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The Origin of Mesoamerican Agriculture: Documenting Archaic Period Social Dynamics
(Anthropology, Forensic Science and Archaeology / Arts and Sciences)

We propose to document human social dynamics during the Late Paleo-Indian and Archaic Periods (9000 - 2000 BC) in three areas of western and southern Mesoamerica and provide a detailed understanding of the exploitation of seasonally available plant resources throughout this period. We propose to use two avenues of data collection: radiocarbon, trace element analyses and ancient DNA assays on existing collections of archaeological plant material and intensive field reconnaissance, site testing and full scale excavation of rock shelters in three propitiously situated regions of Mexico. Our researches will attempt to detail climatic change during the Late Paleo-Indian/Early Archaic through Late Archaic Periods in the Tehuacan and Oaxaca valleys using radiocarbon and trace isotope assays on desiccated plant material - agave quids, maize cobs and chupandilla seeds from caves excavated during the 1960s. Social dynamics will be described and existing hypotheses concerning group size and composition will be tested using human mitochondrial ancient (aDNA) DNA markers obtained from these desiccated plant materials.

The second avenue involves testing already identified rock shelters in the Mitla arm of the Valley of Oaxaca, Oaxaca, in the Teocuitatlan and Atoyac regions of the Sayula-Zacoalco lake basin, Jalisco and the Balsas River Valley between Teloloapan and Ciudad Altamirano, Guerrero and carrying out detailed surface reconnaissance and excavation of sites in the vicinity of these already identified archaeological sites. We expect the aforementioned rockshelters to contain evidence of Archaic Period occupation based on site surface indications (in Oaxaca and Guerrero) and previous testing and AMS dating of material recovered (in Jalisco). The merit of this research is that it will test existing hypotheses about the relative role of climate, population pressure and human social organization in human transition from hunting and gathering to farming. Furthermore, we intend to apply novel techniques never before used on Mesoamerican archaeological material to test the aforementioned hypotheses.

From the abovementioned field and laboratory studies we expect the following results:

1. Band size and composition will change over 7000 years. We will find that nuclear families focus on a wide range of resources early with gender-biased groups focusing on specific resources later in the sequence. We expect to demonstrate that band composition changes from small highly mobile nuclear family bands will focus on a wide range of resources until 7000B.C when gender biased-male predominated bands appear to focus on a few plant or animal resources later on.
2. Regional differences in task management prior to agricultural adoption will reflect environmental differences initially and we will record the gradual displacement of resources procured locally by agricultural staples that will reflect energetic relations - efficiently procured naturally occurring local resources will occur latter if at all.

3. Agricultural activities will manifest themselves in domestic refuse of plants demonstrating morphological evidence of dependence on humans and evidence of human selection in the reduction of teosinte alleles in maize populations.
4. To develop chronology for Archaic Period in the Balsas River Valley of Guerrero and the Sayula graben in Jalisco and increase the level of chronological resolution of the Archaic Period in Oaxaca.
5. Complement the existing areal settlement and subsistence systems in the Valley of Oaxaca, and the Valley of Sayula and develop an initial model for Archaic Period settlement and subsistence in the Balsas River Valley.
6. Development of a model of climatic variation for western and southern Mexico based using stable isotopes from organic materials in carbon dated excavated contexts.

This research involves novel collaboration between geochemists, archaeologists and biologists who will attempt to derive a wide range of information about the origins of Mesoamerican agriculture from a limited range of materials. This collaboration will have significant impact on all these fields if the data collection techniques bear fruit.