 15-16cm in length, and they can sometimes be as long as 35cm. The length of the objects in glaucophanites, in other metabasites, in ultrabasites and in 'valesian' rocks never exceeds 15-16cm, with one exception. Moreover, most of them do not measure more than about 10cm in length.

Changes in the supply system through time

These observations all point up the contrast between the eclogitic and the other alpine industries. The eclogitic products are larger, more complex to manufacture, may be imported long distances as rough-outs before finishing and dominate over a large transalpine zone. The other industries are more local and have more modest outputs in size and quantity. This implies a general difference in the character of the supply systems represented. However, the pottery and other material found in association with the axe blades at the sites mentioned above suggest that this supply system was not static but was in a state of change. The last part of the investigation presented here concerns the changes in the system which may be observed from the early to the later Neolithic periods, and can be divided into three stages (Figures 6-8).

Stage 1: Up to the first part of the middle Neolithic (Néolithique moyen I/Neolitico medio) about 5800/5600 to 4500/4200 BC (calibrated)

The first evidence of transalpine relations appears during the later stages of *Cardial* and Ligurian *Impressa*, and the movement of the groups of *Vhò*, *Fiorano*, *Gaban* and *Alba* northwards into the Apennines (Biagi & Nisbet 1987). At this time, the first manufacturing sites of polished blades in eclogites appear on the north slopes of the Apennines, and probably in the alpine Piemontese lower valleys (Rumiano in Vaie, following the dating of Bagolini & Biagi 1977). Polished blades in eclogites appear at La Planta in Sion (Gallay *et al.* 1983), and long-distance relationships across the Alps are confirmed by the *Fiorano* type pots

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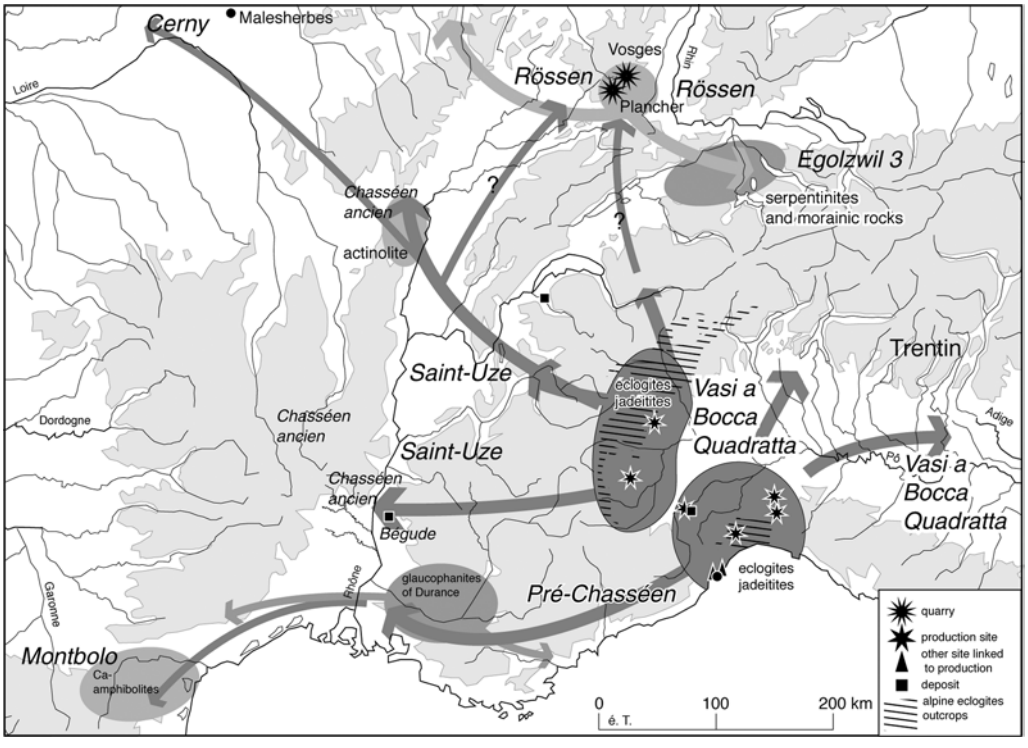

Figure 6. Supply models for axe blades in the Western Alps during the first part of the middle Neolithic (Stage 1).

found in the Isère valley and in Provence (Beeching 1999). I would also propose to date to this same stage (on the basis of the site of Vaie) some of the polished blades of great size in eclogite shaped according to the A type which are present in the Piemonte, in Valais and perhaps in the inner, French Alps. Entirely pecked, with an approximate regularity, sometimes showing an edge a little wide-mouthed, these great polished blades of Zermatt type, so named because of a valesian discovery at a high altitude (Sauter 1978), indicate an aim to produce the longest objects possible.

These trends increase during the first part of the middle Neolithic (*Néolithique moyen I/Neolitico Medio*). In the Rhône basin, this phase equates with the *Saint-Uze* style (Beeching *et al.* 1997), and also with the most ancient *Chassey* culture period (Beeching *et al.* 1997) and with the *Pré-Chassey* style in Provence (Courtin 1976). In Northern Italy, it can be linked to phases I and mainly II of the *Vasi a Bocca Quadrata Culture* (VBQ geometric-linear style, then meander style; Bagolini 1998). Human settlement in the Piemontese inner alpine valleys is now completely established and the site of Rocca di Cavour attests production of polished blades in eclogites coming from alpine outcrops (Zamagni 1996a). In the Rhône basin alpine eclogites coming from Piedmontese outcrops are found in Valais, in the middle valley of the Rhône and in the Southern foothills of the Alps, and a parallel can be made with the squared-mouth pots which are attested on numerous *Saint-Uze* sites or sites of the ancient *Chassey* style in the Rhône basin (Beeching 1999). The products include long blades entirely polished (Bégude type), with a very convex edge which show a more regular aspect than

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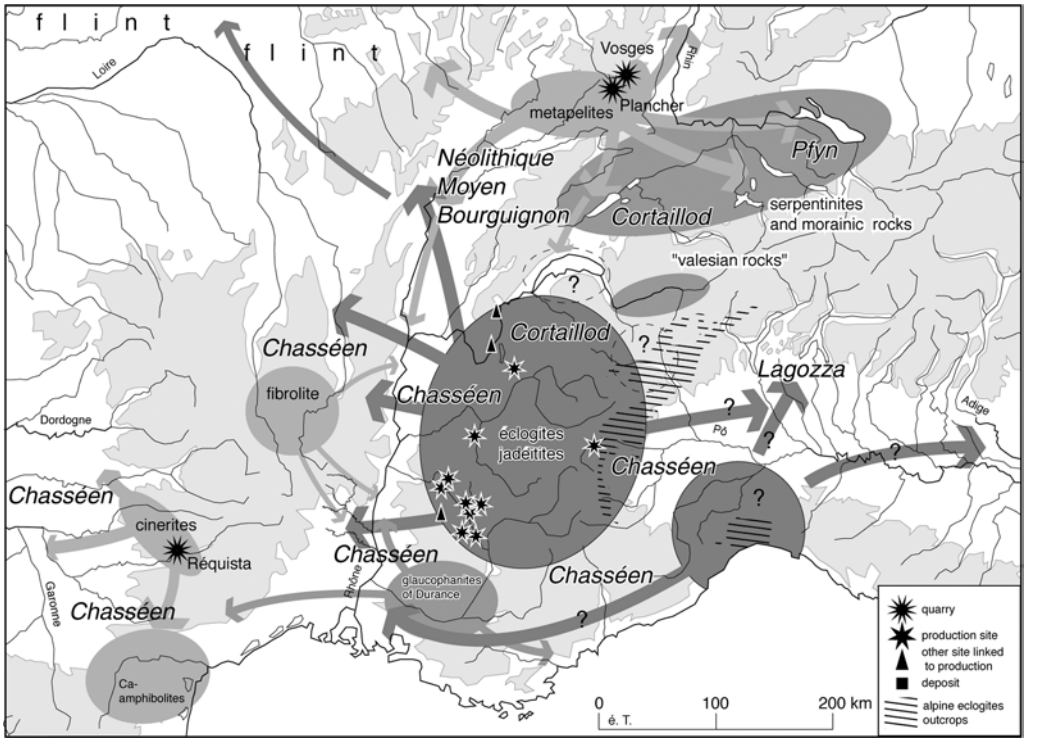

Figure 7. Supply models for axe blades in the Western Alps during the second part of the middle Neolithic (Stage 2).

the Zermatt type (Pétrequin *et al.* 1997, 1998; Cordier & Bocquet 1998; Thirault 1999, 2001a).

The Alpine networks of eclogite polished blades are by no means out of step with a general cultural evolution. In contrast, they echo the modes of neolithisation of the Po and of the Rhône basins so well that it is necessary to pose the question of the potential role of the blades in those processes. Contributions to this debate have already pointed out that some of the early polished blades are so long and large that they cannot easily serve as tools (Thirault 2001a). Such objects show clearly the know-how of makers who were able to control technical processes from the selection of material up to the very last shaping; but it is doubtful if their objectives were simply technical and economic, particularly as local industries were already functioning, in the Rhône valley, for example. This suggests a social dynamism using Alpine axe blades of enhanced value expanding from Piemontese starting points which are under the control of the VBQ culture. This phenomenon probably concerns a great part of Western Europe at that time (Giot 1965; Pétrequin *et al.* 1997, 1998, 2002).

Stage 2: The second part of the middle Neolithic. Néolithique moyen II/Neolitico Recente, around 4500/4200 to 3600/3300 BC

At this time the production and distribution of polished blades in eclogite were at their peak. The period corresponds to the recent phases of the *Chassey* culture in the Rhône

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basin (Beeching 1995), and immediately following in the Po basin (Bagolini & Barfield 1991) and in the Cortaillod culture of the Swiss Plateau, of Haute-Savoie and of Valais (Marguet 1995; Baudais *et al.* 1989-90). Production sites continue in the Piemontese alpine valleys (La Maddalena in Chiomonte), but new sites are settled westward in the Rhône basin. The number and density of settlements in open-area sites in the Buëch valley, Diois and to a minimal degree in Vif/Saint-Loup and Saint-Saturnin, show that a part of the polished blade production was in the foothills of the French Alps at a distance of more than 100 km from eclogite outcrops (Figure 3). This substantial extension of the production area is accompanied by transformations in products: the significant proportion of blanks of flake type, about 20 per cent, shows a probable restructuring of production first stages which could be interpreted as an intensification. At the same time, shaping modes evolved with the growing importance of the C and B types (40 per cent) compared with the A type, which had been predominant previously. This means an increase of polishing to the detriment of pecking, that is to say the choice of a slower but less risky technique for achieving a complete object. So the production of polished blades in eclogite seems to be modified in order to simplify the manufacturing process. During this phase, the distribution of polished blades made of alpine eclogite reached its maximum expansion in the Rhône basin, where they constitute a tool with no serious competitor (Thirault *et al.* 1999). Further afield, the few precise studies made underline that distributions are far from being insignificant, as in Eastern Languedoc and Eastern Burgundy (Ricq-de Bouard 1991, 1996). By contrast, in the Valais, eclogites are rare, while 'valesian' rocks are greatly in the majority (80 per cent) on sites of this period, especially in Saint-Léonard/Sur le Grand Pré where numerous rough-outs and waste flakes are evidence of manufacture on site. The valesian assemblage may be due to the recent character of the documented sites (Baudais *et al.* 1989-90). But if we keep in mind that 'valesian' rocks are mainly worked by sawing, a relation between the Cortaillod of the Swiss Plateau, where this technique is usual, can be proved (Buret 1983; Willms 1980). This fact may imply a dichotomy within the Western Alps between northern areas close to the cultural focus of Cortaillod and adjacent southern areas related to the Chassey culture.

Indeed, it seems to me that the key to the considerable extension of the distribution networks of alpine eclogite is in the structuring of cultural movements, established on each side of the Alps. The structural mobility of the *Chassey* culture societies (Beeching *et al.* 2000) and its deep effect on Northern Italy cultures (Bagolini & Barfield 1991) underline the active role played by populations who settled in the Alps and generated interaction. However, the documentation for the inner Alpine valleys is still poor.

Stage 3: Late Neolithic (Néolithique final/Eneolitico & Calcolitico), from 3600/3300 to 2300/2000 BC

In this period the area dominated by eclogite remains large, but the mode of supply and of production are both changing. The transport of rough-outs in the form of flakes is increasing and the importance of the B and C types (60 per cent of the eclogites) is enhanced, the latter fact being linked to a new polishing technique on lengthwise facets. Distributions are still substantial in the documented areas of the Rhône basin (Savoy and middle valley of

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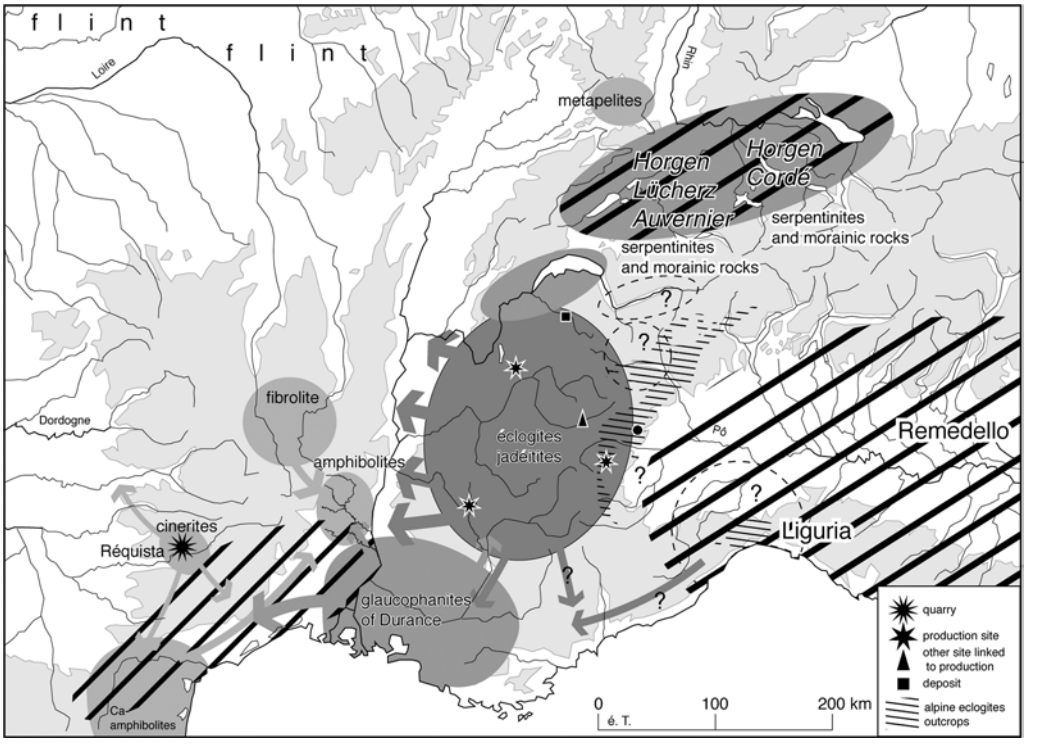

Figure 8. Supply models for axe blades in the Western Alps during the late Neolithic (Stage 3). Diagonal hatching: regions of copper axe head use.

the Rhône), but evidence for long-distance (targeted) distribution is less certain (Figure 8). This is paralleled with the growth of peripheral productions. Glaucophanites of the lower Durance, which were used during the middle Neolithic, are used again in the late Neolithic and are frequent in the Western Provence (Ricq-de Bouard 1996). Also, varied amphibolites present in the Ardèche basin are used only on the right bank of the Rhône. If a recession in the exchange of polished blades in Alpine eclogites appears clearly up the Rhône valley, the maintenance of important productions in the foothills of the Alps indicates that this kind of axe blade remains symbolically significant for the alpine societies. This fact is illustrated by the presence of axe blades of good size, which however do not exceed 22cm in length. As in the earlier phases of the Neolithic, they are found in isolated deposits in the higher Alps (e.g. rock shelter of Balme in Magland, Haute-Savoie).

In the Rhône basin, the decrease of interest in axe blades of Alpine eclogite may be due to the coming of competitive goods with higher exchange value (if not necessarily a greater technical efficiency). We think especially about the arrival of products in copper (including axe blades) as early as the end of the fourth millennium BC in Languedoc (Ambert 1991), in the Swiss Plateau (Strahm 1994) and in North Italian plains and Liguria (de Marinis 1992; Campana *et al.* 1998; diagonal hatching in Figure 8). By contrast, in the Western Alps the development of copper metallurgy is rather late, at the earliest in the second half of the third millennium BC, as far as we know (Saint-Véran mines: Barge 1997).

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Conclusion

This short and schematic outline of a new model for axe-blade production and distribution in the Western Alps serves to demonstrate an essential point: there is no long-term stability in the system of supply. We have discussed only the polished axes, but the same kind of demonstration can be given for haftings and for the use and representation of modes of tools (Winiger 1981, 1991; Voruz 1984, 1986, 1997; Suter 1993; Baudais & Delattre 1997; Thirault 2001a).

The quantity and quality of axe blades produced from eclogites in specific areas had no proportional link to their distance from the source of the raw material, as would be the case with a 'down-the-line' model. This suggests that the supply was targeted, and politically constructed. The initial expansion of this industry seems to have been part of the Neolithic acculturation of Northern Italy, and the material had a high symbolic status. By the middle Neolithic it was dominating a great area of the Alps (apart from Valais) and the Rhône Valley. In the later Neolithic period, although the Rhône Valley was losing its interest in the eclogite axe blades, the zone of influence may have been exercised in new status objects, for example in copper. If these patterns represent not only supply systems but changing political relationships between mountain communities, then this kind of analysis may have still more to offer.

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