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Review of *The Origins of Agriculture and Settled Life*  
by Richard S. MacNeish. Norman and London:  
University of Oklahoma Press, 1992. 433 pages.

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**The Origins of Agriculture and Settled Life.** By Richard S. MacNeish. Norman and London: University of Oklahoma Press, 1992. 433 pages. \$75.00 cloth.

Richard "Scotty" MacNeish must be commended for completing such an ambitious, global summary of prehistoric agriculture. Following a brief review of the "environmentalist's" (e. g., Ratzel, de Candolle, Childe, Braidwood, and Flannery) and the "materialist's" (e. g., Marx, Vavilov, D. Harris, Binford, and Cohen) accounts, MacNeish presents his "trilinear theory." It consists of "three hypothetical models and three hypothetical sets of causes" for the development of plant domestication and sedentism. This "trilinear theory" is a world culture history similar to the multilinear developmental frameworks proposed by Julian Steward (*The Theory of Culture Change: The Methodology of Multilinear Evolution*, 1955). MacNeish's multilinear scheme is cross-cut by three developmental stages, i. e., food collectors, transitional foragers, and food producers, and incorporates culture histories associated with both centers and noncenters of domestication. He arrays numerous archaeological sequences along primary, secondary, and tertiary courses from hunting-collecting bands to agricultural villagers. These three developmental lines, in turn, involve ten developmental systems (e. g., [A] hunting-collecting bands, [B] destitute foraging bands; . . . [E] agricultural villagers) and seventeen developmental routes. MacNeish also presents mutually exclusive sets of necessary (requisite) and sufficient (causal) conditions for each of the three developmental courses toward village agricultural life.

The primary "theory" deals with centers of domestication (i. e., the Andes; Meso-America; the Near East; and the Far East—China, Korea, Taiwan, and Japan) similar to those described by Vavilov and Harlan. Hunting-collecting bands (stage 1) developed ultimately into agricultural villagers (stage 3) via "destitute" hunter-gatherers (stage 2). "Destitution" resulted from post-Pleistocene reductions in animal biomass and increased seasonality. MacNeish suggests that primary or pristine development took place as a result of specific necessary conditions (i. e., marked seasonality, a "harsh" season, diverse and patchy resources, and a number of potential domesticates) and accompanying causal conditions (i. e., post-Pleistocene reduction in food, decreased residential mobility, broad spectrum diets, seed storage, and altered seed plant genetics). We are told that the shift to agriculture did not

occur during the Pleistocene, because hunter-gatherers lack knowledge of storage, appropriate technology, and the environment!

The secondary "theory" accounts for the development of horticultural and agricultural villagers from foraging villagers and affluent foraging bands. In such cases, sedentary agriculturalists arose from "affluent" hunter-gatherers who exploited lush, wild food resources from a fixed residential location within a circumscribed environment. In such cases, domesticated plants were obtained from contemporary agriculturalists in nearby or distant centers of domestication. MacNeish's "tertiary theory" covers areas like the eastern United States that were characterized by a long, gradual development from "semi-sedentary bands with domesticates" to "horticultural villagers" and later to "agricultural villagers."

MacNeish does not provide an explicit account of how this "trilinear theory" was produced. Critical portions of the "primary theory" are based on archaeological sequences he observed firsthand in the Tehuacan Valley of Mexico and the Ayacucho Valley of Peru. Major components of this trilinear summary can be found in his previous works (e. g., "The Evolution of Community Patterns in the Tehuacan Valley of Mexico and Speculations about Cultural Process," in *Ecology and Agricultural Settlements: An Ethnographic and Archaeological Perspective*, ed. R. Tringham, 1973; *The Science of Archaeology?* 1978; "The Transition to Statehood as Seen from the Mouth of a Cave," in *Transition to Statehood in the New World*, ed. G. D. Jones and R. R. Kautz, 1981).

Ten chapters are devoted to descriptive accounts of fifty archaeological sequences in agricultural centers (i. e., the Andes, Meso-America, the Near East, and the Far East), temperate noncenters (i. e., the American Southwest, Europe, and the eastern United States), and tropical noncenters (India, Southeast Asia, and Oceania; the New World tropics; and Africa). MacNeish makes use of these archaeological sequences to "test" his "trilinear theory."

MacNeish's explanatory approach to agriculture and sedentism exhibits several epistemological problems. The "trilinear theory" (also referred to as "hypotheses" and "models") is, in actuality, a complex empirical generalization that is constructed from the "ground up." The "hypotheses" that he presents are specific archaeological generalizations that are stated in an "if-then" format. MacNeish chooses to describe archaeological variation in

enumerative fashion (e. g., Nogales projectile points, basalt metates, twined baskets, hide scrapers, bone awls, and flexed burials). Environmental variation is described in terms of nominal categories, including a variety of "major divisions," "subareas," or "ecozones." Such archaeological and environmental descriptions and classifications are usually regionally specific, and they are inappropriate for use on a global level. He does not make use of quantitative measures or continuous variables (e. g., net annual primary production, coefficients of variation in precipitation, Simpson's index of plant species similarity, debitage-to-tool ratios, or artifact assemblage diversity indices). These measures could be utilized to generate more powerful generalizations about the correlations between archaeological and environmental variables. MacNeish's "empirical tests" based on archaeological sequences are actually comparative statements involving empirical generalizations at local, regional, and global levels. These "tests" serve more appropriately as examples of pattern recognition.

Some of the limitations of MacNeish's interpretations result from his strict empiricist approach. Archaeological observations are frequently given very literal meanings, and little attention is given to a range of natural and behavioral factors that are involved in site formation. For example, beans are found at sites assigned to the Chihua Phase (4400–3100 B. C.). The presence of *Phaseolus* sp. this time and in these locations is never questioned. MacNeish does not have any expectations regarding the systemic context for the human consumption of beans that are, in turn, independent of the archaeological context in which they are found. Nutritionists realize, however, that common beans (*Phaseolus vulgaris*), as well as most legumes, contain secondary compounds, e. g., alkaloids, goitrogens, phytohaemagglutinins, antivitamin, antimineral, and enzyme inhibitors, that pose severe metabolic problems for humans. The most effective way to eliminate these chemical substances from legumes is sustained cooking or boiling. Yet the earliest ceramics recovered from this valley are from the Andamarka-Wichqana Phase (1750–900 B. C.) more than two millennia later. Since archaeological evidence for the association of common beans and ceramic vessels is lacking during the Chihua Phase, we might begin to question the association with Chihua materials, the time of initial domestication, the residential nature of such Chihua sites, the existence of alternative processing methods, or the role of common beans in human or animal diets. What if common beans were used initially in this region as food for guinea pigs? After all,

MacNeish points out that guinea pig remains were numerous in Chihua components and that they appeared to be similar to domesticated varieties (p. 57). These rodents exhibit high metabolic rates; perhaps they could convert plants containing toxins and antinutrients into high quality animal protein and fat. Stable carbon and nitrogen isotope analyses of both guinea pig and human remains might help resolve this issue.

Our understanding of sedentism, population growth, and the adoption of agriculture will not ultimately arise, however, from more careful scrutiny of the archaeological record. There are a number of relevant research areas that MacNeish does not discuss. For example, many recent studies in evolutionary ecology, reproductive physiology, nutritional anthropology, bioarchaeology, paleopathology, and socioecology provide critical causal linkages in an emerging theory of agriculture and sedentism. Anthropologists and archaeologists are addressing critical questions in these studies regarding the reasons for the shifts toward greater dependence on plant food resources, reductions in residential mobility, implementation of food storage, the effects of food storage on human fertility, adaptive changes in food processing technology, and the impacts of dietary change on health.

Richard S. MacNeish has contributed immeasurably to our understanding of prehistoric agriculture and settled life. He has completed very important regional-level archaeological surveys in Mexico, Peru, and Belize that have provided archaeologists with some of our most detailed glimpses of prehistoric hunter-gatherers and early agriculturalists. These projects have served to integrate the research of physical, biological, and social scientists. MacNeish and his associates have contributed a number of innovative survey and excavation methods to archaeology. His excavations have produced very significant assemblages of prehistoric domesticated plants that have proved to be extremely valuable for paleoethnobotanical research. Importantly, MacNeish has always been eager to share his knowledge in the form of press releases, lectures, scholarly papers, annual reports, articles, monographs, and books with both public and academic audiences. (Let us hope that the University of Oklahoma Press plans to print this volume in a less expensive paperback version for university courses.) During his life-long research, MacNeish has been very successful in delineating archaeological patterns at a number of variable temporal and spatial scales. These patterns are his legacy, and they will prove to be extremely useful for those

of us in archaeology who are not suffering from postmodernist, postprocessual delirium.

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