HUMAN RESPONSE TO CLIMATE CHANGES IN THE NORTHWESTERN PONTIC REGION AT THE PLEISTOCENE-HOLOCENE BOUNDARY: AN APPLICATION OF ENVIRONMENTAL STRESS THEORY

Smyntyna, O., [1] *and Goncharenko, A.* [2]

Odessa I.I. Mechnikov National University, Department of Archaeology and Ethnology of Ukraine, Dvoryanskaya str., 2; Odessa, Ukraine 65082, [1] smyntyna_oleria@onu.edu.ua, [2] goncharenko_alisa@onu. edu. Ua

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Introduction

At the start of this new millennium, it is practically conventional to recognize the extreme importance of stress on the psycho-physiological processes of the contemporary human body and on cultural behavior. Recent developments in the ecological paradigm within historical studies have made it possible to use stress theory to study some issues involving the origin of *Homo sapiens sapiens* and its social organization as possible explanations for paleohistorical stadiality, in interpreting the origins of new economic forms, etc.

Peculiarities of the paleogcographic history of the Pleistocene have led us to assume that environmental stresses should be regarded as one of the basic reasons for changes in the behavior of prehistoric humans and the elaboration of new adaptive modes of life as well as the foundation for cultural transformations.

The purpose of the current contribution is to discuss the principal points of environmental stress theory as it is applied to the interpretation of human responses to global climate changes in the northwestern Pontic region at the Pleistocene-Holocene boundary.

Stress theory: basic points

Stress is regarded as a basic reason for the transformation of behavior as well as an important premise for the reshaping of cultural systems and the creation of new adaptations (Brothwell 1997: 7-8). Traditionally, stresses and stressors (factors causing stress) are characterized through their classifications. In the English-language literature, differentiation of stresses based on their spheres of influence and the potential for overcoming them is one of the most popular classifications. In such a context, three kinds are distinguished: system stresses in which physiological components dominate, psychological stresses in which behavioral and emotional components dominate, and ecological stresses that combine system and psychological components (Bell et al., 1996: 131). Soviet researchers preferred a classification of stresses and stressors as having evolutionary, social, and technogenic origins (Khlebovich et al., 1975: 155-157).

Environmental stress is highly ranked by proponents of both approaches. It is understood mostly as a series of natural, social, economic, psychological, and physiological factors that cause tension in regulatory mechanisms and disturb society or the dynamic equilibrium of a social organism. The special concept of social and ecological resilience was introduced in order to estimate the capacity of a community to overcome external stresses, and a series of factors that helps to increase resilience was outlined (Adger, 2000: 347, 349, 354).

The result of the general theory of stress development is the creation of a great diversity of models of stress and, in particular, patterns of stress display in archaeological human populations (Dincauze, 2000: 486). Unfortunately, these models, as well as the simulations of "new archaeology," are often characterized by an abuse of generalized and sometimes indefinite concepts and terms, such as "individual growth rate change," "decrease of health," "buffer role of culture strengthening," and so on. Taken on their own, these notions hardly contain the information necessary for a thorough comprehension of the ecological implications of the mode of life among prehistoric societies. Moreover, the proponents of this approach sometimes tend to stereotype and excessively generalize about processes that took place in the distant past.

On the other hand, this theory has greatly contributed to the development of an environmental mentality through its attention to stresses inherent within human society. In the framework of this theory, adaptation is regarded as only one possible result of the impact of stressors alongside other potential human responses to environmental stresses, such as regulation, adjustment, and cultural system destruction.

The northwestern Pontic region at the Pleistocene-Holocene boundary: stressors, stresses, and human responses to them

Comprehensive interdisciplinary studies of the paleogeography of the northwestern Black Sea region at the Pleistocene-Holocene boundary provide no doubt that this period was marked by a series of drastic climatic and environmental changes. Most researchers agree that the principal changes in the fundamental paleogeographic components, including overall dry land and marine landscape, took place at least three times during the Allerod, Dryas III, and Preboreal. Major discrepancies here are concerned with the interpretation of their scale and extent of their influence on the mode of life, subsistence strategies, and social adaptations of humans. Basic versions of such interpretations vary between two main controversies: the Black Sea Flood hypothesis and that of gradual human adaptation to global environmental changes. These two hypotheses imply, in their turn, principally different understandings of the Black Sea basin's shelf and adjacent dry land at the Pleistocene-Holocene boundary.

From an archaeological point of view, three basic sets of stressors influenced the human procurement system and social behavior in the northwestern Pontic region at the time. The first and most significant of them was the transformation of the faunal complex resulting from unsustainable human behavior during the LGM, i.e.. bison overkills complicated by the high population density in the region during the Late Paleolithic (Bibikova, 1978). Replacement of bison and horse herds by aurochs and smaller horses at the beginning of the Holocene implies a transition from collective procurement of large gregarious game toward hunting for small non-gregarious species conducted mainly by small groups or individuals. In its turn, it stimulated a re-shaping of traditional tool kits among the inhabitants of the North Pontic steppes (initially, their hunting weapons and tool inventory for game butchering and further processing) and restructuring of their social groups: there was no longer a need for collective agglomeration around large game kills, even for short periods of time at the beginning of the Holocene.

Reduction in the number of archaeological sites across the landscape, disappearance of large long-lasting settlements, absolute predominance of short-term sites, and preponderance of bones from small non- gregarious game in faunal assemblages implies significant reduction of population density, increase in mobility of separate groups, and formation of a dispersed occupation system based on an extensive economy during the Dryas III-Preboreal interval. These tendencies are in full conformity with modifications in the character of tool processing and functional characteristics. Such changes in social behavior and mobility were accompanied by a transformation in tool production strategy within the flint industries of local populations. Traditionally, these phenomena imply the beginning of a new stage of human history: the Mesolithic one.

The second set of stressors influencing human populations of the northwestern Pontic region at the Pleistocene-Holocene boundary should be connected with the rise in the level of the Black Sea and coastline migration. It needs to be stressed that, in the case of the dry Pontic steppes, the formation and early activity of its estuaries (lakes and limans) and watercourses (rivers, springs, etc.) are equally if not more important than Black Sea shoreline migration. Re-shaping of the hydrological network together with the new configuration of the Black Sea coast and adjacent dry lands created new forms of living space which needed to be explored by the local populations. Occupation system, choice of settlement space, possibility of contacts among groups inhabiting different niches, and other traits of human spatial behavior on the macro-level (living space exploitation system) were determined in many respects by these features.

The third basic set of environmental stressors in the northwestern Pontic region at the Pleistocene-Holocene boundary is the dynamic of floral complexes and species composition, which usually is regarded as a product of the climatic oscillations that took place during the Last Glacial retreat (Artyushenko, 1970). In spite of the major importance of plants in the diet of most prehistoric hunter- gatherers, this phenomenon probably had little direct impact on human diet in the study area at the time in question. There are very few archaeological records indicating plant use for food, and those that exist originate mainly from the Late Mesolithic settlement at Myrne. In this area, flora influenced human resource procurement strategies through being the basic food of the animals they hunted, that is, vegetation changes were stressors because they brought about faunal changes.

Conclusions

Complex analysis of the basic stressors influencing mode of life and social behavior of human populations in the northwestern Pontic steppes at the Pleistocene-Holocene boundary allows the detection of four stages of environmental stress development in this region.

The first indicators of ecological crisis in the region under study are associated usually with the LGM and its subsequent development through time, traditionally correlated with stages of the Last Glacial retreat. The rapidity of

the dcglaciation process in most cases makes it impossible to detect direct evidence of the stressors simultaneously in paleogeographic records and in the remnants of human activity.

The second basic phase of environmental stress could be correlated with the Allerod oscillation of the late glacial period, which is relatively well represented in environmental records but is characterized by very poor archaeological evidence.

The Dryas III-Preboreal is the third basic phase of ecological stress displayed in the archaeological and paleogeographical records of the northwestern Pontic region. It correlates well with Black Sea level changes and coastline migrations in the course of the final Neoeuxinian transgression of the late Pleistocene-early I lolocene, phases of which correspond with the main climatic stages of this period.

The later phase of the Boreal period is the fourth and last phase of environmental stress in the northwestern Pontic region. This phase resulted in a fundamental transformation in the human mode of life and subsistence strategy in the region, opening a new stage connected with the introduction of a productive economy.

These phases in the development of environmental stresses, nevertheless, cannot be recognized as catastrophic ones for the human population: no signs of total desertion of the northwestern Black Sea steppes as well as no traces of human failure to find suitable means to overcome the stressors are observed at Late Paleolithic and Early Mesolithic sites. Negative influences of global climate changes were successfully compensated already in the short-term perspective through a broad spectrum of adaptive strategies, most important among which were transformation of living space exploitation and modification of tool kits.

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