



Please help us find the origins of Greek and Italian Early Neolithic lever pressure-flaking!

Denis Guilbeau, Catherine Perlès

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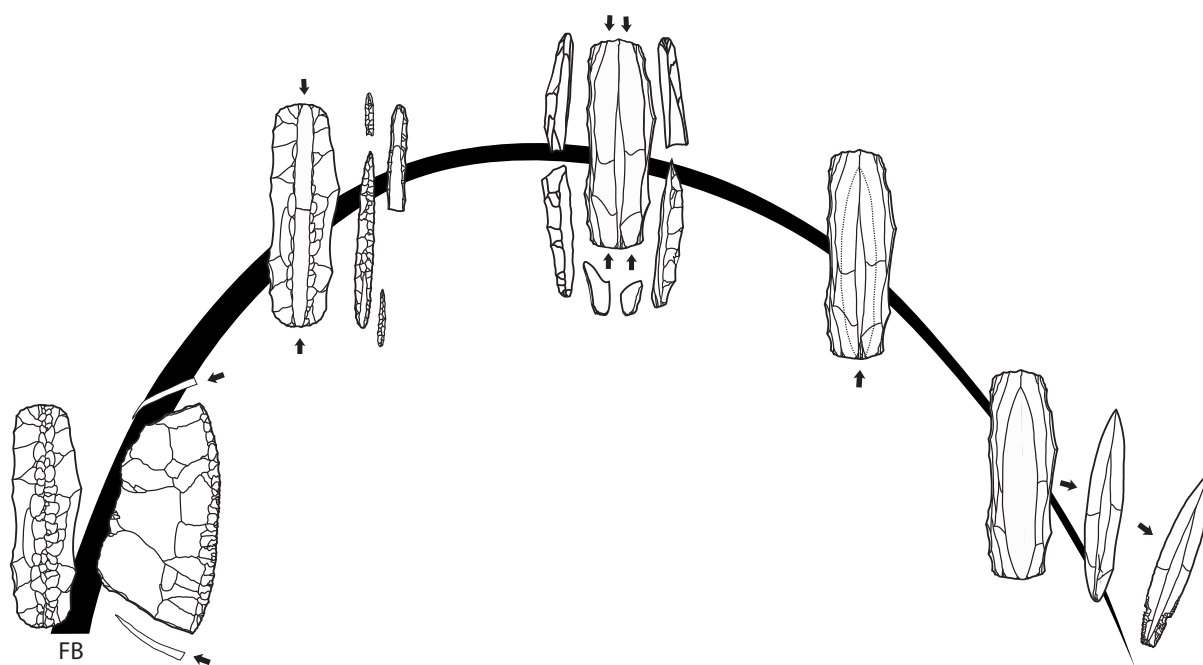
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NEAR EASTERN LITHIC TECHNOLOGIES ON THE MOVE. INTERACTIONS AND CONTEXTS IN NEOLITHIC TRADITIONS

8th International Conference on PPN Chipped and Ground Stone
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edited by

Laurence Astruc, Carole McCartney, François Briois
and Vasiliki Kassianidou



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This volume is dedicated to the late
Nikolai Ottovitch Bader, Nur Balkan-Atli, Edgar Peltenburg and Klaus Schmit

The opportunity to hear about ongoing field-work and new discoveries in parts of the Middle East—in spite of the devastation occurring elsewhere. Like our recently departed colleagues, whom we miss, we are united by a passion for prehistory. The PPN8 participants expressed this passion by reaching across ideological boundaries to share data, debate concepts and join in reveries that allow us to preserve the best of what makes the Near East so special to all of us.

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Please help us find the origins of Greek and Italian Early Neolithic lever pressure-flaking!

Denis Guilbeau and Catherine Perlès

Abstract

The Neolithic way-of-life is considered to have been introduced in Greece and southern Italy by migrant farmers from Anatolia or the Near East, during the 7th millennium cal. BC in Greece, the early 6th millennium in Italy. In both regions Early Neolithic lithic assemblages yielded long blades produced by a very specific technique, pressure-flaking with a lever. The raw materials and technical details differ, but independent local invention of this complex technique, which requires important know-how and knowledge, appears highly unlikely. It can thus be presumed that pressure-flaking with a lever was introduced with all the other new elements and techniques brought by Neolithic farmers, and that its origins must be sought in Anatolia and the Levant. The earliest evidence for lever pressure in these regions is provided by the large obsidian blades from Çayönü, in the second half of the 8th millennium, followed, one millennium later, by the obsidian blades of Sabi Abyad 1. According to the raw material, the workshops must have been located in eastern Anatolia (Bingöl/Nemrut Dağ area).

A direct introduction of the technique from eastern Anatolia to Greece and Italy can be ruled out, but lever pressure-flaking has only been mentioned in western Anatolia in Çukuriçi, near Izmir, on Melian obsidian and on a supposedly local flint. It is highly unlikely, however, that lever pressure-flaking was restricted to this site or this region. There is indeed no argument in favour of a direct link between the Greek and the Italian earliest Neolithic settlements, which differ with regard to their chronology, architecture, ceramics, etc. We should therefore look for several regions of origin, possibly or probably making use of different raw materials and variants of the technique.

Our presentation, thus, simply wishes to draw attention to these specific productions, whose singularity and specificities constitute an excellent marker of regional technical traditions and should help to define the routes followed by the early colonists of Europe.

Introduction

The production of long blades by pressure-flaking with a lever is one of the most impressive Neolithic innovations in the domain of chipped stone workmanship. It was identified in particular for the exceptional flint blades uncovered at the Varna cemetery in Bulgaria, dating to the mid-5th millennium cal. BC and attributed to the Karanovo VI-Kodjadermen-Gulmenitsa Culture. The longest intact blade measures 43cm and was deposited in the richest tomb (Burial 43), exemplifying the clear relation between the richness of the tomb in terms of the variety and quality of the offerings, and the length of the blade deposited with the deceased (Manolakis 2005: 211–212). The Varna blades are certainly the most spectacular, but they are not, and by far, the oldest in Europe. As we shall show, they are present in Greece and Italy at the dawn of the Neolithic. However, how this elaborate technique reached Europe and where it came from remain to be investigated. Our presentation thus wishes to draw attention to these specific productions, whose singularity should constitute an excellent marker of regional technical traditions and help to define the routes followed by the early Neolithic colonists of Europe.

Pressure-flaking with a lever is the most demanding technique in blade production (Manolakis 2005, 2006; Pelegrin 2006). Jacques Pelegrin, who has done extensive experimentation on pressure-flaking, has defined five pressure-flaking modes (**Fig. 1**) that require more and more force as the products detached become larger (Pelegrin 2012a). The amount of force required, however, depends on the width rather than the length of the blade, as stated a long time ago by D. Crabtree (1968; and see Altınbilek-Algül *et al.* 2012: 172). Small bladelets can be detached with a hand-held pressure tool (mode 1) or a shoulder crutch (mode 2). A short crutch used in a sitting position (mode 3) allows the detachment of narrow blades or bladelets, while flint blades up to 20–21mm wide with an organic tip on the crutch, or 21–22mm with a copper

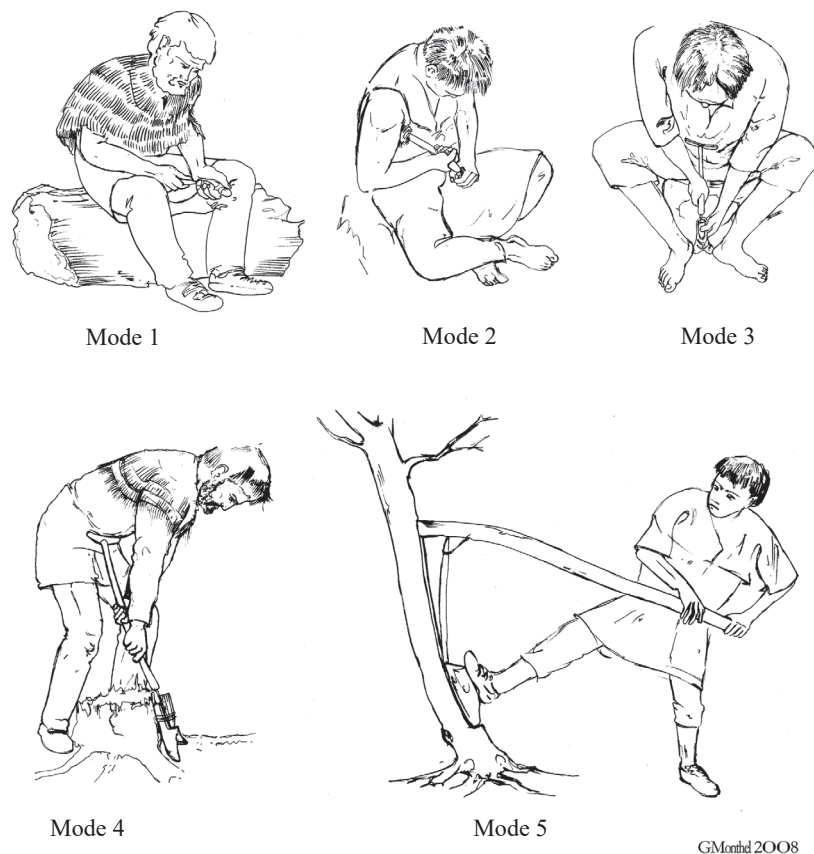


Figure 1. The five modes of pressure-flaking defined by J. Pelegrin (drawings by G. Monthel © J. Pelegrin)

tip, can be produced with a long crutch in a standing position (mode 4). To detach even larger blades by pressure, from 22–40mm wide in flint and 26–40mm or even 50mm wide in obsidian, human strength no longer suffices and the pressure crutch needs to be fixed to a lever, which characterises mode 5 (Pelegrin 1988, 2006, 2012a: fig. 18.10; Altınbilek-Algöl *et al.* 2012: 172). Indeed, according to Pelegrin's estimate, a force of 200–300kg is required to detach a flint blade of 3–4cm wide and 30cm long (Pelegrin 2012a: 477–478). Above 5cm wide, the blade tends to be blocked in the stabilising device, which creates additional difficulties (Pelegrin, *pers. comm.* 27/10/16).

Like all pressure-flaked blades and bladelets, mode 5 blades tend to present a high width/thickness ratio, regular edges and ridges, a straight or only slightly curved profile, a short and usually well-delimited bulb, frequent fine compression ripples but no wide undulations as occur with indirect percussion (Tixier 1984; Pelegrin 1988, 2004; see Astruc *et al.* 2007).

Various lever systems were tested by Pelegrin (1988, 2012a), Volkov and Guiria (1991), Abbès and Arrok (Abbès 2013) and Kelterborn (2012) for instance, and, although some are more effective than others or easier to set up, all allow the detachment of blades. What really matters is the elasticity of the crutch, the previous shaping of the core and its tight immobilisation when high pressure is applied.

The tip of the crutch itself can be made either from antler or from copper. Depending on the tip and on local preferences, the platform can be flat or faceted; consequently, the butts are flat, dihedral or faceted. A lip can occur, especially on blades produced with an antler tip (see Pelegrin 2012b: fig. 4).

Long blades produced by percussion are usually less regular and always more curved. Indirect percussion is the only other technique that allows the production of light regular blades, i.e. with a high ratio width to thickness. However, their dimensions are smaller on average (15–18cm) and the frequent undulations on the detachment surface, caused by the shock of percussion, diminish the overall regularity. The workshops of the Grand-Pressigny are the only ones that, through a very specific method of indirect percussion, succeeded in producing long blades that can compare with the best productions by lever pressure (Pelegrin 2002, 2012b).

If the long blades from Varna are among the most spectacular lever pressure-flaked blades, they are not the earliest in Europe. Pressure-flaked blades are indeed present in the earliest Neolithic contexts from Greece and Italy. These blades are not associated with elite funerary burials but mostly with domestic contexts. They are certainly less spectacular, but they nevertheless demonstrate the very early use of this complex and sophisticated technique.

Neolithic pressure-flaked blades

Greece

Although they were not initially recognised as such, some of the oldest lever pressure-flaked blades probably come from Stratum 31c at Argissa in Thessaly (Fig. 2). This stratum belongs to the debated 'Preceramic' (or Initial Neolithic) phase of this long-lived settlement and may pre-date 6500 cal. BC (Milojčić *et al.* 1962; Perlès 1987, 1990; Reingruber 2005). However, the fragments do not encompass the proximal ends so that the diagnosis remains unconfirmed. The oldest blades in Greece (and in Europe) that can assuredly be identified as pressure-flaked with a lever come from secure Early Neolithic levels at Franchthi (Argolid), dated between 6600 and 6000 cal. BC (Pelegrin 2004; Perlès 2004; Roux *et al.* 2013). The Q5N 57 and H1A 80 proximal fragments (Fig. 2) are highly characteristic with their very prominent, small and well delimited bulb, their rectilinear and perfectly regular profile and rectilinear arises above the counter-bulbs. The wide flat butts without cracks indicate the use of a rather soft tip, such as antler. Even without the proximal part, the rectilinear arises and flat section of G 21 indicate pressure-flaking, while its width clearly required the use of a lever.

Franchthi appears to be especially rich in large lever pressure-flaked blades and yielded numerous Middle Neolithic specimens (ca 6000–5500 cal. BC). Most are segmented and lack their proximal end (Fig. 2). However, despite intense retouching, they too present the three diagnostic features that, when combined, allow the identification of lever pressure: extreme regularity of the dorsal ridges, rectilinear profile and high width to thickness ratio (Pelegrin 1988: 48). The rarely preserved Middle Neolithic butts tend to be faceted, but there is no evidence for the use of a copper tip until the Late Neolithic. A few lighter blades may have been produced with a standing crutch (mode 4), but there is no evidence at Franchthi that this mode of flaking was systematically used after lever pressure-flaking to obtain smaller blanks. The lever pressure-flaked blades were primarily used as sickle blades, with multiple cycles of use and retouch, and often transformed afterwards into a different tool (end-scraper, transverse arrowhead, point) or even re-flaked to produce small bladelets and flakes that are also retouched (Perlès 2004).

This intense use and re-use can be taken as a testimony of their high value, probably linked both to their exotic character and the high quality of the raw material. Pressure-flaked blades are, for the majority, made on several varieties of very fine-grained, homogeneous, translucent beige to brown flints called 'honey flint' by lithic specialists in Greece, but which should not be confused with the Balkan 'honey flint' from Bulgaria (Gurova *et al.* 2016). Large 'honey flint' blades are known all over Greece, from EN Nea Nikomedeia in Macedonia to Alepotrypa

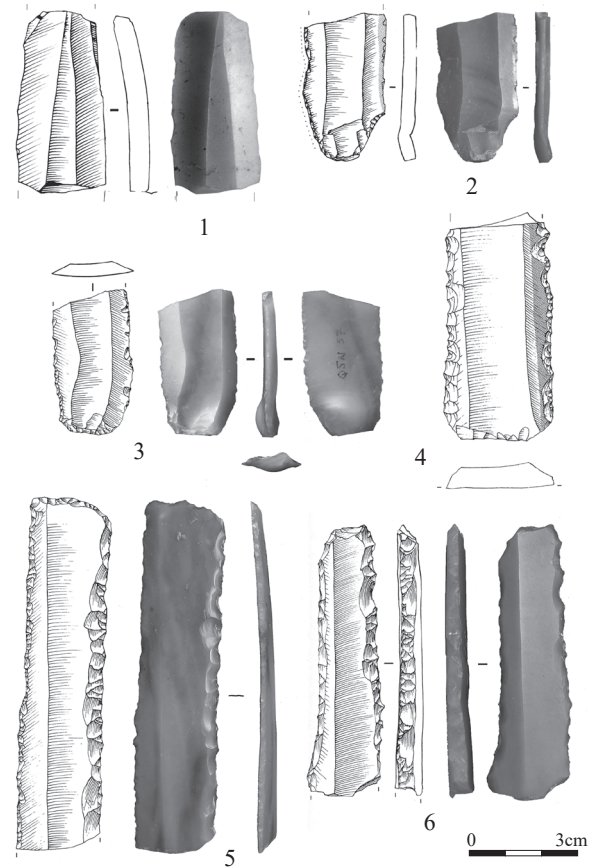


Figure 2. 1. Probable lever pressure-flaked blade from an Initial Neolithic context at Argissa (Thessaly), 2–4. Early Neolithic lever pressure-flaked blades from Franchthi (Argolid), 5–6. Middle Neolithic lever pressure-flaked blades from Franchthi (Argolid) (drawings M. Ballinger, photographs C. Perlès)

in the southern tip of the Peloponnese. They have always been found in small quantities, with no perceptible concentration beyond the west coast, and were always imported as finished products, usually already segmented. The sources and workshops are unknown but may be located on the northwestern coast of Greece and/or in Albania, where a large variety of flints and cherts are exploited alongside the 'honey flints'. The presence of very fresh white cortex on some specimens indicates that the flint was mined from primary deposits.

Pressure-flaked blades constitute a majority of the blanks produced on 'honey flints', but they would not all have required the use of a lever. Narrower blades could have been produced with a standing crutch (mode 4). Examples of these smaller modules (<2cm wide) can be found in the Early Neolithic of Franchthi (Perlès 2004) or the Middle Neolithic of Plateia Magoula Zarkou (Perlès in prep.). Rarer 'honey flint' blades produced by indirect percussion are also found in some Early and Middle Neolithic assemblages. This is the case, for instance, at Nea Nikomedeia in Macedonia or Plateia Magoula Zarkou in Thessaly (*pers. obs.*). Other small blades produced by indirect

percussion were made on a wide variety of exotic siliceous raw materials. Most come from unstratified collections (Chaeroneia, Choirospilia) or date to the Late Neolithic: Kitsos, Ayios Nikolaos, Tharrounia, for instance (*pers. obs.*). Indeed, the use of pressure-flaking on 'honey flints' or other exotic raw materials remains to be demonstrated for the Late Neolithic after 5600 cal. BC.

Italy

In Italy, contrary to Greece, several sources of flint for the production of long blades have been identified (Guilbeau 2010, 2011). The richest are located in Puglia in the Jurassic/Cretaceous and Eocene formations of the Gargano; and were exploited through systematic underground mining since the Early Neolithic (Galiberti 2005; Tarantini & Galiberti 2011). Pressure-flaked blades manufactured by mode 4 and mode 5 techniques were present from the beginning of the Neolithic. The Defensola A mine was already exploited at about 6010–5720 cal. BC and has yielded Archaic impressed ware (Galiberti 2011: 145; Muntoni & Tarantini 2011: 44). Some blades probably crossed the Adriatic Sea and reached Croatia as early as 6000/5900 cal. BC (Brusić 2008; Korona 2009; Mazzucco *et al.* 2018; Podrug *et al.* in press; work in progress of Sonja Kacar and Zlatko Perhoč). In southeastern Italy, lever pressure-flaked blades are attested around 5800 cal. BC during the Guadone phase, in particular at Ripa Tetta and Rendina (Cipolloni 2002; Tozzi 2002; Collina 2016) but may have appeared even earlier. Large pressure-flaked blades become more abundant in the following phases. In the dense network of villages of the Tavoliere plain, southeast Italy, they were mostly found mixed within the total chipped stone assemblages, but sometimes also deposited in caches. From the mid-5th millennium onwards, lever pressure-flaked blades can also be found in graves.

The earliest EN long blades in Gargano flint are wide (about 30mm) and thick (at least 8mm), with straight edges and arises (Fig. 3). From about 5600 cal. BC, long blades become narrower and thinner, about 22mm wide and 5mm thick (at the limit of mode 4), but a few larger blades are still present (Fig. 3). There is a technical and morphological continuum between lever pressure-flaked blades and the blades that were removed subsequently from the same cores by standing pressure (mode 4). The width is, therefore, the only criterion we can use to differentiate them. The butts are faceted or flat, with a wide angle (almost 90°) and a careful preparation resulting in complete removal of the overhang on the dorsal face.

Two very early centres of production are also operating in Sicily (Guilbeau 2010), one linked to the very rich Hyblaean hills flint outcrops. The other has not yet been localised but is most probably in the central-western part of the island.

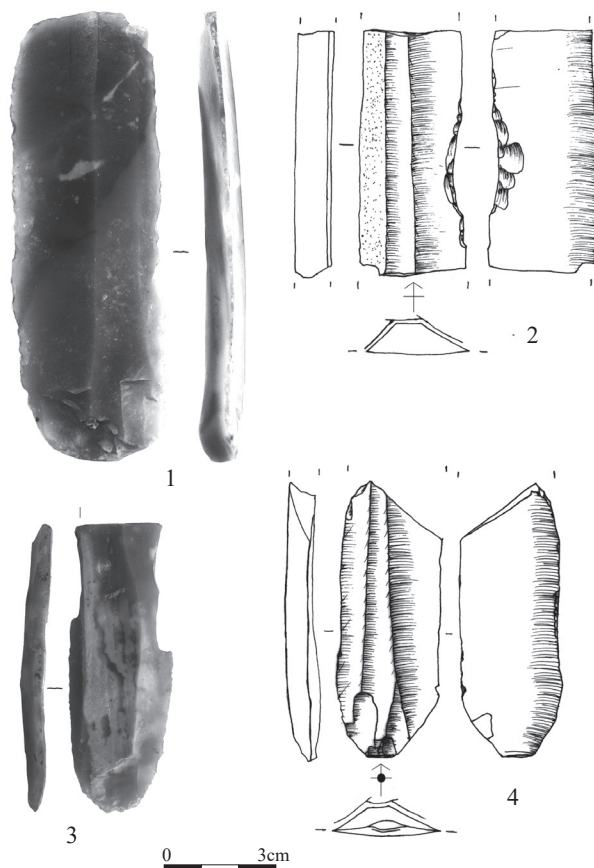


Figure 3. Early Neolithic lever pressure-flaked blades from southeastern Italy, 1. and 3. Ripa Tetta, 2. and 4. Passo di Corvo (drawings and photographs D. Guilbeau)

Distinctions between Greece and Italy

The Italian and Greek productions by lever pressure-flaking share several characteristics, such as the choice of very high quality quarried raw materials, the co-existence of flat and faceted butts, the straight or only slightly curved profiles and a high level of craftsmanship. However, they differ in other aspects: the Italian blades, after the initial phase, tend to be lighter, with a high ratio width to thickness, and to present a more thorough preparation on the dorsal face. Copper may have been used earlier in Italy than in Greece for the tip of the crutch: the platform of the blades tends to be very small and often exhibits a small crack (see Guilbeau 2010: 26, vol. 3; Pelegrin 2012a: fig. 18.19). Most significantly, there is no evidence in Greece that exploitation of the macro-cores was initiated by lever pressure and completed by standing pressure. The smaller pressure-flaked blades tend to be made on a variety of homogeneous flints different from the ones used for lever pressure-flaking. The closest parallels between the two regions thus concern the very earliest phase of long blade production, in the Archaic Impressa phase, and may indicate a common

origin of these specialist flint knappers. Later on, the Italian and Greek productions developed their own idiosyncratic styles.

The origins of lever pressure

The introduction of pressure-flaked blades in Greece and Italy is not synchronous but, in both areas, they seem to appear at the beginning of the Neolithic together with the whole 'Neolithic package': permanent architecture, domesticated plants and animals, pottery, polished stone, etc. There is no antecedent to lever pressure in the microlithic assemblages that characterise the Mesolithic in the two areas or even, in Greece, for standing pressure-flaking (Perlès 1990). Independent local invention of such a complex technique can be ruled out. As stated by Pelegrin (2012a: 493–496), only experienced knappers who had efficiently mastered standing pressure could learn the lever technique through observation. Both standing pressure and lever pressure must have been introduced by the colonists that settled in Greece and southern Italy, and whose Anatolian or Near Eastern origins can no longer be disputed (Paschou *et al.* 2014; Olalde *et al.* 2015; Omrak *et al.* 2016). However, their precise origins and the routes that they followed still escape us. Yet, because pressure-flaking with a lever is such a highly characteristic technique, it could potentially help to define the origins of these groups more precisely.

The earliest identification of the use of lever pressure in Anatolia comes from Çayönü (Binder 2007), for large obsidian blades imported from the Bingöl or Nemrut Dağ outcrops in eastern Anatolia (Altınbilek-Algül *et al.* 2012). It appears in the Late Cell Phase (ca 7500–7250 cal. BC) and persists through the Pottery Neolithic phase. The technique was also identified, a millennium later, at Sabi Abyad 1 in Syria, on imported obsidian blades produced with similar raw materials and techniques to the Çayönü blades (Altınbilek-Algül *et al.* 2012). Given its location, the workshop that supplied Çayönü cannot be considered as a direct source for European Early Neolithic (lever) pressure-flaking. We should, thus, expect to find some milestones on the southern Anatolian coast, or in central and western Anatolia.

On the southern Anatolian coast lever pressure-flaking may be present at Mersin-Yumuktepe, but in the Chalcolithic, thus later than the Greek and Italian Early Neolithic (Baykal-Seeher 1996: 114). On the west coast, it is suspected at Çukuriçi, south of İzmir, on the basis of flint blades just over 20mm wide and obsidian blades just over 26mm wide (Horejs *et al.* 2015: 315). So far, they are attested only during the latest phase of the Neolithic, at the beginning of the 6th millennium, i.e. later than those found in

Greece (Milić this volume). Lever pressure technique is probably present at Uğurlu on Gökçeada Island at the same period, but here again only short blade segments have been recovered and the designation remains to be fully confirmed (Guilbeau & Erdoğu 2011; and *pers. obs.*) We found no other explicit mention of the use of lever pressure in Anatolia or the Levant for the 7th millennium, but, judging from the publications and some personal observations, it is possibly present in the Lakes region and the Marmara region. For instance, several of the blades published by R. Duru for Kuruçay Level 12 (Burdur Province) strongly suggest pressure-flaking with a lever (Duru 1994: pl. 235.3, 7). Some of the blades published by M. Gurova for Ilıpınar 9 and 10 in the eastern Marmara region appear to be at the limit between modes 4 and 5 (Gurova 2006: pl. 5.12). On the other hand, modes 3 and 4 pressure-flaking are abundantly represented in Anatolia (see for instance Balcı 2011: figs 4.2, 5.5, 6). We can, thus, expect more instances of lever pressure-flaking, even if the number of blades may be small compared to those made with less demanding modes of pressure-flaking.

Conclusion

Pressure-flaking, under its different variants, has long been considered as a good criterion for the identification of technical traditions and cultural groups, and for migrating with these culture groups in their movements across space and time (Inizan *et al.* 1992; Inizan & Lechevallier 1994; Gomez-Coutouly 2011; Inizan 2012; Gomez-Coutouly & Ponkratova 2016). Among the different modes of pressure-flaking, lever pressure-flaking is the most demanding and the most complex to implement. It allows for the production of long, wide blades, characterised by very regular edges and arises, a straight or slightly curved profile of regular thickness, the absence of marked undulations on the ventral face and their 'lightness', i.e. a high ratio width to thickness. A circular crack on the butt indicates the use of a copper tip but will be absent with an antler tip. A lever becomes necessary to augment the human force when the blades exceed ca 20–22mm in flint and 26–28mm in obsidian, but it can also be used for smaller modules.

Lever pressure is not ubiquitous, even when pressure-flaking is in use. It demands high quality flint, mining techniques, time, energy and skill. Except when it serves prestige-related purposes, as was the case at Varna, its advantages compared with indirect percussion are not obvious (Perlès 2004; Guilbeau 2010; see also Pelegrin 2002: 98 for the Grand-Pressigny blades). In this respect, lever pressure can be considered as a good marker of technical and cultural traditions. For instance, it is present in Greece from

the Initial Neolithic, but it has not yet been recognised in Bulgaria before the Karanovo 6, some two millennia later. Similarly, it is present in southern Italy in the early 6th millennium, but only spreads to central and northern Italy, in different cultural contexts, a few centuries later. It may appear in France as early as the beginning of the 5th millennium (Bassin de Forcalquier) and co-exists during the 4th millennium with other specialised workshops using indirect percussion (Honegger 2006; Renault 2006; Mazzieri 2010; Pons *et al.* 2015; Vaquer & Renault 2015; Binder 2016; Provost *et al.* 2017).

The precise origins of the groups that brought the Neolithic way of life to Greece and Italy are still uncertain. Lever pressure has never been considered in this perspective but is a good candidate to trace movements of populations, since its transmission requires direct observation and training among specialists. Depending on the raw material available, the stabilising device, the nature of the crutch tip, as well as idiosyncratic traditions, the module of the products and technical traits of the production (e.g. particular preparation, angle, size and morphology of the butt) will vary, thus allowing for the identification of specific technical lineages.

Equally relevant to define specific traditions and cultural affiliation is the status of the long blades produced in each context (Roux *et al.* 2013). Do they constitute a production distinct from average blades, or is there a continuum between pressure-flaking with a lever and standing pressure-flaking? When intact, were these long blades used as tools and discarded with the remaining lithic assemblage, or were they deposited in special contexts, such as burials and caches? Were they produced to answer specific functional needs or to answer specific social demands?

To understand the origins of pressure-flaking with a lever in Europe (and there may well be a number of different origins) we need to trace its diffusion from southeastern Anatolia to western Anatolia. To do this we need to identify the specific technical signatures of the different lineages of craftsmen involved, as well as the specific social signatures of the groups that made use of these blades.

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