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**Odysseas Kakavakis**



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# **Lithics in the Neolithic archaeology of Greece: Capturing the social dynamics of chipped stone technology.**

**Odysseas Kakavakis**

*Ephorate of Antiquities of Athens, Greece*

*odkakavakis@yahoo.com*

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## **Abstract**

Over the years, lithic analysis has become an integral part of Neolithic research in Greece. In the past, chipped stone tools were considered as potential chronological and cultural markers. Pottery, however, and polished stone implements attracted the greatest deal of attention for many decades. During the 1960s, prehistoric archaeology shifted toward a positivist approach away from the culture-historical perspective. Pioneering characterization studies and exchange theories made obsidian a focal point of interest in Aegean archaeology. In the course of time new ideas began to challenge old perspectives, offering different interpretations of the Neolithic past. The concept of the operational sequence or artefact biography started to dominate the field of lithic analysis, providing insight into human behaviour and mind. Currently, the artefact biography approach is used to explore space structuring and depositional practices from a contextual point of view.

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## **Introduction and early background**

This article, focusing on chipped stone, attempts to highlight how lithic studies became integral to the Neolithic archaeology of Greece. Approaches to prehistory are influenced by theoretical trends within the social sciences, and thus over the years there have been various reconstructions and interpretations. In this respect, the following questions arise: what was the role of chipped stone tools in investigating the Greek Neolithic (Fig. 1), and how they became part of the research agenda; furthermore, what is the significance of lithics in the Neolithic archaeology of Greece at present?

At the beginning of prehistoric research in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, archaeologists were familiar with the various stone tools and recognized their contribution to the archaeological record. By that time, after the development of the Three-Age system and thanks to Thomsen's relative chronology (Bahn 2005, 265-266), it was known that stone comprised the main raw material for the manufacture of tools and weapons before the use of

bronze and iron. However, in a period crucial to the structuring of the Greek nation's identity after the establishment of the Greek state in 1830 (Clogg 1992, 47-99), remote prehistory did not serve the dominant ideology since its origins were not clear. From the viewpoint of the culture-historical archaeology, lithics would probably contribute more or less to the establishment of relative chronologies. From an evolutionary perspective, chipped stone compared to polished stone tools represented an early and less sophisticated stage of pre-urban civilization (Mylonas 1928, 120-122). At any rate, lithic artefacts were not considered as significant as pottery, which is obvious in that the former were never discussed as detailed as the latter.

	<b>Early/Middle Neolithic 6700-5400 BC</b>		<b>Late Neolithic 5400-3300 BC</b>	
	<b>Obsidian</b>	<b>Chert/Flint</b>	<b>Obsidian</b>	<b>Chert/Flint</b>
<b>Northern Greece</b>	Very rare	Dominant	Rare	Dominant
<b>Western Thessaly</b>	Rare/Frequent	Dominant	Rare	Dominant
<b>Eastern Thessaly &amp; N. Sporades</b>	Abundant		Dominant	Rare/Frequent
<b>Central &amp; Southern Greece</b>	Dominant	Rare/Frequent	Dominant	Rare
<b>Western Greece &amp; Ionian Islands</b>	Absent	Dominant	Rare	Dominant
<b>Cyclades</b>	Lacuna?		Dominant	Rare/Very rare
<b>Crete</b>	Dominant	Rare	Dominant	Rare/Very rare

**Fig. 1.** Chronological chart showing relative frequency of raw materials (after Perlès 1990a, Tables 3, 4; Andreou et al. 2001, Table 1).

In the first half of the 20<sup>th</sup> century chipped stone tools were treated as ‘miscellaneous finds’, a term implying that the artefacts under discussion were thought of as being of restricted interpretative value. This is apparent in the work of both the Greek Archaeological Society and the Foreign Archaeological Schools (Tsountas 1908, 327-328; Heurtley 1939, 200-201). Stone tools were viewed as evidence of daily routines. Archaeologists published the best preserved and most representative ones, with little or no reference to debitage and

waste products. The approach was descriptive, distinguishing tool types such as knives, scrapers, arrowheads, and sickle-blades. Within this framework, there was not much space for addressing more advanced and complex issues relating to the production, use, and exchange of chipped stone implements.

### **Lithics in broad perspective**

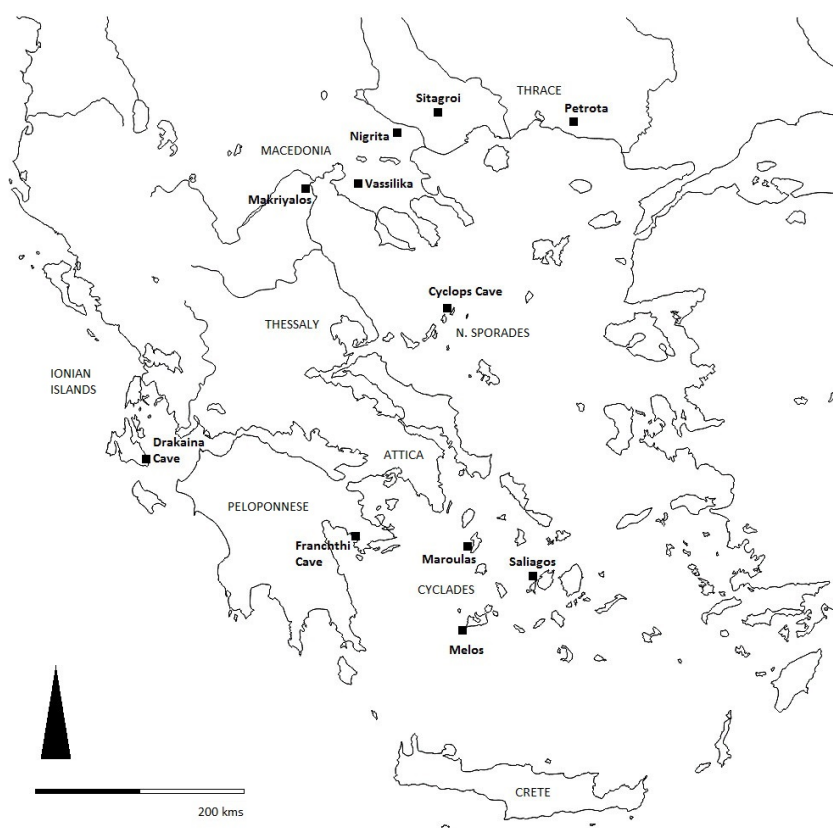
The neo-evolutionary theory of the 1940s and 1950s had a great impact on prehistoric archaeology. The idea put forward was that cultural change is a long-term process of adjustment to external challenges, conditioned by regularities which are detectable in the archaeological record; in addition, culture was viewed as a system with three interacting components which were identified as technological, sociological, and ideological (Steward 1955 and White 1959, cited in Trigger 1989, 289-294). Archaeologists redefined the objectives of the discipline on this basis (Binford 1962). The New Archaeology of the 1960s was determined by the belief that past human behaviour is patterned and predictable in various ways, and for that reason archaeologists need to develop global theories in order to explain cultural change (Sabloff 2005). The concepts of diffusion and population movement were regarded as inadequate for achieving this goal as they focused on artefact classification, aiming at providing regional typological sequences. The new research agenda necessitated the use of natural and formal sciences in the processing and evaluation of the archaeological data. Emphasis was no longer placed on defining cultures and their chronology, but rather on answering questions relating to a variety of subjects, eg environment, demography, survival strategies, exchange, and cultural complexity. In the field of lithic analysis, there was a major shift from typological classifications (Bordes 1961) to techno-functional approaches (Binford and Binford 1966). In this respect, very influential was the English translation of Semenov's work of the 1930s (Semenov 1964).

During the 1960s, a significant number of Greek Neolithic sites were excavated under the influence of these principles. The team of the Saliagos project in the Cyclades had a strong background in lithics (Evans and Renfrew 1968, 42-68). Attention was paid not only to finished tools and debitage products, but also to the numerous waste materials. The latter were regarded as particularly important, because the presence of debris indicates on-site processing. For this reason, the excavation was organized in a manner that enabled the maximum recovery of findings. Another issue important to the Saliagos project was the

provenance of obsidian, which comprised the most abundant raw material of the site's chipped stone industry.

### *Obsidian circulation in Greece*

It was during that period that trace element analysis proved to be appropriate for obsidian characterization. Obsidian is a natural glass that forms under specific conditions in areas of recent volcanic activity, its chemical composition varying significantly depending on the source (Renfrew 2005, 33). This property alongside the fact of being rare enables an accurate provenance definition. Renfrew and his associates were pioneers in this field. Analyzing a wide variety of samples (Cann and Renfrew 1964), they proved that the island of Melos in the Cyclades was the most important obsidian source for prehistoric tool-makers in both insular and mainland Greece (Fig. 2).



**Fig. 2,** Map of Greece with sites mentioned in the text (*d-maps.com*)

In the early 20<sup>th</sup> century, obsidian artefacts found in mainland Greece were assumed to have a Melian provenance. This is not surprising, since the Melos quarries had been

surveyed by the British Archaeological School already by the end of the 19<sup>th</sup> century on the occasion of excavations at the Bronze Age settlement of Phylakopi (Bosanquet 1904). The excavators laid great emphasis on the prehistoric quarries, ascribing the prosperity of the settlement to the trading of fine obsidian blades. Contemporary archaeologists excavating Neolithic sites in mainland Greece pointed out the presence of obsidian artefacts as evidence for contacts with the South, without however attempting to provide further interpretations (Wace and Thompson 1912, 226).

Obsidian circulation in the Aegean was a central issue in Renfrew's research. Challenging the traditional theory (Renfrew et al. 1965), he argued that the prosperity of Phylakopi started at a time when the demand for obsidian had been reduced. In his view, based on field evidence, the Melos quarries were not owned by any authority, and therefore access was neither controlled nor restricted. From this perspective, no actual trade was involved; Neolithic and Bronze Age stone knappers obtained lithic material directly from the sources (ibid. 241-242). In Renfrew's work, obsidian distribution is displayed as an ellipse on the map. Quantities appear to be pretty large as far south as the island of Crete and as far north as Thessaly, that is, within a radius of c 400 kms from the Melos quarries. Farther north, its presence is sporadic.

Holding to the positivist paradigm, Renfrew developed the 'law of monotonic decrement' which predicts that the commodity proportions decline as the distance from the sources increases (Renfrew 1977, 72). Therefore, he used mathematical equations and diagrams to depict various fall-off patterns on the grounds of the relationship between two selected variables: proportion of circulating commodities and distance from sources. The 'down-the-line' model (ibid. 77-79) distinguishes two zones of procurement: the supply zone in which obsidian is plentiful, acquired through direct access at a certain distance from the sources, and the interaction zone in which the raw material is distributed farther in exponentially smaller quantities through bartering with neighboring communities.

In the long run, archaeologists came to believe that exchange systems in prehistory are a more complex issue which cannot be understood by approaching it in terms of artefact frequency against linear distance from sources (Karimali and Karabatsoli 2010, 331-334). From the 1970s onward, the concept of the operational sequence brought new perspective in the field of lithic analysis (Soressi and Geneste 2011, 335-336). Originally termed 'chaîne opératoire' by Leroi-Gourhan (1964), the operational sequence or artefact biography is a methodological tool for reconstructing the processes by which raw materials are converted into finished goods (Lemmonier 1986, 149; LaMotta and Schiffer 2001, 21-24). Being a

reductive process with diagnostic products and by-products, the entire spectrum of stone tool-making can be reconstructed step by step, that is, from raw material procurement to core reduction, tool shaping, and discard. Very influential was the work of Tixier, Inizan, and Roche (1980). At the same time, there has been an increased interest in experimental stone knapping with particular focus on documenting the manufacturing process and the production of diagnostic by-products (Andrefsky 1998, 8).

These developments had a great impact on the study of the Neolithic chipped stone industries of Greece. A basic corpus of data regarding obsidian frequency, stage of importation, and reduction technology was created in the period around 1980 (eg Moundrea-Agrafioti 1981; Perlès 1981). Experts are mainly concerned with analyzing the technological and economical parameters of lithic production as well as capturing the social dimension of technology.

Torrence's fieldwork at the Melos quarries added further evidence supporting the direct access model. Going through different aspects with regard to quarrying techniques, core preparation technology, composition and distribution of knapping floors, she reached the conclusion that obsidian procurement was rather expedient, which does not agree with the commercial trade theory, recognizing though that the stone knappers were efficiently skillful (Torrence 1986, 198-216). Torrence analyzed quantitative and qualitative characteristics of the obsidian waste products left behind at the quarries, ie core roughouts, biface preforms, flake and blade debitage, thereby providing an insight into the knapping activities that took place there over thousands of years. Furthermore, of no less importance is the fact that, despite extensive survey, no traces of permanent settlements earlier than the Early Bronze Age were found on the island (Cherry and Torrence 1982).

Exchange systems in Neolithic Greece were also Perlès' focus of research on the chipped stone industries. Attempting a cognitive approach, Perlès argued that a trip to Melos during that period must have been a very risky task which only experienced navigators would be able to accomplish; in addition she underlined that the production of obsidian blades from carefully prepared prismatic cores presupposes long apprenticeship and a high level of craft specialization (Perlès 1989, 11-12). She also pointed out that Melian obsidian in eastern Thessaly is almost as much abundant as in southern Greece and the Cyclades; the raw material was imported in the settlements in the form of partially or completely prepared blade cores, and the various chipped stone industries exhibited identical techno-morphological characteristics (Perlès 1990a, 17-39). For these reasons, neither direct access nor the down-the-line model suffices to account for obsidian distribution in the Aegean and mainland



Greece. Perlès suggested that Melian obsidian was acquired by specialized knappers from the nearest islands and mainland coastal sites, and that the flaked products were distributed farther by means of itinerant trading (Perlès 1992, 144-145).

Karimali reconsidered the Neolithic modes of production and exchange with regard to obsidian, suggesting the parallel existence of multiple exchange networks across regions. In her view, obsidian networks connected Neolithic communities which were affiliated by virtue of regional and cultural identity (Karimali 1994, 50-57). This suggestion was supported by evidence derived from the study of production and distribution patterns in Thessaly (ibid. 280-338, 371-387). From this point of view, she stressed that the social context of space and distance was a decisive factor for the development of obsidian networks in Neolithic Greece (Karimali 2001, 757-759).

Melian obsidian has also been involved in the debate on the Neolithisation process in Greece, as it is present in the Mesolithic chipped stone industries of the Franchthi Cave in the Argolid (Perlès 1990b), the Cyclops Cave on Youra in the northern Sporades (Kaczanowska and Kozłowski 2008, 169-172, 177-178), and the open site of Maroulas on the Cycladic island of Kythnos (Sampson et al. 2010, 42-56). In the light of the new data, it is argued that the early farmers of central and southern Greece invested socially in the long established network of Melian obsidian, often ignoring the locally available raw materials; this is seen as evidence for the non local origin of the people who first practiced agriculture in these regions (Perlès 2003). It is also suggested that the technological changes observed in obsidian reduction during the transition to the Neolithic, ie the shift from percussion to pressure blade debitage, can be interpreted as resulting from contacts with the eastern Mediterranean (Kaczanowska and Kozłowski 2006, 82). From another perspective, obsidian circulation in the Aegean in both the Mesolithic and Neolithic periods is viewed as evidence for continuity in the field of lithic procurement, and therefore as an indigenous contribution to the Neolithisation process (Sampson 2006, 48-52, 58-59).

### *Lithics other than obsidian*

Obsidian is not abundant in western Thessaly and northern Greece. In these regions, chipped stone industries are mainly composed of various kinds of flint, chert, and quartz. Lithics in northern Greece have been approached from a territorial perspective since the raw materials are mostly of local and regional provenance, as suggested by petrographic analysis (Dimitriadis and Skourtoupoulou 2001). Influenced by theories derived from economic

anthropology (Sahlins 1974), research in the early 1980s yielded a distribution pattern that implied unequal access to lithic resources (Fotiadis 1985, 290-291; Grammenos 1997, 293-297). In this light, it was claimed that some Neolithic communities acquired specific kinds of lithics through exchange.

The above hypothesis was supported by specialized studies on lithic technology, which appeared in the literature from 1990 onward. Working on chipped stone assemblages from central Macedonia, ie the area between the Strymon River and the Thermaic Gulf, Skourtopoulou (2002, 545-546) concluded the existence of a small scale network that specialized in the distribution of local chert. The raw material, which occurs in the Vassilika Valley (Grammenos 1991, 119-120), was processed in the nearest settlements. Partially prepared cores were distributed farther within a radius of c 50 kms.

A rather different model may be proposed for the regionally available yellowish brown flint, which is by far more abundant in eastern Macedonia. Possible sources have been traced northward into the Rhodope Mountains (Dimitriadis and Skourtopoulou 2003, 129-130; Gurova and Nachev 2008, 34), pretty far from the settlements of the Serres and Drama Basins. The only actual evidence for on-site working comes from Sitagroi, the raw material being imported as prepared cores (Tringham 2003, 84). Elsewhere it is found mainly in the form of finished artefacts (eg Séfériadès 1992, 75; Kourtessi-Philippakis 1997, 214; Skourtopoulou 1999, 123). The above evidence is indicative of a regional network which seems more complex in terms of procurement and distribution.

Procurement site identification has contributed to a better understanding of lithic patterns. The Petrota and Nigrita sites, the former located in Thrace (Fotiadis et al. 2003), the latter on the north slopes of Mount Kerdyllia (Kourtessi-Philippakis et al. 1993; Kambouroglou and Peristeri 2008), have provided evidence for outcrop quarrying and lithic processing. The cryptocrystalline material is of various colours, ranging from translucent to opaque (Fig. 3). The presence of knapping floors, composed of numerous debris as well as cores and diagnostic debitage, suggests that stone working during the Neolithic period was to a considerable extent an off-village activity. This evidence may account for the low frequency of cortical flakes and other technical pieces in many domestic chipped stone assemblages.

The Nigrita sources are located at an equal distance from the settlements of both central and eastern Macedonia. However, statistical data regarding raw material frequency and stage of importation imply that the Neolithic settlements west of the Strymon River did not have direct access to the sources (Kakavakis 2011, 200, 261). Landscape negotiation

between neighbouring regions with distinct cultural traits emerges as an important strategy for the long-term management of lithic resources.

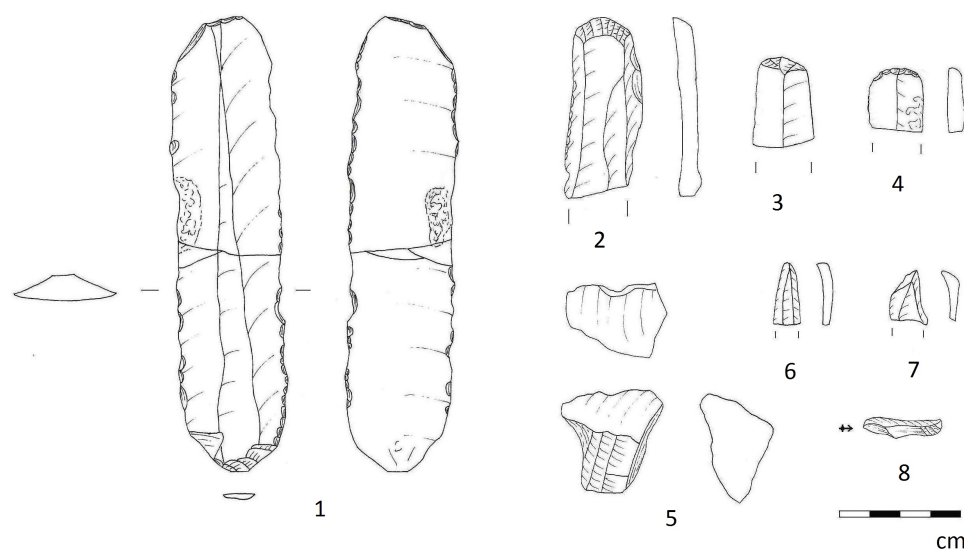


**Fig. 3.** Blade core and blades from Sitagroi (photo: Odysseas Kakavakis)

The Balkan yellowish brown or ‘honey’ flint, probably extracted from sources located in north-eastern Bulgaria, contributes to ongoing discussions on the Neolithisation process (Gurova 2008). Although not plentiful, pressure blades of macroscopically similar material are present in the chipped stone assemblages of Greece already by the Early Neolithic (Kozłowski et al. 1996, 337; Perlès 2001, 202). In the Late Neolithic assemblages of eastern Macedonia (late 6<sup>th</sup> to 4<sup>th</sup> millennia BC), Balkan flint has been distinguished from regionally available yellowish brown flints strictly on technological grounds. According to Manolakakis (2005, 194-196, 201-202, 267-269), the former, which is rare, occurs as large blades produced by pressure, while the latter as smaller blades produced by percussion (Fig. 4).

When chipped stone variation is examined over time and space in connection with other material evidence, a pattern emerges suggesting that the frequency of lithics from distant sources, or from regional sources not directly accessible, is analogous to the frequency of artefacts that carry symbolic connotations, eg decorated pottery, figurines, metal objects, and spondylus shell ornaments. In northern Greece in particular, imported chipped stone tools appear to be more numerous in settlements where expressive material culture is abundant and varied (Kakavakis 2014). This correlation, associated with the rapid growth of social

networks in the course of the 5<sup>th</sup> millennium BC, indicates that indirect procurement of lithics was done in meaningful contexts of interaction.



**Fig. 4.** Yellowish brown flint artefacts from Sitagroi (drawings: Odysseas Kakavakis)

1. Long blade with distal truncation (Balkan flint) 2-4. End scrapers 5. Blade core 6-7. Plunging blades 8. Core platform rejuvenation flake

Over the last decades, thanks to long-term projects and large-scale development works, a significant number of Neolithic settlements were excavated to a great extent, especially in northern Greece (Andreou et al. 2001). Spatial analysis of chipped stone distribution has been undertaken at a number of sites as an attempt to explore space structuring through depositional patterns (eg Skourtopoulou 2004, 393-401; Andreasen 2011). The spatial distribution approach focuses on identifying lithic activity areas relating to tool production, storage, and discard, as well as tracing contextual evidence for socially meaningful or ‘structured’ depositions, which highlight the symbolic potential of the chipped stone, tool assemblages. At Makriyalos for example, in the later phase of occupation, stone tools of high quality raw materials and sophisticated craftsmanship were deposited in pits alongside various items of expressive material culture (Skourtopoulou 2006, 67-68, 71-72). A more intriguing context comes from Drakaina Cave on Cephalonia in the Ionian Sea; the numerous flint arrowheads deposited in the cave are regarded as evidence for communal ritual related to hunting (Stratouli and Metaxas 2009, 322-324). Lithic studies have taken on a

hermeneutic perspective (Hodder and Hutson 2003, 195-196), providing narratives about how material culture contributes to the structuring of human behavior.

## **Conclusions**

Chipped stone research is relatively recent in the Neolithic archaeology of Greece. In the early years not much attention was drawn to this particular category of artefacts. The archaeology of Greece was mainly concerned with distinguishing cultural groups, notably on the basis of pottery, as well as identifying ethnicity in the material culture. Lithic artefacts were treated as small finds which were partially classified as tools or weapons on descriptive and typological grounds.

Things changed significantly in the 1960s, when prehistoric archaeology cooperated closely with the natural sciences in order to explain patterns of past human behaviour in a more objective manner. The potential for accurately provenancing obsidian artefacts through trace element analysis created a brand-new field of research that was both pioneering and influential. Exchange systems in prehistory became the focus of Aegean archaeology, especially with reference to obsidian. In the long run, however, the two-variable approach of calculating artefact frequency against absolute distance from sources resulted in biased estimations.

A breakthrough was made possible by applying the concept of the operational sequence on the study of lithic technology. With the potential of reconstructing the entire process of tool manufacture, use, and discard, archaeologists viewed lithics in a totally new light, looking for options, intentions, and decisions behind technical acts. Currently, the artefact biography approach in connection with spatial distribution analysis provides insights into depositional practices, as well as intriguing narratives of stone tools being used in symbolic contexts. In addition, the ongoing mapping of lithic sources alongside attempts toward chert and flint characterization contributes to a more extensive understanding of chipped stone variability.

## Bibliography

- Andreasen, N.H. 2011. The chipped stone artefacts from Neolithic Avgi. Some observations from the continued study of the west sector in 2011 [online]. Available at: [http://www.neolithicavggi.gr/?page\\_id=492](http://www.neolithicavggi.gr/?page_id=492) [Accessed: 27 January 2015].
- Andrefsky, W. 1998. *Lithics. Macroscopic approaches to analysis*. Cambridge: Cambridge University Press.
- Andreou, S., Fotiadis, M., and Kotsakis, K. 2001. Review of Aegean prehistory V. The Neolithic and Bronze Age of northern Greece. In: Cullen, T. ed. *Aegean prehistory. A review*. AJA Monographs. Boston: Archaeological Institute of America, pp. 259-327.
- Bahn, P. 2005. The Three Ages. In: Renfrew, C. and Bahn, P. eds. *Archaeology. The key concepts*. London and New York: Routledge, pp. 264-268.
- Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28, pp. 217-225.
- Binford, L.R. and Binford, S.R. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68, pp. 238-295.
- Bordes, F. 1961. *Typologie du Paléolithique ancien et moyen*. Bordeaux: Delmas.
- Bosanquet, R.C. 1904. The obsidian trade. In: Atkinson, T.D., Bosanquet, R.C., Edgar, C.C., Evans, A.J., Hogarth, D.G., Mackenzie, D., Smith, C., and Welch, F.B. eds. *Excavations at Phylakopi in Melos, conducted by the British School at Athens*. London: The Society for the Promotion of Hellenic Studies Supplementary Paper 4, pp. 216-233.
- Cann, J.R. and Renfrew, C. 1964. The characterization of obsidian and its application to the Mediterranean region. *PPS* 30, pp. 111-133.
- Cherry, J. F. and Torrence, R. 1982. The earliest prehistory of Melos. In: Renfrew, C. and Wagstaff, J.M. eds. *An Island Polity. The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 24-34.
- Clogg, R. 1992. *A concise history of Greece*. Cambridge: Cambridge University Press.
- Dimitriadis, S. and Skourtopoulou, K. 2001. Characterization of lithic materials by petrographic and SEM techniques. Towards suggestions on chipped stone tool provenance from Neolithic sites of northern Greece. In: Bassiakos, Y., Aloupi, E., and Facorellis, Y. eds. *Archaeometry issues in Greek prehistory and antiquity*. Athens: Hellenic Society of Archaeometry and Society of Messenian Archaeological Studies, pp. 779-790.
- Dimitriadis, S. and Skourtopoulou, K. 2003. Petrographic examination of chipped stone material. In: Elster, E.S. and Renfrew, C. eds. *Prehistoric Sitagroi. Excavations in northeast Greece 1968-1970. The final report*. Monumenta Archaeologica 20. Los Angeles: University of California, pp. 127-132.

- Evans, J.D. and Renfrew, C. 1968. *Excavations at Saliagos near Antiparos*. BSA Supplementary Volume 5. London: Thames and Hudson.
- Fotiadis, M. 1985. *Economy, ecology and settlement among subsistence farmers in the Serres Basin, northeastern Greece, 5000-1000 BC*. PhD Thesis, Indiana University.
- Fotiadis, M., Papayanni, D., and Efstratiou, N. 2003. Πετρωτά Θράκης. Προϊστορικό λατομείο πυριτόλιθου. [Petrota, Thrace. A prehistoric quarry of siliceous stone]. *AEMTh* 15 (2001), pp. 9-18. (In Greek with English summary).
- Grammenos, D.V. 1991. *Νεολιθικές έρευνες στην Κεντρική και Ανατολική Μακεδονία*. [Neolithic research in central and eastern Macedonia]. Athens: Publications of the Archaeological Society at Athens 117. (In Greek).
- Grammenos, D.V. 1997. Το σύστημα των ανταλλαγών. [The system of exchange]. In: Grammenos, D.V. ed. *Νεολιθική Μακεδονία*. [Neolithic Macedonia]. Athens: Archaeological Receipts Fund, pp. 291-316. (In Greek with English summary).
- Gurova, M. 2008. Towards an understanding of Early Neolithic populations. A flint perspective from Bulgaria. *Documenta Praehistorica* XXXV, pp. 111-129.
- Gurova, M. and Nachev, C. 2008. Formal Early Neolithic flint toolkits. Archaeological and sedimentological aspects. In: Kostov, R.I., Gaydarska, B., and Gurova, M. eds. *Geoarchaeology and archaeomineralogy. Proceedings of the International Conference, 29-30 October 2008, Sofia*. Sofia: Publishing House 'St. Ivan Rilski', pp. 29-35.
- Heurtley, W.A. 1939. *Prehistoric Macedonia. An archaeological reconnaissance of Greek Macedonia (west of the Struma) in the Neolithic, Bronze, and Early Iron Ages*. Cambridge: Cambridge University Press.
- Hodder, I. and Hutson, S. 2003. *Reading the past. Current approaches to interpretation in archaeology*. 3<sup>rd</sup> ed. Cambridge: Cambridge University Press.
- Kaczanowska, M. and Kozlowski, J.K. 2006. Παλαιολιθικές παραδόσεις, μεσολιθικές προσαρμογές και νεολιθικές καινοτομίες στο Αιγαίο μέσα από το πρίσμα της λιθοτεχνίας. [Palaeolithic traditions, Mesolithic adaptations and Neolithic innovations as seen through lithic industries]. In: Sampson, A. ed. *Προϊστορία του Αιγαίου. Παλαιολιθική, Μεσολιθική, Νεολιθική*. [The prehistory of the Aegean Basin. Palaeolithic, Mesolithic, Neolithic]. Athens: Atrapos Press, pp. 67-87. (In Greek with English summary).
- Kaczanowska, M. and Kozlowski, J.K. 2008. Chipped stone artifacts. In: Sampson, A. ed. *The cave of the Cyclops. Mesolithic and Neolithic networks in the northern Aegean, Greece. Volume I. Intra-site analysis, local industries, and regional site distribution*. Philadelphia: INSTAP Academic Press, pp.169-178.
- Kakavakis, O. 2011. *Οι λιθοτεχνίες πελεκημένου λίθου της νεολιθικής εποχής στην Ανατολική και Κεντρική Μακεδονία. Παράγοντες και συνθήκες διαφοροποίησης*. [Neolithic chipped stone industries of eastern and central Macedonia, Greece. Factors and conditions of differentiation]. PhD Thesis, National and Kapodistrian University of Athens. (In

- Greek). Available at: <http://phdtheses.ekt.gr/eadd/handle/10442/26110> [Accessed: 27 January 2015].
- Kakavakis, O. 2014. In search of social networks during the Neolithic period in Macedonia, northern Greece. The case of chipped stone industries. In: Stefani, E., Merousis, N., and Dimoula, A. eds. *A century of research in prehistoric Macedonia 1912-2012. International Conference Proceedings. Archaeological Museum of Thessaloniki, 22-24 November 2012*. Thessaloniki: Archaeological Museum of Thessaloniki, pp. 599-606.
- Kambouroglou, E. and Peristeri, K. 2008. Επιφανειακή έρευνα 2006 για τον εντοπισμό λατομείων και θέσεων πρώτης ύλης προϊστορικών εργαλείων (πυριτόλιθου) νομού Σερρών. [Quarries and prehistoric flint sites in the Serres district, Macedonia. Survey 2006]. *AEMTh* 20 (2006), pp. 209-216. (In Greek with French summary).
- Karimali, E. 1994. *The Neolithic mode of production and exchange reconsidered. Lithic production and exchange patterns in Thessaly, Greece, during the transitional Late Neolithic- Bronze Age period*. PhD Thesis, Boston University.
- Karimali, E. 2001. Επαναπροσδιορισμός της συχνότητας υλικού και της απόστασης στα μοντέλα ανταλλαγής οψιανού στο Αιγαίο. Η περίπτωση της νεολιθικής Θεσσαλίας. [Redefining the variables of material abundance and distance in the fall-off models. The case of Neolithic Thessaly]. In: Bassiakos, Y., Aloupi, E., and Facorellis, Y. eds. *Archaeometry issues in Greek prehistory and antiquity*. Athens: Hellenic Society of Archaeometry and Society of Messenian Archaeological Studies, pp. 753-761. (In Greek with English summary).
- Karimali, L. and Karabatsoli, A. 2010. Λιθοτεχνίες λαξεμένου λίθου από οψιανό και πυριτόλιθο στο Αιγαίο και στην ευρύτερη περιοχή της Μεσογείου. Σύγχρονες αρχαιολογικές προσεγγίσεις. [Obsidian and flint industries in the Aegean and the wider Mediterranean. Current approaches]. In: Liritzis, I. and Zacharias, N. eds. *Αρχαιο-υλικά. Αρχαιολογικές, αρχαιομετρικές και πολιτισμικές προσεγγίσεις. [Archaeomaterials. Archaeological, archaeometrical, and cultural approaches]*. Athens: Papazisis Press, pp. 319-364. (In Greek).
- Kourtessi-Philippakis, G. 1997. Les industries lithiques taillées. In: Grammenos, D.V. ed. *Νεολιθική Μακεδονία. [Neolithic Macedonia]*. Athens: Archaeological Receipts Fund, pp. 212-216.
- Kourtessi-Philippakis, G., Georgiou Ch., Dimadis L., and Trantalidou, K. 1993. Η διερεύνηση της παλαιολιθικής κατοίκησης στην Ανατολική Μακεδονία. Προκαταρκτική έκθεση 1989-1990. [The investigation of Palaeolithic sites in eastern Macedonia. Preliminary reports 1989-1990]. *AEMTh* 4 (1990), pp. 553-559. (In Greek with English summary).
- Kozłowski, J.K., Kaczanowska, M., and Pawlikowski, M. 1996. Chipped-stone industries from Neolithic levels at Lerna. *Hesperia* 65 (3), pp. 295-372.
- LaMotta, V.M. and Schiffer, M.B. 2001. Behavioral archaeology. Towards a new synthesis. In: Hodder I. ed. *Archaeological theory today*. Cambridge: Polity Press, pp. 14-64.



- Lemonnier, P. 1986. The study of material culture today. Toward an anthropology of technical systems. *Journal of Anthropological Archaeology* 5, pp. 147-186.
- Leroi-Gourhan, A. 1964. *Le geste et la parole. Volume I. Technique et langage*. Paris: Albin Michel.
- Manolakakis, L. 2005. *Les industries lithiques énéolithiques de Bulgarie*. Internationale Archäologie 88. Rahden/Westf.: Verlag Marie Leidorf GmbH.
- Moundrea-Agrafioti, H. A. 1981. *La Thessalie du Sud-Est au Néolithique. Outillage lithique et osseux*. PhD Thesis, Université de Paris X.
- Mylonas, G.E. 1928. *Η νεολιθική εποχή εν Ελλάδι*. [The Neolithic era in Greece]. Athens: Publications of the Archaeological Society at Athens 24. (In Greek).
- Perlès, C. 1981. Les industries lithiques de la grotte de Kitsos. In: Lambert, N. ed. *La grotte préhistorique de Kitsos (Attique). Tome I*. Paris: A.D.P.F, pp. 129-222.
- Perlès, C. 1989. From stone procurement to Neolithic society in Greece. [Text of a lecture delivered February 1989]. The David Skomp Distinguished Lectures in Anthropology. Indiana University, Department of Anthropology.
- Perlès, C. 1990a. L' outillage de pierre taillée néolithique en Grèce. Approvisionnement et exploitation des matières premières. *BCH* 114, pp. 1-42.
- Perles, C. 1990b. *Les industries lithiques taillées de Franchthi (Argolide, Grèce). Tome II. Les industries du mésolithique et néolithique initial*. Bloomington and Indianapolis: Indiana University Press.
- Perlès, C. 1992. Systems of exchange and organization in Neolithic Greece. *JMA* 5 (2), pp. 115-164.
- Perlès, C. 2001. *The Early Neolithic in Greece*. Cambridge: Cambridge University Press.
- Perlès, C. 2003. An alternate (and old-fashioned) view of Neolithisation in Greece. *Documenta Praehistorica* XXX, pp. 99-113.
- Renfrew, C. 1977. Alternative models for exchange and spatial distribution. In: Earl, T.K. and Ericson, J.E. eds. *Exchange systems in prehistory*. New York: New York Academic Press, pp. 71-90.
- Renfrew, C. 2005. Characterization and exchange theory. In: Renfrew, C. and Bahn, P. eds. *Archaeology. The key concepts*. London and New York: Routledge, pp. 31-35.
- Renfrew, C., Cann, J.R., and Dixon, J.E. 1965. Obsidian in the Aegean. *BSA* 60, pp. 225-247.
- Sabloff, J. 2005. Processual archaeology. In: Renfrew, C. and Bahn, P. eds. *Archaeology. The key concepts*. London and New York: Routledge, pp. 212-219.
- Sahlins, M. 1974. *Stone Age economics*. London: Tavistock Publications.

- Sampson, A. 2006. Η μεσολιθική περίοδος στο Αιγαίο. [The Aegean Mesolithic]. In: Sampson, A. ed. *Προϊστορία του Αιγαίου. Παλαιολιθική, Μεσολιθική, Νεολιθική*. [The prehistory of the Aegean Basin. Palaeolithic, Mesolithic, Neolithic]. Athens: Atrapos Press, pp. 25-66. (In Greek with English summary).
- Sampson, A., Kaczanowska, M., and Kozłowski, J.K. 2010. *The prehistory of the island of Kythnos (Cyclades, Greece) and the Mesolithic settlement at Maroulas*. Krakow: Polish Academy of Arts and Sciences and University of the Aegean.
- Séfériadès, M. 1992. La pierre taillée. In: Treuil, R. ed. *Dikili Tash. Village préhistorique de Macédoine orientale. Volume I. Fouilles de Jean Deshayes (1961-1975)*. BCH Supplément 24. Athènes: École française d'Athènes, pp. 59-83.
- Semenov, S.A. 1964. *Prehistoric technology. An experimental study of the oldest tools and artefacts from traces of manufacture and wear*. Translated by M.W. Thompson. London: Cory, Adams and Mackay.
- Skourtopoulou, K. 1999. The chipped stone from Makriyalos. A preliminary report. In: Halstead, P. ed. *Neolithic Society in Greece*. Sheffield: Sheffield Academic Press, pp. 121-127.
- Skourtopoulou, K. 2002. Η λιθοτεχνία απολεπισμένου λίθου από τον οικισμό της Σταυρούπολης. Τα πρώτα στοιχεία. [The chipped stone industry in the settlement of Stavroupoli. A preliminary report]. In: Grammenos, D.V. and Kotsos, S. eds. *Σωστικές ανασκαφές στο νεολιθικό οικισμό Σταυρούπολης Θεσσαλονίκης*. [Rescue excavations at the Neolithic settlement of Stavroupoli, Thessaloniki]. Thessaloniki: Publications of the Archaeological Institute of Northern Greece 2, pp. 537-559. (In Greek with English summary).
- Skourtopoulou, K. 2004. Η λιθοτεχνία αποκρουσμένου λίθου στον οικισμό της Σταυρούπολης. [The chipped stone industry in the settlement of Stavroupoli]. In: Grammenos, D.V. and Kotsos, S. eds. *Σωστικές ανασκαφές στο νεολιθικό οικισμό Σταυρούπολης Θεσσαλονίκης, Μέρος II (1998-2003)*. [Rescue excavations at the Neolithic settlement of Stavroupoli, Thessaloniki, Part II (1998-2003)]. Thessaloniki: Publications of the Archaeological Institute of Northern Greece 6, pp. 361-475. (In Greek with English summary).
- Skourtopoulou, K. 2006. Questioning spatial contexts. The contribution of lithics studies as analytical and interpretative bodies of data. In: Papaconstantinou, D. ed. *Deconstructing context. A critical approach to archaeological practice*. Oxford: Oxbow Books, pp. 50-78.
- Soressi, M. and Geneste, J.-M. 2011. The history and efficacy of the *chaîne opératoire* approach to lithic analysis. Studying techniques to reveal past societies in an evolutionary perspective. *PaleoAnthropology* [online]. Special issue edited by Tostevin G. entitled 'Reduction sequence, chaîne opératoire, and other methods. The epistemologies of different approaches to lithic analysis', pp. 334-350. Available at: [www.paleoanthro.org/static/journal/content/PA20110334.pdf](http://www.paleoanthro.org/static/journal/content/PA20110334.pdf) [Accessed: 24 January 2015].

- Stratouli, G. and Metaxas, O. 2009. Projectile tips from Neolithic layers of Drakaina Cave on Kephallonia, Ionian Islands, W. Greece. Technological 'conservatism' and social identity. In: Pétillon, J.-M., Dias-Meirinho, M.-H., Cattelain, P., Honegger, M., Normand, C., and Valdeyron N. eds. *Projectile weapon elements from the Upper Palaeolithic to the Neolithic. Proceedings of session C83, XVth World Congress UISPP, Lisbon, September 4-9, 2006. Palethnologie* [online] 1, pp. 309-327. Available at: <http://blogs.univ-tlse2.fr/palethnologie/en/2009-15-stratouli-metaxas/> [Accessed: 27 January 2015].
- Tixier, J., Inizan, M.-L., and Roche, H. 1980. *Préhistoire de la pierre taillée I. Terminologie et technologie*. Paris: C.R.E.P.
- Torrence, R. 1986. *Production and exchange of stone tools. Prehistoric obsidian exchange*. Cambridge: Cambridge University Press.
- Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.
- Tringham, R. 2003. Flaked stone. In: Elster, E.S. and Renfrew, C. eds. *Prehistoric Sitagroi. Excavations in northeast Greece 1968-1970. The final report*. Monumenta Archaeologica 20. Los Angeles: University of California, pp. 81-126.
- Tsountas, Ch. 1908. *Αι προϊστορικοί ακροπόλεις Διμηνίου και Σέσκλου*. [*The prehistoric acropolises of Dimini and Sesklo*]. Athens: Publications of the Archaeological Society at Athens 24. (In Greek).
- Wace, A.J.B. and Thompson, M.S. 1912. *Prehistoric Thessaly*. Cambridge: Cambridge University Press.