Chapitre 27

Alpine axes and early metallurgy

Haches alpines et première métallurgie

Lutz Klassen, Serge Cassen and Pierre Pétrequin

Abstract :
At the same time as large axes made of Alpine jade (i.e. jadeitite, eclogite, omphacitite and other rock types) were circulating around much of western and central Europe, early metallurgy was undergoing a major development in south-east Europe. Heavy copper shafthole tools and abundant artefacts of gold played a significant role in the social and ritual life of the Chalcolithic populations there, just as the Alpine jade axes did at the opposite end of Europe. Even though the distribution areas of these two groups of artefacts are generally separated by a zone, several hundred kilometres wide, that is devoid of any finds of the categories in question, nevertheless various kinds of contact, both direct and indirect, between the two areas be can observed. This paper discusses these relations through an investigation of artefacts that were exchanged, in either direction, between the two groups. These may include a few copper and gold objects found in France as well as a comparatively large group of Alpine axes found in south-east Europe, especially Bulgaria. The paper also deals with imitations of Alpine jade axes in copper. These are extremely rare and are only known from Denmark and Italy. Direct imitations of early metal tools in Alpine rock are unknown, but several types of Alpine jade axes show clear typological influences from early metal artefacts. The same is true the other way around, as a comparatively large number of copper flat axes from central Germany, Bosnia-Herzegovina and Croatia and northern and central Italy are clearly inspired by the shape of Alpine jade axes, without being true imitations. In the final part of the paper these observations are interpreted in an attempt, on one hand, to describe the role of Alpine jade axes in the early history of metallurgy in Europe, and on the other, to understand the importance of early metallurgy in the European perception of jade.

Keywords : copper, gold, jade, early metallurgy, 5th millennium BC, objects of power.

Résumé :
Au moment où les grandes haches en roches alpines (c'est-à-dire des jadéitites, des éclogites, des omphacitites et d'autres types de roches encore) étaient en circulation dans une grande partie de l'Europe occidentale et centrale, la première métallurgie connaissait un développement majeur en l'Europe du Sud-Est. Là-bas, de lourds outils perforés en cuivre et de nombreux objets en or jouaient un rôle important dans la vie sociale et rituelle des populations du Chalcolithique, exactement comme les haches en jades alpins à l'autre extrémité de l'Europe. Bien que les aires de répartition de ces deux groupes d'objets soient en général séparées par une zone vide, large de plusieurs centaines de kilomètres, on observe pourtant différents types de contacts, directs ou indirects, entre ces deux zones de répartition. C'est de ces relations que nous discuterons, en étudiant les artefacts qui ont pu être échangés entre les deux groupes, dans l'une et l'autre direction. Ces relations pourraient inclure de rares objets en cuivre ou en or trouvés en France, tout aussi bien qu'un nombre relativement important de haches alpines découvertes en Europe sud-orientale, en particulier en Bulgarie. Cet article traite également de haches en cuivre imitant les haches en jades alpins. Ce type d'imitation est très rare et n'est connu qu'au Danemark et en Italie. A l'opposé, on ne connaît pas, en roches alpines, de strictes imitations de haches en cuivre ; mais plusieurs types de haches en jades alpins montrent d'évidentes influences typologiques en rapport avec les premiers objets en métal. Le phénomène se vérifie également en sens inverse, car un nombre assez important de haches plates en cuivre (trouvées en Allemagne centrale, au nord-ouest de l'ancienne Yougoslavie, en Italie septentrionale et centrale) s'inspirent clairement de la forme des haches en jades alpins, sans être pour autant des copies à l'identique. A la fin de notre article, nous tenterons de synthétiser ces observations, d'une part en décrivant le rôle des haches en jades alpins dans l'histoire de la première métallurgie en Europe, d'autre part en cherchant à comprendre l'importance de la métallurgie précoce dans la perception des jades en Europe.

(traduction : Pierre Pétrequin)

Mots clés : *cuivre, or, métallurgie précoce, Ve millénaire av. J.-C., objets de pouvoir.*

In their 2002 paper, Pétrequin, Cassen *et al.* (2002 : 88ff. ; see also Pétrequin and Jeunesse 1995 : 120) concluded that the circulation of large Alpine jade axes (the term 'jade' being used to encompass jadeitite, eclogite, omphacitite and other Alpine rock types) around large parts of western and central Europe, and the circulation of heavy copper tools in south-east Europe, reflect two independent systems in which social inequalities were represented. This fundamental observation, which demonstrates why we need to revise our concept of a Copper Age with a single, south-east European epicentre of social evolution, can be illustrated by a distribution map of the objects in question -namely, on the one side, large Alpine jade axes over 13.5 cm long, and on the other, heavy copper tools, along with 5th and early 4th millennium gold finds (fig. 1). As regards the copper tools, the representation has been restricted to types with shaftholes (axe-adzes and axe-hammers). From a chronological point of view, the western part of the map spans approximately a millennium between 4800 and 3800 BC, with a few large

Alpine jade axes in northern Italy being up to *c* 400 years older and a few others (mainly in Germany and Denmark) circulating for up to 500 years longer. The depicted copper and gold artefacts date to between *c* 4700 and *c* 3800 BC and are therefore generally contemporary with the Alpine jade axes.

This chapter sets out to explore the relationship between the production and circulation of Alpine axes, on the one hand, and of early metal objects on the other. Several parts of this contribution offer a synthesis of the large amount of information currently available, and for further background information on specific topics the reader is directed to various publications by Pétrequin *et al.*, namely : i) Pétrequin, Cassen *et al*. this book, on the chronology and distribution of the different types of Alpine axe, p. 574 ; ii) Pétrequin; Cassen *et al*. this book, on Alpine axes in Bulgaria, p. 1231 ; and iii) Pétrequin, Cassen *et al*. this book, on the general theoretical concepts employed in understanding the phenomenon of Alpine axe production and distribution, p. 1354

• 1. Early metallurgy and its relation to Alpine jade axes

Three different kinds of relationship between the early metal objects of south-east Europe and the large Alpine jade axes will be investigated below : the importation of metal artefacts into the distribution area of the stone axes ; the making of imitations in copper of Alpine jade axes ; and the production of copper axes whose design is clearly influenced by the shape of Alpine jade axes, even though they do not represent true imitations.

1. 1. Imported metal finds within the main distribution area of Alpine jade axes

1. 1. 1. Copper shafthole tools

Recently, a drawing of a shafthole axe from the region of Fougères (Ille-et-Vilaine) in Brittany, which had been mentioned in the literature several times before (Briard 1965, Briard, Tuarze *et al*. 1999), has been published (Briard and Roussot-Larroque 2002 : 137, fig. 1. 1). This find differs clearly from the other west European shafthole axes, with which it was associated by the authors referred to. A control of the drawing by comparing it to the object in question, which was kindly conducted by Henri Gandois, showed the illustration to be somewhat erroneous, as the cross-section of the object is much more rounded-oval than it appears. Based on these new observations,

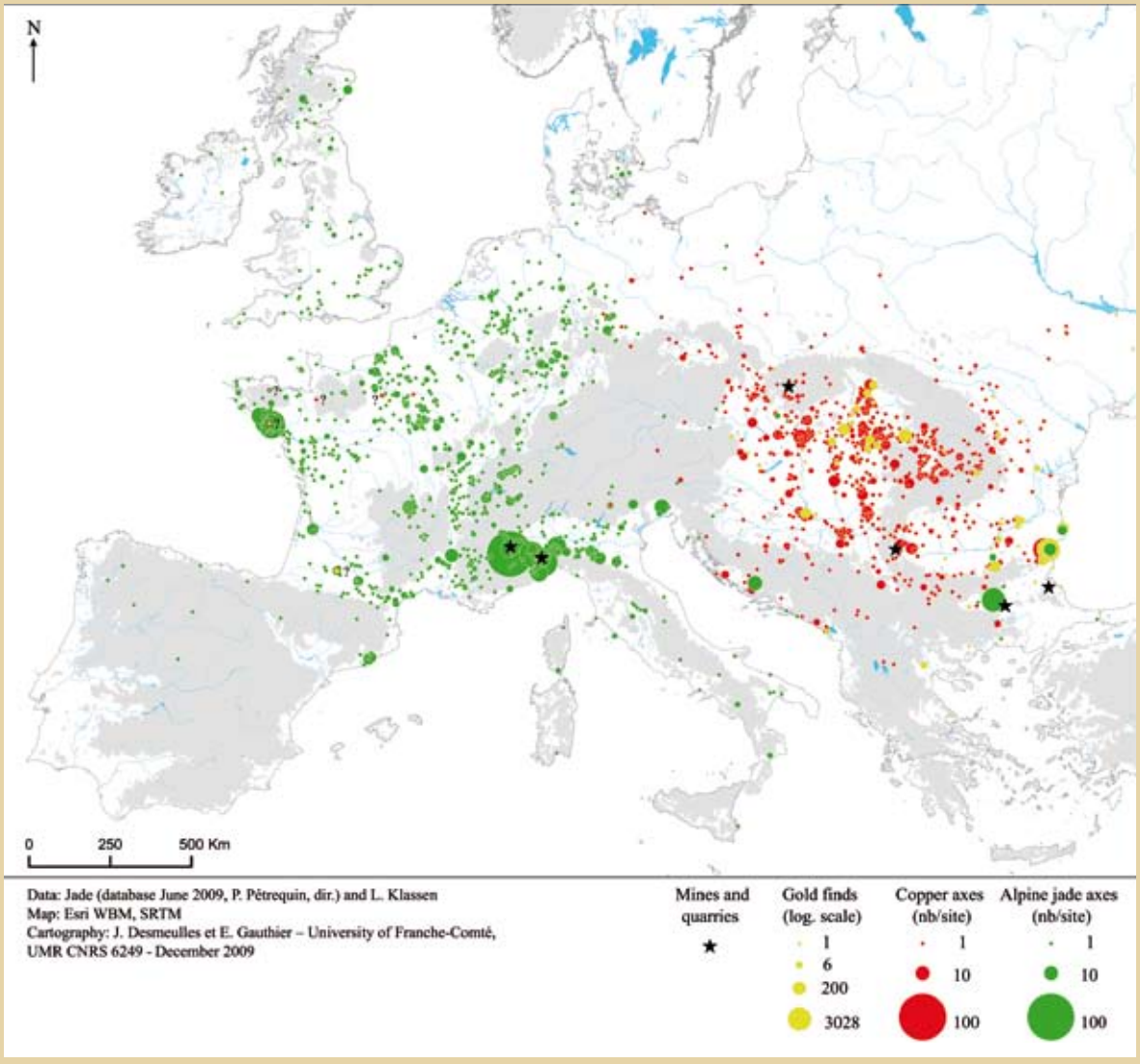

FIG. 1
The distribution of large Alpine jade axes and of heavy copper shafthole tools and gold objects in Europe from the early 5th to the early 4th millennium BC.

the object can be identified as a round-armed hammer axe of the south-east European Čoka type as defined by Schubert (1965) with certainty (Klassen, Gandois *et al.* in preparation). Axes of this type can be dated to the time of the transition between the Tiszapolgar- and Bodrogkeresztúr-cultures in the Carpathian Basin (Kuna 1981, 24f.), i.e. around 4000 BC. The best typological parallels are known from Hungary (Patay 1984 : Taf. 24, no. 279, 281), which consequently can be identified as most likely region of origin. The axe from the region of Fougères thus represents the westernmost find of a heavy southeast European copper artefact and is contemporary with the latest types of Alpine jade axes (the Puy type).

Furthermore, two imported early 4th millennium copper axe-adzes of the Jászladány-type are known from the Paris Basin (Rowlette 1965, Eluère 1972 : 8ff. fig. 7, Ruiz 1984 : no. 63, Briard and Verron 1976 : 11 f. fig. 1-2). The find spot of one of these axes (fig. 2) can be located precisely at Meaux, while no information is available for the second object, stored in the museum of Chartres. The latter find is part of a collection that also contains artefacts bought in the antiquities trade and therefore has to be treated with caution.

The French copper tools referred to above are the westernmost known items of their kind. They penetrated well into the main distribution area of Alpine jade axes at the time of their importation. The contemporary use of both the metal and jade artefacts in question furthermore is known from two other regions : Saxony-Anhalt/Thuringia in eastern Germany, and the Adriatic coast and its hinterland in Slovenia, Croatia and Bosnia-Herzegovina (fig. 1). Both of these areas are situated at the extreme eastern border of the closed distribution area of Alpine jade axes. In both areas metallurgy was introduced as a result of impulses from the area where the heavy shafthole tools originated ; metalworking arrived along with the imported implements at the very beginning of the 4th millennium BC. The earliest products of this metalworking activity show typological influence from Alpine jade axes and will be dealt with below (section 1. 3). The number of known imported copper tools in each area appears to be directly related to their distance from the copper artefacts' region of origin : while finds from the Adriatic coast are comparatively abundant (Žeravica 1993), only two are known from the distribution area of Alpine jade axes in eastern Germany (finds from Auleben and Kleinprießnitz : Mania 1977).

A single axe-adze with probable find place in Denmark (unknown location) might constitute another example of an early 4th millennium import into a region in which Alpine jade axes circulated (Klassen and Pernicka 1998), even though in this case only in very modest numbers. Furthermore, contrary to what could be observed above for the central parts of Germany and the Adriatic coast and its hinterland, metallurgy was not introduced to south Scandinavia at the time of the import of the heavy shafthole axe.

In the literature, the presence of four heavy south-east European copper shafthole-axes of the fifth/early fourth millennium BC has been claimed for Italy. Two of these, both axe-adzes, shall have been found in the province of Torino and thus very close to the point of origin of the alpine jade axes, while a third object of the same type was found at Pollenzo (Krause 2003 : 148 with 205 Anm. 1, Gleirscher 2007 : 98). A closer look at the metal analyses available for all three items reveals tin contents of between 3.6 and 7.4%, nevertheless (analyses SAM 7995, 7998 and 8056). Therefore these three objects can't have anything to do with the time in question here, but must be dated to the Bronze Age (see also Boroffka 2009 : 250, fig. 4). A drawing only is published for one of the three finds (Pollenza, Junghans *et al.* 1968 : Taf. 50.8056) and shows an object that in shape is very close, but not identical to early fourth millennium axe-adzes from the Carpathian Basin.

The last claim for an early copper object of southeast European provenance in Italy, a hammer axe of the Pločnik type, refers to a find from Trento (Govedarica 2001 : 156 with Anm. 22, Dobeš and Peška 2010 : 121, Obr. 3). No metal analysis is available for this object that only has been published in an old photo (Menghin 1912 : 71, fig. 18). The strong reduction of width of this artefact right behind the shafthole is in conflict with Govedarica's own classification of the Pločnik type. Furthermore the neck of the axe appears to be damaged and its original shape therefore can't be assessed with certainty. In consequence, this find can't be classified as hammer axe of the Pločnik-type, but it may well represent a different type of early southeast European hammer axe, a closer identification of which isn't possible at the moment. Finds of such items have generally to be reckoned with in north-eastern Italy (Gleirscher 2007 : 98).

With regard to the presumably early imports of southeast European metal objects in Italy, it must therefore be concluded that none of the four artefacts in question can be identified as such. In three cases the claims with certainty can be rejected, while it is not possible at present to decide on the last case.

Before concluding this subchapter, an isolated find of an axe-hammer of the early fourth millennium BC Şiria type from Überlingen, on the western shores of Lake Constance in south-west Germany (Matuschik 1997), must be mentioned. However, this find is not directly relevant here, because it is situated just outside the closed distribution area of large Alpine jade axes.

In summary it can be concluded that imported southeast European copper tools of the late 5th and early 4th millennium BC are known from a number of regions where Alpine jade axes circulated at the same time. The finds can be grouped in two different entities. The first is made up of the items from the Adriatic coast and its hinterland, from eastern Germany as well as probably from Denmark and possibly also from north-eastern Italy. All of these regions constitute the eastern border of the closed distribution area of Alpine jade axes. The second group is made up of up to three finds from France, which appear isolated from the remainder of artefacts. While the first group of items thus can be understood as a kind of contact-phenomenon, a different explanation is required for the isolated artefacts from the Paris Basin and even Brittany.

1. 1. 2. Gold objects

A potentially comparable picture emerges when imported gold objects are considered. Three find complexes, each comprising several artefacts, are known from south-west and north-west France, but unfortunately doubts remain in every case regarding the objects' origin and date.

The finds from Pauilhac (Gers) (fig. 3, 1) in south-west France are well known and have recently - and not for the first time - been the subject of a larger study (Roussot-Larroque 2008). They originally comprised seven gold beads and one gold diadem, together with two large Alpine axes, six very large flint blades, two objects made from boars' tusks, possibly the bones of a horse and at least one human skeleton. As it is a very old find, discovered in 1865, that was made by chance and subsequently dispersed over two different collections ; uncertainty remains over whether all the objects really represent one closed find. However, the fact that many of the items show traces of the same type of sediment and have a uniform patina might well point in that direction. The gold diadem has long been compared to a find from Moigrad in Romania, which represents the best known parallel although it is not identical (see Roussot-Larroque 2008 : 122 ff. for discussion with references). Unfortunately, however, the specific shape of the golden beads has no precise parallel among the vast numbers of gold beads from south-east Europe (see Todorova and Vajsov 2001). Therefore it is not presently possible to assign the gold finds from Pauilhac with certainty

FIG. 2
Copper axe-adze of Jászladány-type from Meaux in the Paris Basin, France.
Photo P. Pétrequin

to a south-east European origin and a 5th millennium date. Nevertheless, since Bulgarian objects of copper and gold must have been known in France at the transition between the 5th and 4th millennium BC (see below), since copper objects from south-east Europe indeed reached France at the time in question, and since at least an exchange of ideas can be demonstrated to have taken place between the Morbihan region of Brittany and Varna in Bulgaria in the mid-5th millennium BC (Cassen 1991, see below), a south-east European origin and a 5th/early 4th millennium date of the gold finds from Pauilhac does indeed seem probable. Other possible interpretations, such as a much younger date for the gold items or an origin in the Iberian Peninsula (Cassen and Pétrequin 1999 : 15ff., Cassen 2000a : 407f.) cannot be ruled out at the moment, however, even though no convincing parallels are known from there either (cf. Pingel 1992).

As long as no convincing typological parallels for the Pauilhac gold objects can be cited, the best way of identifying the origin and age of the objects would seem to lie in the trace element analysis of the gold. It is clear that such analysis has already been undertaken, at least for the diadem (Eluère 2002), but unfortunately the results seem not to have been published fully.

The second possible 5th millennium gold find from the distribution area of Alpine jade axes is that of several objects from a grave in St. Germain en Erdeven (Morbihan) (Cassen 2000b : 471ff.). Excavated by G. Chaplain-Duparc in 1877, the stone chamber under an earthen mound in which the gold items were found also produced typical Castellic-style pottery as well as some bird bone and imported lignite beads that may well date to the same period as the pottery. No demonstrably later artefacts were present, according to the investigation and restoration of the monument by Z. Le Rouzic in 1926, who discovered a second stone chamber ("coffre") below the first. The gold objects have been published by Le Rouzic (1930 : fig. 6, 1-3, 5-6), but unfortunately there are some uncertainties regarding the actual number of finds. Le Rouzic cites five pieces, while the original records by Chaplain-Duparc refer only to three (depicted as nos. 1-3 in Le Rouzic's publication). Among the remaining two pieces at least one (no. 6), from a typological point of view, must date to the end of the Neolithic or even the early Bronze Age and therefore cannot have anything to do with the period in question here. As there is no evidence for the presence of a secondary interment in the chamber it seems most likely that the Chaplain-Duparc collection had become mixed with other material in the museum of Le Mans. Another possibility is that Le Rouzic made a mistake in his publication and that only the gold finds nos. 1-3, all representing small and typologically rather uncharacteristic strips of gold sheet with folded ends (fig. 3, 3), belong to the chamber in question. This uncertainty cannot be resolved, due to the fact that the excavation took place in the 19th century and no further documentation is available. At present it must be assumed that the three pieces of gold sheet with folded ends belonged to the burial with Castellic ceramics.

While not overtly complex with regard to their shape, it should be noted that closely related finds, which have been interpreted as either parts of composite arm rings or mountings for bows, are known from the 5th millennium BC in Southeast Europe. The closest parallels are several pieces made of copper from the large deposition of Cărbuna in Moldavia (Sergeev 1963, Dergačev 2002 : 11ff., Taf. 3, nr. 45-52), while at least related artefacts of gold are known from Giurgiuleşti, also in Moldavia (Dergačev 2002 : Taf. 13, nr. 3-5).
Once more, the only way to find out more about the French finds is to undertake compositional analysis of the gold.

The third and last potential example of 5th millennium gold artefacts in the main distribution area of axes of Alpine jade is that of a flat, ring-shaped bracelet and a piece of bent thick wire (fig. 3, 2), discovered during peat cutting in Guern ar Floc'h, Maël-Pestivien (Côtes-d'Armor) in Brittany together with two cakes of bronze (Micault 1877). In the absence of typological parallels in gold for the ring-shaped bracelet, Micault (1877 : 144) compared it to the few ring-bangles of jadeitite and serpentinite that had been discovered alongside large jade axes in graves in Brittany (Herbaut and Pailler 2000 : fig. 122). This idea has recently been revived by Herbaut and Pailler (2000 : 373, 375 and fig. 122), while others had previously

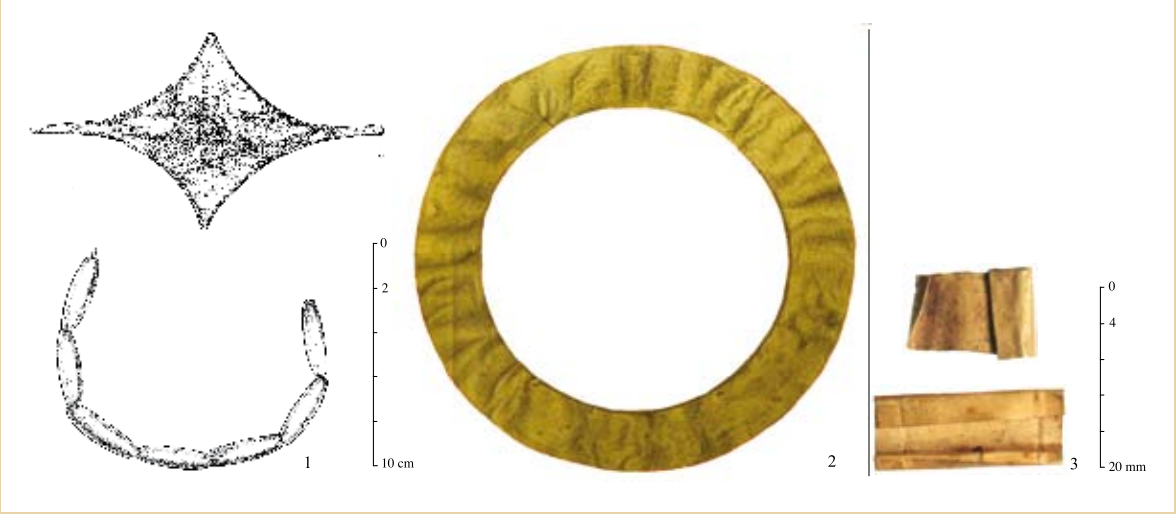

FIG. 3
Gold finds from France, representing possible 5th millennium imports from south-east Europe.
1 : Pauilhac, Gers (*after Roussot-Larroque 2008*) ; 2 : Guern-an-Floc'h, Côtes-d'Armor (*after Micault 1877*) ; 3 : St. Germain en Erdeven, Morbihan (*photo Marianne Thauré, museum Le Mans*).

chosen to assign them to various periods of the Bronze Age (e.g. Giot and Briard 1956, Briard 1965).

Since it cannot be demonstrated beyond doubt that the bronze cakes and gold artefacts constituted a closed find, one cannot rule out the possibility that the gold artefacts date to the Neolithic, even though they cannot be paralleled exactly. The numerous golden bracelets from Varna (Todorova and Vajsov 2001 : no. 399-412) are clearly of different shape. However, there are copper bracelets from the Durankulak cemetery in Bulgaria (Todorova and Vajsov 2001 : no. 413-418, Dimitrov 2002 : 141ff.) as well as from several sites in Romania (Horedt 1976 : 179, Abb. 2) which are comparable with the Guern an Floc'h gold ring and closely comparable with jadeitite and serpentinite rings.

It has to be admitted that the typology of such simple ring-shaped bracelets is not complex, and so it could well be that the resemblances between gold and jadeitite/serpentinite examples are coincidental. Nevertheless, the question of whether they are related deserves to be considered. The lack of exact parallels with, for example, the gold bracelets in Varna could simply be due to the re-shaping of the objects in Brittany or elsewhere in western Europe ; after all, many Alpine axes had been reshaped, both in Brittany and Bulgaria (Pétrequin *et al.* this book, chapter 11, p. 574 and chapter 26, p. 1231). This applies too, of course, to the other gold objects discussed above. In every case, metal analysis appears to be the only way to solve the problem.

Finally, mention should be made here of a round haematite pendant from a passage tomb in Renongar en Plovan (Finistère) in Brittany (fig. 4), even though it is only a local imitation of a copper or gold artefact, and not itself an import (Cassen 2003 : 261f.). The existence of this exceptional object probably testifies to the presence of south-east European metal artefacts of the type in question in Brittany, and thereby lends support to the suggestion that one or more of the finds discussed above might really represent a 5th millennium import.

1. 1. 3. Summary

To summarize, it can be concluded that heavy copper tools of southeast European origin were imported into the closed distribution area of Alpine stone axes. Most of the imports are restricted to regions that either border the area where the copper tools were produced (Slovenia, Croatia and parts of Bosnia-Herzegovina) or that are known to have received strong influences from the core area of early metallurgy (east-central Germany : see Behrens 1969). There are, however, also three of these artefacts known from France, together with a local imitation of a gold or copper ornament. These last finds were discovered in regions with huge concentrations of Alpine axes (Paris Basin, Brittany). The fact that two out of the three possible sets of imported 5th millennium gold finds (St. Germain and Guern ar Floc'h) were also discovered in Brittany may not be coincidental. Almost all the finds in question may well have reached the region due to the power of attraction of the mid-5th millennium social elites ; we know that these elites were able to amass large numbers of fine jade axes from the Italian Alps, together with variscite beads and fibrolite axes from different parts of Spain (see Cassen *et al.* this book, chapter 16, p. 918). In each of the cases discussed above, trace element analyses of the copper or gold should be undertaken to clarify the age and origin of the objects.

1. 2. Imitations of Alpine stone axes and disc-shaped bracelets in copper

1. 2. 1. Axes

Copper axes that are faithful imitations of Alpine jade axes, including their oval cross-sections, are extremely rare. If we restrict our survey to imitations of large Alpine axes as mapped in fig. 1, there are only two candidates, both from eastern Denmark (fig. 5, Klassen 2000 : nos. 33 and 34). If the survey is widened to include possible imitations of smaller Alpine axes, some examples from Italy could be cited. However, with these it is not always easy to decide whether they really are precise representations of Alpine axes or were simply inspired by their design. These axes will be dealt with separately below.

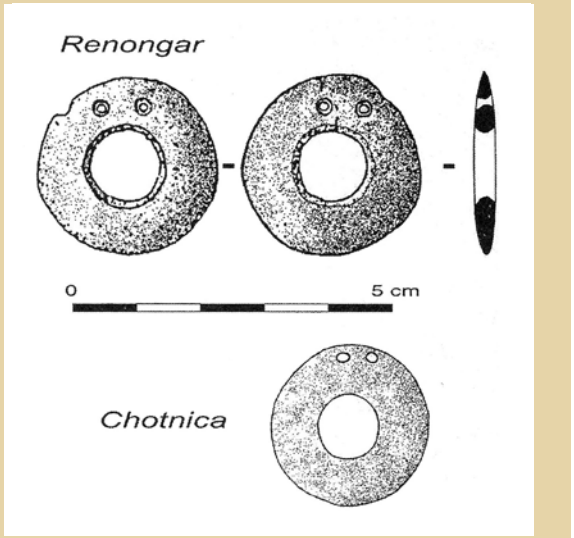

FIG. 4
Haematite pendant from Renongar, Finistère and possible model from Chotnica, Bulgaria (*after Cassen 2003*).

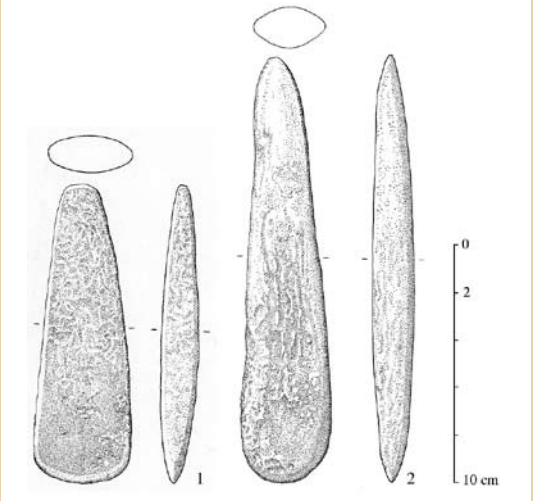

FIG. 5
Copper flat axes from Pilegård (1) and Vester Bedegadegård (2), Denmark (*after Klassen 2000*).

In the literature, copper axes that resemble stone axes are often interpreted as the earliest products of a newly established local metallurgy. They are thought to represent initial experiments, in which old typological models still ruled and the possibilities of the new material had not yet been fully exploited (e.g. Todorova 1981 : 25, Colini 1900 : 232). This evolutionary line of thought is problematic, however, since it can arguably only be applied to regions in which metallurgy developed locally. In regions where the first metallurgical activities resulted from influences from an existing metalworking centre, the first artefacts to be made ought to reflect designs used in the existing centre. This can easily be demonstrated for many regions in Europe, for example the Mondsee Group in Austria with its copper daggers, awls, spirals and flat axes, all of which copy south-east European models (Matuschik 1996, 1998). In the parts of Europe under discussion here, the 'experimentation' model could only apply in Serbia, Bulgaria and northern Greece. But even here it is possible to demonstrate that metallurgy had already been practised several centuries before the first metal axes were produced (Šljivar *et al*. 2006, Borič 2009, Todorova 1999), and so the resemblance between copper and stone axes cannot be accounted for in terms of the makers' lack of experience in working with copper. Since the spread of metalworking through our area of interest is exclusively linked to the early metallurgy of the Balkans and Carpathians - we are not concerned here with the question of whether metallurgy had developed independently in southern Spain (Ruiz-Taboada and Montero-Ruiz 1999) - then we must conclude that the copying of stone axe design in copper was not the product of an unconscious process, but rather a deliberate choice. Consequently, the axes in question are of considerable importance to our evaluation of the relationship between the two different value systems that characterised Europe during the period in question.

The two Danish flat axes, from Pilegård in Varpelev parish on eastern Zealand and Vester Bedegadegård in Klemensker parish on the island of Bornholm (fig. 5), are both single finds and are made of east-Alpine Mondsee copper that was imported to southern Scandinavia in huge quantities between c 3750 and 3300 BC. Between 3500 and 3300 BC, a very intense local metallurgy, based on this imported metal, developed in the late Early Neolithic Funnel Beaker Culture in Denmark, southern Sweden and northern Germany (Klassen 2000). It is highly likely that both axes are local products that were probably made around 3500 BC on Zealand. This island has a minor concentration of Alpine jade axes that could have been the subject of the imitation (fig. 1). No comparable copper axes have ever have been found in the remainder of the huge central European area in which Mondsee copper was used around the middle of the 4th millennium BC.

The fact that Alpine jade axes were imitated in copper testifies to the enormous importance the jade axes must have had in Denmark, as the metal itself was of Alpine provenance and had to be acquired from a source at a distance of c 900 km. The metal must have had great social value and probably also ritual significance for the local population. Contrary to the situation in most parts of Europe where a clear opposition existed between the social valorisation of either metal axes and trinkets or of Alpine jade axes, both categories of items and both materials seem to have been accorded special value in the Early Neolithic of southern Scandinavia. This can probably be explained by two distinct factors. One is its geographical position, to the north of and in between the two circulation zones in Europe visible on fig. 1. The map also shows that the region attracted a few items from both zones, and in fact the adoption of cultural influences from both central and south-eastern Europe on the one hand, and western Europe on the other, is typical for the prehistory of southern Scandinavia. The second important factor is chronology. Metallurgy was adopted in south Scandinavia as late as *c* 3500 BC - around 300 years after the major decline of metallurgy in south-east Europe and also after the production of large Alpine jade axes ceased in the quarries of Mont Viso and Mont Beigua in northern Italy. This means that when the copper imitations of Alpine jade axes were being made, the latter must have been in circulation for several centuries ; indeed, in the case of the Vester Bedegadegård axe, its prototype could have been as much as a thousand years old (see below). These Alpine jade axes must have been true objects of power (Pétrequin and Pétrequin 2006) that had been passed down through many generations, possibly with a name and a biography attached to each.

A closer look at the two Danish copper imitations allows us to identify their models. The Pilegård axe seems to imitate the late Chelles type, while the find from Vester Bedegadegård seems to copy either a long Bégude type axe, or a repolished version of this type (known as a Bernon type axe). In fact, Alpine jade axes that are typologically almost identical (apart from their size) are known from the hoard at La Bégude-de-Mazenc (Drôme) in the Middle Rhône valley in France (axe JADE 2008_443, in this book, p. 602, fig. 26), and also from the tumulus of Mané er Hroëck in Locmariaquer, Morbihan (axe JADE 2008_702, in this book, p 615, fig. 41). The latter axe is the best parallel to the Vester Bedegadegård specimen and it might offer a further explanation as to why an imitation in a precious material such as copper had been made in Denmark : the model could well have been an *hache carnacéenne* that was charged with ritual values that related to megalithic ideas, *inter alia*. In fact, it can be demonstrated that there exists an intimate relationship between the importation of Alpine jade axes and the geographical distribution of the earliest megalithic graves in southern Scandinavia (Klassen, Pétrequin *et al*. in press ; in this book, chapter 18, p. 1014). While there are no *haches carnacéennes* among the known Alpine axes from southern Scandinavia, their importation is testified by a flint imitation of an axe of Saint-Michel type from Varpelev on Zealand (Pétrequin, Cassen *et al*. this book, chapter 18, p. 1014), the same parish in which the copper imitation from Pilegård has been found. Furthermore, the possibility of the importation of repolished Bégude type axes to southern Scandinavia is indicated by a find from Einbeck-Salzderhelden in Lower Saxony, just a few hundred kilometres to the south (axe JADE 2008_192). The cited parallels to the copper axe from Vester Bedegadegård date to the mid- 5th millennium (in the case of Mané er Hroëck) and even the first half (La Bégude-de-Mazenc) of that millennium, indicating that the model for the Vester Bedegadegård copper axe may have been in circulation for as long as a millennium.

1. 2. 2. Disc-shaped bracelets

From the Bulgarian necropolis of Durankulak, a number of disc-shaped copper bracelets are known (Todorova and Vajsov 2001 : 79, Dimitrov 2002 : 141ff.). This type of bracelet only appears here, while other types of bracelet in copper, gold and spondylus shell are known in large numbers from many sites in south-east Europe. Some copper bracelets from Romania (Horedt 1976 : 179, Abb. 2) come rather close from a typological point of view. The Durankulak-type bracelets, especially the find from grave 245 (fig. 6), resemble the west European stone rings, which in some exceptional cases were made of jades and found together with large Alpine jade axes in elite burials and hoards in Brittany (Herbaut and Pailler 2000 : 372ff. ; in this book, chapter 11, p. 627-641). As demonstrated by the copper axes from the region of Fougères and the Paris Basin, the pendant from Renongar and possibly by some of the gold finds listed above, it is possible that artefacts were exchanged between Bulgaria and Brittany at opposite ends of Europe. West European stone rings of jadeitite or other materials might therefore well have reached Durankulak and been imitated there. The production of the stone rings of jadeitite, eclogite and serpentinite is attested by numerous finds from northern Italy (Rossi *et al*. 2008), and an exchange towards Bulgaria could therefore have started in the Alpine region, and not necessarily as far away as Brittany. The presence of several Alpine jade axes in graves from Durankulak demonstrates that an exchange between these two regions did indeed take place (Pétrequin, Cassen *et al*. this book, chapter 26, p. 1246). Therefore, the disc-shaped copper bracelets of Durankulak type may very well be imitations of Alpine models. Unfortunately, however, the simplicity of their form makes it hard to be certain that this was the case.

1. 3. Copper flat axes influenced by Alpine jade axes

While precise imitations of Alpine jade axes are distinctive and in most cases can easily be recognized as such, the same does not follow for those copper flat axes that are not faithful imitations, but whose design was inspired by Alpine jade axes. These can lack the distinctive oval cross-section of Alpine jade axes. Their most characteristic trait is their triangular, straight-sided outline, which is often but not invariably combined with a blade that is neither splayed nor has any protruding edge corners. Therefore, an important factor for identifying the copper axes in question is not only the presence of characteristic traits of Alpine axes, but also the absence of traits otherwise characteristic for copper flat axes (i.e. blade shape). The problems of identification are exacerbated by the fact that Alpine jade axes are not the only stone axes with a triangular outline. Consequently, without additional corroborative evidence such as the nearby presence of Alpine jade axes, it can be hard to demonstrate that a particular axe had been inspired by such axes. Because of these uncertainties, we shall disregard the isolated finds of straight-sided triangular copper flat axes which are known from a number of regions (e.g. Bulgaria : Todorova 1984, no. 66, Romania : Vulpe 197 : no. 250, Austria : Mayer 197: no. 121, Moravia : Řihovský 19 : no. 130). It may well be that some or all these finds do indeed owe their existence to typological influences from Alpine jade axes, but none shows characteristics that are sufficiently distinctive to dispel doubt.

A minor concentration of triangular copper flat axes in southern France (Chardenoux and Courtois 1979 : nos. 13–19, 33, Roussot-Larroque 1985 : fig. 6, 1) is also disregarded here, even though possible Alpine models are present in the region. Since -as far as we know- metallurgy was unknown in this area until the second half of the 4th millennium (with copper flat axes appearing possibly no earlier than 3000 BC), then it is unlikely that the shape of the metal axes in question reflects influences from Alpine jade axes, since there is no evidence in this region that the latter had been circulating over many centuries.

Only in one case, an isolated find, from Hungary but unfortunately otherwise unprovenanced, can be cited as a probable example of inspiration from Alpine jade axes (Patay 1984 : no. 92). In addition to having a very triangular outline, this axe shows a combination of slightly S-shaped sides, a very narrow, more or less flat butt and a blade with minimally-protruding ends. These elements are typical for Rarogne/Saint-Michel/Krk type axes that are known to have been present in various parts of south-east Europe (the Krk variant, cf. finds from Varna II, grave 1 in Bulgaria : axe JADE 2009_133, in this book, p. 1241, fig. 8 ; from Vrbnik in Croatia : axe JADE 2008_1589, *ibid*., p. 1261, fig. 27 and probably also from Semerovce in Slovakia : Mitscha-Märheim and Pittioni 1934, Taf. VIII.5). The same traits are also present in at least one other known imitation of the Alpine jade axe type in question, namely the aforementioned flint axe from Varpelev in Denmark.

The more or less regular production of copper flat axes whose design had probably or definitely been influenced by Alpine jade axes can be seen in just three regions of Europe. Two of these -east-central Germany and the north-western parts of the Balkans (Croatia, Bosnia-Herzegovina)- are exactly the same as those that have already been discussed as the only regions in which both Alpine jade axes and heavy south-east European copper tools circulated, and in which local metalworking began thanks to influences from south-east Europe around 4000 BC. This cannot be a coincidence, but must be seen as an indicator of the conditions that were necessary for the

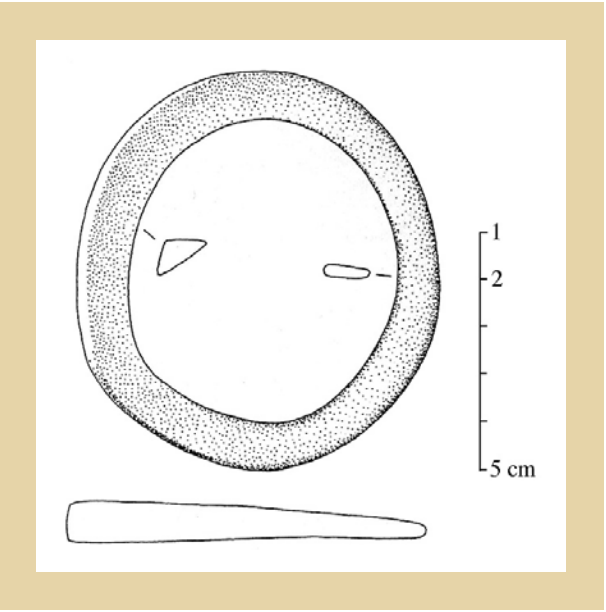

FIG. 6
Disc-shaped copper bracelet from grave 245 at Durankulak, Bulgaria (*after Todorova and Vajsov 2001*).

emergence of these 'hybrid' copper axes that show symbiosis between Alpine jade axes and typical copper flat axes. While one could argue that direct imitations of Alpine jade axes in copper were only produced in regions where metallurgy was flourishing and where Alpine axes were rare, it seems equally evident that the regular production of 'hybrid' copper axes seems only to have occurred in regions with a more even relationship between Alpine axes and metallurgy, in terms of both their presence and their social value. These conditions only existed in the two regions referred to above, and obviously also in the third region of interest here, Italy. But while a regular production of the same types of triangular copper flat axes can be demonstrated to have taken place in east-central Germany and parts of Croatia and Bosnia-Herzegovina, this was not the case in Italy. Since it is harder to judge whether the Italian copper axes represent faithful imitations or 'hybrid' versions, these will be discussed separately below.

1. 3. 1. East-central Germany

In east-central Germany (modern day Thuringia and Saxony-Anhalt), between *c* 4100 and 3500/3300 BC, numerous 'hybrid' flat copper axes, inspired by various types of Alpine jade axe, were produced. No fewer than 20 examples have recently been identified and discussed in detail (Klassen, Dobeš *et al.* in press b). Several had been exchanged to the north (southern Scandinavia), west (Westphalia) and south-east (Bohemia and Moravia) (fig. 7).

Virtually all the axes in question were discovered as single finds ; in two cases, we may be dealing with disturbed hoards of pairs of axes. Determining their date therefore has to rely on a combination of typological and compositional analysis ; from these one can propose a bracket between *c* 4100 and 3500/3300 BC. Within this rather long period we can perceive a typological development (fig. 8). The earliest, Kaka type axes, are closely related to the Greenlaw and Chenoise types of Alpine jade axe and were probably produced between *c* 4100 and 3900 BC. They are made from a distinctive copper, Nógrádmarcal copper, from the ore-mountains of western Slovakia.

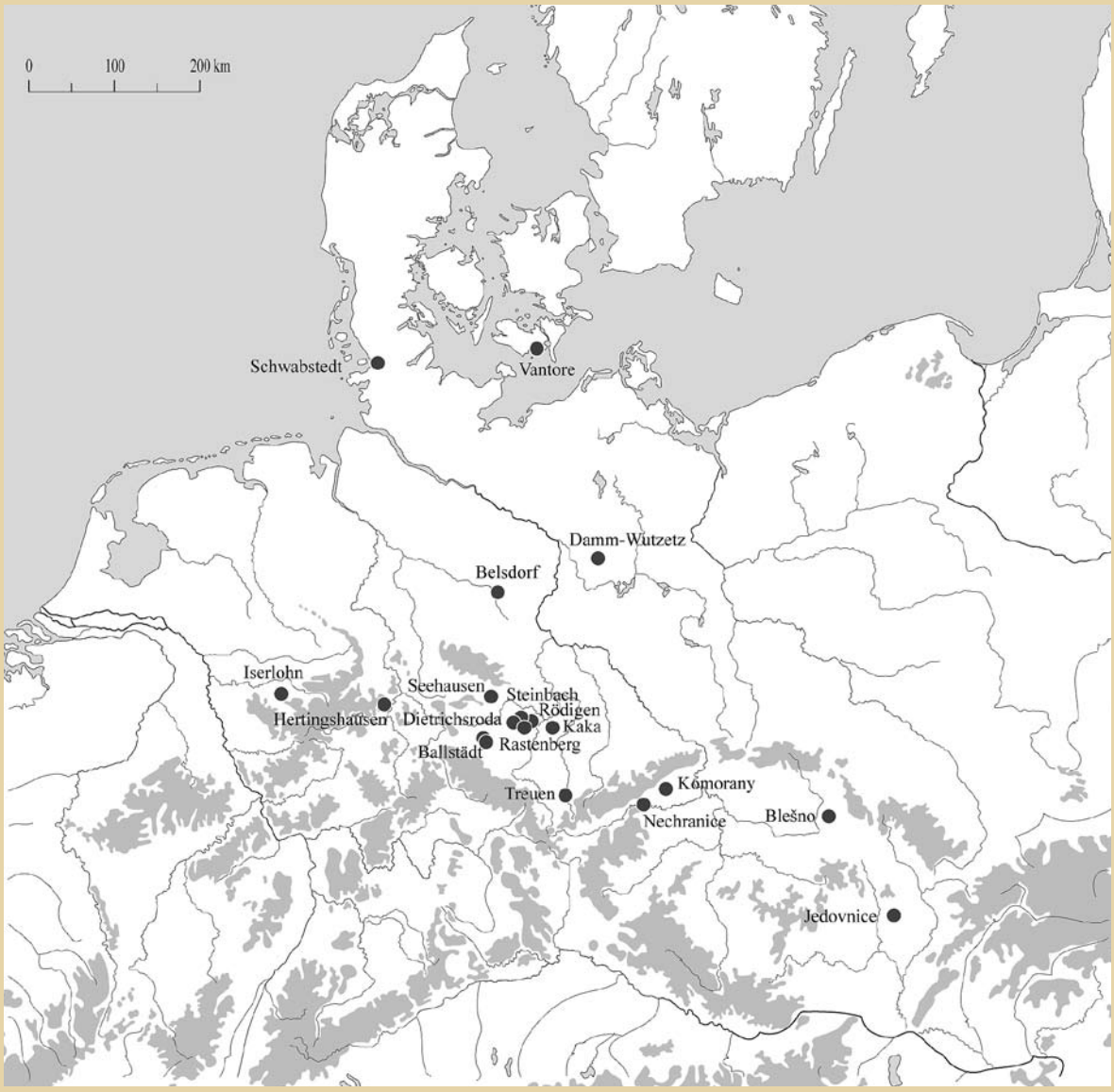

FIG. 7
Distribution of copper flat axes showing typological elements derived from large Alpine jade axes in east-central Germany and neighbouring regions. Almost all probably originate in the small region with the highest density of finds.

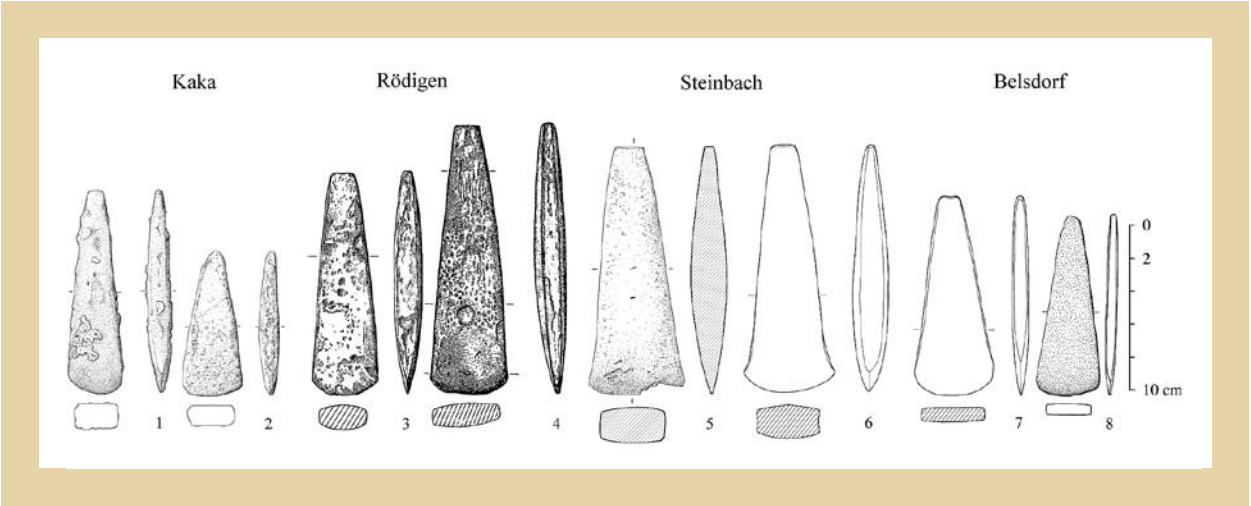

FIG. 8
Types of copper flat axes from east-central Germany and Bohemia influenced by large Alpine jade axes.
1 : Vantore ; 2 : Schwabstedt ; 3 : Komořany ; 4 : Nechranice ; 5 : Rastenberg ; 6 : Steinbach ; 7 : Belsdorf ; 8 : Jedovnice (adapted after Klassen *et al.* in press b).

The same material was also used for the axes of the slightly later Rödigen-type, although at least one such axe seems to have been made from Slovakian Handlova copper, and another possibly of east-Alpine Mondsee copper. The production can tentatively be placed between ca. 4000 and 3800/3700 BC. Compared to the Kaka-type axes, those of the Rödigen type show a less marked influence from the triangular Alpine axes, but their very trapezoidal outline still diverges clearly from that of south-east European copper flat axes. In contrast, those of the subsequent type, Steinbach - which were probably produced between 3900 and 3700 BC - show a strong influence from the Rarogne/Saint-Michel type of Alpine jade axe. In particular, an example from Rastenberg shows the characteristic S-shaped sides and narrow flat butt as seen in the Hungarian axe discussed above. The Steinbach type is also the only type to have the distinctive, slightly protruding edge-corners as seen on Alpine jade axes in question. Steinbach type axes were produced from copper imported from both Slovakia and the eastern Alps (Handlova and Mondsee copper). Two examples have a median ridge as seen on several types of *hache carnacéenne* (Pétrequin, Cassen *et al.* this book, chapter 18, p. 1017).

Almost all the axes discussed so far probably originated in the rather small Burgenlandkreis-district of Saxony-Anhalt. Further examples had probably been made around 100 km further north, in the Altmark region (also in Saxony-Anhalt). These Belsdorf type axeheads were also made from Mondsee copper and can be dated to *c* 3700-3500/3300 BC. Their production implies the prolonged circulation of Alpine stone axes in the region. A mapping of all known Alpine jade axes and of the copper axes in question in this region shows that the respective distribution areas overlap considerably. This lends weight to the suggestion that the copper axe design was inspired by Alpine jade axes (fig. 9).

Two copper axes from Ballstädt in Thuringia, which represent one of the two probable hoards of pairs of axes, deserve special attention (fig. 10). One has slightly protruding edge corners and is of Steinbach type, while the second is a unique object, characterised by a long, narrow trapeze shape, an unusual thinness, and the presence of two holes at the butt end. While at first sight this strange object does not seem to have anything to do with Alpine stone axes, it can in fact be paralleled in the perforated Tumiac type of Alpine jade axe and compared with the Cangas type axes found in the north-western part of the Iberian Peninsula (Fábregas Valcarce *et al.* this book, chapter 21, p. 1108, and Pétrequin, Cassen *et al.*, chapter 18, p. 1028). The latter are clear copies of the perforated Tumiac type axes as found in Brittany. Most are triangular in outline, but there is one that is closely comparable with the Ballstädt axe, from the dolmen Santa Cruz in Cangas de Onis. A comparable phenomenon can be seen in the stone axes of Zug type, found in parts of Switzerland and south-west Germany : these, too, are obvious copies of the perforated Tumiac-type axe form (Pétrequin, Cassen *et al.* 2006). The abundance and widespread occurrence of these various imitations of perforated Tumiac axes clearly indicate that this type of *hache carnacéenne* must have had considerable significance as a socially-valorised object (fig. 11).

The probable hoard from Ballstädt therefore comprises two axes that reflect inspiration from two different Carnac-style Alpine axes : the perforated Tumiac type and the Saint-Michel type. Neither has yet been found in the region, but two axes from Mönchpfiffel-Nikolausrieth (axe JADE 2008_270, p. 1490,) and Harras (axe JADE 2008_227) belong - with varying degrees of certainty - to the group of Alpine jade axes that had been re-shaped in the Carnac region in Morbihan. These suggest that axes of perforated Tumiac type and of Saint-Michel type might also have been circulating in east-central Germany.

1. 3. 2 Croatia and Bosnia-Herzegovina

In the north-western part of the Balkans - the second area in which copper axes inspired by Alpine jade axes were being produced on a more or less regular basis - the hybrid axes are far fewer, and less distinctive, than those from east-central Germany. This is probably because this region is immediately adjacent to the core zone of early metallurgy, and relatively few Alpine jade axes were circulating there. The hybrid axes reflect the characteristics of south-east European flat copper axes more strongly, and show fewer elements that can be attributed to influence from Alpine jade axes. It is thus harder to identify the specific types of Alpine axe that could have acted as models in the design of the axes in question.

The copper axes of interest here have been classified in various ways and can either be grouped together under the general type name of Dugo Selo (Kuna 1981), or else attributed to a number of different variants and types (Žeravica 1993). As far as the present study is concerned, they can be divided into two groups. The first comprises very narrow triangular axes with completely straight, narrow sides and a blade that neither splays nor has expanded ends (fig. 12. 1-2). Only the two flat axes from the hoard of Split-Gripe (Marovič 1953 : Taf. III, Žeravica 1993 : no. 158/159) can be attributed to this group. In Austria, Mayer has labelled several finds of unknown provenance as "type Split" after this hoard (Mayer 1977 : nos. 116-120). While these Austrian finds share some features in common with the eponymous axes, there are differences, especially regarding blade shape.

The second group (fig. 12. 3-7) comprises axes from Ždralovac, Kladari-Karavid, Vojnič, Dugo Selo and Mikleuš (Žeravica 1993 : nos. 132-134, Marovič 1953, Brunšmid 1902). All show some characteristics of the local Boljun and Szakálhát types of flat copper axe, particularly their asymmetrical longitudinal section and their straight and very narrow butt. Where they differ from these local types is in the shape of the blade : the local types have splaying blades with clearly developed edge corners, while the hybrid axes

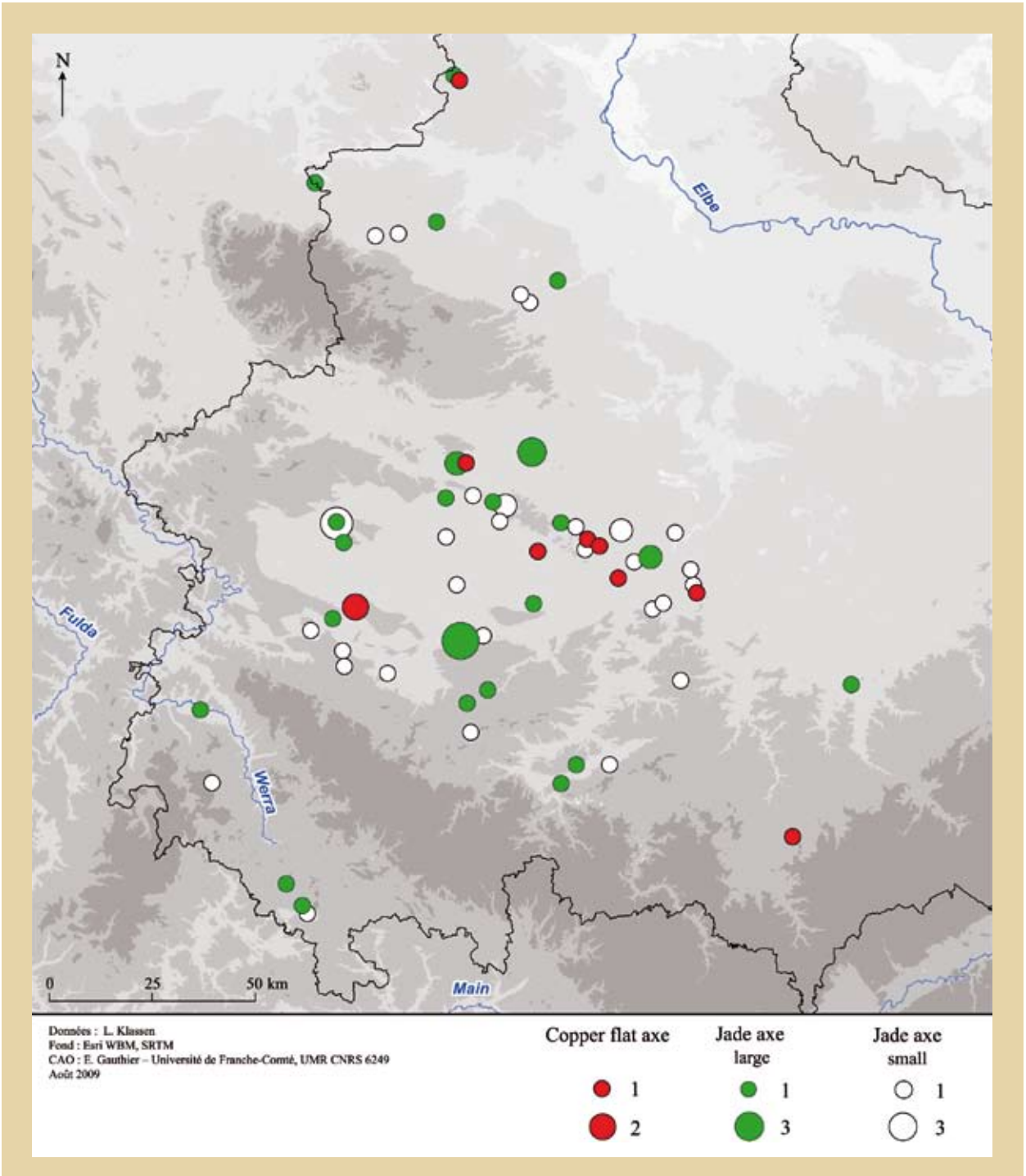

FIG. 9
The distribution of large and small Alpine jade axes, and of copper flat axes whose design was influenced by Alpine jade axes, in Thuringia, Saxony and Saxony-Anhalt (Germany). The intimate spatial relationship between the two groups of finds strengthens the idea that the shape of the copper flat axes is influenced by that of Alpine jade axes.

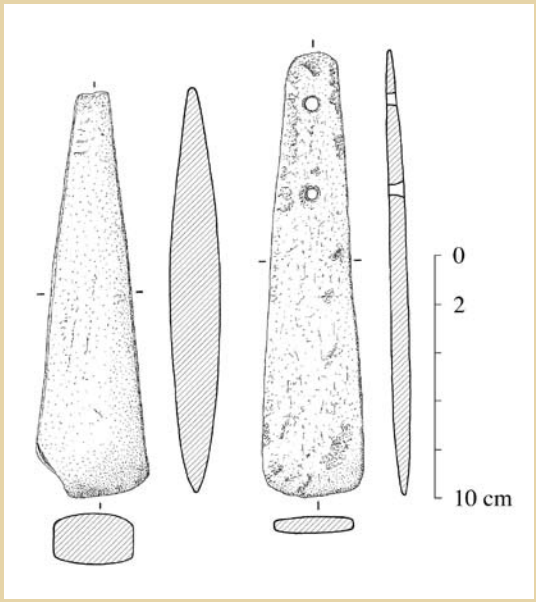

FIG. 10
Two copper flat axes from Ballstädt (Thuringia), probably from a ploughed-up hoard (after Klassen et al. in print b). Both are typologically related to two different types (perforated Tumiac and Saint-Michel) of haches carnacéennes.

have a somewhat broad, in some cases very deep and rounded blade. Furthermore, at least one of the finds (Mikleuš) appears to have somewhat rounded narrow sides, giving it an almost oval cross-section. This cross-section, as well as the deep rounded shape of the blade and the rather straight narrow sides are clearly elements that may be derived from Alpine jade axes.

The typological distinction between these two groups of axe is also reflected in their divergent distribution (fig. 13).

Where analysed, all the hybrid axes have been found to consist of pure copper or copper with faint traces of silver as the only impurity. Both of these kinds of copper are very widespread, making it impossible to trace the precise origin of the metal without additional lead isotope analysis.

Due to the presence of clear typological elements of the Boljun and Szakálhát-type axes, the hybrid axes described above can be dated to between *c* 4000 and 3800 BC. This is confirmed by the fact that one of the pieces (from Kladari-Karavid) was found together with a copper axe-adze of this date in a probable hoard. The same date applies to the axes from Split-Gripe, which were also from a hoard, found alongside heavy shafthole tools of various types.

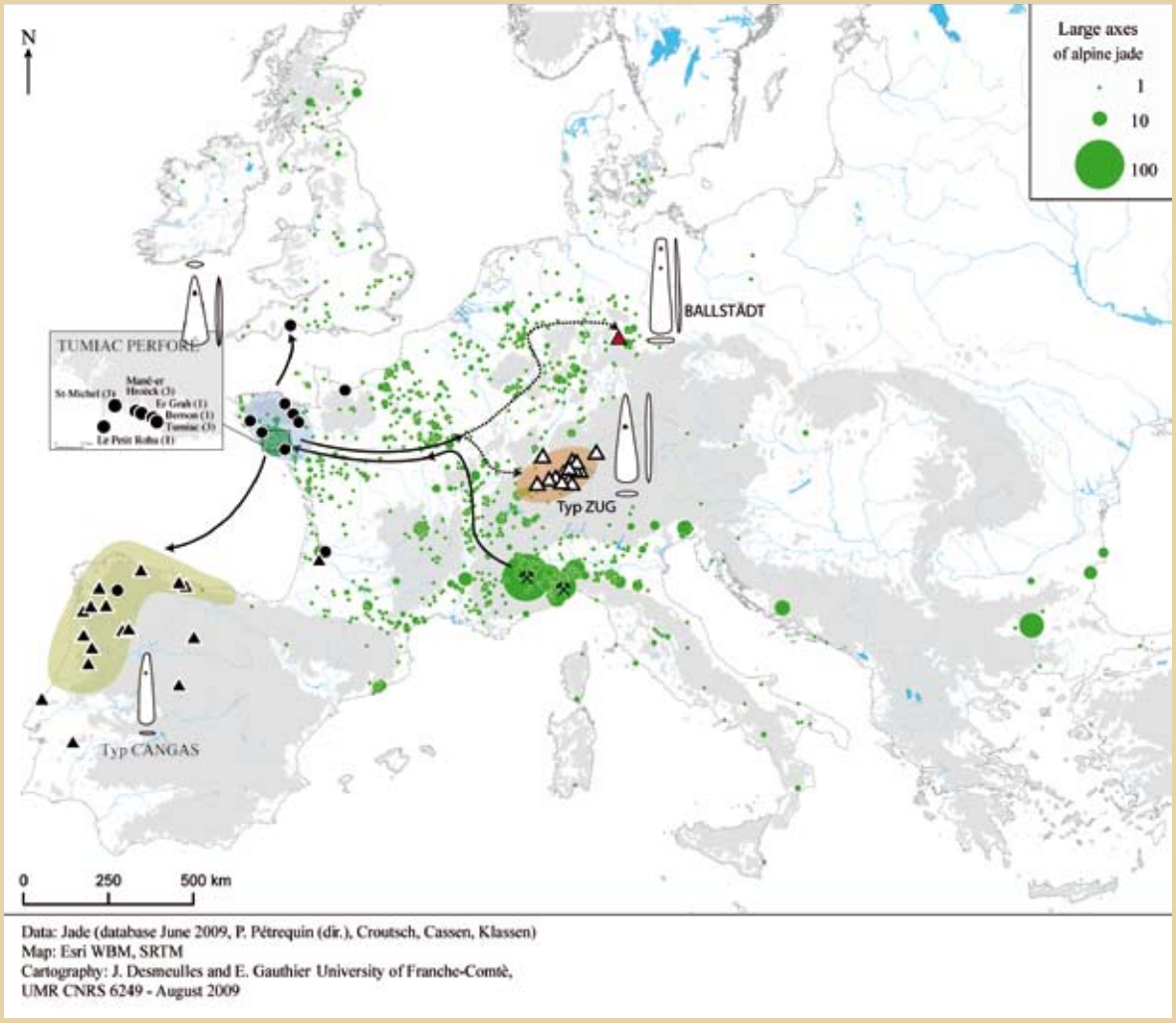

FIG. 11
Map showing the distribution of perforated Tumiac type axes from the Morbihan and their copies in Iberia (Cangas type), Switzerland/south-west Germany (Zug type) and Thuringia (at Ballstädt), and the suggested route by which the idea of making this type of axe reached Thuringia.

1. 3. 3. Italy

From Italy there are 9-12 triangular flat copper axes whose design may have been influenced by Alpine jade axes. Unfortunately it is not possible to be more precise, as no drawings or photographs are available for three potential finds which were claimed to have a triangular outline : one, unprovenanced, from the museum at Bergamo (De Marinis 1992 : 389) and two from Perugia and Umbria (Carancini (1993 : 126).

From the geographical distribution of these axes it is clear that their design reflects a conscious decision ; they are not the product of primitive stages of early metallurgy. Two clusters of finds exist : one at the southern edge of the Alps, the other in Umbria and Tuscany (fig. 14).

All the axes are single finds. As only a few of them seem to have been analysed and since the state of archaeo-metallurgical research in Italy is generally not as advanced as that north of the Alps or in south-east Europe, the following observations can only be preliminary in nature.

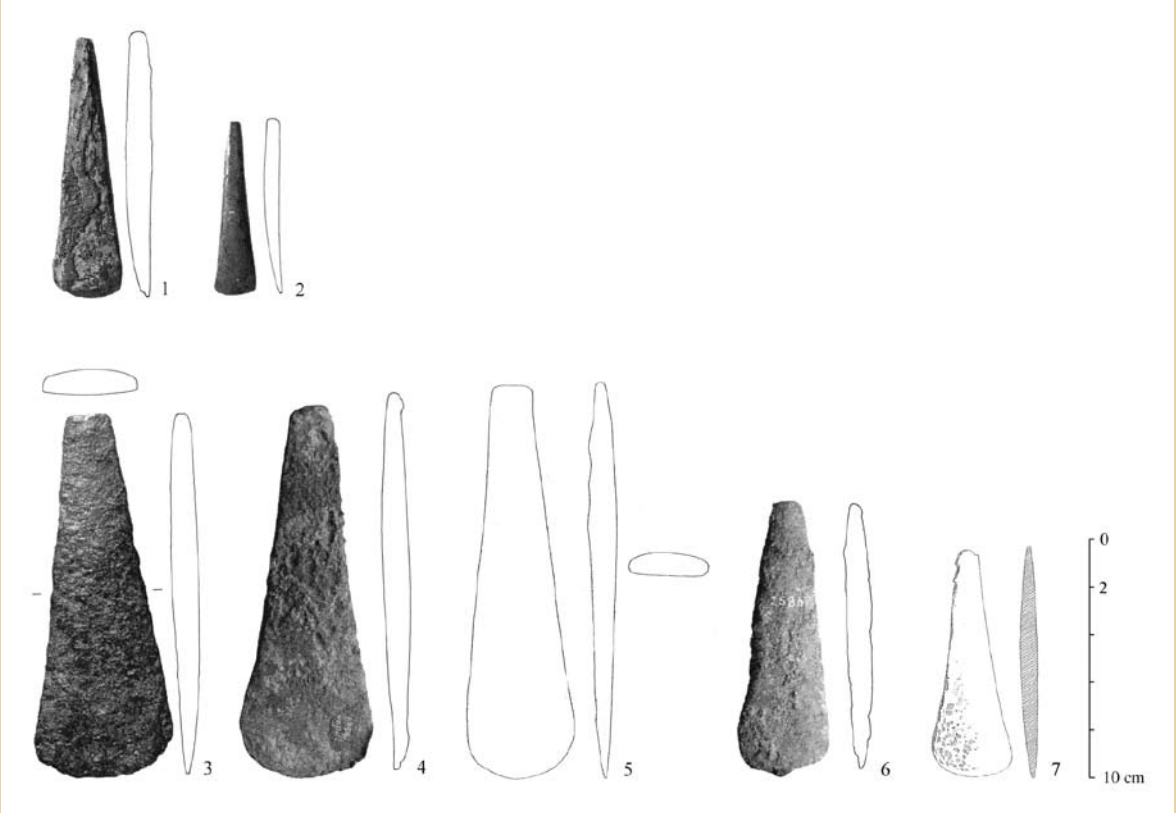

FIG. 12
Copper flat axes from Croatia and Bosnia-Herzegovina showing typological elements derived from Alpine jade axes.
1, 2 : Split-Gripe ; 3 : Ždralovac ; 4 : Vojnič ; 5 : Dugo Selo ; 6 : Kladari-Karavid ; 7 : Mikleuš. 1-4, 6 after Žeravica 1993, 5 after unpublished catalogue of the SAM project, university of Freiburg, 7 after Brunšmid 1902.

FIG. 13
Distribution of copper flat axes showing typological elements derived from large Alpine jade axes in Croatia and Bosnia-Herzegovina.

Two of the axes -from Campegine (Malavolti 1946), and Valle Fontega (Broglio and Fasani 1975 : fig. 25, 3)- have lenticular cross-sections and therefore could well be direct imitations of stone axes (fig. 15). The latter's cross-section, pointed-oval on one side and oblique-straight on the other, appears to mark a transition to axes with rectangular cross-sections. As copper flat axes of rectangular cross-section (Bocca Lorenza type) appear in the same region around 4000 BC (Klassen 2010), this observation could point towards a late 5th millennium date for the axe.

Both axes are typologically different from each other and rather short with lengths of only 7.7 cm (Campegine) and 9.0 cm (Valle Fontega). Neither closely resembles any of the types of large Alpine jade axe that have been defined. This is not surprising, as these large axes (apart from some exceptions, such as the imported (*haches carnacéennes)* obviously served as common tools in Italy and only gained in social and ritual value mostly after their exchange across the Alps. It is therefore unlikely that the large axes would have been the target of imitation in copper. From grave assemblages belonging to the VBQ

Culture, however, it is clear that small triangular axes of jadeitite were socially valorised during the 5th millennium BC in northern Italy (Bernabò Brea, Errera *et al.* this book, tome 1, p. 816) and so might well have been the object of imitations. The axe (type Collecchio) from grave 24 of the cemetery of Le Mose is one such possible model (Bernabò Brea, Errera *et al.* this book, tome 1, p. 847, fig. 48). The fact that both the Campegine and Valle Fontega axes are from northern Italy, while none of the Umbrian and Tuscan finds have lenticular cross-sections, may well support this interpretation.

While the earliest copper mines currently known in Italy do not date further back than *c* 3500 BC (Maggi and Pearce 2005), metallurgy had been introduced approximately 800 years earlier, as demonstrated in northern Italy by the recent find of two copper awls and a fragment of a crucible with copper slag adhering to it from Parma/Botteghino (Mazzieri and Dal Santo 2007). It had appeared that the only copper objects to be found in definite and secure VBQ contexts were small items, principally awls (Pessina and Tiné 2008 : 132ff. with fig. 14, Pearce 2000). However, according to the original reports by the excavator (Pellegrini 1910 : 74ff.) and the detailed investigations of the available evidence by Pearce (2007 : 42ff.), the three flat copper axes from the Bocca Lorenza cave probably also belong to this culture. Furthermore, several flat copper axes have been found very close to major VBQ sites, or else in them but unstratified (Barfield 1996 : 66, Pearce 2007 : 38ff.). The Campegine axe and a find from Pizzo di Bodio (discussed below) fall into this category. It is therefore possible that flat copper axes could have been produced as early as 4500 BC.

The compositional analysis of the Valle Fontega axe (Matteoli and Storti 1982) shows that it consists of a very characteristic type of copper, which is only known from a few other objects. It probably originates in the Lessinian Alps in northern Italy (Klassen 2010). At least one find made of this metal (the bossed copper disc from Hornstaad in south-west Germany : Dieckmann 1987) can be dated firmly to the early 4th millennium (namely by the dendrochronological date of 3917 BC for the Hornstaad settlement : Billamboz 1998) ; this provides indirect evidence for the Valle Fontega axe. Due to its peculiar cross-section (see above), however, this find may be slightly earlier and date to the end of the 5th millennium.

For the Campegine axe, only a preliminary metal analysis, of insufficient quality, is currently available (unpublished, G. Artioli and R.C. De Marinis, pers. comm.). The axe appears to be of a different, very pure type of copper. Nothing can be deduced from this regarding the origin or date of this metal.

Four of the remaining triangular flat axes with rectangular cross-section seem at first to form a relatively homogeneous group, thanks to their markedly oblong shape (fig. 16). On closer inspection, however, there are clear differences between at least some of these axes. The 10 cm long unprovenanced axe in Bergamo Museum (De Marinis 1992 : Abb. 1.2) is distinguished by its rounded neck and slightly splayed blade, while the 13.2 cm long axe from Collelungo (Colini 1898-1902 : fig. 120) has slightly convex sides. The remainder, from Gemignanello (Colini 1898-1902 : Tav. XIII.10) and Sgurgola (Colini 1898-1902 : Tav. XV.4), with lengths of 15.3 and 13.3 cm respectively, closely resemble each other and might well share a common origin.

The convex sides of the Collelungo axe are rather distinctive. As this is the only axe in the group of finds discussed here with this specific trait, it is quite possible that it is an import. A survey of all flat copper axes produces only one generally comparable axe, a find from the Bulgarian tell Goljamo Delčevo (Todorova 1981 : Taf. 4. 65) that is dated to the middle phase of the KGK VI-culture, i.e. *c* 4400/4300 BC. It is therefore possible that the Collelungo axe is a fifth millennium import from Bulgaria, but the scarcity of comparable finds and the absence of compositional data make it impossible to verify this. The general, somewhat chisel-like outline of the axe and its rather thick cross-section indicate that the axe probably dates to before or around 4000 BC, since no axe of this general form was produced anywhere after the turn of the fourth millennium BC.

The axe from the Bergamo Museum closely resembles the larger of the two axes from the Split-Gripe hoard in Croatia (see above). The only, but significant difference is the shape of the longitudinal section, which is symmetrical in the Italian find but typically asymmetrical in the find from Split. While the resemblances are close enough

FIG. 14
Distribution of copper flat axes showing typological elements derived from large Alpine jade axes in Italy.

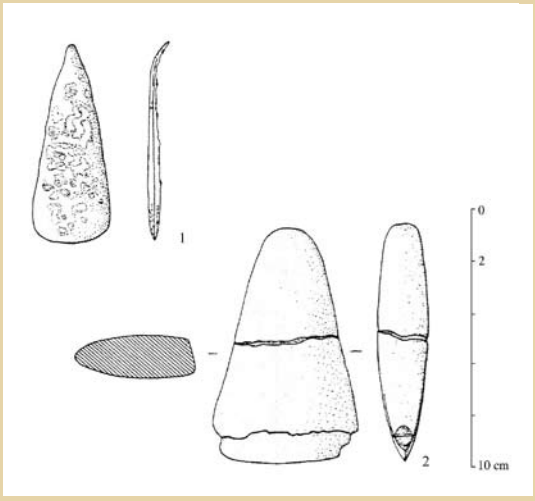

FIG. 15
Copper flat axes from 1 : Campegine and 2 : Valle Fontega that are probably imitations of small jadeitite axes (*after De Marinis 1992*).

to suggest that the Bergamo Museum and Split axes are probably contemporary, around 4000 BC, it is impossible to say whether the former is an import. No metal analysis is available and therefore no precise identification of the origin of this find is possible.

Due to their strong similarity, the two axes from Gemignanello and Sgurgola can be treated together. Their characteristic triangular shape is unparalleled and suggests that they are likely to have been produced somewhere in central Italy. However, the metal analysis of the Sgurgola axe (SAM 19801) showed it to have been made from pure copper. This composition is not matched by any other flat axe from Italy. Five other analysed flat axes are also of pure copper, but with traces of several other elements (Otto and Witter 1952 : nos. 30-34). However, as these analyses were made in the 1930s, when the detection limit of the elements in question was probably much higher than that of the SAM-analyses (Klassen 2010), it may be that these axes are not made of copper as pure as that of the Sgurgola axe. Therefore, the chemical composition of the Sgurgola axe may well indicate that it is imported, but due to the lack of typological parallels outside Italy it is not possible to suggest a place of origin. Notwithstanding the lack of parallels, on typological grounds the Gemignanello and Sgurgola axes should in theory date to around 4000 BC.

The remaining three triangular copper flat axes of which drawings were available (fig. 17) all are very small -they measure not more than ca. 4.5 cm (Panicarola : Carancini 1993 : fig. 2, 3), 4.8 cm (Pizzo di Bodio : Banchieri 1999 : fig. 4, 2) and ca. 6.0 cm (Badiola : Carancini 1993 : fig. 2, 1). In each case the available drawings are not sufficiently good to show the cross-section shape clearly, but it appears that the central Italian pieces from Badiola and Panicarola might have rounded rectangular cross-sections while that of the Pizzo di Bodio axe could be either rectangular or oval. The latter is an unstratified find from a settlement that has produced, in addition to Early Neolithic and Eneolithic material, finds of the VBQ Culture. The metal analysis published by Banchieri (1999) is of insufficient quality and only allows one to state that the axe consists of rather pure copper. This is well in line with its suspected date of *c* 4000 BC rather than Banchieri's proposed Eneolithic date, since most Eneolithic axes contain sizable quantities of arsenic. The most remarkable feature of this object is the somewhat splayed blade. This trait may well relate to the copper flat axes of Bocca Lorenza type, which have a more easterly distribution area in the foreland of the Lessinian Alps (Klassen 2010). This might indicate that the Pizzo di Bodio find dates to the very early 4th millennium, as the Bocca Lorenza axes belong to the period *c* 4000-3800 BC.

In summary one can conclude that, at the present state of knowledge, it is difficult to make precise statements regarding the triangular flat copper axes from Italy. A few small finds with lenticular cross-sections from northern Italy are probably direct imitations of the small triangular jadeitite axes that were socially valorised in (among others) the VBQ Culture. The remaining axes, with rectangular or rounded-rectangular cross-sections, could well have been inspired by Alpine jade axes -in terms not only of their design but also their symbolic meaning. This interpretation is supported by the overall distribution of triangular copper flat axes, which shows two separate distribution areas in northern Italy and in Umbria/Tuscany. The latter distribution is almost perfectly matched by a concentration of large Alpine jade axes. As regards the date of the copper axes, in two cases there are indications that they may date to the very early 4th millennium BC, but others - at least the Campegine and Valle Fontega axes, with their lenticular cross-sections - may be as early as the 5th millennium. The remaining axes, with rectangular cross-sections, are likely to date to *c* 4000 BC. The Collelungo axe might be an exception, as it could represent a 5th millennium import from Bulgaria. All the other axes must be judged to have been produced in Italy.

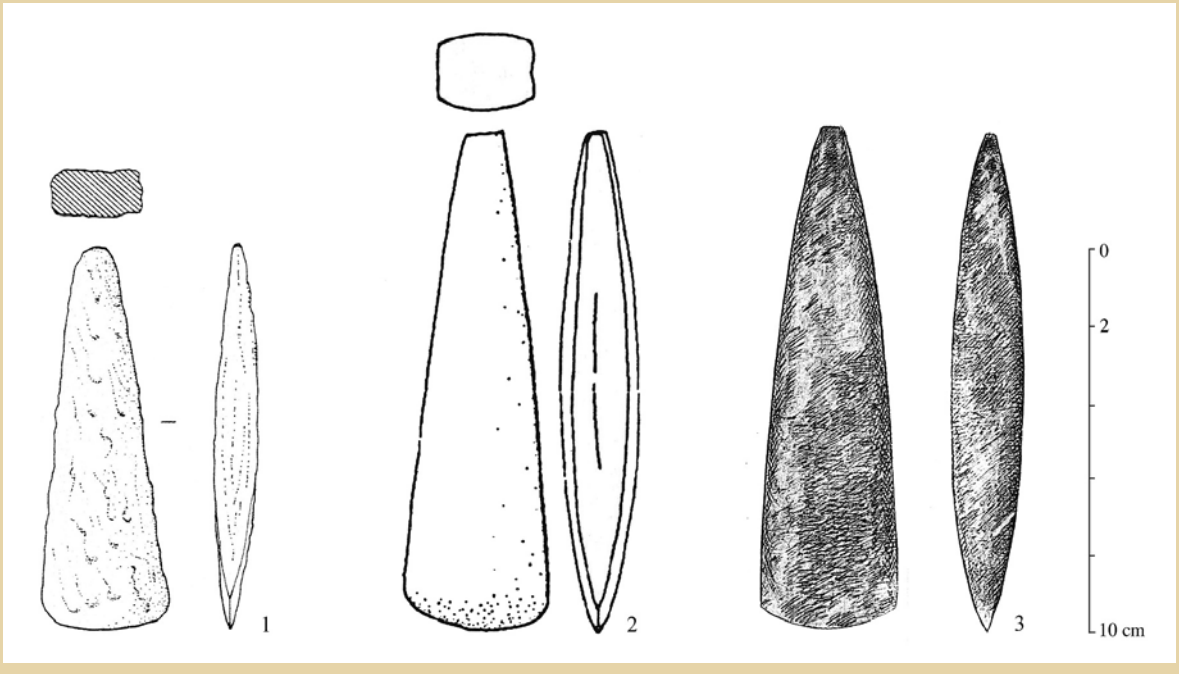

FIG. 16
Copper flat axes with rectangular cross-sections showing typological elements derived from Alpine jade axes. 1 : Unknown origin, museum of Bergamo (after De Marinis 1992) ; 2 : Sgurgola (after Carancini 1993) ; 3 : Collelungo (after Colini 1898-1902). The finds from the museum of Bergamo and Sgurgola were probably made locally around 4000 BC while the axe from Collelungo may well be a 5th millennium import from Bulgaria.

• 2. Alpine axes and their relation to early metallurgy

2. 1. Imported Alpine axes in the distribution area of heavy copper tools and gold artefacts

At the moment, only preliminary observations regarding imported Alpine jade axes in south-east Europe are possible, as the area has not yet been surveyed as intensively as western Europe. However, it is not expected that the picture will change significantly with the addition of new data. According to our present state of knowledge, two different developments can be recognized. The first concerns mainly small axes from rich graves of the early Lengyel culture (e.g. Zengövarkony graves 110 and 206 : Dombay 1960 : Tabl. XLI.14 and LIX.7 ; Alsónyék-Kanizsa, grave 792 : Zalai-Gaál 2008 : fig. 19 ; note, however, that the axes have only been seen in photographs, and direct investigation is needed to confirm the observations). A few larger axes were presumably also exchanged at this early date : fragments of two such axes were definitely found in a ring ditch site in Golianovo in Slovakia (Hovorka *et al.* 2008) and one may have been found in grave 3060 at Alsónyék-Kanizsa (Zalai-Gaál 2008 : Abb. 15). It is possible that these early imports are also present in areas beyond the distribution area of the Lengyel culture.

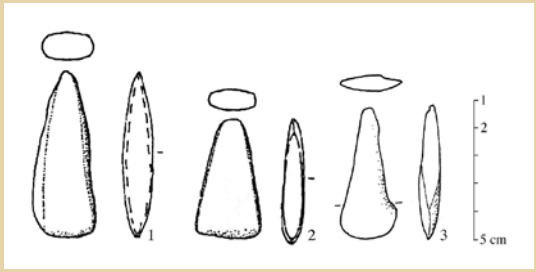

FIG. 17
Small Italian copper flat axes showing typological elements derived from Alpine jade axes. 1 : Badiola ; 2 : Panicarola (after Carancini 1993) ; 3 : Pizzo di Bodio (*after Banchieri 1999*).

While metal was certainly present and even widely used during the early 5th millennium in south-east Europe (see for example Zalai-Gaál 1996, Todorova 1999 : 237), the early phase of importation of Alpine axes predates that of the heavy shafthole-tools and gold artefacts as depicted in fig. 1. These early finds are therefore not directly relevant here.

The second relevant development is that of the importation of Alpine jade axes in comparatively large numbers to Bulgaria. As this is described in detail by Pétrequin, Cassen *et al.* (this book, chapter 26, p. 1231), a few comments will suffice here. Their chronology is well established due to the fact that many axes were found either in graves or stratified settlement contexts. Alpine jade axes appear to have reached the coast of the Black Sea between the Karanovo V/Hamangia IV/Sava IV period and the late Kodzadermen-Gumelnița-Karanovo VI (KGK VI) Culture (late Varna Culture),

FIG. 18
Types of Alpine jade axes that show typological elements derived from early copper axes. 1 : Varna II, grave 1 (*Bulgaria: Krk-variant of the Rarogne type*) ; 2 : Schweicheln (*Germany: St. Michel type*) ; 3 : Peyriac-de-Mer (*France: Pauilhac type*) ; 4 : Zealand (*Denmark: Puy type*). 1, 3 photos P. Pétrequin, 2 photo Steen Hendriksen, Haderslev Museum, 4 photo Rogvi Johansen, Moesgård Museum.

that is, in absolute dates, between 4600/4500 und 4200/4100 BC. They are therefore exactly contemporaneous with the metallurgical phase of interest here, which had started slightly earlier (see below).

Axes of the following types/variants can be recognized among the imports : Krk, Chelles, Durrington, Bégude and small axes. However, it is important to note that many of the axes have been re-shaped locally. In some cases this process of re-shaping mainly affected the shape of the cross-section, which generally changed from oval to (rounded-) rectangular ; in other cases the entire shape was changed, resulting in the creation of a completely new type with strictly rectangular cross-section, the Varna type. It may be that some of these Varna-type axes were exchanged back towards Italy, as indicated by possible finds of this type from Sinj in Croatia (Milosevic 1998). This observation still needs to be confirmed, however.

Finally it should be noted that the importation of Alpine jade axes to Bulgaria seems to be linked closely to the power of the elite leaders buried in the Varna cemeteries to attract exotic luxuries. Alpine jade axes appear in some of the very richest graves of the famous Varna I necropolis (Pétrequin, Cassen *et al.* this book, chapter 26, p. 1231).

2. 2. Imitations of metal artefacts in Alpine rock

No direct imitations of any artefacts of copper or gold in Alpine jade are known. The only definite example of any imitation of such objects in western Europe is the aforementioned haematite pendant from Renongar in Brittany, which copies the south-east European 'idols' made from gold and copper.

2. 3. Alpine jade axes inspired by early metal axes

Several of the large Alpine jade axe types show clear typological characteristics of early metal axes (fig. 18), namely expanded blade ends (seen in the Rarogne, Saint-Michel and Pauilhac types as well as in the Krk-variant of the Rarogne type) and rectangular cross-sections (types Pauilhac and Puy). The former have long been recognised and have played a key role in the dating of these types of Alpine jade axe in the Morbihan, where they concentrate (see for example Roussot-Larroque 2008 : 106ff., with references to older literature). While the parallels between the jade and the metal axes were initially interpreted as evidence that the massive tumuli of the Morbihan were of Bronze Age construction, our improved knowledge both of the dating of the tumuli themselves and of the chronology of early copper axes means that we are dealing with a much older phenomenon (Pétrequin, Cassen *et al.* 2002, Roussot-Larroque 2008 : 110). In the most recent publications, there unfortunately still are misconceptions regarding the chronology applied for jade and copper axes in question. Furthermore, not enough attention has been paid to the difference between copper axes with protruding blade ends and those with splaying blades in comparisons with jade axes.

It would appear that the earliest Alpine jade axes with protruding blade ends -the Rarogne type and its Krk variant as well as the St. Michel type- appeared around 4600 BC while the Pauilhac-type axes, with their protruding blade ends and rectangular cross-section, were produced from *c* 4300 BC onwards, possibly a bit later. The regular production of axes with rectangular cross-section, the Puy type, is of approximately the same age as that of the Pauilhac type (see Pétrequin, Cassen *et al.* this book, chapter 11, p. 648 and fig. 97, p. 689-692).

The copper flat axes that have hitherto been proposed in the literature as probable models for the production of Alpine jade axes with protruding blade ends cannot have played this role, as they post-date the earliest jade examples by at least 500 years (Klassen 2010). This is true for the copper flat axes of the Balaton-Lasinja Culture (*c* 4000-3800 BC : Pétrequin, Cassen *et al.* 2002 : 89) as well as for the axes of Bocca Lorenza type, belonging to the late VBQ Culture or the earliest Lagozza Culture (*c* 4000-3800 BC : Roussot-Larroque 2008 : 110).

The typological problem alluded to above means that care needs to be taken to compare axes with the exact same trait. All jade axes with protruding blade ends have sides that are almost completely straight, so that only the very ends of the blade jut out. This means that it is not valid to compare them with copper axes where the splaying of the blade is partly due to the concavity of the sides. This, along with the chronological disjunction mentioned above, rules out the Bocca Lorenza type copper axes as the models for the jade axes.

As a result we must reject all the previous claims regarding the relationship between metal axes and Alpine jade axes with metallic attributes. But this is not the same as saying that metal artefacts didn't serve as models for the Alpine axes in question. For a fresh evaluation of the problem, it is important to start with the chronological framework as currently established for the Alpine axes. The first copper flat axes of Europe appear indeed just around 4700/4600 BC -the same date as the oldest Alpine jade axes with metallic attributes.

These early copper axes can be found in two different metallurgical centres. The first is located in northern Greece and Bulgaria, from where a handful of objects is known (Todorova 1999 : Abb. 4). The second is in Serbia, from where a much larger number of finds is known from the depositions at Pločnik (Grbič 1929, Stalio 1964). These have recently convincingly been dated to the period in question here (Šljivar *et al.* 2009, Borič 2009). Several of the Greek/Bulgarian and the majority of the Serbian finds in question show faintly developed protruding edge corners, while their blades do not splay (fig. 19.1). Therefore they are well comparable to the Alpine axe types under discussion with regard to this important trait, and they could well have played a role in the creation of the Rarogne, St. Michel and Krk types/variants. If so, it should be possible to demonstrate a connection between the production area of the Alpine axes at Mont Viso and Mont Beigua in north-west Italy and the distribution area of the metal axes in Bulgaria/northern Greece and/or Serbia. It is in fact possible to do so.

The key find for the assessment is the Alpine jade axe that was found in grave 1 on the Varna II cemetery, which can be dated to *c* 4500 BC (see Pétrequin, Cassen *et al.* this book, chapter 26, p. 1241, fig. 8). This axe is of the Krk variant of the Rarogne type with protruding edge corners (fig. 18.1). If such an axe could go from the Alps to Varna at the time in question, then the same could have been the case for an early copper axe in the opposite direction. Even though possibly several hundred years younger, the find from Collelungo referred to above might well be an example of the exchange of Bulgarian copper axes to Italy during the 5th millennium BC. The exchange of artefacts from the Varna region towards Italy

might furthermore be attested by re-shaped Alpine axes of the Varna type found in Croatia (see above).

There is therefore every reason to believe that an early Bulgarian or Greek (or Serbian) copper axe could have reached north Italy around 4600 BC and inspired the production of the Rarogne, St. Michel and Krk types/variants of Alpine axes with protruding blade ends in the Mont Viso and Mont Beigua quarries.

Strictly rectangular cross-sections are an innovation linked to the earliest copper flat axes in southeast Europe. The rectangular cross-sections of the Pauilhac and Puy types are therefore very likely to reflect the increased incorporation of metal-related ideas of southeast European origin into the production of Alpine axes. This assumption is clearly corroborated by the fact that the appearance of the very earliest Alpine axes showing rectangular cross-sections - finds of the Puy type from the Chasséen settlement of Parma/Botteghino - is of exactly the same age as the introduction of metallurgy in northern Italy. Besides early Puy type axes, a crucible with adhering copper slag as well as two copper awls were excavated at Parma/ Botteghino (Mazzieri and Santo 2007, Mazzieri, Occhi *et al.* à paraître). This crucible at present is the earliest proof of metallurgy in Italy, while the awls, which also are characteristic for practically all other of the earliest north Italian copper finds (Klassen 2010, Fundliste 1), represent typical southeast European types (see below). The idea that increased influences from southeast Europe led to the introduction of metallurgy in northern Italy around or a bit earlier than 4300 BC and at the same time to the creation of new types of Alpine axes with clear southeast European traits therefore is confirmed.

It should be noted that contrary to what has been argued above for the Rarogne/Krk/St.-Michel types/variants, the observed process not necessarily must be bound to metallurgical innovations in southeast Europe. At least it is possible that Puy type axes are not imitations of southeast European copper axes, but rather copies of the Varna type Alpine jade axes that were exchanged back towards Italy after having been given their distinctive shape by repolishing in Bulgaria (fig. 19.2). Not only do these Varna type axes lack the protruding edge corners as seen on copper axes ; as Alpine jade artefacts, they might have had a more profound design influence on the north Italian communities who were quarrying jades on Viso and Beigua than would copper axes.

The fact that some of the newly created Alpine axes (the Pauilhac type) show strongly accentuated protruding blade ends, while the majority of these new axes (the Puy) type does not, may well be a reflection of different groups' divergent reaction to the incoming influences. At least it is possible that the relatively small production of Pauilhac-type axes could be linked to a single group, working a separate quarry at Mont Viso/Barant (see Pétrequin, Pétrequin *et al.*, this book, chapter 2, p. 70-80).

The first appearance of rectangular cross-sections in flint axes in Bulgaria can be dated to approximately the same time as the first appearance of rectangular cross-sections in Alpine axes (see below). This is hardly a coincidence, put strongly hints at the power of the idea behind this innovation. The changes seen in the production of Alpine axes around or slightly before 4300 BC may therefore neither be linked directly to metallurgical innovations, nor direct imitations of possibly imported re-shaped artefacts (the Varna type), but to the mere power of a new ideas, possibly created by the Varna elites.

• 3. Discussion

3. 1. General remarks

Any evaluation of the evidence presented above must take its point of departure in the overall distribution map fig. 1. This clearly reveals the division of Europe into a western and an eastern cultural area. The origins of this division predate the phenomenon discussed here, and it also continues to exist for millennia afterwards. At the time of interest here (*c.* 4800-3800 BC), the map shows that in general, the distribution areas of large Alpine jade axes on the one hand, and of heavy copper shafthole tools and gold artefacts on the other, are distinct and mutually exclusive. The exceptions that exist can be accounted for by the power of attraction of the social elites in the Varna centre in Bulgaria at one end of Europe, and in the Morbihan and Paris Basin regions at the other.

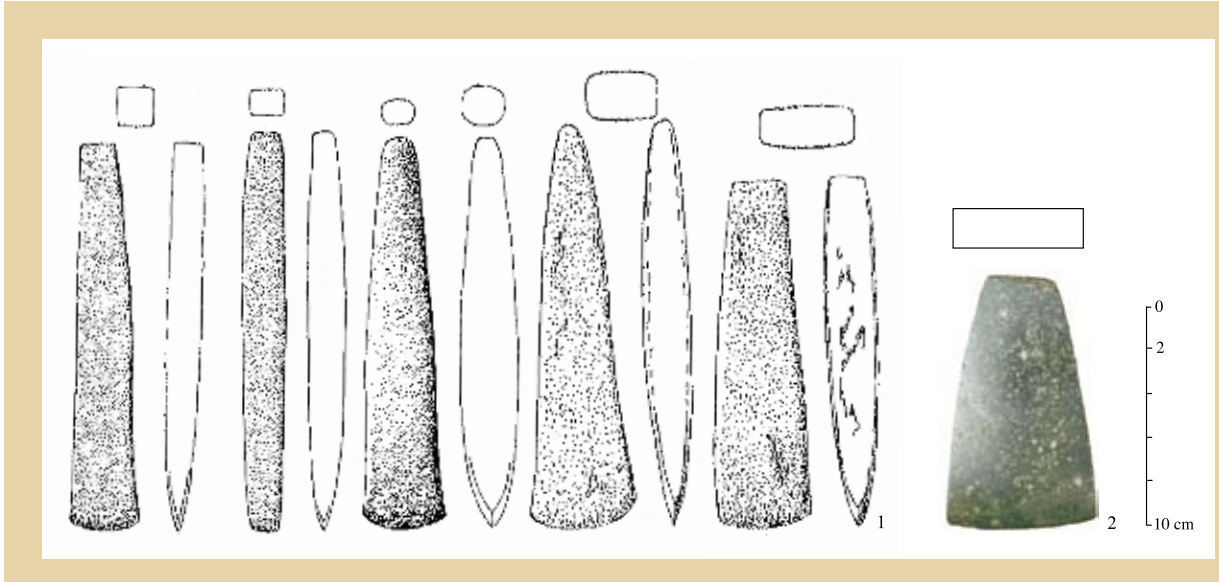

FIG. 19
Possible models for the types of Alpine axe depicted in fig. 18. 1 : The earliest copper flat axes from Bulgaria and Greece (after Todorova 1999). 2 : Alpine axe of type Varna from Varna I, grave 43 (*photo P. Pétrequin*).

The gold finds from Pauilhac, while found outside these regions, were clearly connected to a social elite also, to judge from their find context. The key question to be addressed is : what can we deduce about the significance of this two-part division of Europe between *c* 4800 and 3800 BC.

There is no doubt that the objects that we have been considering all held a considerable prestige value, thanks to the exotic and rare nature of the raw materials involved (Taffinder 1998). However, this prestige value does not account for the mutual exclusivity of the distribution areas : if all elites had desired Alpine jade on the one hand, and copper and gold on the other, the distributions would have been mixed. A second set of values must therefore have been in play. Another point to consider is the very large distances covered in the exchange of some of these objects - mostly large Alpine jade axes, but to a certain degree also some of the metal artefacts. These distances far exceed those normally covered by the exchange of prestige goods in the European Neolithic. It is thus obvious that both the Alpine jade axes and the metal artefacts in question must have had a very strong ritual connotation that was recognized in huge areas of western and central Europe and in south-eastern Europe respectively. The items may have fulfilled a comparable role in their respective societies and therefore would have excluded each other, leading to the observed division of Europe into opposing parts. The different colours -green in western and central Europe, and yellow and red in south-east Europe- may have played a key role in leading elites to select objects of the one colour, and to reject (in general) the objects made of the other colour.

It is very easy to demonstrate that the Alpine jade axes had a strong ritual connotation, as demonstrated, for example, by the fact that the vast majority are not found in settlements or graves, but rather as isolated finds, many in conspicuous locations in the landscape. Furthermore, the vertical deposition of jade axes that has been observed throughout their entire distribution area, including the raw material quarries on Mont Viso, demonstrates the existence of universally-held beliefs relating to these exceptional objects (Pétrequin, Cassen *et al.* 2009, Pétrequin, Cassen *et al.* this book, chapter 29, p. 1354).

While comparable deposition practices have not been observed for the heavy copper tools and gold artefacts, which were furthermore produced in many locations, rather than at few centres like the Alpine axes, it is nevertheless possible to show that these items must also have been invested with strong ritual beliefs. How else could it be explained that at Durankulak in Bulgaria, a metal workshop was found in a building interpreted as a temple (Todorova 1999 : 244) ? Furthermore the ritual role of gold artefacts is obvious from the fact that in Varna, investigations of the objects demonstrated that at least a large part of them were made specifically for the burial of high ranking individuals and thus did not serve as everyday adornment (Hartmann 1982 : 39f., Lichardus-Itten 2007 : 17, 20).

As described by Pétrequin *et al.* (this book, chapter 29, p. 1354), due to its indestructibility jade is associated with beliefs in immortality in societies in south-east Asia and central America. It is reserved for the elite and the gods in very complex societies. Exactly the same is true for gold : due to its indestructibility, it symbolises eternity and was used in elite burials to achieve immortality for the deceased, especially by covering the face, but also other body parts. Examples for this practice are numerous and widespread, for example in Africa (in the gold masks of Egyptian pharaohs) ; in Europe (in the gold masks from the shaft graves of Mycenae) and in South America (e.g. at Sipán and Trujillo in Peru : Gebhard 2001 : 10ff.). It is likely that the same beliefs also were bound up in the ritual use of gold in Varna, where some of the famous symbolic graves with clay masks show golden objects covering (*inter alia*) the eyes, mouth and ears (graves 2 and 3 : see, for example, Biegel 1986).

This specific ritual use of gold can be compared to the famous burial suits and masks of jade (nephrite) from the western Han dynasty in China, which were made to achieve immortality for the deceased emperors. Mayan jade (jadeitite, serpentinite) masks from Central America may constitute another possible example, but in addition to being used for death masks in graves these objects also had other ritual uses, which were related to their colour.

The fact that jade and gold, in an amazing range of different cultures and through many millennia, were associated with comparable ritual beliefs around the world indicates that the same was probably also the case in 5th millennium Europe. This lends support to the proposition that objects of jade and gold, and some copper objects, may have fulfilled a comparable role in their respective distribution areas.

The fact that ritual beliefs relating to jade and its green colour were widespread in the distribution area of the large Alpine axes can therefore be seen as one of the main reasons why early metallurgy, in the specific form that existed in south-east Europe, did not spread further west during the 5th millennium than it did. Here it is important to distinguish between the spread of metallurgy in general and that of the production of ritually charged shafthole tools and gold artefacts in particular, as demonstrated by the fact that metallurgy was introduced as early as *c* 4500-4300 BC in northern Italy (Pessina and Tiné 2008 : 132ff., Klassen 2010 and see above). It is certainly no coincidence that, before *c* 4000 BC, the products of this earliest metallurgy seem to be limited to small objects -awls and pins- and to axes that probably imitated Alpine jade axes. The awls and pins, for which a function in flint working has been proposed (Pearce 2000), indicate conclusively that the impulse for the beginnings of metallurgy in Italy came from south-east Europe. Here these items were very common and had been in use from Karanovo II-times (early 6th millennium BC) onwards (Kuna 1981 : 16f. with list of finds). While metalworking was thus introduced in Italy shortly after the middle of the 5th millennium, the products were limited to items with a profane function, or objects that were associated with rituals that did not conflict with those involving jade. No shafthole tools and no flat axes with rectangular cross-sections were made, and gold finds are missing too. These types of artefact were actively rejected by the Neolithic groups of northern Italy who valued jade objects and the ritual beliefs attaching to them.

While the general rejection of heavy shafthole tools of various types in western Europe is evident from the map fig. 1 despite a few exceptions in France, a few comments are necessary with regard to copper flat axes with rectangular cross-sections. This shape of the cross-section is hardly ever merely a question of "fashion", of production technique or of the way of hafting the axes. It is a novelty

introduced with the first copper flat axes and it certainly had a specific symbolic meaning. This is obvious from the phenomenon of flint axes with rectangular cross-sections, which are invented by Gumelniţa communities around 4400 BC and which spread northwards from the Danube as far as the Baltic (Klimscha 2007, Klimscha this book, chapter 25, p. 1208). As producing a flint axe with rectangular cross-section required a completely different and much more complicated technique than producing an axe with an oval cross-section, this spread of axes with rectangular cross-sections is remarkable and can only be explained by the attraction of the specific inherent meaning of the shape. Nor is it coincidental that the new type of jade axe that was created by elites in Varna through reshaping imported Alpine axes, the Varna type, has been given a strictly rectangular cross-section.

3. 2. Jade-metal interaction in the production area of the Alpine jade axes

With these considerations in mind it is now possible to evaluate the dynamics of the relationship between jade and metal using groups in 5th millennium BC Europe as apparent from the evidence of imports, imitations and typologically inspired objects. Before the onset of the widespread circulation of large, ritually charged Alpine jade axes (*c* 4800 BC) and the beginnings of the production of massive copper tools with rectangular cross-sections (*c* 4700/4600 BC), both Alpine axes and copper items had been in circulation for a long time.

Quarries at Mont Viso started to be opened as early as the late 6th millennium BC, but the products - mostly small workaday axes - were only used more or less locally by the Neolithic communities of the Po valley in northern Italy (Errera, Pétrequin *et al*. this book, chapter 13, p. 744). While these items may well have had some ritual significance for the local communities, these beliefs were clearly of regional importance only.

In south-east Europe, copper had been in use from Karanovo II/ late Criş-times (early 6th millennium BC) onwards (e.g. Horedt 1976). Before 4700/4600 BC, only small items such as beads, pins and awls were produced. Such artefacts were comparatively widespread and common, being found for example in the Lengyel culture (Zalai-Gaál 1996). This clearly demonstrates that at this early time, the opposition between metal and jade as bearers of comparable, yet mutually exclusive ritual beliefs did not yet exist, as jade axes seem to appear rather regularly in Lengyel contexts (see above). The same may well be true beyond the Slovakian and Hungarian territory of the Lengyel culture, but since no systematic search for Alpine jade axes has yet been undertaken in south-east Europe, it is impossible to say. The regular co-appearance of jade axes and metal artefacts is yet another clear indication of the fact that it was not just metal artefacts or metallurgy in general that was charged with ritual beliefs comparable to those connected to Alpine jade axes. On the contrary, the present example clearly underlines that these specific beliefs were bound to the production of heavy copper tools (flat axes with rectangular cross-section and shafthole tools). Copper working was thus an innovation promoted by social elites, for whom the ritual manipulation of metal artefacts offered a way of enhancing their power.

As described in a previous section, the earliest ritually charged copper tools were made from *c* 4700/4600 BC in two different regions (southern Bulgaria/northern Greece and Serbia), but around 4400 BC, production spread to other parts of Bulgaria and possibly also Romania. Gold begins to appear in graves in Bulgaria (Varna II, grave 3) around 4600 BC and has not yet been found in comparatively early contexts in other regions.

By *c* 4300/4200 BC, the copper tools in question also were produced in parts of Hungary and Slovakia (Šiška 1964, Bognár-Kutzian 1972, Vizdal 1977, Točik 1991) and gold was used in large quantities especially in the Varna centre, but also in the remainder of the area in which heavy copper tools were made. This phase marks the maximum spread of the production of shafthole tools, while the production of copper flat axes with rectangular cross-section spread further west by *c* 4000 BC.

Long distance, trans-Alpine exchange of large Alpine jade axes started around 4800 BC, as did their transformation from woodworking tools into ritual objects. The emergence of social elites in the Morbihan with their enormous power of attraction by *c* 4700-4600 BC led to an intensification of this exchange ; and the manipulation of the imported objects by re-shaping added to the complexity of ritual beliefs bound to them. Somewhat later, after *c* 4500 BC, the area in which jade axes circulated was enlarged considerably to the north-west and - east by the appearance of the northern family of Alpine jade axe types.

With the creation of the Alpine Rarogne type and its Krk variant, as well as the appearance of the St.-Michel type, all with protruding blade ends, in the quarries at Mont Beigua and Mont Viso *c* 4600 BC, we see the first signs of interaction between the jade-using groups on one side and the metal-using groups on the other side that went beyond a simple exchange. The expanded blade ends, while not exclusively linked to metal objects (see for instance a stone axe with this feature from the Mesolithic Sandarna culture in Sweden, *c* 5000 BC : Hernek 2005 : fig. 7 : 8/9), must have had a specific meaning. It cannot be a coincidence that one of the earliest known Alpine jade axes in Bulgaria is of the Krk variant of the Rarogne type, and that this axe was found in the grave of a member of the social elite (Varna II, grave 1). At the opposite end of Europe, Rarogne and St.-Michel type axes show a marked concentration in Morbihan (fig. 20). Obviously these objects had a special significance to the elites there, who must have made considerable efforts to attract them. The frequent re-shaping of Rarogne type axes into axes of the Tumiac type (possibly also the St.-Michel type) might therefore represent an attempt by the Morbihan elites to adapt and incorporate within their own symbol system the ritual ideas and thoughts from the Varna elites, drawing as they did on the earliest heavy copper flat axes. The marked concentration of Alpine jade axes with protruding blade ends in the Morbihan region clearly underlines the role of the local elites in creating new sets of ritual values and in transcending the opposition between the two major groups of objects of power in 5th millennium BC Europe. The people controlling the quarries in the Mont Viso and Mont Beigua area of northern Italy held a key position in this process. They acted as transmitters of ritual ideas between the two European centres of social evolution in Varna and the Morbihan. The various golden items and shafthole axes found in France - as far as they really do belong to the period in question here - will almost certainly have been transmitted from south-east Europe to France by these Italian groups (fig. 21), even though possibly only at a somewhat later date around 4000 BC.

With the creation of the Pauilhac and Puy types of Alpine axes in the quarries at Mont Viso *c* 4400/4300 BC, the process of integration of south-eastern ritual symbols into the Alpine jade axes reached a new level. There is every reason to believe that this process reflects the dynamics of metal using groups in Bulgaria and the power of the ritual ideas created by social elites in that area, which not only led to the start of production of heavy copper tools in Serbia and Romania at the same time, but probably also to the introduction of metallurgy in Italy.

The number of Alpine axes with protruding blade ends and rectangular cross-section (the Pauilhac type) that were produced is rather restricted, however, as is their distribution, which is confined to the southern parts of the overall distribution area of large Alpine axes (fig. 22). This may reflect the fact that the south-eastern ideas were only adopted by *some* of the groups that used the quarries at Mont Viso and that these groups had some specific trans-Alpine contacts. These contacts led to an influx and acceptance of ritual elements of south-eastern European origin in southern France. But as demonstrated by the (probable) association of two axes of Pauilhac type with golden artefacts at Pauilhac itself, the influx was not restricted to ideas alone, but also comprised physical objects. It thus appears that the social elite that is reflected in the finds from Pauilhac played a role similar to that of its Morbihan counterparts.

The Pauilhac type axes are true symbiotic objects : while taking on several elements of ritually charged south-east European metal artefacts, they still retain a clear jade identity in the choice of raw material, the quality of workmanship, the size and the overall triangular shape. The combination of western and south-eastern elements may reflect the fact that both ideologies had some clear overall commonalities and indicates that at least some groups, to a certain degree, overcame the opposition between green and red/yellow that is demonstrated so clearly in the overall distribution map fig. 1. Through the *Rückstrom* of re-shaped axes, the Morbihan elites may well have played a decisive role in this process (Pétrequin, Cassen *et al.*, in this book, chapter 18, p. 1014). The Pauilhac type axes can best be compared to those copper flat axes that were made as equally symbiotic objects by groups in central Germany and Croatia/Bosnia-Herzegovina after 4000 BC (see above).

While some groups in north Italy thus intensified relations with south-east Europe from around 4600 BC, the majority kept on producing traditional Alpine axes with oval cross-sections (types Durrington and Puymirol) in the

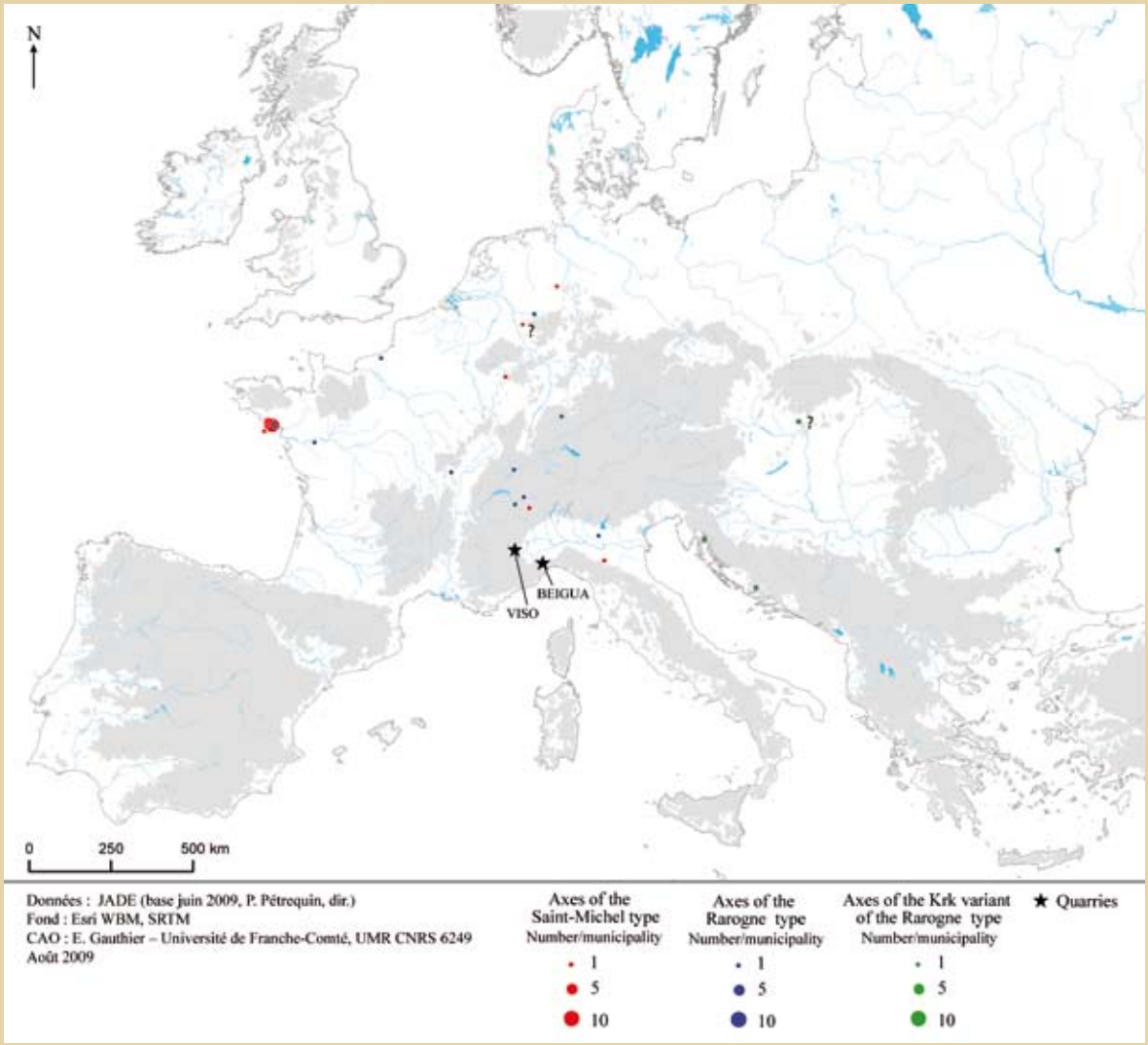

FIG. 20
Distribution of Alpine jade axes of Saint-Michel and Rarogne type including the Krk-variant of the Rarogne-type.

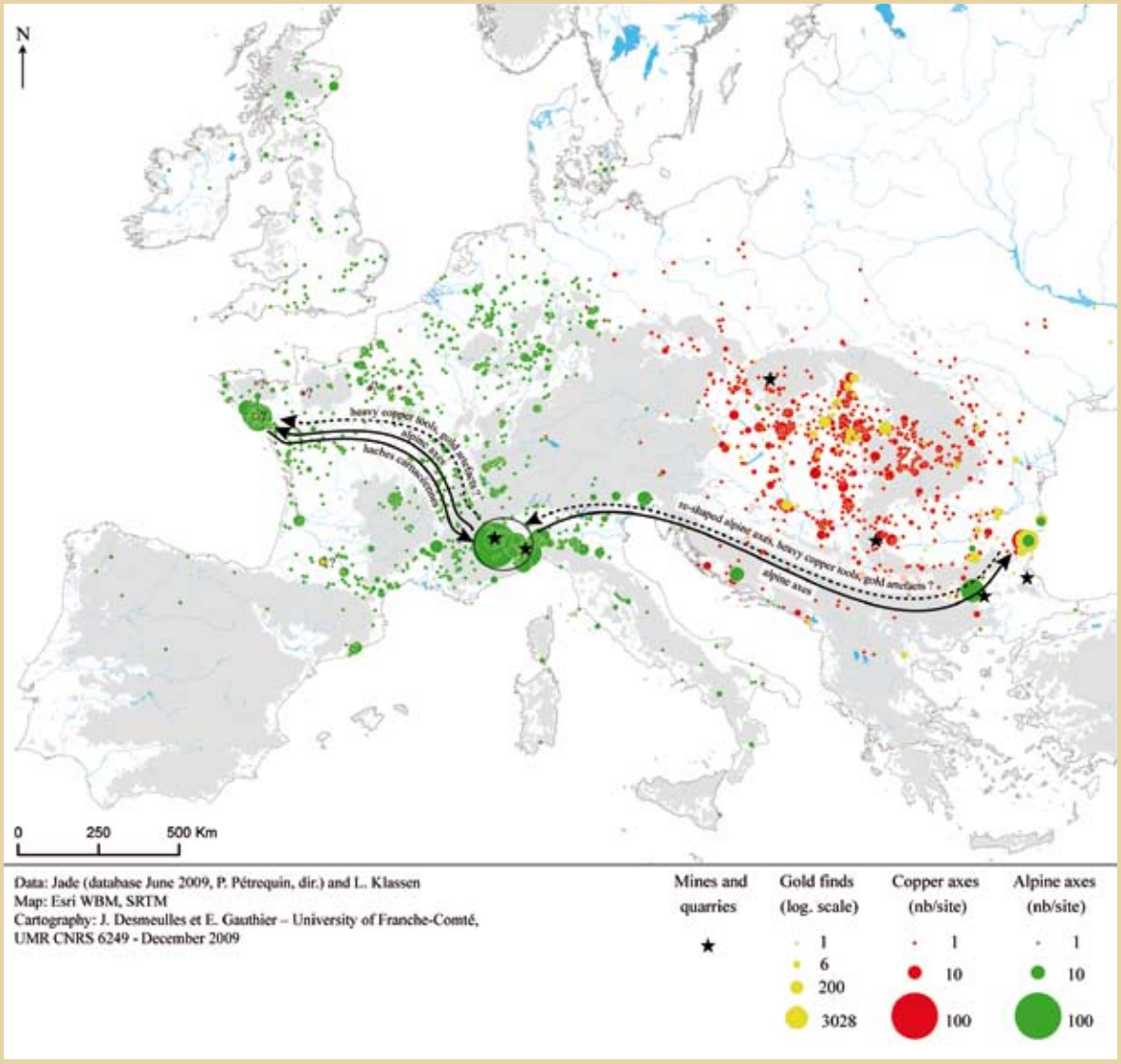

FIG. 21
Schematic representation of possible exchange system across Europe. The axe-producing groups in northern Italy held a key position for the proposed transmission of metal artefacts from south-east Europe to Brittany.

quarries at Mont Viso and Mont Beigua for several hundred years. In fact, the production of these "normal" axes reached its apogee in the middle of the 5th millennium BC, with a huge enlargement of the total circulation area into Germany and Britain and Ireland. The latter relates ultimately to the activities of groups in the Paris Basin ; these people attracted the 'traditional' axes in large numbers and re-shaped them into the typical northern type axes (Altenstadt/Greenlaw and Chenoise).

The Altenstadt/Greenlaw type was probably made by re-shaping jade axes of Durrington type and the longest are around 30 cm. The Altenstadt variant emerged slightly before 4500 BC, while the Greenlaw variant probably is a bit younger. The Chenoise type differs from the Altenstadt/Greenlaw type in several ways besides its shape. From a chronological point of view it is clearly younger than the Altenstadt/Greenlaw type and probably emerges in the last quarter of the 5th millennium BC. The number of known axes of Chenoise type is much lower than that of the other two types, suggesting that its production was of limited scale. The most obvious difference is in their length, with Chenoise type axes regularly approaching 40 cm. It may be that this marked increase in length reflects a reaction, by the people who quarried at Mont Viso, to the ever-growing influences from south-east Europe. It may represent an attempt to keep traditional beliefs alive by producing ever more extreme traditional Alpine jade axes.

Around 4300 BC, the development of the Varna centre reached its apogee, to judge from the wealth of the graves and the complexity of rituals involved (including the creation of symbolic graves). The further enlargement of the area in which heavy copper shafthole tools, flat copper axes with rectangular cross-section and gold objects were made and used - expanding north-west into eastern Hungary and Slovakia- is probably an expression of this development. The overall dynamics of south-east Europe were clearly also felt among the communities using the quarries at Mont Viso and Mont Beigua, since this was the time when the production of Alpine axes with oval cross-sections came to a complete stop and was replaced by the production of the Puy type axes with rectangular cross-section. With the exception of Britain and Ireland (where these axes, with their metal-related symbolic meaning, were either actively rejected or - more likely - present in only small numbers,

thanks to a disruption in contacts with the proximate source area in France during the early 4th millennium), the Puy type spread in large numbers over the entire distribution area of large Alpine jade axes, thus overcoming an old, north-south distributional divide between various kinds of Alpine jade axe (fig. 23). This is also clearly seen in the use of a wide range of different raw materials for Puy type axes, as opposed to the preferred use of dark green rocks for southern type axes and pale/light green rocks for northern type axes (Pétrequin, Croutsch *et al.* 1998, Pétrequin, Sheridan *et al.* 2011). This probably reflects the beginning of the end for the value system that had been linked to Alpine jade axes. It is an appealing thought that the elites in Varna may have played an active and rather direct role in this process, as they created the Varna type of Alpine axe with its clear rectangular cross-section but absence of protruding blade ends. As already mentioned above, some of these axes may have been exchanged back towards Italy where they might have inspired the creation of the Puy type, a few centuries before copper flat axes with rectangular cross-sections began to be produced in Italy.

The largest of all known axes made of jadeitite, a 44.4 cm long item found in Geitelde in northern Germany (axe JADE 2008_203, p. 479, fig.37), is a Puy type axe. The size of this piece is absolutely exceptional, as few other Puy type axes reach lengths of 30 cm and most are much smaller. The Geitelde axe may represent the onset of Puy type production, as it may be an attempt of its producers to compete with the oversized Chenoise-type axes (see above).

When the Varna centre ceased to operate *c* 4100 BC, this did not bring the dynamics of the metal-using communities in south-east Europe to a halt. The Bodrogkeresztúr Culture in eastern Hungary displays a massive production

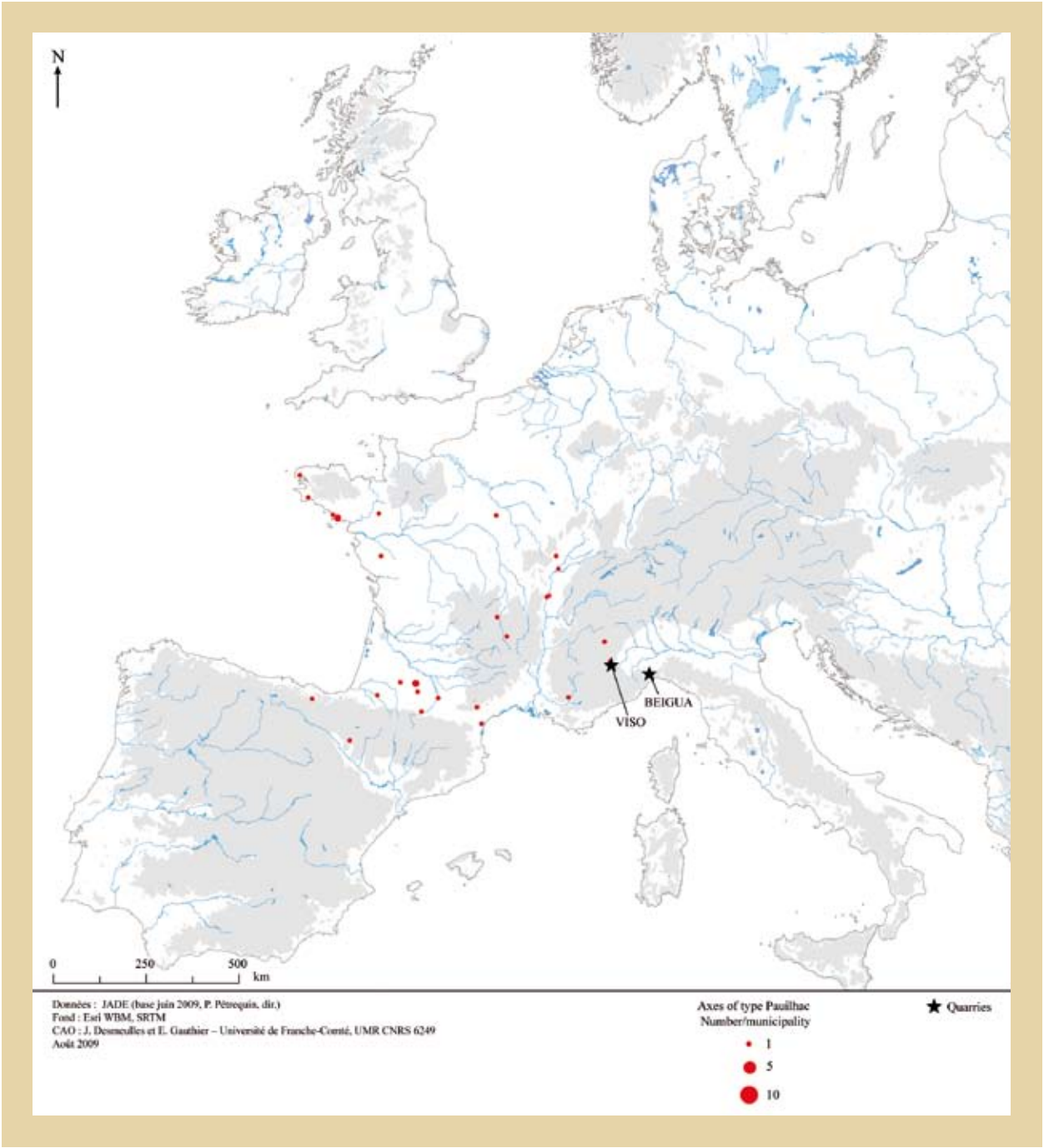

FIG. 22
Distribution of Alpine jade axes of Pauilhac type.

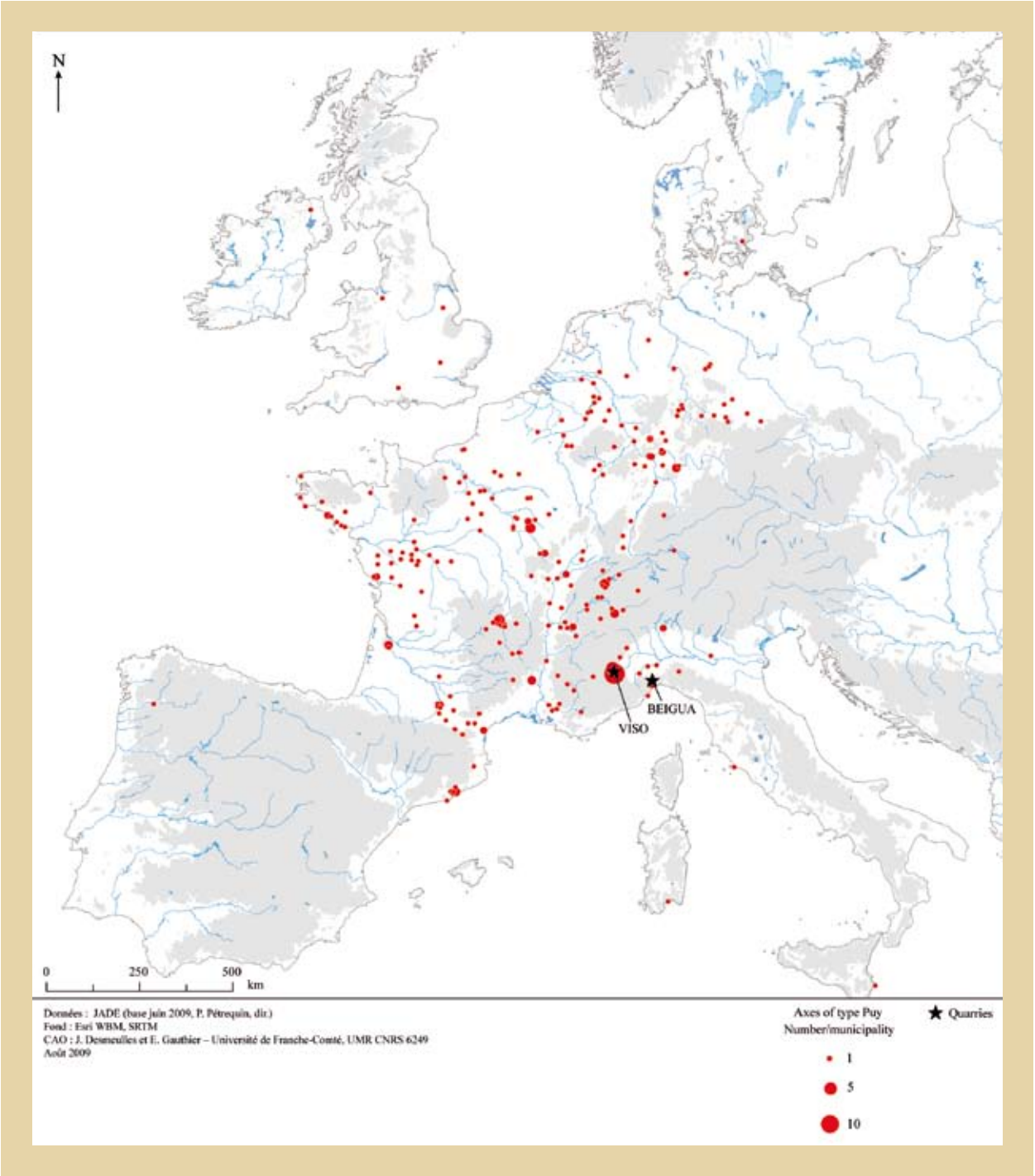

FIG. 23
Distribution of Alpine jade axes of Puy type.

of ritually charged heavy copper tools with and without shaftholes, together with an abundant use of gold (Patay 1975). The emergence of the Jordanów culture in southern Poland, Moravia and Bohemia is clearly a result of Bodrogkeresztúr-dynamics, as is that of the Balaton-Lasinja Culture in western Hungary (Kalicz 1991). The latter cultures actively produced copper flat axes with rectangular cross-sections related to the Szakálhát-type as found in the Bodrogkeresztúr culture ; and in the Balaton-Lasinja Culture, golden objects of ritual function (the bossed discs of Csáford-Stollhof type - Makkay 1985) also played an important role. As already described above, these dynamics also led to the production of copper flat axes with rectangular cross-sections as far away as central Germany from *c* 4000 BC onwards. Due to the distance to the origin of the cultural impulse as well as the circulation of large amounts of huge Alpine axes in that area, these copper axes are not identical to those made in the neighbouring Jordanów culture, but their triangular shape clearly reflects symbolic values bound to the Alpine axes.

The cultural dynamics in the south-east were so strong at this time (at the beginning of the 4th millennium BC) that it arguably triggered the production of copper flat axes with rectangular cross-section even in a restricted region of northern Italy (Klassen 2010). These axes (of Bocca Lorenza type) are practically identical to those produced in the Jordanów culture and would seem to demonstrate that by this time, north Italian groups had started to accept completely the ritual beliefs of south-east Europe and to reject those originally tied to the Alpine jade axes. Within a few centuries this shift in beliefs had spread

throughout northern Italy so that, by 3600 BC at the latest, the production of large, ritually charged Alpine axes in the quarries of Mont Viso and Mont Beigua had ceased completely. From that point in time and for several centuries more, only ordinary small woodworking tools were produced here until the quarries were abandoned around 2300 BC.

• 3. 3. Jade-metal interaction in the periphery : the example of Germany

The opposition between groups that accepted and groups that rejected the ritual ideas from south-east Europe can be demonstrated not only for the production area of Alpine axes in northern Italy, but also far away in Germany and northern France. Possibly after the decline of the mid-5th millennium elite in the Morbihan, a number of large axes that had been re-shaped in this region entered circulation and were exchanged in various directions, including eastwards (Pétrequin, Cassen *et al*. this book, chapter 18, p. 1014). Many of these axes possessed features, such as projecting blade edges, that suggest influence from south-east Europe. In Germany, the deliberate destruction of the blade of one of these axes (of Saint-Michel type, from Saarburg : axe JADE 2008_296, fig. 24, n°1) by precise blows that removed the protruding blade ends could signify the rejection of the specific ideas associated with this type of axe. A second German axe (Mettmann, axe JADE 2008_268, fig. 24, n°2) shows an almost identical destruction of the cutting edge, echoing the Saarburg axe, but in this case destruction is so severe that it cannot be decided with certainty whether the axe had originally been of Saint-Michel type, with protruding blade ends - although it probably had been, given the dark green stone used for this axe. While dark green rocks regularly appear among the stone used to make axes in the Morbihan, they were practically never used to make the northern type axes found in Germany. It is therefore likely that the Mettmann axe had originally been a *carnacéenne* Saint-Michel type axe and not a northern-style axe of Chenoise type. Finally it is hardly a coincidence that the third known Saint-Michel type axe from Germany, an intact example from Schweicheln (axe JADE 2008_301, fig. 18.2) was deposited vertically in the ground (as apparent from its patination), but not with its blade upwards - the usual manner in which axes were 'planted'. Instead, the blade, complete with its protruding ends, was hidden in the ground.

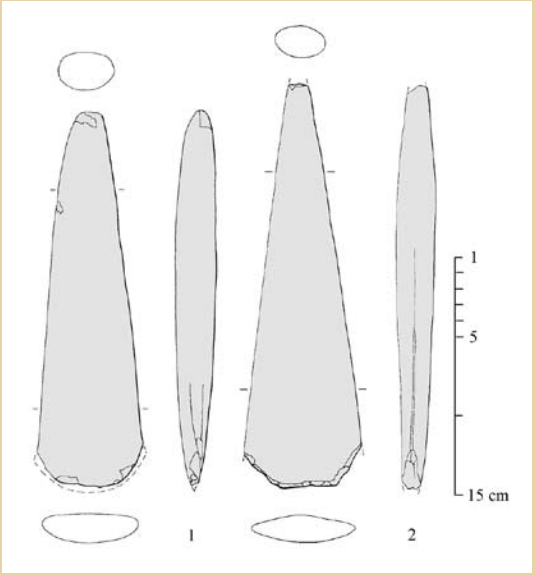

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FIG. 24
Certain and probable axes of Saint-Michel type from Germany with deliberately destroyed cutting edges. 1 : Saarburg ; 2 : Mettmann.

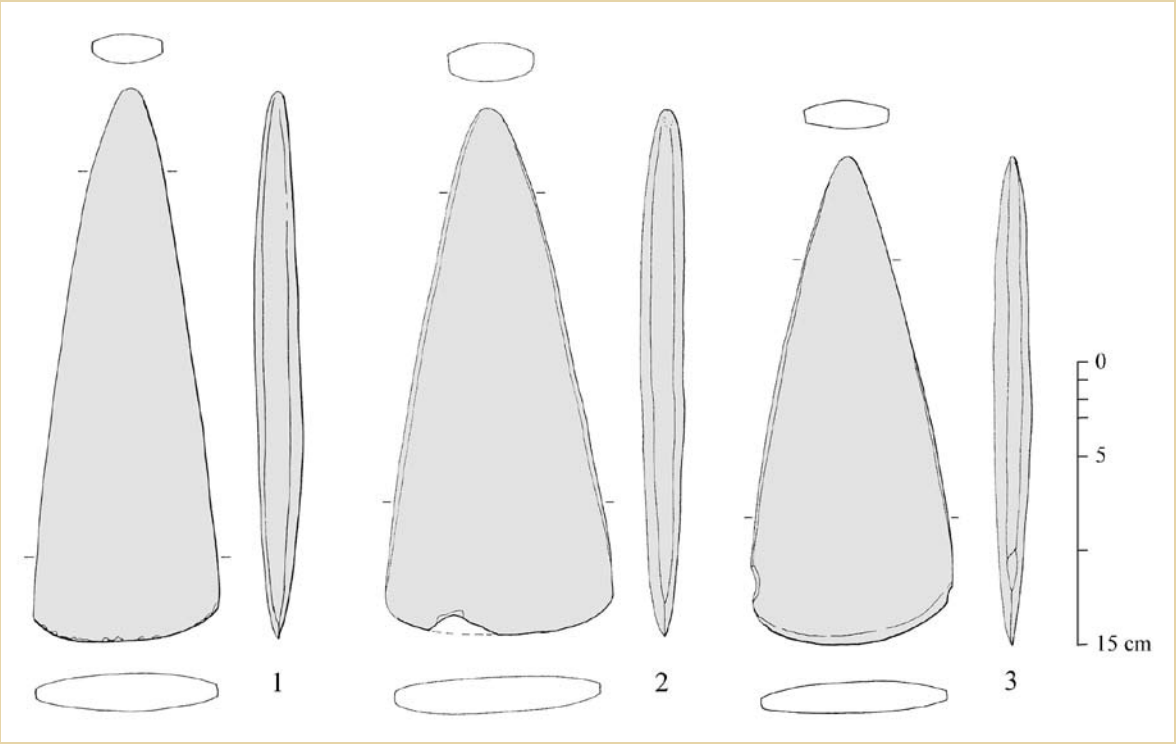

FIG. 25
Examples of large northern type Alpine axes from Germany that have been re-shaped into Puy-type axes. 1 : Cloppenburg ; 2 : Södel ; 3 : Coesfeld.

The opposite reaction, whereby "common" Alpine jade axes with oval cross-section were transformed into objects with metal-related ritual connotations, can also be observed (fig. 25). In Germany and France, several axes of the northern Altenstadt/Greenlaw type were re-shaped into Puy type axes by re-polishing their narrow sides (Coesfeld, axe JADE 2008_184, p. 1486 ; Mainz-Gonsenheim : axe JADE 2008_210, p. 1488 ; Södel, axe JADE 2008_306 ; southern Germany : axe JADE 2008_150 ; Cloppenburg, axe JADE 2008_182 ; Baye : axe JADE 2008_431). In Germany, at least, only the very largest axes were chosen for this transformation, clearly underlining an intention to maintain the importance of these extremely valuable objects. The resulting symbiotic artefacts, which in Germany only are known from the western parts of the country, can be regarded as the counterpart of the triangular copper flat axes in east-central Germany, as both represent symbiotic objects that combined ritual values traditionally associated with either jade or metal. The re-shaped Alpine axes are therefore probably contemporary with the copper finds in question, which dates their re-shaping to the first 200-300 years of the 4th millennium. What can be observed here is a process similar to that described for the development of pottery shapes (Klassen 2004, 288 ff.) in Central Europe, with regionally divergent reactions to western and south-eastern impulses reaching the area.

While some groups thus obviously tried to adapt their objects of power to new ritual beliefs, this action seems only to have had a temporary and limited effect. There seems to be a clear connection between the appearance of Puy type axes -either imported, or else created locally by re-shaping northern type axes- and the deposition (and thus removal from circulation) of some of the largest collections of Alpine jade axe known from Germany, as seen in the hoards from Erfurt-Büssleben (axes JADE 2008_177-181, p. 1485), Mainz-Gonsenheim (axes JADE 2008_206-210, p. 1488) and Coesfeld (axes JADE 2008_183-184, p. 1486). These all contain a single Puy type axe alongside one or several traditional northern type axes. It would appear that the latter lost their high ritual value when the metal-related Puy-type axes appeared in the early 4th millennium BC. An even more explicit example is known from a hoard from Großheubach in Bavaria, where in addition to Alpine jade axes of Chelles and Puy type there was an early 4th millennium copper flat axe with rectangular cross-section (axes JADE 2008_216-220, p. 1489). All these hoards indicate that most large Alpine axes had probably gone out of circulation by c 3800/3700 BC. It is only in remote areas, such as the Altmark (Saxony-Anhalt, Germany) or Denmark, that we see the traditional Alpine axes with oval cross-sections still circulating and having a social value until at least 3500 BC, as apparent from the fact that people were making copper axes in these regions that were either direct imitations (in Denmark) or whose design was heavily influenced by them (in the Altmark).

• 4. Conclusion

By following the distribution and typological development of symbols of power made from Alpine jade on the one hand and from copper and gold on the other between the early 5th and early 4th millennium BC, it is possible to demonstrate how two related sets of ritual beliefs competed with each other over large parts of Europe. It is also possible to show how the elites in the two centres of social evolution in Europe at the time - Varna on the Black Sea and the Morbihan region on the Atlantic coast - created and manipulated these beliefs and thereby indirectly exerted a profound influence on the life of Neolithic groups in large parts of Europe through the circulation of the objects bearing ritual messages. The effects and dynamics of this process are even felt far beyond the main distribution areas of the large Alpine jade axes and ritually charged metal objects. They arguably led, for example, to the Neolithisation of the north European lowlands through the creation of the Funnel Beaker Culture as a mélange of western and south-eastern ideas (Klassen 2004, Klassen, Dobeš *et al.* in press). Over the course of almost one millennium of interaction, metal-related ideas gradually replaced those linked to Alpine jade, and by the middle of the 4th millennium they led to the demise of Alpine jade as a socially valued material. It is a fascinating thought that jade could still have been as much appreciated in western and central Europe as it is today in south-east Asia and central America, had it not been for the ingenuity of the Varna elites.

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Grandes haches alpines du Néolithique européen. Ve et IVe millénaires av. J.-C.

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