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Early Neolithic chert variability in central Cyprus: Geo-chemical and spatial analyses

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ABSTRACT

Three archaeological surveys in central Cyprus have recovered lithic artifacts from a variety of chert sources, isolated findspots and sites. Typological analyses of these finds and ^{14}C results from one site suggest that they date to the Late Epi-Palaeolithic and very early Neolithic periods. Previous research (McCartney et al., 2006, 2007, 2008; Murphy et al., 2019; Stewart et al. 2017) of the spatial relationships between these finds suggests ways that these early settlers to the island entered into and explored this new landscape to access a variety of resources, with chert artifacts leaving a lasting record of this behaviour. A previous pilot test of Instrumental Neutron Activation analysis (INAA) further supported our initial observations. Here we expand this research to include a much larger sample size. While this study was only able statistically to isolate one group of artifacts, it does indicate that all the other artifacts in the study originated in the circum-Troodos Lefkara sedimentary formation chert deposits. The single anomaly, a group of dark, silicified umber artifacts, may reflect early use of this distinctive raw material, judging by its restricted location along the central south coast and into the interior by way of the Tremithos River valley.

1. Introduction

A number of studies have considered a variety of models for human presence and colonization of islands in the eastern Mediterranean (Broodbank, 2000, 2013; Cherry, 1990; Finlayson 2004; Held 1989, 1992, 1993; Knapp 2008, 2013; Peltenburg et al. 2001; Peltenburg et al., 2004; Steel 2004). However, very few have investigated the means and processes by which primary settlers initially gain the knowledge to access important resources and become familiar with a new environment (although see Knapp 2013: 62,67,73). Late Epi-Palaeolithic/Early Neolithic finds from central Cyprus provide an intriguing case study of this problem. Most artifacts recovered from these sites are lithic tools and debitage, primarily cherts associated with the Lefkara formation surrounding the Troodos Mountain Massif (Gass 1960: 31-33; Pantazis 1979; Pearlman 1984; Robertson 1977: 26-27; Stewart 2006: 10-13, 18-19, Stewart 2007). While these finds originate from this single formation, the variety of colours, texture and lustre between artifacts are such that it may be possible to chemically distinguish between them. To test this, we use a geo-chemical trace element analysis, Instrumental Neutron Activation Analysis (INAA), on the recovered artifacts and source materials, followed by an examination of their spatial associations. If successful, this could provide testable, statistically significant connections between archaeological sites, isolated finds and stone quarry sources in the eastern Troodos foothills, to reveal how early settlers began mapping their new landscape and material selection preferences.

Previous work on a smaller sample of artifacts tested the validity of this approach, and showed that it is possible to isolate a number of trace elements that indicate distinct differences or similarities between a number of the samples and specific geological formations (McCartney et al. 2007:39-40, 2010:142–143). In addition, previous spatial models have traced the probable routes between sites and sources (Murphy et al., 2019). Our research here will build on these approaches by providing both a method and analysis (geo-chemical trace element

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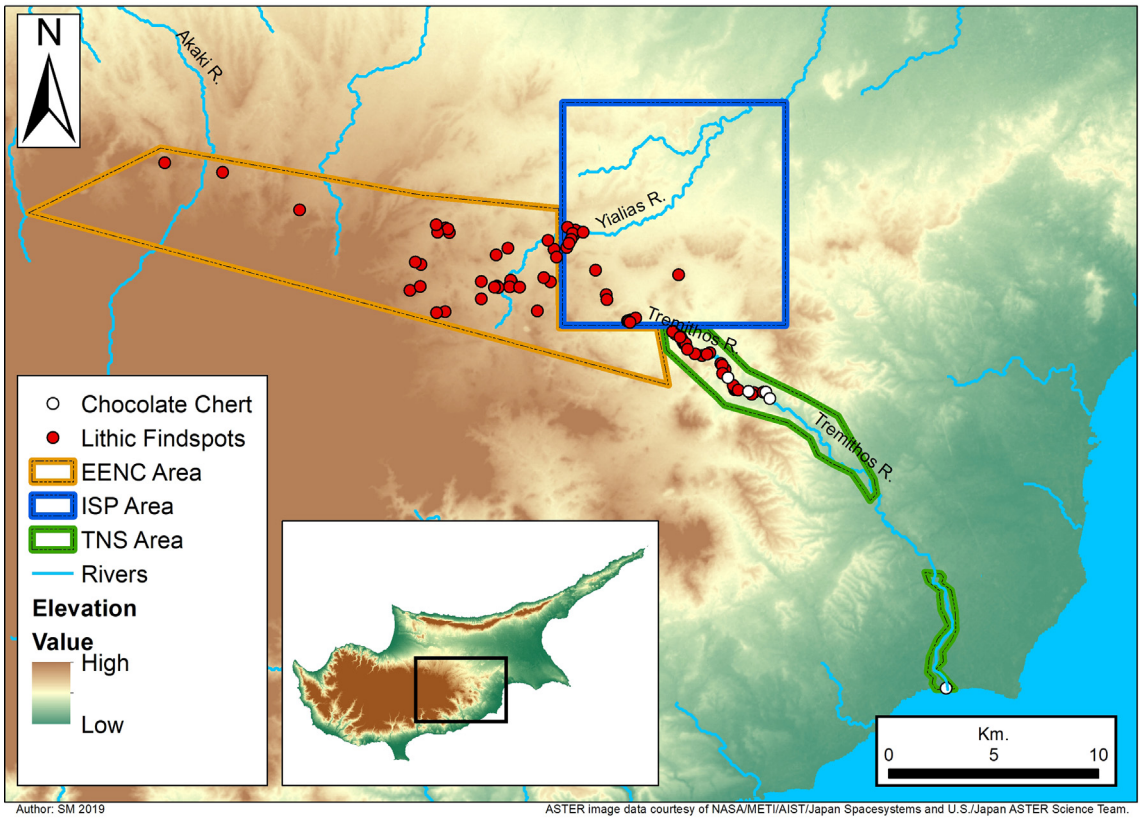

Fig. 1. Map of study area and chert findspots.

studies) that could link artifacts across the landscape and provide a testable means of establishing potential pathways established by the early settlers. These potential pathways can then be tested further through least cost path analysis modelling (Murphy et al., 2019). From this we could generate models to explain landscape use that goes beyond the simple connections between sites and resources, to consider other economic and sociological (trade, kinship ties and so on) patterns of landscape use (Stewart 2016), particularly after initial colonization. From these we would then be able to hypothesize how early settlers were exploring and exploiting a new landscape. Results from this regional approach could provide a basis for understanding how the island was initially explored and occupied and how mobility and adaptability combined to provide an environment for a successful foraging economy, and set the stage for the subsequent development of settled agricultural societies.

2. Epi-Palaeolithic to early Neolithic activity in central Cyprus

2.1. Migration and movement across new landscapes

The ways in which people, particularly foraging settlers, enter, explore, and finally settle unfamiliar landscapes is an important research theme (Rockman and Steele 2003; Rockman, 2013), yet much remains unclear about these complex processes. In the past, problems addressing adaptations to a new landscape have been considered infrequently (although see Cooney 1999; Kaufman 1992; Kelly 2003, and others in Rockman and Steele 2003). Much of this work focuses on mobility strategy models and how these can be applied to initial interactions with the landscape (Binford 1980). We know a great deal about when and how people first migrated to new lands (note specifically Kelly 2003) but very little about what they did once they arrived. Kelly predicts that residential mobility would have been higher during phases of initial colonization, as the new arrivals were forced to adapt quickly to a new landscape (Kelly 2003:52-53). This would likely be followed by lower residential mobility as knowledge of the location and quality of resources increased. Models may also incorporate the cognitive approaches to learning and gaining knowledge of navigation routes in a new landscape (Cooney, 1999; Rockman and Steele 2003). For example, important elements in this stage of 'landscape learning' would include initial location of critical resources (water, fauna, flora, lithic); limitations on the usefulness and reliability of resources; barriers to access (social, biological, topographical); and resource modelling (the manner and ease in which resources can be accessed). While these stages may be difficult to see archaeologically, the actual traces of moving about the landscape may be more visible. In particular, the use of prominent features may have been used prehistorically as landmarks for way-finding in the landscape notably for travel from sites to chert sources and other resources, and we should expect to find isolated artifacts along these routes. A critical piece of evidence of major significance for the situation on Cyprus, is lithic raw material availability, and its impact on mobility patterns. Current archaeological evidence suggests that this early period was characterized by a few widely dispersed sites occupied or used by small groups of primary settlers testing resource possibilities in a new and unfamiliar landscape (McCartney et al. 2007, 2010; Stewart, 2004, 2006; Stewart et al. 2017).

While we know that people must have very quickly discovered access to basic life necessities (water, food and shelter), this study will apply a method and series of analyses that can trace how migrants to a new landscape actually began to venture out and acquire these needed resources. For instance, in Cyprus, high mobility during phases of initial colonization, as the new arrivals were forced to adapt quickly to a new landscape, is seen in the ephemeral evidence of small and temporary occupation up the Tremithos river valley (Stewart et al. 2017). As primary settlers, these people would be likely highly mobile foragers, less familiar with their surrounding landscape and its available resources. This would be followed by lower residential mobility as