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SUMAR / SUMMARY

PAGINI DIN ISTORIA ARHEOLOGIEI ROMÂNEȘTI PAGES FROM THE HISTORY OF ROMANIAN ARCHAEOLOGY

Radu-Alexandru DRAGOMAN

Pagini inconfortabile din istoria arheologiei românești: Odessa și Transnistria, 1941-1944

Uncomfortable pages from the history of Romanian archaeology: Odessa and Transnistria, 1941-1944 7-42

STUDII

STUDIES

Ciprian F. ARDELEAN

The "Transitional Period": a short terminological debate around the Pleistocene-Holocene Transition in North American prehistory

43-62

Cătălin BEM, Constantin HAITĂ

Tell-ul Bucșani Pod (Muntenia, România). Caracteristici tipologice și petrografice ale utilajului litic șlefuit din nivelul superior (Gumelnița B1)

Tell Bucșani Pod (Wallachia, Romania). *Typological and petrographical features of polished litic inventory from the upper level (Gumelnița B1)*

63-127

Mihaela GOLEA

Discuții asupra prezenței speciei *Chenopodium album* în așezările preistorice din România

Discussions on the presence of the species Chenopodium album in the prehistorical settlements from Romania

129-144

Monica MĂRGĂRIT, Mariana PROCIUC

Ce ne spun oasele prelucrate dintr-o groapă menajeră? Cazul așezării eneolitice de la Frunțișeni (jud. Vaslui)

What the worked bones from a waste pit tell us? The case of the Chalcolithic settlement from Frunțișeni (Vaslui County)

145-156

The “Transitional Period”: a short terminological debate around the Pleistocene-Holocene Transition in North American prehistory

Ciprian F. ARDELEAN*

Abstract: *America’s cultural historical schemes, the archaeological conceptual constructions that were built upon them and the current theoretical debates in the “New World”’s prehistory are probably not among the mound sound topics for the European reader and students. This paper is a sample of such theorizations we use to involve into in this part of the world and it also stands as an invitation - mainly meant for my immediate colleagues - to debate around the Pleistocene-Holocene transition, as seen from the North American archaeology as a whole, including Mexico (where the paper’s author has been working for a long time). It is still a preliminary view, more like an invitation to debate and a vague proposal. The passage between the two geological eras is usually presented as a boundary or threshold, meaning a sudden transition happening at a determined point in time, which is not congruent with the way archaeology understands the cultural and historical processes. The way Earth scientists and palaeoenvironmentalists use to approach the issue is not entirely consistent with the manner prehistorians envisage the archaeological phases corresponding to that time period. In North America, the first human cultures are labeled either as Paleoindian or Paleoamerican, but the time-jurisdiction of the terms invade the transition between Eras; the later cultures, those of Holocene age, are normally referred to as Archaic. The chronological models derived from this particular terminology do not reflect objectively the cultural transitions from the Pleistocene to the Holocene, as seen in the archaeological record. A formal Transitional period is proposed instead, for consideration and debate.*

Rezumat: *Schemele cultural-istorice ale Americii, construcțiile conceptuale arheologice ridicate pe fundațiile lor și diferitele dezbateri teoretice actuale în preistoria „Lumii Noi” nu reprezintă, cel mai probabil, teme mult prea familiare cititorului și studentului european. Acest articol este o mostră a teoretizării care preocupă uneori breasla arheologilor în această parte a lumii și reprezintă, totodată, o invitație la o dezbatere - menită în special pentru colegii preocupați de problematica tranziției de la Pleistocen (Era glaciară) la Holocen (Era actuală), așa cum este înțeleasă din perspectiva arheologiei în America de Nord, incluzând Mexicul (unde lucrează autorul acestui text de mulți ani). Ceea ce se prezintă aici este, deocamdată, o idee preliminară, mai mult o invitație la dezbatere și o propunere incipientă. Tranziția între cele două ere geologice, Pleistocen și Holocen, se prezintă de obicei ca o graniță sau ca un prag, implicând o tranziție relativ bruscă care se petrece într-un moment determinat în timp, ceea ce nu este congruent cu felul în care arheologia înțelege procesele culturale și istorice. Modul în care științele Pământului și de „palaeoenvironment” obișnuiesc să îmbrățișeze această problemă nu este pe de-a-ntregul compatibilă cu poziția arheologiei față de fazele arheologice corespunzătoare epocilor în discuție. În America de Nord (cu predilecție în mediile de limba engleză), primele culturi umane sunt reunite sub terminologia de “Paleoindian” sau “Paleoamerican”, însă jurisdicția temporală a acestor termeni invadează tranziția între Ere; culturile mai târzii, cele de vârstă holocenă, sunt în mod obișnuit numite Arhaice. Modelele cronologice derivate din aceasta terminologie în particular nu reflectă în mod obiectiv tranzițiile culturale între Pleistocen și Holocen în concordanță cu ceea ce se observă în contextul arheologic. Astfel, se propune folosirea în literatura arheologică a unei Etape de Tranziție, ca o idee pentru a fi luată în considerare și dezbătută.*

Keywords: *archaeology, prehistory, Pleistocene, Holocene, Transition, Palaeoamerican, North America.*

Cuvinte cheie: *arheologie, preistorie, Pleistocen, Holocen, Tranziție, Paleoamerican, America de Nord.*

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◆ Introduction

This paper is an invitation to debate and dialogue, and also a divulgation of certain theoretical, terminological and conceptual aspects related to the manner in which archaeologists approach the chronological categorization for the early prehistoric times in North America, and it embraces a series of incipient ideas already stated elsewhere (C.F. Ardelean 2013). At first, a few general words about the North American early human cultures are stated, as a basis for the discussion. Also, some insights into terminological, conceptual and chronological aspects are considered useful for a better argumentation. The core of the article engages into the topic of the Pleistocene-Holocene Transition, pleading for the definition and recognition of a proper *Transitional Period* – conceived as a processual and cultural historical concept – specifically conceived for its usage in the domain of American prehistory if not on a much wider scale. Instead of perceiving the passage between the two components of the Quaternary as a ‘border’ or threshold - as often presented in the geological and the archaeological literature - a formal Transitional period is proposed, a concept that brings together progressive transformations in the climatic, geological and cultural realms. I consider that this posture allows a better integration of “post-Clovis” archaeological manifestations in the North American prehistory, as the inclusion of some of them either in the Pleistocene or the Holocene might otherwise continue to be forced. The model is not fully developed yet, but presented here as an *incipient idea*, in the hope that colleagues worldwide would find it useful and contribute to improving it. The establishment of a proper Transitional period between the Pleistocene and the Holocene in *the archaeological terminology* can be acknowledged as an important task meant to provide the conceptual and chronological framework for the integrated study of the environmental and cultural transformations and processes that marked the making of post-glacial times.

This text is written from the perspective of an archaeologist who has been working in Mexico for sufficient years. So, North America is understood in its correct continental extension, including Mexico, and the problematic debated here is considered relevant for those latitudes, as well. It is also written from the perspective of a person (relatively) recently integrated into the Quaternary/prehistoric studies in this part of the world, as an inevitable effect of impressions and confusions experienced in front of terminologies and chronological models managed for the region. The general discussions in this text can be of relevance for colleagues and students in either Europe and Americas, for those who are interested in the delicate aspects of chronological terminologies.

◆ Words on North American early prehistory

The Clovis technology is famous worldwide for being the flaked stone manifestation of one of the oldest, most complex and better integrated archaeological cultures in North America, one that left behind so many fabulous artifacts and a diverse settlement pattern over a vast territory during the final centuries of the Pleistocene or Ice Age (see A.T. Boldurian, J.L. Cotter 1999, M.B. Collins 1999, M.B. Collins 2007, C.V. Haynes, B.B. Huckell 2007; B.A. Bradley, M.B. Collins, A. Hemmings 2010; M.R. Waters *et alii* 2011; C.F. Ardelean 2014; A.M. Smallwood, T.A. Jennings 2015).

After the dismissal of the “Clovis-first” paradigm and the accumulation of new data in favor of a much earlier human presence in the western hemisphere (J. Adovasio *et alii* 1980; T. Dillehay 2000; J. Adovasio, D.R. Pedler 2005; D.J. Stanford 2005; D.J. Stanford, B.A. Bradley 2012; C.F. Ardelean 2013; C.F. Ardelean 2014; D.J. Stanford, A.J. Stenger 2015), the Clovis

projectile point still represents the emblem of Ice Age North America. Radiocarbon dating places it between about 13,500 and 12,800 calendar years ago (calBP) (S. Fiedel 2004), or, more accurately, between 11,050 and 10,800 radiocarbon years ago (RCYBP) (M.R. Waters, T.W. Stafford 2007). The archaeological record shows Clovis clustering in the centre, the southwest and west of the United States, while suggesting the existence of other traditions co-existing with them in the middle-east, east and southeast of the country (J.E. Morrow, T.A. Morrow 1999; A. Hemmings *et alii* 2004; J.S. Dunbar, A. Hemmings 2004; D.G. Anderson 2005; B. Lepper 2005; M. Faught 2006), as well as in the Great Basin to the west (D.J. Stanford *et alii* 2005; C. Beck, G.T. Jones 2010; C. Beck, G.T. Jones 2012). The Pleistocene “fluted point traditions” are almost absent to the south, in Mexico, where the archaeological-palaeoenvironmental panorama is even more confusing, with the possibility of having there completely different and still unknown cultures at that moment in time (cf. C.F. Ardelean 2013, C.F. Ardelean 2014). The exception is represented by a few early sites in the northwest of the country, in the Sonora region (G. Sánchez *et alii* 2015).

No matter who they were - Clovis, their mysterious contemporaries and the “older-than-Clovis” inhabitants - as long as they lived before the onset of the Younger Dryas chronozone, they were of Pleistocene age. The immediately following cultures, such as Folsom, Goshen-Plainview, Agate Basin, the Cody complex and others - normally known as ‘Late Paleoindian’ (cf. D.G. Anderson 2004, D.G. Anderson 2005; C.F. Ardelean 2014) (fig. 1) - developed during the Younger Dryas (the brief climate reversal that lasted between 12,800 and 11,700 calBP) and continued after it (V. Holliday *et alii* 1999; G. Frison 2005; D.J. Stanford 2005; D.G. Wyckoff 2005).

PERIOD		CHRONOLOGY (calendar years B.P.)
Historic		300 - ...
Late Prehistoric		1 200 - 300
Transitional Archaic		2 000 - 1 200
Archaic	Late	3 500 - 2 000
	Middle	6/5 000 - 3 500
	Early	9/8 000 - 6/5 000
Paleoindian (Paleoamerican)	Late	11 000 - 8 000
	Middle	13 500 - 11 000
	Early	> 16 000 - 13 500

Fig. 1. The simplified general chronological scheme of the North American prehistory, as commonly employed mostly in the United States. The ages presented here are approximate and orientative, only. Such a model is rarely used by archaeologists in other countries, such as Mexico (adapted from E.S. Turner, T.R. Hester 1999, D.G. Anderson 2005, and others).

Schema cronologică generală a preistoriei Americii de Nord, așa cum se folosește în mod frecvent în Statele Unite ale Americii. Perioadele prezentate aici sunt aproximative și orientative. Acest model este rar folosit de către arheologii din alte țări, precum Mexic (adaptat după E.S. Turner, T.R. Hester 1999, D.G. Anderson 2005 și alții).

Therefore, technically, they are not of Pleistocene age anymore. But, they are not properly speaking Holocene cultures either, as they “drag” cultural behaviors more characteristic for the previous, Pleistocene times, and differ, in artifacts and behaviors, from their later counterparts. In most of North America, including the northern half of Mexico, the Holocene is characterized by a notable change in material culture, projectile points and subsistence patterns. As far as we understand the chronologies today, the lithic assemblages of the Early-to-Middle Holocene became dominated by triangular, side-notched or corner-notched points, their size decreased and the bow-and-arrow weaponry seems to have replaced the dart and spear-thrower (E.S. Turner, T.R. Hester 1999; N. Justice 1987; N. Justice 2002a; N. Justice 2002b; T.A. Jennings 2008; N.J. Parezo, J.C. Janetski 2014). Whether linked or not to the new hunter-gatherer technologies, the environment and climate of the Holocene were also very different from the Pleistocene, as it happened anywhere else in the world. In that case, are our cultural terminologies and historic periodizations adequately reflecting the Transition between the Ice Age and the current interstadial?

◆ Considerations about terminology and concepts

Unlike the Old World prehistory, Americas do not count with a traditional, continental-wide, well-established chronological/cultural-historical framework, and the models in use are rather regional, sometimes varying from country to country, poorly compatible with the need for an international and trans-disciplinary dialogue.

How should we refer to the archaeology we practice when studying the earliest human occupations in the Americas? Can we call it Palaeolithic, like in the Eastern Hemisphere? Should we stick to the terminology currently in use in the United States or Canada, with the concepts of ‘Paleoindian’ and ‘Archaic’ in the foreground? Is there anything to pay attention to in the Mexican prehistoric terminology or in South American models? These questions are well-known to scholars working in these parts of the world, but the complexity of the topic may not be so clear for readers elsewhere. Terminologies are not only words to be used according to preferences; voluntarily or not, they label objective realities of the past and may even have political implications. A much too diverse and particularistic panorama tends to generate confusions when comparing data from different regions and puts obstacles to the communication between archaeologists speaking different languages.

In Mexico, it is well-known that the word *indio* (‘Indian’), referring to the indigenous populations, is largely considered an offense. Employed for centuries as a synonymous for social and racial inferiority by the Spanish chronicles and Colonial documents, the term acquired an unpleasant hue for the locals. The millions of inhabitants of native origin still speaking native languages never adopted the term “Indian” as part of their identity, contrarily to what happened, to certain extent, with Native Americans in the United States in their relationship with the wider public. As a matter of respect for the native populations, archaeologists in Mexico do not use the word *indio* or any derivate concept.

In the United States, authors, media and general public traditionally employed the word ‘Paleoindian’ when referring to the early stages of human presence, although it is never clear when its specific use refers to Terminal Pleistocene or Early Holocene cultures, which makes it part of the problem debated here, because ‘Paleoindians’ includes all those cultures named above and the chronological coverage of the term is blurry. According to R. Bonnichsen (1999, p. 2), the term was first introduced by Frank Roberts in 1935 and implies links between the Pleistocene and the Holocene. As A. Bryan and R. Gruhn (1989, p. 83) showed, the term

has been widely used in a variety of senses, most commonly for ‘specialized big game hunting with lanceolate stone projectile points’, but it has also been used in an evolutive sense, for previous stages of development preceding the so-called Archaic; in North American archaeology, ‘Archaic’ seems to be almost synonymous with the Holocene (fig. 1). In fact, there is a true automatism among scholars in labeling as Archaic almost everything that does not look Paleoindian-like, regardless the cultural, technological and chronological pertinence of the finds. A word used at ease, bearing an undeniable hue of unilinear evolutionism. In Mexico, the term ‘Paleoindian’ has seldom been employed in academic writing, for reasons alluded above. Julio Montané (1988) unsuccessfully proposed a chronological scheme based on this concept. Before that, Luis Aveyra (1962) had already intended the definition of a ‘Paleoindian phase’ in Mexican prehistory, referring to all those finds and localities belonging to nomadic hunters of extinct fauna from the Upper Pleistocene.

The term ‘Paleoamerican’ is much more common in the present among both scholars and general public, in its way to replace the previous one. It was first proposed by D.A. Suhm *et alii* (1954) and much later re-introduced in the archaeological terminology by R. Bonnichsen (1999), who considered it to be a neutral and ‘a more descriptive geographical term’, without any political implications similar to those related ‘to determine descendant and affinity relationships’. In J. Chatters’ opinion (2010, p. 54), Paleoamerican refers to “any humans predating 8,000 radiocarbon years BP (ca. 10,000 calBP), associated with cultures identified as Paleoindian, Early Archaic, or Paleoarchaic” (fig. 1). A *terminus ante quem* to be kept in mind.

A. Bryan and R. Gruhn (1989) were active supporters of the employment of the term ‘Palaeolithic’ for the earliest American prehistory, on a continental level. They consider that cultural relationships between the earliest inhabitants of the Americas and the Old World would justify the validity of the term. They affirm that, if the specific phases of cultural development always imply a sort of evolutionary process in their terminology, the word used to define the early human presence in the New World must be as general as possible. In Mexico, J.L. Lorenzo (1967) dominated the local archaeological thinking during the last five decades with his particularistic and etno-geo-centric ‘Lithic Stage’ model (“la Etapa Lítica”, in Spanish), in which doubtful chronological phases, such as “Archaeolithic” and “Lower Cenolithic”, had little in common with neither the objective data or the continental debates on the subject.

In my opinion, the use of the term Paleolithic for the American continent is theoretically possible, but highly risky, as it would suggest an actual antiquity of human occupation as old as in the Old World. Especially, because there are regions where data is still confusing and poorly studied, such as the particular case of Mexico. The term to be finally chosen for that purpose should be applicable to the entire continent, or at least to the North American sub-continent as a whole. This would be healthy if one wanted to stop the particularism and artificial separation on methodological and epistemological grounds between what happens in each one of the North American countries. For the case of Mexico, at least for the moment, the use of the word Palaeolithic would be relatively dangerous in the absence of widely accepted archaeological evidence. In the first place, because it would increase the a priori ‘faith’ in an Archaeolithic phase, whose objective existence is not (or just weakly) supported, so far, by the available data, and that would set more obstacles in front of the efforts to reduce dogma and increase scientific objectivity. In consequence, the employment of the term Paleolithic for the American early occupations should be considered with serious precaution.

The most appropriate word to define the periods of the earliest human occupation in the Americas would probably be Pleistocene: “Pleistocene archaeology”, “Pleistocene cultures”, etc. The problem is that the end of the Pleistocene and the beginning of the Holocene are still in debate – although the recent proposal by M.J. Head and P. Gibbard (2015) reflects the current state of the art (see below) – and the decision must come in the future from an agreement between archaeologists, geologists, palaeoclimatologists, palaeoenvironmentalists, palaeontologists, and so on. That would be the ideal scenario, because it would finally set the earliest human cultures into a chronological framework conceptually congruent with the realities of the planet during the complex pass from the Pleistocene to the Holocene. For the moment, the use of ‘Pleistocene cultures’ should await for a better dialogue between disciplines. Clovis and older-than-Clovis cultures are indeed part of the Pleistocene, as they seem to have ended when the Younger Dryas commenced; but only them and their contemporaries. It is also true that there will always be a risk to provoke, in people’s minds, a synonymy between Paleoamerican and Pleistocene terms, tending to extend the use of the archaeological term Pleistocene to post-Clovis – but not yet properly Archaic – flaked stone cultures, which developed during or after the closing episode of the Ice Age, and that would add to the confusion.

This kind of terminology, as well as the underlying chronological schemes, are not constructed upon a relationship between the technology employed by ancient people and the environmental conditions of their world, breaking the necessary dialogue between archaeological and palaeoenvironmental data. I consider that the ideal solution would be to refer properly to the Pleistocene societies and Holocene societies. But, in order to achieve that, we must learn how to define what comes in between: the *Transitional* societies.

◆ **The Pleistocene-Holocene Transition: a blurry image and the need for a proper transitional chronozone**

The “Pleistocene-Holocene Transition” is still an ambiguous concept, although widely used in American prehistoric archaeology literature today. It refers to ‘something’ that falls in between two defined and accepted geologic epochs, but not a proper interval easily delimited and described by itself. When does the Pleistocene end and the Holocene start? A precise “moment” in time cannot be established and less if one wants to capture it on a global level. The definition of a formally recognized *Transition* period between the two, reflecting both climatic and cultural processes (either sudden or gradual) that probably cover more than three millennia, is very much needed in the archaeological vocabulary, especially in the field of prehistory and particularly for the Americas, where archaeological studies do not count with long established and internationally accepted chronological schemes. The term ‘Transition’, referring specifically to the passage between Pleistocene and Holocene from a cultural point of view, is intentionally written here with capital T, as it is assumed as a process in itself and an ontological reality that would justify the adoption of a new chronological phase (archaeological, not geological) or chronozone, with both cultural and palaeoenvironmental implications.

The problem is that the discussion seems to be a completely separate one among geologists and paleoclimatologists, on one side, and archaeologists, on the other side. The arguments and criteria the Earth scientists adopt for defining the Transition do not necessarily match the vision of archaeologists. Glacial retreats, sedimentary units and pollen zones are preferred by the former, while particular changes and shifts in human behavior, material

culture and subsistence patterns are favored by the latter. An inter-disciplinary consensus about what the Transition means is probably far from being achieved, but a few aspects can be explored in order to evaluate if, at least for the North American prehistory, a proper Transitional chronozone may be established, as a convention for archaeological purposes. Here, the “Pleistocene-Holocene Transition” concept is tentatively conceived mainly (but not exclusively) from a *cultural* point of view, not restricted to geo-climatic criteria (but seriously considering them as crucial). This way, the ‘limit’ between the two Eras necessarily adopts the status of a gradual passage, involving processes, not arbitrary thresholds. It was, most likely, a lasting time-zone (or chronozone), not a boundary.

Often, the ‘border’ between Pleistocene and Holocene is associated, in American archaeology, with the Younger Dryas climate reversal, the last cold pulsation that brought back Glacial Maximum conditions to large parts of the planet for a millennium and definitely marked the “death” of the Ice Ages (J.H. Mercer 1972; D. Peteet 1995; D. Peteet *et alii* 1990; W.S. Broecker *et alii* 1988, W.S. Broecker *et alii* 2010; J.A.M. Ballenger *et alii* 2011; M. Eren 2012; C.F. Ardelean 2013). Its indicators in the palaeolandscape – for example, its stratigraphic markers - would provide guidance about at least a portion of the Transitional period that is being proposed here. That climatic episode was part – and only a part – of the interval of passage between the Pleistocene and the Holocene. From a cultural/archaeological point of view, the Younger Dryas by itself cannot be considered as the monolithic limit between the two geo-climatic Eras, as it may be seen by geologists. In my archaeological thinking, it did put an end to the Pleistocene, but it was not the start of the Holocene by itself; at least, not from a cultural (archaeological) point of view. The cultural changes in the Americas were much more complex and covered a longer time than the Younger Dryas millennium. The succession of transformations that defined the human dimension in Americas at the end of the Pleistocene manifest as a long sequence of archaeological cultures that reflect a proper *transitional* process between the Ice Age and the warmer Holocene, which continued *after* the termination of the cold interval. Whether the end of the Pleistocene is somehow easier to agree on (mainly because of that cold episode that left quite strong signals in the palaeoclimatic records around the globe), the beginning of the Holocene is a much more complicated issue.

Scientists, principally in Europe, used to speak of the *Last Termination*, including the terminal intra-stadial events developing within the last glaciation and ending with the Preboreal and Boreal phases, in European terminology (fig. 2). Since the end of the 19th century, researchers were familiar with the Blytt-Sernander scheme, which introduced phases like the Arctic, Boreal and Atlantic among the models describing the Pleistocene-Holocene Transition in the Old World (D.E. Anderson *et alii* 2007, p. 10-12). The development of pollen studies (with the establishment of the ‘pollen zones’) and, later, the advent of radiocarbon dating showed that the traditional scheme was not accurate enough and the Holocene was not as stable, climatically, as originally thought. However, J. Mangerud *et alii* (1974) argued that the Blytt-Sernander sequence could be refined, adapted to the radiocarbon and pollen data and kept as a useful reference terminology for the study of the transitional interval (fig. 2).

In my opinion, in this scheme, the latest part of a potential Transitional period coincides with the Boreal, while the Early Holocene would correspond to the Atlantic phase, starting at about 10,000 calBP. The Transition would be comprised within the Preboreal and the Boreal stages (ca. 12,000-10,000 calBP), plus the Younger Dryas, which overlaps with the first part of this interval. In Americas, the ‘Atlantic’ stage proved rather unstable, with severe droughts and the formation of carbonate horizons and sand dunes (around 8,500-7,000 calBP), and that justified the definition of another particular climatic event, warm and dry, known as

the Altithermal or 'hypsithermal' (E.S. Deevey, R.F. Flint 1957; R. Nance 1972). The Altithermal is already Holocene, perhaps the most significant recognizable climatic event in the earliest stages of the Holocene. The Pleistocene-Holocene Transition must have ended at some point before it.

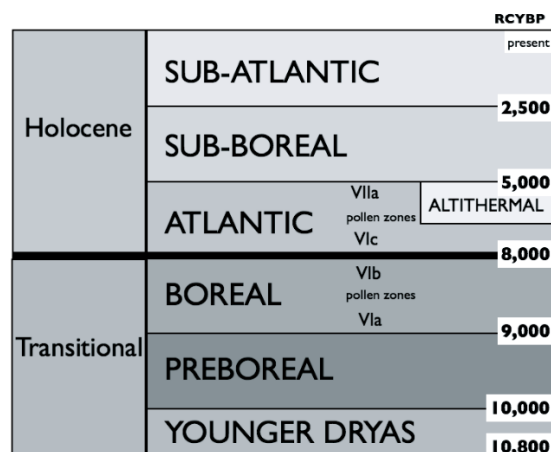


Fig. 2. This model presents the author's interpretation of the 'buffer zone' Transitional period between the Pleistocene and the Holocene, occupying a rather long interval between 12,800 – 9,000 calBP. Based on data from D.G. Anderson (2005) and E.S. Deevey, R.F. Flint (1957), as well as on the modifications proposed by J. Mangerud *et alii* (1974) to the Blytt-Sernander scheme.

Acest model prezintă interpretarea autorului cu privire la perioada de Tranziție, „zona de tampon” între Pleistocen și Holocen, care ocupă un interval destul de îndelungat între 12800 și 9000 calBP. Realizat pe baza datelor din D.G. Anderson (2005) și E.S. Deevey, R.F. Flint (1957), precum și modificărilor aduse de J. Mangerud *et alii* (1974) schemei cunoscute ca Blytt-Sernander.

Very few authors speak of the threshold between the Pleistocene and the Holocene in terms of a transitional process, as a relatively long and gradual cultural-environmental development. No Transition or 'buffer zone' has been officially defined so far between the Pleistocene and the Holocene; at least not for the use of archaeologists. The chronozone between the two is usually referred to in terms of sudden or arbitrary dates, seldom correlated with specific climatic events. Just to use a few examples, M. Walker (2005) and L.G. Straus (1996) establish the start of the Holocene at 11,500 calBP, at the end of the Younger Dryas. M. Williams *et alii* (1998) manage a limit around 10,000 RCYBP, also roughly coinciding with the last cold pulsation. In fact, the global, mostly accepted, Pleistocene-Holocene official 'boundary' among scientists is set at 11,650±99 calBP, precisely at the end of the Younger Dryas (M. Walker *et alii* 2009; cf. C.B. Bousman. B.J. Vierra 2012a, p. 4-5; also in M.J. Head, P. Gibbard 2015). Others propose that the onset of the Holocene in North America should be set at 8,000-7,000 RCYBP (meaning about 10,000-9,000 calBP), when near-modern conditions were already installed (J. Quade 1986) or at 7,000 RCYBP, when the ice sheets had disappeared (W.R. Peltier 1994). C.V. Haynes (1991, p. 448; 2007, p. 40) wrote that the 'black mat' sediments of Younger Dryas age should be considered as the best stratigraphic marker for the Pleistocene-Holocene limit, dating around 11,000 RCYBP (12,800/13,000 calBP). I agree with the importance of the Younger Dryas and related black mats as indicators for the end of the Pleistocene (C.F. Ardelean 2013), but not also as markers for the onset of the *cultural* Holocene, as such a sudden pass would not match the more gradual cultural responses which continued to bear Pleistocene technological customs long after the mentioned climatic event in some geographic

regions. Berger (1990) agreed that the limit corresponded to the Boreal/Atlantic boundary, around 8,000 RCYBP.

Decades ago, J.H. Mercer (1972) reviewed the discussions and conclusions of several INQUA meetings about the Pleistocene-Holocene transition. He observed that nobody had considered the Younger Dryas climate reversal as a viable option, although even earlier proposals (Allerød - end of YD, for example) had been proposed¹. As I could understand, one of the most favored ‘solutions’ in those meetings was the chronoboundary comprising the Younger Dryas/Preboreal, at 10,000 RCYBP. But most proposals, as Mercer showed (J.H. Mercer 1972, p. 15), were clearly Eurocentric, of dubious global relevance. In his opinion, a Pleistocene-Holocene boundary could not be equivalent with the Younger Dryas - Preboreal stages, because Mercer postulated as an adversary of a global Younger Dryas. He defended the lower boundary of the Holocene at 14,500-14,000 RCYBP, considering that the climatic oscillations of that age were the only globally relevant climatic events before the Altithermal/Hypsithermal interval.

The Altithermal was better defined for North America (mainly western US) by E. Antevs (1955). In his model, the whole post-glacial (or Deglacial) epoch, roughly coeval with the concept of the Holocene, is called *Neothermal*. The Altithermal/Hypsithermal (situated in time between 7,500/7,000 - 4,000 RCYBP) was a warm and dry interval, with pronounced droughts, preceded by the Anathermal (following the Younger Dryas, between 10,000-7,500 RCYBP) and continued by the Medithermal (or Katathermal), from 4,000 RCYBP to the present (fig. 3). The author refined the model later and, based on data from sites in Arizona, he established the famous Altithermal period as a clearly arid interval, marked by sand dune formation and accumulations of carbonates (E. Antevs 1962). Some authors, in the field of archaeology, questioned Antevs’ Neothermal model. Some archaeologists, like A. Bryan and R. Gruhn (1964), argued that those phases could not be considered as fixed, definite and universal periods, as the climatic conditions observed in radiocarbon dated sites from different regions did not share similar attributes; they should rather be “phases of the Neothermal temperature curve” with local variations. However, pollen records obtained by R. Byrne *et alii* (1979) in the Great Basin confirmed the Altithermal as a warm and dry period, with an increase in xerophytic plants; the first major bio-climatic signature of the Holocene.

Another important and still mysterious episode, at the very end of the Pleistocene-Holocene Transition interval and somehow within the Altithermal, was the so-called 8.2ka or “8,200 calBP event”. Lasting for only about 160 years (8,250-8,090 calBP; cf. C.B. Bousman, B.J. Vierra 2012a, p. 5), this cool pulsation was documented for central Mexico, too, supposedly as the only evident post-glacial cold peak there, in detriment of the Younger Dryas episode (K. Heine 1994). Data from around the world indicate its global manifestation as a major cooling event that practically closed the climatic oscillations preceding the Early Holocene “optimum” (J.U.L. Baldini *et alii* 2002; C.R.W. Ellison *et alii* 2006). The 8.2ka event had its own internal variations and caused rapid and short-lived temperature pulsations in the oceans (L. Randsalu-Wendrup *et alii* 2012).

¹ The author presented the results of the International Quaternary Association (INQUA) meetings from Warsaw, Poland (1961), Boulder, Colorado, US (1965) and Haarlem, Netherlands (1968), in which scientists discussed the Transition topic and proposed several options of boundaries between the Pleistocene and the Holocene.

		RCYBP	
		Present	
Holocene	Neothermal	Medithermal	4,000
		Altithermal	7,500
Transitional		Anathermal	10,000
		Younger Dryas	11,000
Pleistocene		Bølling-Allerød	15,000

Fig. 3. A chronological table based on E. Antevs's model of the Neothermal, with the Altithermal as the main warm peak in the first part of the Holocene. In the left column, the author's 'coarse' proposal of the Transitional period, including the Younger Dryas and the Anathermal (based on the climatic model diagram from E. Antevs 1955, p. 323).

Tabel cronologic bazat pe modelul lui E. Antevs despre Neothermal, cu Altithermalul reprezentând principalul vârf climatic cald în prima parte a Holocenului. În coloana din stânga, propunerea inițială a autorului asupra Perioadei de Tranziție, incluzând Younger Dryas și Anathermalul (bazat pe date din E. Antevs 1955, p. 323).

The commencement of the Holocene, under this panorama, seems to have been associated with adverse climatic conditions, potentially problematic for human cultures. Actually, the idea of an occupational hiatus in North America was common among scholars. B. Reeves (1973) explored this hypothesis for the Northern Plains and discovered that the landscape was characterized by rich grasslands which may have supported considerable bison populations, so the absence of human groups in the Early Holocene was only apparent, resulting from insufficient sampling. However, the problem was raised again by M.S. Sheehan (1995). Testing Reeves' conclusion, he noticed that the Middle and Late Archaic occupations were indeed abundant in the region, but, in spite of sustained investigations, the Early Archaic (correspondingly, the Anathermal-Altithermal) human presence remained underrepresented. In North American archaeology, the Holocene and the Archaic are almost synonymous concepts, when referring to events occurring before the European arrival. In effect, the Holocene had commenced under curious circumstances. As shown by D. Meltzer (1991) for the Southern High Plains of Texas, the onset of the Altithermal meant severe droughts, with scarce human presence and many ancient wells dug by people to reach the dropping water tables. A similar "hiatus theory" was proposed, time ago, for the Eastern Great Basin, for the following Medithermal period (D.B. Madsen, M.S. Berry 1975), but the argument was questioned by C.M. Aikens (1976).

More recent publications do envision a proper, long transitional process between the Pleistocene and the Holocene, from an archaeological point of view, not only like a "barrier" marked by the terminus point of a climatic event (L.G. Straus *et alii* 1996; C.B. Bousman, B.J. Vierra 2012b). Culturally speaking, the Transition was prolonged, lasting between 15/13,000 and 8,000 RCYBP (D. Yesner 1996; L.G. Straus 1996; J.M. Erlandson, M.L. Moss 1996). A long list of climatic and environmental changes produced an entirely new landscape that the survivors of the "Transitional" had to cope with (D. Yesner 1996). Comparing the transition

with a play in several acts, L.G. Straus (1996, p. 4) considers that the third and last act was the 10,000-8,000 RCYBP interval, corresponding to the Preboreal and Boreal stages. This interval is sometimes referred to as the “Paleoarchaic”, mainly in the Great Basin of the Western US. C. Beck and G.T. Jones (1997) point at a very important characteristic of the Paleoarchaic archaeological record of that region: the period lacks buried sites, lacks stratigraphy and all sites are principally made of surface materials.

At this moment, the chronological model accepted by the community of Quaternary studies is the one presented recently at the 2015 INQUA Meeting in Nagoya, Japan, and published in *Quaternary International* (M.J. Head, P. Gibbard 2015). The chronological convention established by this proposal considers the end of the Pleistocene as coincident with the end of the Younger Dryas cold reversal at 11,700 calBP, according to the new international data. This also marks the beginning of the Early Holocene, which in turn ends with the 8.2ka event (at 8200 calBP). I consider this is a valuable scheme that I personally embrace, most useful for differentiating between “early” and “late” in the American prehistory. Nevertheless, the establishment of this new chronological paradigm in Quaternary studies still does not solve the problem archaeologists face when dealing with ancient human societies whose archaeological manifestations and internal dynamics not always respect the time boundaries established on geological and climatological criteria.

◆ Conclusions

At the end of this brief discussion of the Pleistocene-Holocene Transition, I propose the use of the *Transitional Period*, as a valid concept defining the “buffer” chronozone between the Terminal Ice Age and the current interglacial in North America (fig. 4). I consider that in North America we should be able to employ terminology like “Pleistocene cultures” and “Holocene cultures”, with their corresponding phases and subdivisions, instead of the traditional terms in use, such as “Paleoamerican”, “Archaic” and so on. By referring to Pleistocene and Holocene, we would link our archaeological interpretations to already established chrono-geo-cultural stages of global relevance, we would ease the dialogue with colleagues from around the globe and facilitate the access of students from other geographic corners to our American archaeological literature. It would also provide a better terminological background for comparisons of artifacts and societies and for the making of trans-oceanic cultural correlations. Additionally, the introduction of an intermediate Transitional phase would allow the chronological adjustment of the cultural manifestations situated in time between the end of Clovis era and the proper Early Archaic/Early-to-Middle Holocene horizons.

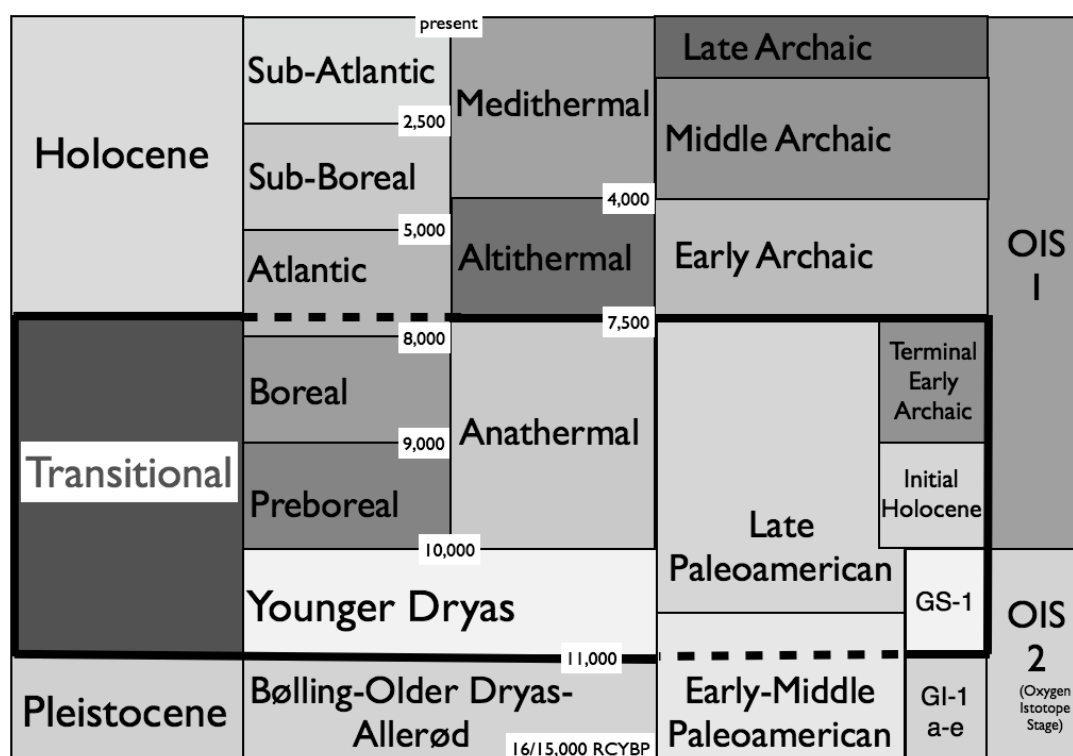


Fig. 4. This image summarizes the discussion in this paper and presents the situation of the Transitional chronozone between the Pleistocene and the Holocene, in relationship to the most important climatic stages, cultural phases, oxygen isotope stages, as well as the last stadial (GS) and interstadial (GI) events based on the Greenland ice cores. Data based on D.E. Anderson *et alii* 2007, E.S. Deevey, R.F. Flint 1957, J. Mangerud *et alii* 1974, E. Antevs 1955, E.S. Turner, T.R. Hester 1999, C.B. Bousman, B.J. Viera 2012a. Dates are in radiocarbon years (RCYBP).

Această imagine prezintă rezumatul ideilor din acest articol și marchează locul perioadei de Tranziție între Pleistocen și Holocen, în legătură cu cele mai importante stadii climatice, faze culturale, stadii izotopice ale oxigenului, și în relație cu ultimele stadii și interstadii pe baza cronologiei derivate din carotele de gheață din Groenlanda. Informații bazate pe D.E. Anderson *et alii* 2007, E.S. Deevey, R.F. Flint 1957, J. Mangerud *et alii* 1974, E. Antevs 1955, E.S. Turner, T.R. Hester 1999, C.B. Bousman, B.J. Viera 2012a. Datările sunt în ani radiocarbon (RCYBP).

This interval could theoretically comprise at least two major phases: i) "Transitional A", commencing at 12,800 calBP and lasting for the entire duration of the Younger Dryas, until about 11,700 calBP; ii) "Transitional B", following the Younger Dryas, including the so-called Preboreal and Boreal stages and ending either with the onset of the Altithermal (roughly around 7,500 RCYBP / 9,000 calBP) or, in other terms and in a more flexible position, coeval with the end of the Early Holocene (around 8,200 calBP). This model occupies a long interval and invades the traditionally managed "boundary" of 8,000 RCYBP. Resuming the proposal to only a few words: the Transitional period, as a useful cultural-chronological interval, would include the Younger Dryas and the Early Holocene (this last one in the terms recently exposed at the 2015 INQUA Meeting; M.J. Head, P. Gibbard 2015) (fig. 5). Of course, a Transitional period meant for the use of archaeology can only be established after a sustained and continuous effort of radiocarbon dating of the cultural manifestations in the archaeological record and a proper dialogue and open communication between researchers across the continent. Otherwise, any intent in establishing a culture-based chronological period would

lack ontological support and would reduce to mere artificial innovation fed by already existing geological/paleoclimatological models.

QUATERNARY	HOLOCENE	calBP	Late Holocene
		4,200	Middle Holocene
	8,200	Early Holocene
	TRANSITIONAL	11,700	YOUNGER DRYAS
	“B”	12,800	Late Pleistocene
	“A”	130,000	Middle Pleistocene
	PLEISTOCENE		

Fig. 5. A simplified presentation of the proposal, in parallel with the most recent periodization of the Quaternary, based on M.J. Head, P. Gibbard 2015.

O prezentare mai simplificată a propunerii, în paralel cu cea mai recentă periodizare a Cuaternarului, după datele din M.J. Head, Gibbard 2015.

The dates managed above are only suggestions, references for this brief discussion and perhaps the relevance of many of them is already being modified substantially by new data generated everyday by ongoing investigations. This paper does not mean to establish a chronological model or to attack the existing accepted schemes, nor was it planned as a complete revision of relevant literature; it is rather an attempt to call the attention on the necessity to count with a proper Transitional Period and to plea for the formal acceptance of the passage from the Pleistocene to the Holocene as a proper transition, as a process that involved more or less gradual cultural transformations in relationship to changes in environment. This is an invitation to debate and collaboration, in the hope that scholars will find this suggestion useful and contribute their more advised expertise to the topic.

◆ Bibliography

J.M. Adovasio *et alii*
1980

J.M. Adovasio, J.D. Gruhn, J. Donahue, R. Stuckenrath, J.E. Guilday, K. Volman, Yes, Virginia, It Really is That Old: A Reply to Haynes and Mead, *Am Antiq*, 45(3), p. 588-595.

- J.M. Adovasio,
D.R. Pedler 2005 A Long View of Deep Time at Meadowcroft Rockshelter, in R. Bonnichsen, B.T. Lepper, D. Stanford, M.R. Waters (eds.), *Paleoamerican Origins: Beyond Clovis*, Center for the Study of the First Americans, Department of Anthropology, Texas A and M University, College Station, p. 23-28.
- C.M. Aikens 1976 Cultural Hiatus in the Eastern Great Basin?, *Am Antiq*, 41(4), p. 543-550.
- D.E. Anderson *et alii*
2007 D.E. Anderson, A.S. Goudie, A.G. Parker, *Global Environments through the Quaternary. Exploring Environmental Change*, Oxford University Press, Oxford.
- D.G. Anderson 2004 Paleoindian Occupation in the Southeastern United States, in B.T. Lepper, R. Bonnichsen (eds.), *New Perspectives on the First Americans*, Center for the Study of the First Americans, Texas A and M University, College Station, p. 119-128.
- D.G. Anderson 2005 Pleistocene Human Occupation of the Southeastern United States: Research Directions for the Early 21st Century, in R. Bonnichsen, B.T. Lepper, D. Stanford, M.R. Waters (eds.), *Paleoamerican Origins: Beyond Clovis*, Center for the Study of the First Americans, Texas A&M University, College Station, p. 29-42.
- E. Antevs 1955 Geologic-Climatic Dating in the West, *Am Antiq*, 20(4), p. 317-335.
- E. Antevs 1962 Late Quaternary Climates in Arizona, *Am Antiq*, 28(2), p. 193-198.
- C.F. Ardelean 2013 *Archaeology of early human occupations and the Pleistocene-Holocene Transition in the Zacatecas Desert, Northern Mexico*, PhD Dissertation, University of Exeter, Exeter, 832 p.
- C.F. Ardelean 2014 The early prehistory of the Americas and the human peopling of the Western Hemisphere. An overview of archaeological data, hypotheses and models, *SP*, 11, p. 33-95.
- L. Aveyra Arroyo
de Anda 1962 *Antigüedad del hombre en México y Centroamérica. Catálogo razonado de localidades y bibliografía selecta (1867-1961)*, Universidad Nacional Autónoma de México, Mexico City.
- J.U.L. Baldini *et alii*
2002 J.U.L. Baldini, F. McDermott, I.J. Fairchild, Structure of the 8200-Year Cold Event Revealed by a Speleothem Trace Element Record, *Science*, New Series, 296 (5576), p. 2203-2206.
- J.A.M. Ballenger *et alii*
2011 J.A.M. Ballenger, V.T. Holliday, A.L. Kowler, W.T.R. Reitze, M.M. Prasciunas, D.S. Miller, J.D. Windingstad, Evidence for Younger Dryas global climate oscillation and human response in the American Southwest, *QI*, 242, p. 502-519.

- C. Beck, G.T. Jones
1997 C. Beck, G.T. Jones, The Terminal Pleistocene/Early Holocene Archaeology of the Great Basin, *JWP*, 11(2), p. 161-236.
- C. Beck, G.T. Jones
2010 Clovis and Western Stemmed: Population Migration and the Meeting of Two Technologies in the Intermountain West, *Am Antiq*, 75(1), p. 81-116.
- C. Beck, G.T. Jones
2012 Clovis and Western Stemmed Again: Reply to Fiedel and Morrow, *Am Antiq*, 77(2), p. 386-397.
- W.H. Berger 1990 The Younger Dryas Spell – a quest for causes, *Palaeogeography, Palaeoclimatology, Palaeoecology (Global and Planetary Change Section)*, 89, p. 219-237.
- A.T. Boldurian,
J.L. Cotter 1999 *Clovis Revisited. New Perspectives on Paleoindian Adaptations from Blackwater Draw, New Mexico*, The University Museum, University of Pennsylvania, Philadelphia.
- R. Bonnichsen
1999 An Introduction to Who Where the First Americans, in R. Bonnichsen (ed.), *Who Where The First Americans? Proceedings of the 58th Annual Biology Colloquium*, Oregon State University, Center for the Study of the First Americans, Oregon State University, Corvallis, p. 1-24.
- C.B. Bousman,
B.J. Viera 2012a Chronology, Environmental Setting, and Views of the Terminal Pleistocene and Early Holocene Cultural Transitions in North America, in C.B. Bousman, B.J. Viera (eds.), *From Pleistocene to the Holocene. Human Organization and Cultural Transformations in Prehistoric North America*, Texas A&M University, College Station, p. 1-15.
- C.B. Bousman, B.J. Vierra
(eds.) 2012b *From Pleistocene to the Holocene. Human Organization and Cultural Transformations in Prehistoric North America*, Texas A&M University, College Station.
- B.A. Bradley *et alii*
2010 B.A. Bradley, M.B. Collins, A. Hemmings, *Clovis Technology*, International Monographs in Prehistory, Ann Arbor.
- W.S. Broecker *et alii*
1988 W.S. Broecker, M. Andree, W. Wolfli, H. Oeschger, G. Bonani, J. Kennett, D. Peteet, The chronology of the last deglaciation: implications to the cause of the Younger Dryas event, *Paleoceanography*, 3, p. 1-9.
- W.S. Broecker *et alii*
2010 W.S. Broecker, G.H. Denton, R.L. Edwards, H. Cheng, R.B. Alley, A.E. Putnam, Putting the Younger Dryas cold event into context, *Quaternary Science Reviews*, 29, p. 1078-1081.
- A.L. Bryan, R. Gruhn
1964 Problems relating to the Neothermal Climatic Sequence, *Am Antiq*, 29, p. 307-315.

- A.L. Bryan, R. Gruhn 1989 The evolutionary significance of the American Lower Paleolithic, in L. Mirambell (ed.), *Homenaje a José Luis Lorenzo*, Instituto Nacional de Antropología e Historia, Mexico City, p. 81-102.
- R. Byrne *et alii* 1979 R. Byrne, C. Busby, R.F. Heizer, The Altithermal Revisited: Pollen Evidence from the Leonard Rockshelter, *Journal of California and Great Basin Anthropology*, 1(2), p. 280-294.
- J.C. Chatters 2010 Patterns of Death and the Peopling of the Americas, in J.C. Jiménez López, C. Serrano Sánchez, A. González-González, F. Aguilar-Arellano (eds.), *III Simposio Internacional "El Hombre Temprano en America"*, Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México, Museo del Desierto A.C, Mexico City and Saltillo, p. 53-75.
- M.B. Collins 1999 *Clovis Blade Technology*, University of Texas Press, Austin.
- M.B. Collins 2007 Discerning Clovis Subsistence from Stone Artifacts and Site Distributions, in R.B. Walker, B.N. Driskell (eds.), *Foragers of the Terminal Pleistocene in North America*, University of Nebraska Press, Lincoln, p. 59-87.
- E.S. Deevey, R.F. Flint 1957 Post-Glacial hypsithermal interval, *Science*, 125, p. 182-184.
- T.D. Dillehay 2000 *The Settlement of the Americas. A New Prehistory*, Basic Books, New York.
- J.S. Dunbar, A. Hemmings 2004 Florida Paleoindian Points and Knives, in B.T. Lepper, R. Bonnicksen (eds.), *New Perspectives on the First Americans*, Center for the Study of the First Americans, Texas A&M University Press, College Station, p. 65-72.
- C.R.W. Ellison *et alii* 2006 C.R.W. Ellison, M.R. Champman, I.R. Hall, Surface and Deep Ocean Interactions during the Cold Climate Event 8200 Years Ago, *Science*, New Series, 312(5782), p. 1929-1932.
- M.I. Eren 2012 *Hunter-Gatherer Behavior. Human Response during the Younger Dryas*, Left Coast Press, Walnut Creek.
- J.M. Erlandson, M.L. Moss 1996 The Pleistocene-Holocene Transition along the Pacific Coast of North America, in L.G. Straus, B.V. Eriksen, J.M. Erlandson, D.R. Yesner (eds.), *Humans at the End of the Ice Age. The Archaeology of the Pleistocene-Holocene Transition*, Plenum Press, New York and London, p. 277-302.
- M. Faught 2006 Paleoindian Archaeology in Florida and Panama: Two Circumgulf Regions Exhibiting Waisted Lanceolate Projectile Points, in J.E. Morrow, C. Gnecco (eds.), *Paleoindian Archaeology. A hemispheric Perspective*, University Press of Florida, Gainesville, p. 164-184.

- S. Fiedel 2004 Clovis Age in Calendar Years: 13,500 - 13,000 CALYBP, in B.T. Lepper, R. Bonnichsen (eds.), *New Perspectives on the First Americans*, Center for the Study of the First Americans, Texas A&M University Press, College Station, p. 73-80.
- G.C. Frison 2005 The Late Pleistocene Prehistory of the Northwestern Plains, the Adjacent Mountains, and the Intermontane Basins, in R. Bonnichsen, K. Turnmire, *Ice Age Peoples of North America. Environments, Origins and Adaptations*, Second Edition, Center for the Study of the First Americans, Department of Anthropology, Texas A&M University, College Station, p. 264-280.
- C.V. Haynes 1991 Geoarchaeological and Paleohydrological Evidence for a Clovis-Age Drought in North America and Its Bearing on Extinction, *QR*, 35, p. 438-450.
- C.V. Haynes 2007 Clovis investigations in the San Pedro Valley, in C.V. Haynes, B.B. Huckell (eds.), *Murray Springs. A Clovis Site with Multiple Activity Areas in the San Pedro Valley, Arizona*, The University of Arizona Press, Tucson, p. 1-15.
- C.V. Haynes,
B.B. Huckell (eds.) 2007 *Murray Springs. A Clovis Site with Multiple Activity Areas in the San Pedro Valley, Arizona*, The University of Arizona Press, Tucson.
- M.J. Head, P. Gibbard
2015 Formal subdivision of the Quaternary System/Period: past, present and future, *QI*, 383, p. 4-35.
- K. Heine 1994 The late-glacial moraine sequences in Mexico: is there evidence for the Younger Dryas event?, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 112, p. 113-123.
- C.A Hemmings *et alii*
2004 C.A Hemmings, J.S. Dunbar, S.D. Web, Florida's Early Paleoindian Bone and Ivory Tools, in B.T. Lepper, R. Bonnichsen (eds.), *New Perspectives on the First Americans*, Center for the Study of the First Americans, Texas A&M University Press, College Station, p. 87-92.
- V.T. Holliday *et alii*
1999 V.T. Holliday, E. Johnson, T.W. Stafford, AMS Radiocarbon Dating of the Type Plainview and Firstview (Paleoindian) Assemblages: The Agony and the Ecstasy, *Am Antiq*, 64(3), p. 444-454.
- T.A. Jennings 2008 San Patrice: An Example of Late Paleoindian Adaptive Versatility in South-Central North America, *Am Antiq*, 73(3), p. 539-558.
- N.D. Justice 1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States. A Modern Survey and Reference*, Indiana University Press, Bloomington and Indianapolis.

- N.D. Justice 2002a *Stone Age Spear and Arrow Points of the Southwestern United States*, Indiana University Press, Bloomington.
- N.D. Justice 2002b *Stone Age Spears and Arrow Points of California and the Great Basin*, Indiana University Press, Bloomington.
- J.L. Lorenzo 1967 *La etapa lítica en México*, Departamento de Prehistoria, Instituto Nacional de Antropología e Historia, Mexico City.
- B. Lepper 2005 Pleistocene Peoples of Midcontinental North America, in R. Bonnichsen and K. Turnmire (eds.), *Ice Age Peoples of North America. Environments, Origins and Adaptations*, Second Edition, Centre for the Study of the First Americans, Department of Anthropology, Texas A&M University, College Station, p. 362-393.
- D.B. Madsen,
M.S. Berry 1975 A reassessment of northeastern Great Basin prehistory, *Am Antiq*, 40, p. 391-405.
- J. Mangerud *et alii*
1974 J. Mangerud, S.T. Andersen, B.E. Berglund, J.J. Donner, Quaternary stratigraphy of Norden, a proposal for terminology and classification, *Boreas*, 3, p. 109-128.
- D.J. Meltzer 1991 Altithermal Archaeology and Paleoecology at Mustangs Springs, on the Southern High Plains of Texas, *Am Antiq*, 56 (2), p. 236-267.
- J.H. Mercer 1972 The Lower Boundary of the Holocene, *Quaternary Research*, 2, p. 15-24.
- J.C. Montané 1988 El poblamiento temprano de Sonora, in A. González Jácome (ed.), *Orígenes del hombre americano. Seminario, 1987*, Secretaria de Educación Pública, Mexico City, p. 83-116.
- J.E. Morrow,
T.A. Morrow 1999 Geographic Variation in Fluted Projectile Points: A Hemispheric Perspective, *Am Antiq*, 64, p. 215-230.
- R.C. Nance 1972 Cultural Evidence for the Altithermal in Texas and Mexico, *Southwestern Journal of Anthropology*, 28 (2), p. 169-192.
- N.J. Parezo,
J.C. Janetski (eds.) 2014 *Archaeology in the Great Basin and Southwest. Papers in Honor of Don D. Fowler*, The University of Utah Press, Salt Lake City.
- W.R. Peltier 1994 Ice Age Paleotopography, *Science*, New Series, 265 (5169), p. 195-201.
- D. Peteet 1995 Global Younger Dryas?, *QI*, 28, p. 93-104.
- D.M. Peteet *et alii*
1990 D.M. Peteet, J.S. Vogel, D.E. Nelson, J.R. Southon, R.J. Nickmann, L.E. Heusser, Younger Dryas Climatic Reversal in Northeastern USA? AMS Ages for an Old Problem, *QR*, 33, p. 219-230.

- J. Quade 1986
Late Quaternary Environmental Changes in the Upper Las Vegas Valley, Nevada, *QR*, 26, p. 340-357.
- L. Randsalu-Wendrup
et alii 2012
L. Randsalu-Wendrup, D.J. Conley, J. Carstensen, I. Snowball, C. Jessen, S.C. Fritz, Ecological Regime Shifts in Lake Kälksjön, Sweden, in Response to Abrupt Climate Change Around the 8.2 ka Cooling Event, *Ecosystems*, 15 (8), p. 1336-1350.
- B. Reeves 1973
The Concept of an Altithermal Cultural Hiatus in Northern Plains Prehistory, *American Anthropologist*, 75 (5), p. 1221-1253.
- G. Sánchez *et alii*
2015
G. Sánchez, V.T. Holliday, J. Carpenter, E. Gaines, Sonoran Clovis Groups: Lithic Technological Organization and Land Use, in A.M. Smallwood, T.A. Jennings (eds.), *Clovis. On the Edge of a New Understanding*, Texas A and M University Press, College Station, p. 243-262.
- M.S. Sheehan 1995
Cultural Responses to the Altithermal or Inadequate Sampling?, *Plains Anthropologist*, 40 (153), p. 261-270.
- A.M. Smallwood,
T.A. Jennings (eds.) 2015
Clovis. On the Edge of a New Understanding, Texas A and M University Press, College Station.
- D. Stanford 2005
Paleoindian Archaeology and Late Pleistocene Environments in the Plains and Southwestern United States, in R. Bonnichsen, K. Turnmire (eds.), *Ice Age Peoples of North America. Environments, Origins and Adaptations*, Second Edition, Center for the Study of the First Americans, Texas A and M University, College Station, p. 281-338.
- D. Stanford *et alii*
2005
D. Stanford, R. Bonnichsen, B. Meggers, D.G. Steele, Paleoamerican Origins: Models, Evidence, and Future Directions, in R. Bonnichsen, B.T. Lepper, D.J. Stanford, M.R. Waters (eds.), *Paleoamerican Origins: Beyond Clovis*, Center for the Study of the First Americans, Texas A and M University, College Station, p. 313-353.
- D. Stanford,
B.A. Bradley 2012
Across Atlantic Ice. The Origin of America's Clovis Culture, University of California Press, Berkeley, Los Angeles and London.
- D.J. Stanford,
A.J. Stenger (eds.) 2015
Pre-Clovis in the Americas, Smithsonian Institution, Washington D.C., 268 p.
- L.G. Straus 1996
The World at the End of the Ice Age, in L.G. Straus, B.V. Eriksen, J.M. Erlandson, D.R. Yesner (eds.), *Humans at the End of the Ice Age. The Archaeology of the Pleistocene-Holocene Transition*, Plenum Press, New York and London, p. 3-10.

- L.G. Straus *et alii* (eds.) 1996 L.G. Straus, B.V. Eriksen, J.M. Erlandson, D.R. Yesner (eds.), *Humans at the End of the Ice Age. The Archaeology of the Pleistocene-Holocene Transition*, Plenum Press, New York and London.
- D.A. Suhm *et alii* 1954 D.A. Suhm, A.D. Krieger, E.B. Jelks, *An Introductory Handbook of Texas Archaeology*, vol. 25, Texas Archaeological Society.
- E.S. Turner, T.R. Hester 1999 *A Field Guide to Stone Artifacts of Texas Indians*, Gulf Publishing, Lanham.
- M. Walker 2005 *Quaternary Dating Methods*, John Wiley and Sons, Southern Gate, Chichester.
- M. Walker *et alii* 2009 M. Walker, S. Johnsen, S.O. Rasmussen, T. Popp, J.P. Steffensen, P. Gibbard, W. Hoek, J. Lowe, J. Andres, S. Björck, L.C. Cwynar, K. Hughen, P. Kershaw, B. Kromer, T. Litt, D.J. Lowe, T. Nakagawa, R. Newnham, J. Schwander, Formal Definition and Dating of the GSSP (Global Stratotype Section and Point) for the Base of the Holocene Using the Greenland NGRIP Ice Core, and Selected Auxiliary Records, *JQS*, 24, p. 3-17.
- M.R. Waters, T.W. Stafford Jr. 2007 Redefining the Age of Clovis: Implications for the Peopling of the Americas, *Science*, New Series, 315 (5815), p. 1122-1126.
- M.R. Waters *et alii* 2011 M.R. Waters, C.D. Pevny, D.L. Carlson (eds.), *Clovis Lithic Technology. Investigation of a Stratified Workshop at the Gault Site, Texas*, Texas A and M University Press, College Station.
- M. Williams *et alii* 1998 M. Williams, D. Dunkerley, P. De Dekker, P. Kershaw, J. Chapell, *Quaternary Environments*, Second edition, Arnold Publishers, London.
- D.G. Wyckoff 2005 The Burnham Site and Pleistocene Human Occupations of the Southern Plains of the United States, in R. Bonnichsen, K. Turnmire (eds.), *Ice Age Peoples of North America. Environments, Origins and Adaptations*, second edition: College Station: Center for the Study of the First Americans, Texas A and M University, p. 340-361.
- D.R. Yesner 1996 Environments and Peoples at the Pleistocene-Holocene Boundary in the Americas, in L.G. Straus, B.V. Eriksen, J.M. Erlandson, D.R. Yesner (eds.), *Humans at the End of the Ice Age. The Archaeology of the Pleistocene-Holocene Transition*, Plenum Press, New York and London, p. 243-253.