Tracing pressure-flaked arrowheads in Europe

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Jan Apel

Introduction

This article takes as its starting point the two slightly different traditions of pressure-flaked arrowheads existing in Scandinavia during the third millennium BC and whose historical and geographical development and relationships involve large parts of Europe.

Pressure-flaked arrowheads are known to exist already in the fifth millennium BC in north Scandinavia (Halén 1994; Skandfer 2005) and Finland (Manninen *et al*. 2003). These traditions most probably had an eastern origin (Darmark MS). It remains unclear exactly how this early phase of lancet-shaped bifacial arrowhead relates to the well established custom of producing bifacial arrowheads with straight bases in local raw materials in Northern Scandinavia during the Late Neolithic and Early Bronze Age (2350–1000 BC) (Forsberg 1989; Hietala 2005; Holm 1991). Hypothetically, these technological traditions could have historic continuity, but there seems to be a hiatus in the production of bifacial points in the region, which rather indicates that they represent two or more separate historical events in which this technology was introduced to northern Fennoscandia from the east.

During the course of the third millennium BC southern Scandinavia is affected by cultural influences from continental Europe that are reflected in the flint technology. In southern Scandinavia the earliest evidence of surface pressure-flaking is dated to the middle of the third millennium BC when lancet-shaped projectile points were introduced to the eastern parts of southern Scandinavia from the Central European Corded Ware complex (Larsson 1999; Vang Petersen 1999). Around 2350 BC tanged and barbed arrowheads were introduced to Jutland as part of the gradual expansion of the European Bell Beaker complex to the north (Sarauw 2006). These arrowheads were made with a technique that involved both soft-hammer percussion and pressure flaking and in the flint-rich areas of southern Scandinavia magnificent arrowheads were produced.

Thus, during the Late Neolithic and Early Bronze Age, two distinct technological traditions produce pressure-flaked arrowheads in Scandinavia: one tradition in southern Scandinavia where arrowheads were produced in high quality flint, and another tradition in northern Fennoscandia where arrowheads were produced in local raw materials of high quality, predominantly quartzite and quartz. In the central parts of Scandinavia simple pressure-flaked arrowheads were produced in south Scandinavian flint, however with a pronounced lack of the skill that characterises the south Scandinavian arrowheads. This lack of skill most likely related to the fact that the population of central Scandinavia lacked local access to high quality flint, and therefore had to rely on flint flakes that were distributed along the same Late Neolithic exchange networks that also distributed flint daggers (Apel 2001). In this context this tradition is regarded as a local variation of the southern tradition.

The northern part of the Mälaren Valley in eastern central Sweden was a border zone where these two different traditions of making bifacial projectile points met (Figure 13.1); a northern tradition, in which projectile points were made from local raw materials through a combination of percussion flaking and pressure flaking, and a central Scandinavian tradition, in which projectile points were made from imported, south Scandinavian flint flakes through edge-pressure flaking (Apel and Darmark 2007; Apel *et al*. 2005). These traditions demarcate a classic cultural barrier between south and north Sweden with roots back

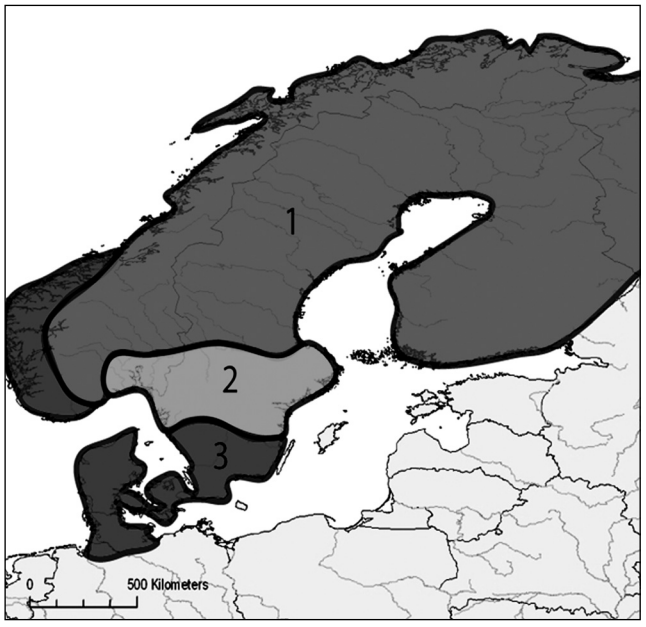

Figure 13.1: The geographical distribution of the Late Neolithic and Early Bronze Age pressure-flaked arrowhead traditions in Fennoscandia (From Apel and Darmark 2007). 1. *The northern tradition where bifacial arrowheads were made in local raw materials with a combination of percussion and pressure techniques.* 2. *The central Scandinavian tradition where bifacial arrowheads were produced with a simple pressure flaking technique on imported thin flakes from southern Scandinavia.* 3. *The southern tradition where bifacial arrowheads were produced on local high quality flint with a combination of percussion and pressure techniques.*

to the Mesolithic. This cultural barrier is also a long lasting division between hunter-gatherers/herders in the north and farming communities in the south. In this paper it is suggested that these two traditions may share a distant common origin and that they have been formed by different historical cultural-historical trajectories. It is therefore relevant to inspect a large geographical area, the whole of Europe and the near East, over a long period of time 6000–1000 BC.

Pressure flaking and the technical production sequence

What type of archaeologically definable units are suitable to use in studies concerning the dynamics between on the one hand material cultural phenomena directly subjected to evolutionary processes, such as selection and drift, and on the other essential cultural phenomena which, due to the inherent cultural conservatism of humans, are reproduced almost intact through the centuries? It has been suggested that a formulation of a relevant taxonomy of the cultural elements of a tool tradition should be based on a detailed mapping of the technological syntax, i.e. the ideas, materials and gestures included in every single production sequence constituting the technology (Darmark and Apel 2008). All of these features can be cultural-specific. In this context it is important to distinguish between individual technological elements and technological syntaxes. A technological element can be defined as an instant event consisting of a combination of a gesture, a tool, a core and an intention. A technological syntax, on the other hand, consists of an ensemble of technical components that are chronologically structured into a sequence that ideally result in a finished artefact with the desired characteristics (Apel 2008; Apel and Darmark 2007; Darmark MS). If a technology is complex enough, it is likely that such syntaxes will be transmitted vertically from parent to child or at least within a fairly close-knit group, as the grammar of a language. The geographical diffusion of individual technical elements happens to a much greater extent horizontally between unrelated people – as the loanwords in a language (Darmark MS). By articulating such a distinction regarding archaeological materials, tools are created which help us understand continuity and change over time and space. Thus, in this context we regard the surface pressure flaking technique as a form of cultural virus that, due to its efficiency, is diffused over large areas (Darmark MS).

In the summer of 2005, a series of experiments (Figure 12.2) were conducted in order to create a distinction between pressure flaking and percussion flaking by looking at the shape of the negative scars on finished projectile points, as well as waste by-products deriving from the making of the projectile points (Darmark and Apel 2008). The aim of the experiments was to balance the knowledge of the operative scheme of projectile point making which comes from practical experience, with a formal way of identifying pressure flaking in waste by-products as well as in finished projectile points. These experiments have been presented in greater detail elsewhere (Darmark and Apel 2008) but it should be mentioned here that we succeeded in independently determining the technique used in about 50% of the flakes stemming from production. More intuitively, the experiments provided an understanding of how the technique would appear on finished projectile points. This understanding formed the basis for the study that is presented below.

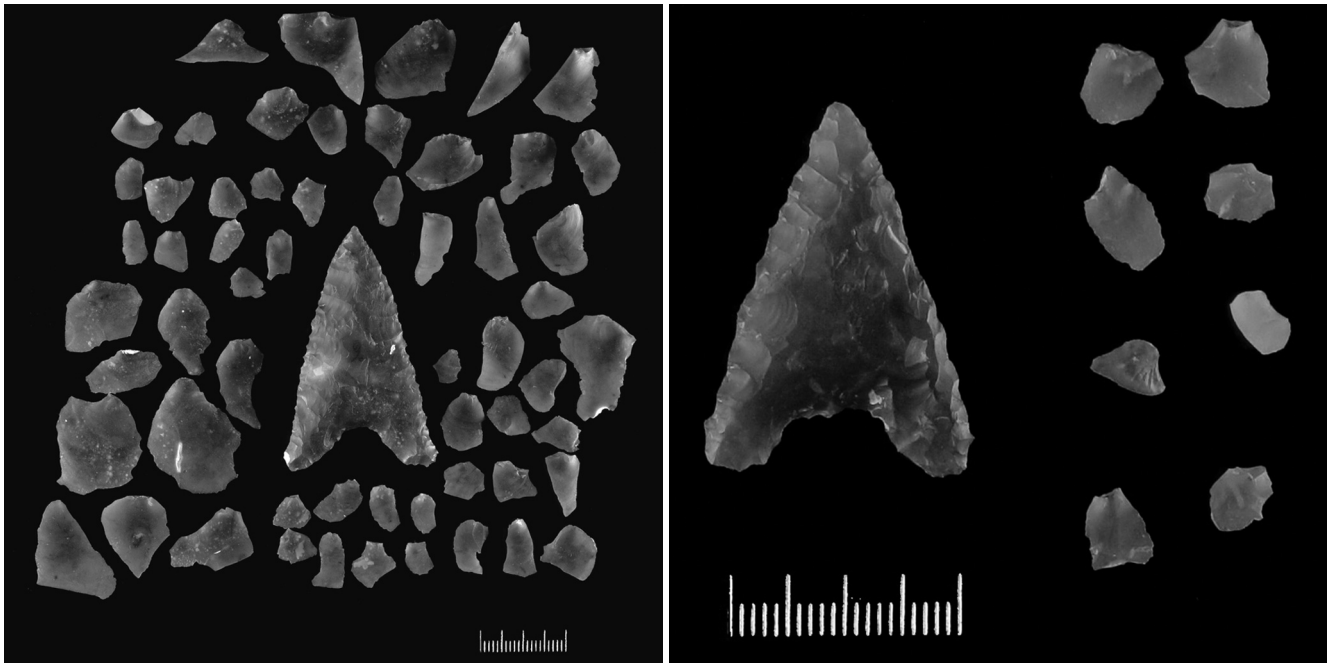

Figure 13.2: Bifacial arrowheads made in flint from the Lejre 2005 experiments. The flakes represent the production waste that was retrieved after using a 5 mm mesh. Left: Arrowhead manufactured with a combination of percussion and pressure flaking. Right: Arrowhead manufactured solely with simple pressure technique (the central Scandinavian tradition).

Pressure-flaked arrowheads in Europe and the Near East, 6000–1000 BC

Early Holocene evidence of the use of surface pressure flaking occurs within the Pre-Pottery Neolithic of Anatolia and the Levant. During this time (*c*. 7500–6000 BC) pressure flaking is used for the retouching of large blades into unifacial and bifacial projectile points. The production of large so-called Byblos and Amuq points continues for a short period of time into the Early Ceramic Neolithic Age. However, during the sixth millennium a conceptual division is made in the flint craft and the large blades formerly used as blanks for projectile points are henceforth used mainly within agriculture as tools for harvesting (Rosen 1997) or threshing (Anderson, *et al*. 2004; see also Knutsson 2007), whereas small blades and flakes are used to produce arrowheads (Copeland 1996: 332:2, 337: 14–15; Rosen 1997: 39). Small points (<4 cm) begin to be made using pressure retouching from 5900–5500 BC during the Late Neolithic period. The most common shapes are the tanged Haparsa point, the oval, shouldered Nizzanim point, and the almond-shaped Herzeliya point (Bar-Yosef 1981: 560ff). It is likely that these points should be viewed in connection with arrows used in archery. In the Levant, the production of these points ceases during the transition to Late Ceramic Neolithic Age, and survives only in the desert regions of Negev, Sinai and southern Jordan (Rosen 1997: 43). During the late Ceramic phase few arrowheads are found in the Anatolian area, from the Balkan Peninsula to the southeast. In the south, the cultures of the Middle East also seem to be experiencing a decline in the use of pressure flaking in the retouching of points. Also in Syria, at the Late Neolithic Tell Sabi Abyad site (5900–5000 BC), the technique is poorly represented. Instead, on the levels 6–4 (5200–5100 BC), unifacial/bifacial pressure retouching occurs in the production of transverse arrowheads on the one hand, and small tanged ones, so called Ubaid/Haparsa points on the other (Copeland 1996). The arrowhead tradition does not form part of the Neolithic package which moves up through the Balkan Peninsula – the Fikirtepe culture beginning around 6000 BC (Özdoğan 1999: 212) – nor does it occur within the Linear Pottery tradition (Gronenborn 1999: 169f; Ošibkina 1996: 27ff). The Early Neolithic stone industry does not seem to be based on pressure retouching in Greece either (Wijnen MS), which is where the first European agricultural societies appear (Runnels 2004).

According to the latest findings, agriculture is introduced in Egypt, in Fayium south of Cairo, between 6000 and 5000 BC, possibly somewhat earlier, although

not before 7000 BC (Hassan 2002: 63; Wetterström 1993/1995: 201). Bifacial, pressure-flaked arrowheads, which are not known in the area before this period (Wenke *et al*. 1988), are part of this agricultural package. There are factors indicating that the impulses for this first phase came from the Levant. In the E75-8 site in Napta Playa, remains of sheep/goats that have not existed naturally in the area but have their origin in the Levant, have been dated to about 5500 BC (Smith 1989: 74). It has also been pointed out that the presence in Egypt of domesticated animals and plants and other ideas which have their origin in southwest Asia, indicates the existence of contacts between these areas during this period (Smith 1989; Trigger 1983). These ideas include for instance sharpened stone axes and various kinds of bifacial arrowheads (Hassan 1988).

The conclusion of this line of reasoning is that agriculture is introduced in Egypt relatively late, if one takes into consideration the early datings that exist of agriculture in the Levant and Turkey. Instead, the Neolithisation takes place almost simultaneously in many parts of the Mediterranean region (Wenke and Casini 1989: 141f). However, surface pressure flaking does not reach the earliest Neolithic cultures immediately east of Mesopotamia; neither the Siyalk culture in present-day Iran, nor the Jeitun culture in present-day Turkmenistan, are associated with projectile points of any kind. Here hunting is done using a bludgeon or a sling (Mellaart 1975: 187f, 212f).

In the western parts of North Africa, the introduction of bifacial thinning using pressure flaking is associated with the introduction of farming (Rahmani, personal communication; see also Clarke 1970), which is traditionally set at about 5000 BC. According to Clarke (1970: 200), bifacial arrowheads are associated with the earliest Neolithic phase in the northwest of North Africa (*Neolithic of Capsian Tradition*). Therefore it seems as if bifacial pressure flaking follows farming west during the first wave of distribution south of the Mediterranean. However, this is not true for the earliest spread of agriculture west along the north shores of the Mediterranean, which takes place earlier and can be placed in connection with the Cardial Ware tradition. In Greece, the Balkan Peninsula, Italy, France and the Iberian Peninsula, bifacial thinning using pressure flaking is not included in the introduction of agriculture. The production of bifacial arrowheads using pressure flaking does not emerge on the Iberian Peninsula until the middle fourth century BC (Zilhao, personal communication). Moreover, this applies for the spread of the agricultural package north along the dell of the Danube in connection with the early Linear Pottery culture. Prior to 3500 BC, bifacial thinning using pressure flaking is associated with agriculture only in the Levant, Anatolia, and northern Africa. There are no indications of bifacial thinning using pressure flaking in the northern and central parts of Europe which are affected by the Linear Pottery complex. During the Early Neolithic phase, the stone craft in these regions is characterised by a microlith-based technique which relates to neighbouring Mesolithic traditions where transverse arrowheads, for instance, can be connected to the use of a bow.

In central Europe, surface pressure flaking appear as early as 4000 BC. Since it seems as if the surface pressure technique is reintroduced to Europe from the Levant and Anatolia along two different routes (Figure 13.3) we must expect a fair amount of blending between different traditions. In north Europe, pressure flaking is introduced from two different areas which in turn share a common area of origin; on the one hand from the east around 3000 BC in connection with an early expansion of the Corded Ware culture, on the other in connection with the expansion of the Bell-Beaker culture from the Iberian Peninsula which begins around 3200 BC. In the Netherlands, the Schipluiden site, which is situated by the coastline and has been dated to *c*. 3500 BC, eighty-eight triangular, bifacial, flint arrowheads and large amounts of waste by-products have been gathered (Van Gijn *et al.* 2006: 142ff). Use-wear analyses of forty-one points from the site show that seventeen points have impact damage and a linear polish which is often associated with archery (Van Gijn *et al.* 2006: 158).

It is important to point out that the social context of the pressure-flaked, bifacially thinned arrowheads has changed in this later phase. If the bow was associated with hunting during the second phase, it is later associated with individual graves starting with the appearance of the influences at the north of the coast of the Black Sea around 5000 BC and from there farther west into central Europe. This could indicate that the bow should be regarded as a weapon and part of a warrior's equipment during this period, rather than anything else. Ethnographically, lithic projectile points have been used in connection with either warfare or large game hunting, while the hunting of small game is carried out using organic points (Ellis 1997).

The various Neolithic cultures of the former Soviet Union display ample evidence of the use of surface pressure flaking. From the Baltic states in the west to the Primorsky Krai in the east surface pressure flaking is used in different ways; to shape projectile points, knives, microlithic inserts and zoomorphic/anthropomorphic figurines. Several of these industries are based on blades, such as the cultures of Upper Volga (Ošibkina 1996: 166ff), of the Volga-Kama river

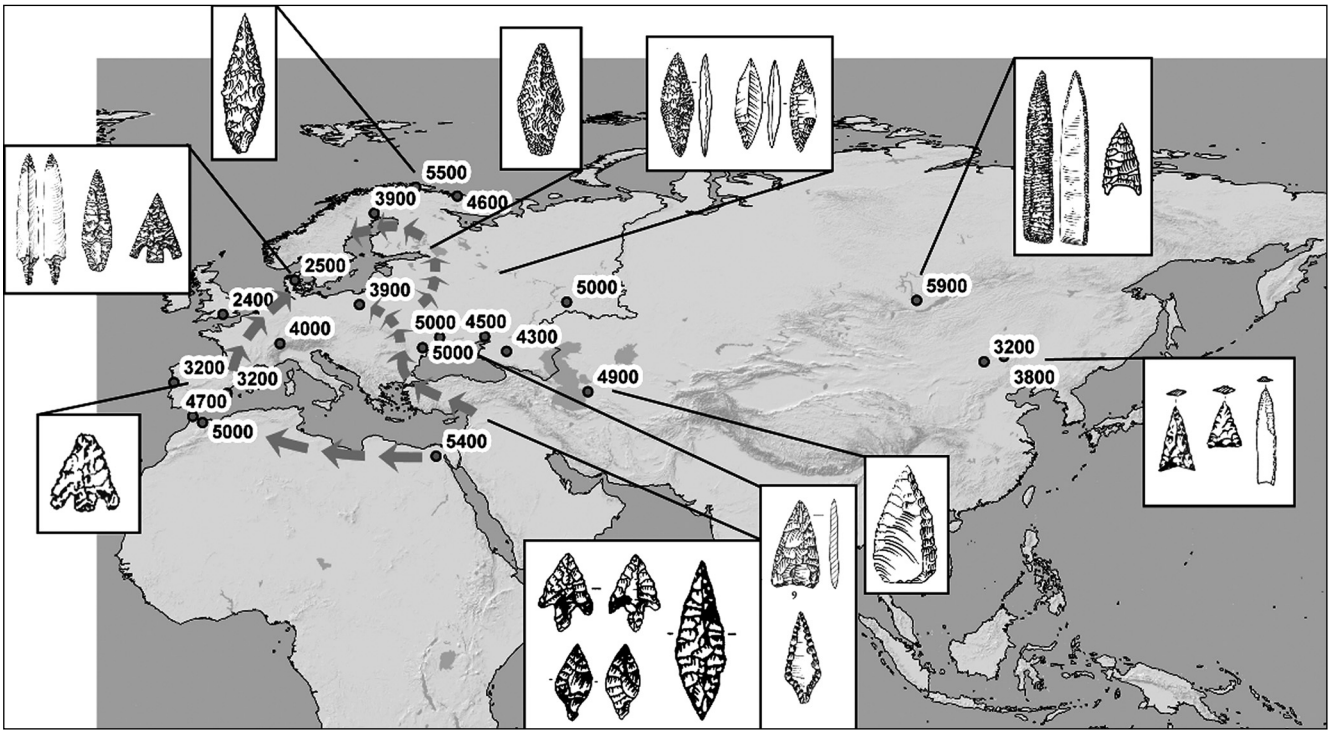

Figure 13.3: Late Holocene surface pressure flaking in the Old World with principal routes of diffusion (From Darmark in press).

basins (Ošibkina 1996: 243ff), or the Novopetrovsk culture in the Priamur (Ošibkina 1996: 318f), while flakes seem to constitute the primary blanks in other industries, such as is the case at the Starodubskoe II site on the Sakhalin Island (Ošibkina 1996: 328). The Baltic Narva Culture is characterised as a 'poor' lithic industry, and the blanks employed seem to have been flakes, modified by edging into small projectile points (Ošibkina 1996: 136ff).

Bifacial thinning using pressure flaking appears to reach southern Russia and Ukraine during the Early Chalcolithic period. Triangular, bifacially retouched points constitute an important element within the Tripolye culture, which comprises present-day Romania (where the tradition is called Cucuteni), Moldavia and western Ukraine (Klochko 2001: 21f). The earliest phase, Tripolye A, is dated to the period 5700–4200 BC, based on twenty-nine datings (Tjernych and Orlovskaja 2004). The development of Cucuteni-Tripolye is followed by the formation of similar groups farther east. From this period copper 'awls' are known from graves in this area and it is likely that they in fact were copper tips for pressure flaking tools (Klochko 2001). Such copper awls have also been connected to pressure flaking in Late Neolithic Italy (Pearce 2000).

Between the rivers Dnieper and Don, pointed-bottom pottery and stone artefacts are found, belonging to the so called Skelya culture which has been dated to around 4550(?)–4100 BC. Blades and triangular, surface-retouched arrow- and spearheads can be noted among the stone artefacts (Rassamakin 1999: 76f). Judging from the correlation between height and width, these are not blade arrowheads but are more likely to have been made from flakes.

Similar flake arrowheads with a triangular shape occur within the Khvalynsk culture further east, around the river Volga. The Khvalynsk culture seems to be influenced by Skelya and has been dated to *c*. 5000–4500 BC (Rassamakin 1999: 61, 107, 111). A similar material culture is found east of the Black Sea, in the north Caucasian Zakubanskaya culture where the same kind of triangular, bifacial points are found (Rassamakin 1999: 110).

In the middle of the Chalceolithic period (*c*. 3800–3400 BC), the projectile points change their appearance somewhat. Several kinds of points are found in the Konstantinovka culture by the river Don, both in settlement contexts and as grave offerings. On the one hand there are large, bifacial leaf-shaped points, and on the other a kind of point with a slanting tang, as well as fluted points (Rassamakin 1999: 120f).

Further east, in present-day Kazakhstan, the local Mesolithic tradition, influenced by the regions stretching from the Caspian Sea to the Aral Sea in the

southwest, evolves into the first Neolithic culture of the region, the Atbasar culture (Kislenko and Tatarintseva 1999: 187ff). In connection with this, a production of triangular, bifacially thinned projectile points begins in the fifth millennium BC. As concerns dating this fits in very well with the Khvalynsk/Skelya cultures in the west. During the course of the fourth millennium, both the leaf- shaped points and those with a slanted tang appear in the area. Pressure-flaked bifacials constitute an important element within the subsequent Botai culture (Kislenko and Tatarintseva 1999: 203ff).

In Finland, bifacial points made from quartz or flint appear in connection with the transition to the typical Comb Ceramic period around 3900 BC. However, their production seems to cease at the transition to the late Comb Ceramic period 500 years later. During the Early Metal Age, the production of bifacials re-emerges in a somewhat different shape, using flint, quartz and quartzite (Manninen *et al.* 2003). Simultaneously, around 4150 BC (Kriiska 2001), the same kinds of rhombic and almond-shaped points occur also in Estonia as part of the typical Comb Ceramic period (Jaanits 1982: 71). Comb Ceramic points made from Russian flint have also been found in northern Sweden (Halén 1994), but bifacial technology seems to have had no impact until later (Holm 1991). However, there are considerably earlier datings of pressure retouched points on the North Calotte; on the Kola Peninsula there are datings as far back as to 4600 BC (Gurina 1997). Even earlier datings have been obtained from the early northern Comb Ceramic culture at the Varangerfjord containing elements of bifacials made by pressure flaking, recently presented by Skandfer (2005). Here the craft seems to exist as early as 5500 BC. However, it should be noted that these points have been dated only with reference to the shoreline.

In south Scandinavia, pressure flaking is part of the technological recipe within the younger Pitted Ware Culture of Denmark, Western Sweden and Southern Norway (Vang Petersen 1999: 79ff), where projectiles are fashioned from blades employing surface pressure flaking. True bifacially thinned points made with pressure flaking occur in southern Scandinavia around 2500 BC. It is a matter of at least two different kinds: an eastern one which is related to the Corded Ware complex of northern Europe, and a western one which has its origin in the Bell-Beaker culture of Western Europe. In Scania and the southeast of Denmark, a number of lancet-shaped Corded Ware points have been found which are common south of the Baltic Sea, in Mecklenburg and central Germany (Larsson 1999; Vang Petersen 1993: 92). In western Scandinavia, bifacial points occur in graves around 2350 BC, along with bell-beakers and slate wrist guards (Sarauw 2006). Bell-Beaker points are relatively common in western Norway as well (Østmo 2006), but only a handful of these points have been found in Sweden, especially in the western parts of the country. This distribution patterns follows closely the distribution of the contemporary pressure-flaked Danish flint daggers of Type IC (Apel 2001) and no doubt the contacts over the north sea (Skagerrak) during the late third millennium BC was possible due to advances in maritime technology (Kvalø 2007; Østmo 2005) The points which can be connected to the Bell-Beaker complex are mainly of two kinds: one kind, which is common in the archers' graves on Jutland (Sarauw 2006), consists of triangular, bifacially thinned points with a deep indentation in the base (Vang Petersen 1993: 92f), and the other, which in Scandinavia has been gathered primarily as stray finds, is made up of triangular, bifacially thinned points with a small tang. The latter type originated in Early Neolithic North Africa/Iberian Peninsula and is known in the Bell Beaker contexts of west Europe. After this, bifacial points made from south Scandinavian flint using pressure flaking are common in the south and central parts of Scandinavia, until the flint points are driven out of competition by metal points at the end of the Bronze Age. Northern Mälardalen constitutes the northern border of this tradition.

Summary

From 4000 BC and onwards surface pressure flaking is incorporated on a large scale into the technologies of Northern Africa and Western Europe, Scandinavia included. In Eastern Europe, South-west and Northern Asia surface pressure flaking continues to be used even though there is evidence of a decline in the technology. To what extent this pattern is a result of analogous (local innovation) or homologous development (cultural transmission) is a matter of debate. However, we wish to stress certain findings. Firstly, the idea of using bifacial surface pressure flaking for the production of tools, primarily projectile points, infiltrates all of Europe, Northern Africa and the Middle East during the Holocene. Even though the process encompasses several thousands of years for the region as a whole, the technology gets a vast distribution during a comparatively narrow period of time. Secondly, we get the impression that the technology consequently constitutes a clear taxonomic break, in that it often replaces earlier technologies with which it has few similarities. These factors speak in favour of the technology being diffused rather than locally developed, even though the exact routes of

transmission remain obscure and those proposed in this paper need to be viewed as speculative. Another interesting observation is the fact that the bifacial technology at hand in no easy way can be seen as being part of a 'cultural package' together with other Neolithic elements such as pottery or domesticates. If we accept the idea that bifacial technology is diffused rather than autocthonically developed, the diffusion follows other routes and/or time schedules than the diffusion of traditional Neolithic cultural elements. The observed pattern indicates that the technique had selective value because it was effective, safe and resulted in aesthetically attractive artefacts. Thus, to use the language analogy discussed in the introduction of this paper, it should be regarded as a successful 'loanword' that spread rapidly between different populations. However, while the surface pressure technique remained the same, the technological syntax used to produce arrowhead blanks varied locally and regionally according to cultural choices as well as to factors such as the quality of available raw material, mobility patterns and economy.

Judging from the data gathered, it seems as though the change which occurs in the Middle East during the Ceramic Neolithic period – when the production of macro blades is reserved for agriculture, whereas the points become smaller in size and are often made from flakes – has consequences in many parts of Eurasia and northern Africa as well. Bifacial thinning using pressure flaking is part of the Neolithic package which reaches Egypt around 5500 BC, and which quickly covers the entire Maghreb region all the way to Spain. The Neolithisation of the Black Sea region which occurs somewhat later (*c*. 5000 BC) is also characterised by the existence of pressure retouched points, not least in grave contexts. The datings collected indicate that there is certain slowness in the adoption of the technique in central and northern Europe, with relatively late datings. One obvious exception from the pattern are early dates from the North Calotte, where the use of bifacial pressure flaking begins almost simultaneously with the change described in the Middle East.

In Scandinavia, the surface pressure flaking technique was introduced at several points in time and in differing economic and environmental contexts. During the fifth millennium BC an introduction took place among the hunter-gatherer populations of northern Fennoscandia. This tradition of making bifacial arrowheads in northern Scandinavia using local raw materials may have had historical continuity until the Bronze Age but it is also possible that the technique was abandoned or forgotten and then reintroduced from the east on several occasions. In southern Scandinavia this way of making bifacial arrowheads was independently introduced from two cultural spheres: from the Corded Ware tradition around 2500 BC and from the Bell Beaker tradition around 2350 BC. In eastern central Sweden the north and south tradition were practised side by side over at least 1000 years until arrowheads for large game and warfare were beginning to be made in iron.

From a regional perspective it may appear as if these techniques are unrelated. They were practised on each side of a well known natural and cultural border, the river Dalälven, and they may reflect different ethnic groups. However, looking at the distribution of the surface pressure technique in time and space it seems as if the northern and central Scandinavian traditions discussed in this paper may have deeper historical roots transcending traditional cultural historical and economical borders.

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