



Cultural macroevolution among high latitude hunter–gatherers: a phylogenetic study of the Arctic Small Tool tradition



Anna Marie Prentiss*, Matthew J. Walsh, Thomas A. Foor, Kristen D. Barnett

Department of Anthropology, The University of Montana, Missoula, MT 59812, USA

ARTICLE INFO

Article history:

Received 9 December 2014

Received in revised form

8 April 2015

Accepted 14 April 2015

Available online 23 April 2015

Keywords:

Evolution

Phylogenetics

Arctic Small Tool tradition

Paleoeskimos

ABSTRACT

This study tests alternative hypotheses regarding the underlying conditions favoring variation in degree of differentiation between cultures in an evolving lineage. To accomplish this we develop a phylogenetic analysis of the early Arctic Small Tool tradition (ASTt) of eastern Siberia and northern North America. The use of early ASTt data permits us to monitor change while largely eliminating the possibility of influence by other cultural traditions. It also allows us to explore lingering questions regarding ASTt migrations. We examine correlations between tree branch length as a measure of cultural differentiation and geographic distance (from the oldest site), mean radiocarbon date, and three measures of terrestrial ecological variation. Outcomes suggest that only geographic distance and radiocarbon dates correlate with tree branch length. We offer conclusions regarding ASTt evolution and migrations along with ideas for future research.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

A fundamental question in evolutionary archaeology concerns the underlying conditions favoring splitting in cultural lineages on macroevolutionary scales. Foley and Lahr (2011) propose geographic and social barriers leading to isolation. If this is the case then greatest distinctions between groups will be evident at greatest distance. Prentiss and Chatters (2003) and Chatters and Prentiss (2005) offer a similar argument but emphasize ecological variation being the critical underlying factor, essentially in providing adequate but different resource conditions to permit groups to explore divergent socio-economic strategies as measured in annual scheduling of mobility, resource harvest, and in some contexts, food storage. Barton et al. (2007:122) also favor patchy environments as conducive to “cultural speciation” among hunter–gatherers. The macroevolutionary arguments of these scholars are in line with microevolutionary models that also implicate isolation as critical to divergence, especially when conformist bias plays a significant role in cultural transmission (Boyd and Richerson, 1985; Richerson and Boyd, 2005). These hypotheses are substantially in line with Hennig's (1966) “Progression” Rule, that more derived taxa will be found at distances further from

geographic center of origin (see also Lycett, 2009). The underlying logic of these arguments is linked to the concept of isolation by distance (IBD) from evolutionary biology (Wright, 1943; see also Meirns, 2012; Rousset, 1997).

Several archaeologists have proposed that cultural transitions could happen extremely fast as transitions between different forms of socio-economic organization are inherently very risky due to potential for misalignments between resource distributions and new strategic efforts by human groups (e.g. Fitzhugh, 2001; Prentiss and Chatters, 2003). Bettinger (2009) argues that this problem can be envisioned in reference to adaptive landscapes (e.g. Wright, 1932) whereby major cultural crossings require trips through risky troughs where the threat of extinction is high. If this is the case then we could also expect two patterns: first, transition time between different socio-economic strategies should be brief, perhaps less than a generation; and second, degree of differentiation should increase with time, assuming that transition events are cumulative. A possible exception to this rule could be if cultural stasis (Prentiss and Lenert, 2009; Rosenberg, 1994) becomes established, in which time would not play a significant role in degree of distance between parent and descendant cultures.

We make use of phylogenetic analysis to examine questions concerning the evolutionary process drawing from data associated with the early Arctic Small Tool tradition (ASTt) as expressed from eastern Siberia through Alaska to Greenland in the date range of ca. 5500–3500 B.P. By emphasizing the early ASTt we avoid the well-

* Corresponding author.

E-mail address: anna.prentiss@umontana.edu (A.M. Prentiss).

known lengthy period of stasis associated with the later ASTt in the Eastern Arctic (Prentiss and Lenert, 2009). The ASTt provides an ideal case study to examine underlying factors associated with cultural divergence as it represents the first human group to explore the eastern North American and Greenlandic Arctic. While expansion of ASTt groups, also known as Paleoeskimos (McGhee, 1996), undoubtedly contacted indigenous groups in Alaska (especially Northern Archaic and Aleutian populations), they appear to have remained ecologically separate to a substantial degree, especially as associated with the North Archaic whose members focused on forests (Mason and Bigelow, 2008), while ASTt groups were for the most part tundra adapted (Odess, 2005). Once into the Eastern Arctic, these groups entered a landscape entirely void of other human groups. Thus, with the possible exception of the eastern Aleutians, the potential is very low that ASTt was ever significantly influenced by other (non-ASTt) human groups. Our study has two goals. First, we apply standard phylogenetic procedures in order to test alternative models of Paleoeskimo expansions and ASTt evolution. Second, we use results of the phylogenetic analysis to provide data to test more general macroevolutionary hypotheses regarding conditions favoring variation in degree of cultural differentiation in a single evolutionary lineage. We do not offer a test of variation in rates of evolution (Bentley and O'Brien, 2011; Rogers and Ehlich, 2008).

2. The early Arctic Small Tool tradition

Artifacts of what would become essential elements of the early Arctic Small Tool tradition (at least the North American portion) were famously independently discovered in 1948 by investigators in Alaska (Giddings, 1949, 1951, 1964) and northern Greenland (Knuth, 1954, 1967a, 1967b) immediately demonstrating the widespread nature of this cultural phenomenon. It was not until the early 1960s that the term Arctic Small Tool tradition was coined and entered common usage to describe the finely flaked and often minute end and side blades, projectile points, end and side scrapers, microblades, hafted burins, and polished adzes typical of sites belonging to this technological tradition (Irving, 1964). Over time archaeologists defined a number of early regional variants of the ASTt including the Brooks Gravels (Dumond, 1981), Margaret Bay (Knecht et al., 2001), and Russell Creek (Maschner and Jordan, 2001) phases of southwest Alaska, the Denbigh Flint Complex in western and northern Alaska (Giddings, 1964; Kunz, 2005), Independence I in northern Greenland and to the west in the islands of High Arctic Nunavut, Canada (Knuth, 1954; McGhee, 1976, 1979), Saqqaq of southern and western Greenland (Larsen and Meldgaard, 1958), and Pre-Dorset in the central and lower Eastern Arctic (Maxwell, 1973; Tuck, 1975). Most North Americanists now recognize the Bel'kachinsk culture of the eastern Siberian Middle Neolithic (Mochanov 1969) as the likely immediate ancestor (Dumond, 1987; Dumond and Bland, 1995; Powers and Jordan, 1990), though archaeologists have speculated regarding the Siberian link for many more years (e.g. Giddings, 1964). The earliest dates of the ASTt Siberia to North America movement have not been firmly determined. If confirmed by further studies, the earliest Alaskan materials (Kuzitrin Lake) could date as early as ca. 5500 B.P. (Harritt, 1998). Most dates, however, fall under 4500 B.P. (Slaughter, 2005).

The widespread nature of early ASTt materials has led to a wide range of hypotheses regarding culture history and Paleoeskimo migrations (Fig. 1). Most debate has centered on the relationships between the Denbigh Flint Complex and Independence I, Saqqaq, and Pre-Dorset (Dumond, 1987; Maxwell, 1985). However, in recent decades discussions have also developed concerning the nature and history of ASTt in southwest Alaska (Davis and Knecht, 2005; Dumond, 1981, 2001; Knecht et al., 2001; Workman and Zollars,

2002). Archaeologists have long argued for a cultural relationship between Denbigh and the various Eastern Arctic early ASTt manifestations (Irving, 1962; Knuth, 1954; Powers and Jordan, 1990; McGhee, 1996). However, there has not always been agreement as to the nature of the ASTt expansion. One hypothesis asserts a single eastward movement of Denbigh groups eventually becoming Independence I, Pre-Dorset and Saqqaq (Dumond, 1987). Logically then Saqqaq also derives from this single Pre-Dorset expansion. In contrast, McGhee (1976, 1979, 1996) argues for two movements, one leading to Independence I in the High Arctic and the other becoming Pre-Dorset in the Low and Middle Arctic. A number of scholars argue that Saqqaq derives from a north to south movement of originally Independence I groups who may have been driven south by excessively cold conditions during the early Neoglacial period (McGhee, 1996; Powers and Jordan, 1990; Schleder- man 1991).

Meanwhile, the ASTt also manifested in southwest Alaska, appearing on the Kenai Peninsula, the Alaska Peninsula and potentially, the eastern Aleutian Islands (Dumond, 1981; Knecht et al., 2001; Workman and Zollars, 2002). Not all archaeologists agree that ASTt groups actually traveled as far as the Aleutian Islands or Kodiak Island (Slaughter, 2005; Steffian and Saltonstall, 2005). However, there does seem to be some consensus that ASTt groups may have reached the outer Alaska Peninsula (Maschner and Jordan, 2001) and potentially the Margaret Bay area of Unalaska Island (Davis and Knecht, 2010; Knecht et al., 2001). Relatively little debate exists regarding origin of ASTt in this region as archaeologists appear to agree that the tradition was mostly likely transported into the region at some time prior to ca. 3500–3600 B.P. (Davis and Knecht, 2005; Dumond, 1981, 2005; Maschner and Jordan 2005; Workman and Zollars, 2002). However, given the limited study of the archaeology in northern Bristol Bay and the Kuskokwim and Yukon delta regions we do not yet have a firm understanding of the timing or process of ASTt expansion south from the Bering Strait region.

3. Methods and materials

In this paper we test hypotheses concerning ASTt cultural evolution using phylogenetic analysis and we follow with additional testing of alternative hypotheses about underlying conditions driving degree of cultural differentiation in the evolutionary process. Some phylogenetic data are necessary to conduct the latter tests. This section provides a review of definition of taxa and characters for phylogenetic analysis, analytical procedures, and approaches to additional evolutionary hypothesis testing.

3.1. Cultural evolution on a macroevolutionary scale

We use archaeological sites as taxa representing the archaeological or analogously, phenotypic, side of the package of cultural constructs associated with the operation of ASTt resource management strategies (Prentiss et al., 2014). Resource management strategies are the integrated means by which human groups schedule residential and task group movement, foraging, food processing (including storage and consumption), and associated technologies (Chatters and Prentiss, 2005; Prentiss and Chatters, 2003). While it is difficult to imagine such a complex array of cultural constructs (e.g. mobility and foraging strategies, technologies) evolving in a coherent way (Bettinger, 2003), studies suggest that the disparate parts are integrated in recognizably logical ways and that this logic is transmissible (Prentiss et al., 2014, 2015). If heritable, we could expect variation between generations of users and thus the potential for descent with modification resulting from the action of natural selection or at least selection-like transmission

Download English Version:

<https://daneshyari.com/en/article/1035357>

Download Persian Version:

<https://daneshyari.com/article/1035357>

[Daneshyari.com](https://daneshyari.com)