The Mesolithic Distillation of Pitch and its Ethnolinguistic Reflections: A Holocene Etymology for an Italian Verb

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Abstract

One of the most important technological innovations of European Mesolithic is the production of tar and pitch from trees. Within the framework of the Palaeolithic Continuity Paradigm (PCP) – which considers the 'arrival' of Indo-European people in Europe and Asia as one of the major episodes of the 'arrival' of *Homo sapiens* in Europe and Asia from Africa, and not as an event of recent prehistory – an ethnolinguistic correlation is here proposed between present-day verbs used in the Italian area with the meaning of 'to light (a fire)' and the process of pitch creation in the Sauveterrian cultural complex (10,000-7,800 B.P.).

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In the period between the final Upper Palaeolithic and the introduction of agriculture, cultures of early postglacial Europe (Mesolithic) start to be associated with relevant specialized activities, such as fishing techniques (Atlantic, Germanic and Baltic areas) and wood industry (Middle and Southern Europe) (Kozlowski 1973; Bagolini *et al*. 1994). This last feature is a consequence of the increasing progression of the forests and of the exploitation of new resources, and its first evidence is the development of woodworking tools-axes, chisels, adzes and gouges. The strong presence of composite tools in Mesolithic archaeological finds implies the discovery, in the same period, of natural gums and, above all, of new techniques able to create natural glues (Perlès 1995).

Starting from these considerations, and according also to the evidence that the usual sealants used for the joints between hides and the sewingholes of boats were pitch, bitumen and tar, the invention of tar and pitch can be ascribed to Mesolithic cultures (see

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Hayek *et al*. 1990, Aveling-Heron 1998, Sampson *et al*. 2002; Pawlik 2004). This invention is well reflected in European languages: for example, with regards to the composite tools, Mario Alinei, in the frame of the Palaeolithic Continuity Paradigm (PCP) (see <www.continuitas.org>), notes that «some words […] still evoke the ancient technique: Old Icelandic *tjorr* 'sword'' but literally 'wooden handle, attached with tar', dialect Swedish *tjör*, *tjor*, *tjur* 'piece of resinous wood from an old pine or fir', 'curved part of the bow'» (Alinei 2003: 211). Moreover, «the same Germanic word family of *tree* and *tar* also include such words as *trust* and *true*, originally 'reliable'. Traditionally, these words have been connected to *tree*, without any pertinent arguments. More concretely and significantly, both *trust* and *true* 'reliable' could be connected with glueing techniques, and reflect the impact of this innovation on the mind of Germanic Mesolithic fishers and hunters» (*ibidem*; see also Alinei 2008, 2010: 526-527).

Before deepening the linguistic problem, it is relevant to recall that in the Northern Mediterranean region three Mesolithic (M) cultural areas can be identified in the Holocene (Kozlowski 2005):

M1) the Iberian microlaminar complex;
M2) the Northern Balkan complex;
M3) the Sauveterrian in Italy, Southern France and part of Balkan area, followed by the Castelnovian diffusion of trapezoidal microliths [FIG. 1].

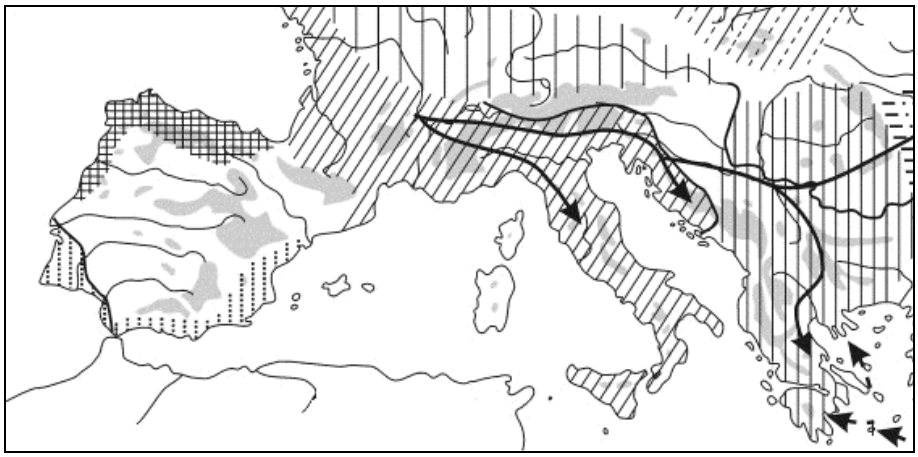

Figure 1 – Early Holocene Mesolithic in the Northern Mediterranean area [from Kozlowski 2005]

= M1 = M2 = M3 = Diffusion of trapezoidal microliths

According to the most recent archaeological research (see *ibidem*), these cultural *facies* must be seen as developments of previous Palaeolithic (P) cultural complexes:

M1) in continuity with Magdalenian (P1);
M2) in continuity with Late Balkanic Epigravettian (P2);
M3) in continuity with Late Italic Epigravettian (P3) [FIG. 2].

This Palaeo-Mesolithic stability, which may be interpreted in some cases also as a substantial permanence of techniques developed for the utilization of natural resources (as already stated by Gabel 1958; see also Otte 2004), can be possibly observed also with regards to the production of tar and pitch: the recent discovery of two stone flakes partly covered in tar in fluvial gravel and clay in central Italy, which are compatible with the late Middle Pleistocene, implies in fact a capability for Pleistocene men to utilize raw materials available during cold phases, and antedates the invention of pitch to Mediterranean Palaeolithic (Mazza *et al*. 2006). The lithic industries from this site indicate that in circum-Mediterranean areas tool hafting with tar «had already been accomplished long before similar techniques became a diffused practice in other parts of the world» (*idem*: 1317). As I will argue, this late discovery is not without implications for my etymological hypothesis (see also Boeda *et al*. 1996 and Grünberg 2002).

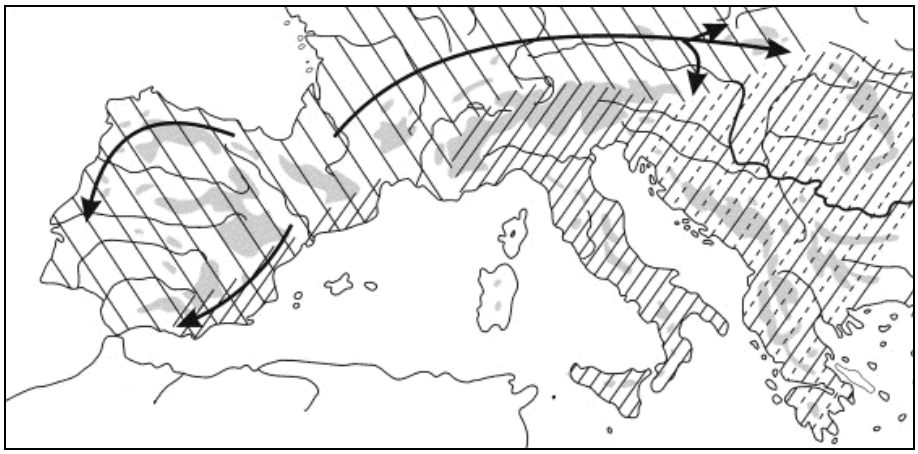

Figure 2 – Final Upper Palaeolithic in the Late Glacial in the Northern Mediterranean area (14,000-10,000 years B.P.) [from Kozlowski 2005]

= P1 = P2 = P3

The invention of pitch implies a skilled knowledge of techniques and procedures associated first of all with the exploitation of fire. Pitch was made by the dry distillation or destructive heating of pinewood (Bonfield 1997; Kaye 1997; Gibby 1999; Regert-Rolando 2002; Regert *et al*. 2003; Regert 2010) and the traditional production-method was intricately elaborate, akin to smelting, and probably involving the construction of

small ovens in the form of an inverted cone, of stone kilns of different kinds, and of rudimental sealed containers where to heat barks (Pollard *et al.* 2006: 154-5)[1].

Although many archaeologists still consider a mystery how Paleo-Mesolithic men could distillate pine resin and birch bark («how these tars were produced in the Paleolithic-Mesolithic age remains a mystery»: Peters *et al*. 2005: 336), modern ethnographic research can provide useful examples.

For instance, among the Native Americans of the Red River Gorge Pine «tar was made by burning pine trees under pressure in kilns. Charcoal and tar were produced, with the tar collected in drainage grooves around the kilns» (*LRRG*: 3). Findings of kilns dated at a pre-Neolithic age, such as the one found in Trollskogen (Holland) may be easily connected to the same technique [FIG. 3].

Another method of producing pine tar was to dig a large pit with a sloping floor. A barrel was set in the ground at the bottom of the slope. The pit was stacked with resin-rich "lightwood" and covered over with dirt except for one ventilation hole. This was the technique in use among the Navaho [FIG. 4]:

Figure 3 – Prehistoric Tar kiln at Trollskogen, Holland

[1] It has been recently argued that even Neanderthals did not come across these pitches by accident: «Today, comparable pitches can easily be produced with modern technical methods, i.e. using airtight laboratory flasks and temperature control facilities. However, any attempt at simulating the conditions of the Neandertal period and at producing these birch pitches without any of these modern facilities will soon be met with many difficulties. This implies […] a conscious action is, and it is a clear sign of considerable technical capabilities» (Koller *et al.* 2001: 386).

Figure 4 – Tar kiln of the Utah Navaho

In Nigeria, bonfires are constantly added with brushwood from time to time over a period of a day, to gradually raise the high temperature able to distillate pitch [FIG. 5].

Figure 5 – Nigerian bonfire, able to distillate pitch when brushwood are constantly added over a period of a day [from Falola 2001]

Bearing in mind procedures similar to the last one, experiments have been made for re-constructing prehistoric bonfires in order to produce pitch, showing that temperatures of 1800 degrees Fahrenheit can be reached in about 24 hours [FIG. 6]

Figure 6 – Experimental reconstruction of a prehistoric fire for pitch production

Other experimental reconstructions of European Mesolithic kilns [FIG. 7] show remarkable similarities with kilns still used in Italian Apennines till a few years ago by charcoal workers (*carbonaie*) [FIG. 8].

Figure 7 – Experimental reconstruction of a Mesolithic kiln

Figure 8 – A typical *carbonaia* of the Northern Italian Apennines (beginning of 20th c.) [from Nicoletti 1988]

On the level of an uninterrupted continuity – apart from stressing that the prehistoric exploitation of seasonal resources (including distillation of pinewood) is well documented in Northern and Central Apennines (Lubell *et al*. 1995) – it should be pointed out that the production of pitch was one of the secondary activities related to the making of charcoal (it was employed for covering roofs, or as a glue for tools, and the *carbonai* used to sell it together with charcoal: Miniati 1986).

From the ethnolinguistic and archaeolinguistic perspective offered by the PCP, it would be curious that two crucial and embryonic associations such as the one between *fire* and *pitch* and the one between *fire* and *glue* did not leave any lexical traces. Starting from the Latin word for pitch (i.e. *pix* and *picula*, significantly derived from *pinus* 'pine' [*IEW*: 794; Gamkrelidze-Ivanov 1995: 543]), it is possible to re-evaluate in this Mesolithic (or late Palaeolithic) frame the original motivation of the Latin verb *picare*, with the variants **piceare* (*REW*: 6479) and *piculare*. These verbs endure in a vast "Neo-Italid" area (for this notion, see Benozzo-Alinei 2011) with the meanings of 'to tar on, to stick, to glue, to entangle, to take' (cf. Italian *pigliare*, *appiccicare*, *impegolare*, *impegolarsi*, Sardinian *pikare*, *pigare*, *pigulare*, Old Occitan *empegar*, Portuguese *pegar*, Southern French [Marseille] *empegar*, Dialectal French *poisser*, Bearnese *apegà*, Friulan *peâ*).

In a more restricted and specific area, which corresponds to the one of Italian dialects [FIG. 9][2], the same verb endures with the meaning of 'to light, to light a fire, to catch fire, to inflame'.

[2] Also Spanish *pegar* means 'to enflame' in the locution *pegar fuego*: see *DCECH*: IV, 514.

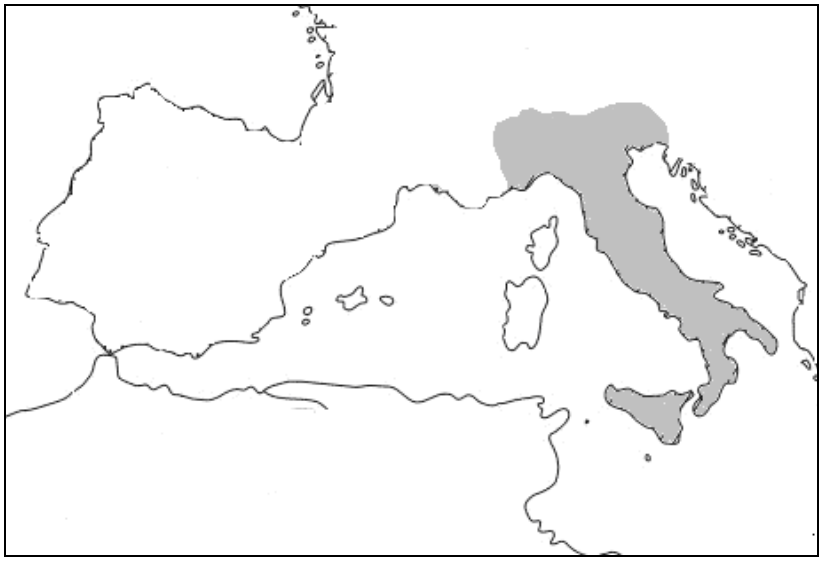

Figure 9 – = area of *appicciare*, *impi(z)èr*, *(ap)picci(c)à* 'to light (a fire), to catch fire, to inflame'

As this meaning is documented simultaneously with the others mentioned above, for to the principle of "semantic density" (Alinei 1996)[3] one can argue that the Italian area is the one where the verb in question was first lexicalized.

As it can be seen, with the exception of Sicily (where the verb for 'to light a fire' is *aḍḍumàri*), the area where the iconomastic[4] passage {'to produce pitch, to plaster with tar'} → 'to light (a fire)' is recognizable, strictly corresponds to the Sauveterrian area (M3) where the invention and production of pitch has been inferred by archaeologists [see FIG. 1]. It corresponds in an even closer way to the (Palaeolithic) Late Italian Epigravettian area (P3), where – as argued by Mazza *et al*. 2006 – tar and pitch production was an activity already developed since Middle Pleistocene [see FIG. 2].

All the existing forms can be easily connected with the Latin ones, according to the following correspondences (geographically listed in FIG. 10):

[3] The principle of "semantic density" can be summarized as follows: «consider the two international words *film* and *scanner*, and imagine that their English origin was unknown to us. On the basis of purely linguistic considerations we could nevertheless identify their focus area, by observing that only in the English area does *film* have a more general meaning, that of 'thin layer', which explains that of the international 'film'; and that only in English does the verb *scan* exist, whose general meaning explains the international name of the machine, plus the morpheme *-er*. This kind of observation can be summed up by saying that European *film* and *scanner* come from the English area because in that area they have the highest 'morpho-semantic density» (Alinei 2004: 15).

[4] See Alinei (2001; 2006; 2010).

(IN +) PICARE

→ Northern Italian *impigar*, *mpigà*, *pigàr*

(IN +) (AD +) *PICEARE

→ Northern Italian *pizà*, *pizàr*, *(i)mpizàr*, *impizèr*, *apizà*
→ Central Italian *picè*, *appiccià*, *piccià*, *apicè*
→ Southern Italian *appiccì*, *appiccià*, *appeccià*, *appeccé*, *mpezà*, *appiccià*

(IN +) PICULARE

→ Norhern Italian *pià*, *pier*, *impièr*, *(i)mpiàr*, *impeà*
→ Central Italian *pier*, *mpiàr*, *apiè*, *pià*

South. It. forms like *appìzzəkə*, *appeccià*, *appìcceke*, *appiccəkà*, *appiccikà*, *appeccekà* (related to It. *appiccicare* 'to stick') seem to have increase the root *PICEARE in *PICICULARE, presumably in analogy with PICULARE, but also with the possibly meaning of 'to drip pitch' (*pece colare*).

With regards to the forms related to PICULARE, one can assume a palatalization of -CL- in [ɬ], with subsequent fall of the palatal consonant: this phonetic tract (well known in Transalpine dialects and typical of French) is common in Piedmontese dialects (Rohlfs 1966: 350), and its diffusion in other northern and central parts of Italy would be consistent with the inferred direction (Nort-West → South-East) of Italian Sauveterrian (Broglio 1996; Binder 2000; Kozlowski 2005; Martini 2008: 181-2) (see arrows in FIG. 1, referring to the later but identical diffusion of Castelnovian)[5]. In this way, the absence of palatalized forms in Sotuhern Italian dialects could be put in correlation with the absence of a few Sauveterrian tools in the same area: «the diffusion of the Sauveterrian model from North to South and its progressive removal from the original cultural area could be the reason of the missed production in Central-Southern Italy of a few tools which are present in the Alpine and bordering areas, […] and which are part of the transalpine Mesolithic» (*idem*: 181)[6].

[5] It has to be noted that in many dialects, e.g. the ones spoken in Emilia, the palatalized form exists as allotropes of the other one (for example, in the dialect of Modena *impièr* is synonymous of *impizèr*).

[6] ['una diffusione del modello sauveterriano da nord verso sud e il suo progressivo allontanamento dalla provincia culturale originaria potrebbe essere la causa della mancata produzione al Centro-Sud di alcuni manufatti segnalati nei complessi dell'area alpina e delle zone limitrofe, […] che fanno parte del Mesolitico transalpino'].

Figure 10 – Forms related to *picare*, **piceare*, *piculare* [based on ALI, map nr. 412: ‘accendere (il fuoco)’, ‘prender fuoco”‘[‘to light (a fire)’, ‘to catch fire’]

I think that also the Italian verb *pigliare* (‘to take, to catch’) must be interpreted as a palatalized form of PICULARE, that is to say as an allotrope of the verb *impegolare* ‘to entangle’, which obviously continues the same root. This correlation is confirmed by the synonymic series *impigliare* ↔ *impegolare* ‘to entangle’ and *impigliarsi* ↔ *impegolarsi* ‘to get entangled’. Moreover, the verb for ‘to catch fire’ is, in Italian and in all the Italian dialects, *pigliar fuoco* (with the variants, from North o South, *pié*, *pier*, *pià*, *piàr*, *pisà*, *pigà*, *pijà*, *peccià*, *pillà*, *piglià*, *piggià*, *piġġàri*, *piccicàri*, etc.): here, the old mean-

ing of *impegolare* represent an astonishing confirmation of my iconomastic hypothesis, as in the earliest documents (e.g. in Guido da Pisa, 14th c.) it is used for 'impiastrare, spalmare di pece' ['to plaster, to cover with tar']). In this sense, *impegolare* still works as an iconym of *pigliare* (and *pigliar fuoco*).

To summarize and conclude, the mentioned verbs documented in Italian dialects for 'to light (a fire)' can be seen as developments of the iconym {to produce pitch, to plaster with tar}, represented by the Latin forms *picare*, **piceare*, *impiculare*, and **picicular*e, all derived from the Latin word for pitch (*pix*, *picem*, *picula*)[7]. The iconymic field is the one connected with the various techniques of fire exploitation and of preparation of fires ad bonfires in order to distillate pitch. This activity was one of the most important innovations in Mesolithic societies, a period when fires, apart from other uses also previously documented, started to be deliberately prepared and lighted for the production of pitches and tars, and when tars were commonly used for the lighting of fires (burned tar torches are typical deposited artefacts in Mesolithic sites of central Europe: see Zvelebil 2008: 32). Cumulative ethnophilological (Benozzo 2009, 2010a) evidence indicates that this verb originated during the twenty-two centuries which coincide with the pre-pottery Neolithic Sauveterrian cultural complex (10,000-7,800 B.P.), an industry clearly linked to the Upper Palaeolithic and Early Epipalaeolithic traditions and to the Final Italic Epigravettian.

References

ALI = Massobrio L., Ronco G. (2001). *Atlante Linguistico Italiano*, vol. V, *La casa e l'arredamento*. Roma: Istituto Poligrafico dello Stato.

Alinei M. (1996). The Principle of Morphosemantic Density and the Etymology of the Latin *rota* Word Family. In *Studier i talesprogsvariation og sprogkontakt. Til Inger Ejskjær på halvfjerdsårsdagen den 20. maj 1996*. Kobenhavn: Institut for dansk Dialektforskning, C.A. Reitzels Forlag, 11-16

— (2001). Aspects of a Theory of Motivation [Iconymy]. In *VS/Quaderni di studi semiotici*, 88, 89-97.

— (2003). Interdisciplinary and Linguistic Evidence for Palaeolithic Continuity of Indo-European, Uralic and Altaic Populations in Eurasia, with an Excursus on Slavic Ethnogenesis. In *Quaderni di Semantica*, 24, 187-216.

— (2004). The Celtic Origin of Lat. *rota* and its Implications for the Prehistory of Europe. In *Studi celtici* 3, 13-29.

[7] In this occasion I renounce to discuss the often bizarre etymologies usually proposed for explaining the verbs in question. Just to quote two examples, the most authoritative etymological dictionary of Italian dialects interprets the forms *impièr*, *impià*, *pià* 'to light (a fire)' as continuations of spoken Latin **piliare* [from late Latin *pilare*], which means 'to steal' (!) (see *DEDI*: 235), while one of the most clever Italian linguists proposes to recognize the Northern Italian verb *pizàr* 'to beak, to spear' (!) behind *(im)pi(z)ar* 'to light (a fire)' (see Bracchi 2009: 117).

— (2006). The Role of Motivation (Iconymy) in Naming: Six Responses to a List of Questions. In Sanga G., Ortalli G. (eds.), *Nature Knowledge, Ethnoscience, Cognition, and Utility*, New York-Oxford: Berghahn Books, 108-118.
— (2008). Forty Years of *ALE* [*Atlas Linguarum Europae*]: Memories and Reflexions of the First General Editor of its Maps and Commentaries. In *Revue Roumanie de Linguistique*, 52, 5-46.
— (2010). *L'origine delle parole*. Roma: Aracne.
Aveling E.M., Heron C. (1998). Identification of Birch Bark Tar at the Mesolithic site of Star Carr. In *Ancient Biomolecules*, 2, 69-80.
Bagolini B., Biagi P., Broglio A., Koslowski J.K., Kozlowski, S.K., Lanzinger M. (1994). *Human Adaptations to the Mountain. Environmenting the Upper Palaeolithic and Mesolithic*. Trento: Museo Tridentino di Scienze Naturali.
Benozzo F. (2009). Correlations between Archaeology, Ethnolinguistics and Ethnophilology. In *The European Archaeologist*, 32, 6-7.
— (2010a). *Etnofilologia. Un'Introduzione*. Napoli: Liguori.
— (2010b). Words as Archaeological Finds: A Further Example of the Ethnophilological Contribute to the Study of European Megalithism. In *The European Archaeologist*, 33, 13-8.
— (2010c). Sounds of the Silent Cave. An Ethnophilolgical Perspective on Prehistoric *incubatio*. In G. Dimitriadis (ed.), *Archaeologies and "Soundscape". From the Prehistoric Sonorous Experiences to the Music of the Ancient World*. Oxford: Archaeopress [BAR International Series].
Benozzo F., Alinei M. (2010). Megalithism as a Manifestation of a Celtic Primacy in Meso-Neolithic Europe. In *Studi Celtici*, 7, 13-56.
— (2011). Dalla linguistica romanza alla linguistica neo-italide. In *Atti del VII Convegno Triennale della Società Italiana di Filologia Romanza (Bologna, 5-8 ottobre 2009)*, Bologna: Pàtron (in press).
Binder D. (2000). Mesolithic and Neolithic Interaction in Southern France and Northern Italy: New Data and Current Hypothesis. In T.D. Price (ed.), *Europe's First Farmers*. Cambridge: Cambridge University Press.
Boeda E., Connan J., Dessort D., Muhesen S., Mercier N., Valladas H., Tisnerat N. (1996). Bitumen as a Hafting Material on Middle Palaeolithic Artefacts. In *Nature*, 380, 336-338.
Bonfield K.M., Heron C., Nemcek N. (1997). The Chemical Characterization of Wood Tars in Prehistoric Europe. In Piotrowski W., Brzezinski W. (eds.), *Proceedings of the First International Symposium on Wood Tar and Pitch*, Warsawa: State Archaeologicum Museum, 203-211.
Bracchi R. (2009). *Nomi e volti della paura nelle valli dell'Adda e della Mera*. Tübingen: Max Niemeyer.
Broglio A. (1996). The Formation of the Mesolithic Complexes in the Alpine-Po Valley Region. In *13th International Union of Prehistoric and Protohistoric Sciences*. Forlì: Colloquium 7 (*The Mesolithic*), 41-46.

Connan J. (1999). Use and Trade of Bitumen in Antiquity and Prehistory: Molecular Archaeology Reveals Secrets of Past Civilizations. In *Philological Transactions of the Royal Society of London*, 354, 33-50.

DCECH = Corominas J., Pascual J.A. (1980-1981). *Diccionario crítico etimológico castellano e hispánico*. Madrid: Gredos.

DEDI = Cortelazzo M., Marcato C.. (2005). *Dizionario etimologico dei dialetti italiani*. Torino: UTET.

Falola T. (2001). *Culture and Customs of Nigeria*. Westport, CT: Greenwood Press.

Gabe W.C. (1958). The Mesolithic Continuum in Western Europe. In *The American Anthropologist*, 60, 658-667.

Gamkrelidze T.V., Ivanov V.V. (1995). *Indo-European and the Indo-Europeans. A Reconstruction and Historical Analysis of a Proto-Language and a Proto-Culture*. Berlin-New York: Mouton de Gruyter [*Indoevropejskij Jazyk i Indovropejcj*. Tbilisi: Tbilisi State University 1984].

Gibby E.H. (1999). Making Pitch Sticks. In Wescott, D. (ed.). *Primitve Technology*. Layton: Gibbs Smith, 189-190.

Grünberg J.M. (2002). Middle Palaeolithic Birch-Bark Pitch. In *Antiquity*, 76, 15-16.

Hayek E.W.H., Krenmayr P., Lohninger H., Jordis H., Moche W., Sauter F. (1990). Identification of Archaeological and Recent Wood Tar Pitches Using Gas Chromatography/Mass Spectrometry and Pattern Recognition. In *Analytical Chemistry*, 62, 2038-2043.

IEW = Pokorny J. (1959). *Indogermanisches Etymologisches Wörterbuch*. Bern-München: Francke.

Kaye T.P. (1997). *Pine Tar: History and Uses*. On line at <www.maritime.org/conf/ conf -kaye-tar.htm>.

Koller J., Baumer U., Mania D. (2001). High-Tech in the Middle Palaeolithic: Neandertal-Manufactured Pitch Identified. In *European Journal of Archaeology*, 4, 385-397.

Kozlowski S.K. (1973). *The Mesolithic in Europe*. Warsawa: Warsaw University Press.

— (2005). Paléolithique supérieur et Mésolithique en Méditerranée: cadre culturel. In *L'Anthropologie*, 109, 520-540.

LRRG = Living In The Red River Gorge: An Archaeological Story. Living Archaeology Committee 2008; on line at <www.southeasternarchaeology.org>.

Lubell D., Mussi M., Musacchio A., Agostini S., Coubray S., Giraudi C. (1995). Exploitation of Seasonal Resources in the Mountains of Abruzzo (Central Italy): Epigravettian to Neolithic. In *L'Europe des derniers chasseurs. V^e^ Colloque International UISPP (Grenoble, 18-23 septembre 1995)*. Paris: Éditions du Comité des Travaux Historiques et Scientifiques, 465-472.

Mazza P.P.A., Martini F., Sala B., Magi M., Colombini M.P., Giachi G., Landucci F., Lemorini C., Modugno F., Ribechini E. (2006). A New Palaeolithic Discovery: Tar-Hafted Stone Tools in a European Mid-Pleistocene Bone-Bearing Bed. In *Journal of Archaeological Science*, 33, 1310-1318.

Miniati M.V. (1986). Carbonai e produzione tradizionale del carbone nell'Appennino tosco-marchigiano. In *Quaderni dell'Istituto di Linguistica dell'Università di Urbino*, 4, 349-368.

Nicoletti G. (1988). *I carbonai. Immagini di un mestiere scomparso*. Pordenone: Savioprint.

Otte M. (1994). Europe during the Upper Palaeolithic and Mesolithic. In *History of Humanity*, vol. I, *Prehistory and the Beginniing of Civilizations*, Paris: UNESCO, 207-224.

Pawlik A. (2004). Identification of Hafting Traces and Residues by Scanning Electron Microscopes and Energy-Dispersive Analysis of X-Rays. In Walker E.A., Wenban-Smith F., Healy F. (eds.), *Lithics in Action*. Oxford: Oxbow Books, 172-183.

Perlès C. (1995). La transition Pléistocène/Holocène et le problème du Mésolithique. In *Los ultimos cazadores, transformaciones culturales y economics durante el Tardiglaciar el inicio del Holoceno en el ambiente mediterraneo*. Alicante: Património, 179-209.

Peters K.E., Walters C.C., Moldowan J.M. (2010). *Biomarkers and Isotopes in the Environment and Human History*. Cambridge: Cambridge University Press.

Pollard A.M., Batt C.M., Stern B., Young S.M.M. (2006). *Analytical Chemistry in Archaeology*. Cambridge: Cambridge University Press.

Regert M. (2010). Investigating the History of Prehistoric Glues by Gas Chromatography-Mass Spectrometry. *Journal of Separation Science*, 27, 244-254.

Regert M., Rolando C. (2002). Identification of Archaeological Adhesives Using Direct Inlet Electron Ionization Mass Spectrometry. In *Analytical Chemistry*, 74, 965-975.

Regert M., Garnier N., Decavallas O., Cren-Olivé C., Rolando C. (2003). Structural Characterization of Lipid Constituents from Natural Substances Preserved in Archaeological Environments. In *Measurement Science and Technology*, 14, 1620-1630.

REW = Meyer-Lübke W. (1935[3]). *Romanisches etymologisches Wörterbuch*. Heidelberg: Winter.

Rohlfs G. (1966). *Grammatica storica della lingua italiana e dei suoi dialetti*. 3 vols., vol. I, *Fonetica*. Torino: Einaudi [*Historische Grammatik der Italienischen Sprache und ihrer Mundarten*. Bern: A. Francke, 1949].

Sampson A., Kozlowski J.K., Kaczanowska M., Giannouli B. (2002). The Mesolithic Settlement at Maroulas, Kythnos. In *Mediterraean Archaeology and Archaeometry*, 2, 45-68.

<www.continuitas.com> = Palaeolithic Continuity Paradigm for the Origins of Indo-European Languages: PCP Workgroup's Official Website.

Zvelebil, M. 2008. Innovating Hunter-Gatherers: The Mesolithic in the Baltic. In Bailey, G. and P. Spikins (eds.), *Mesolithic Europe*. Cambridge: Cambridge University Press, 18-59.