

### Required readings - Journal abstracts and synopses

#### Unit 3 - The Mesoamerican Case Study

##### Peopling of the Americas

1. Martin, P.S.  
1973 The Discovery of America. *Science* 179:969-74.

The first Americans may have swept the Western Hemisphere and decimated its fauna within 1000 years.

2. Mandryk, C.A.S., H. Josenhans, D.W. Fedje, R.W. Mathewes  
2001 Late Quaternary paleoenvironments of Northwestern North America: implications for inland versus coastal migration routes.  
*Quaternary Science Reviews* 20:301-314

**Abstract:** Although the long held normative view of New World colonization relies on entrance through an interior ice-free corridor by terrestrially adapted big-game hunters, a recently demonstrated human presence in southern Chile dating prior to the existence of the corridor route implies different colonization scenarios which must be seriously considered. A renewed focus of archaeological and paleoecological research on early post-glacial landscapes in Northwestern North America has revitalized the "ice-free" vs. coastal corridor controversy. Geological findings from glacial geology and paleo-sea levels support the possibility of coastal migration from Beringia to the Pacific Northwest between about 14,000 and 10,000 BP, and preliminary paleoecological data suggest that the coastal landscape was in part vegetated and probably able to support a terrestrial fauna, including humans. The same cannot be said about the "ice-free corridor".

3. Dixon, E.J.  
2001 Human colonization of the Americas: timing, technology and process.  
*Quaternary Science Reviews* 20:277-299.

**Abstract:** Geological and archeological research indicates that humans first colonized the Americas with the use of watercraft along the southern coast of the Bering Land Bridge and the western coast of the Americas. Early dates from a number of archeological sites in the Americas indicate human colonization of the Americas began prior to ca. 13,000 BP. A review of archeological sites in eastern Beringia identifies several distinctive cultural traditions which had developed by 11,000-10,000 BP. Geological, biological, linguistic evidence, and dated human skeletal remains all suggest human occupation of the Americas prior to ca. 11,500 BP. Glacial geology indicates colonization could have begun ca. 14,000-13,000 BP along the western coasts of the Americas and ended about 5000 BP with deglaciation of the Canadian eastern Arctic and coastal Greenland. The use of watercraft and coastal navigation prior to 11,000 BP are inferentially demonstrated. A model for early coastal and subsequent inland colonization of the Americas along large ecological zones best fits current geologic and archeological data.

4. Neves, W.A. and M. Hubbe  
2005 Cranial morphology of early Americans from Lagoa Santa, Brazil: Implications for the settlement of the New World.  
*Proceedings of the National Academy of Sciences USA* 102(51):18309-18314.  
(December 20, 2005)

**Abstract:** Comparative morphological studies of the earliest human skeletons of the New World have shown that, whereas late prehistoric, recent, and present Native Americans tend to exhibit a cranial morphology similar

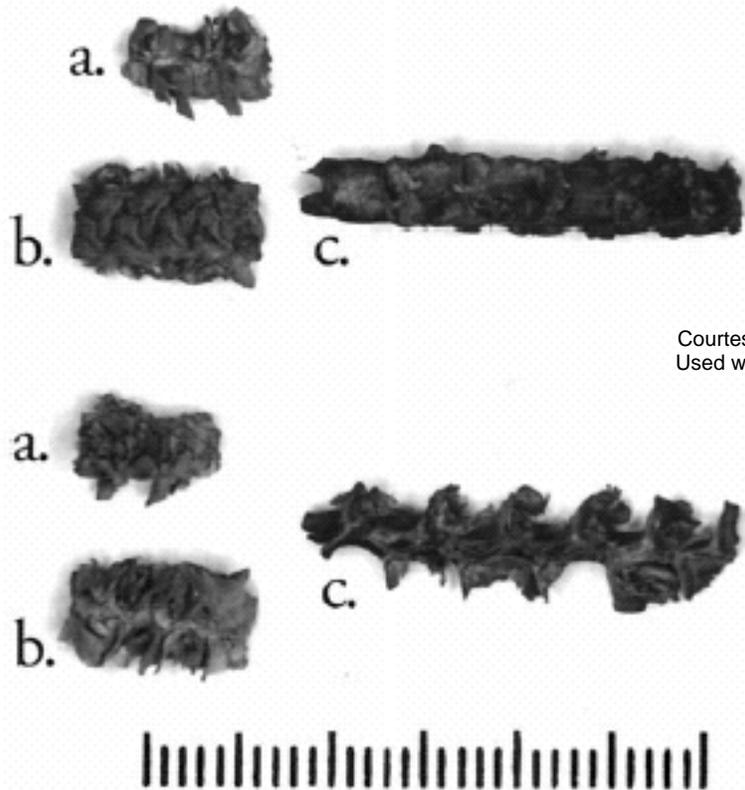
to late and modern Northern Asians (short and wide neurocrania; high, orthognatic and broad faces; and relatively high and narrow orbits and noses), the earliest South Americans tend to be more similar to present Australians, Melanesians, and Sub-Saharan Africans (narrow and long neurocrania; prognatic, low faces; and relatively low and broad orbits and noses). However, most of the previous studies of early American human remains were based on small cranial samples. Herein we compare the largest sample of early American skulls ever studied (81 skulls of the Lagoa Santa region) with worldwide data sets representing global morphological variation in humans, through three different multivariate analyses. The results obtained from all multivariate analyses confirm a close morphological affinity between South-American Paleoindians and extant Australo-Melanesians groups, supporting the hypothesis that two distinct biological populations could have colonized the New World in the Pleistocene Holocene transition.

### **Early plant domestication and domesticates**

5. Benz, B.F.

2001 Archaeological evidence of teosinte domestication from Guilá Naquitz, Oaxaca.  
*Proceedings of the National Academy of Sciences USA* 98(4):2104–2106.  
(February 13, 2001)

**Abstract:** Analysis of the three most ancient *Zea mays* inflorescence fragments from Guilá Naquitz, Oaxaca, Mexico shows they did not disarticulate naturally, indicating that agricultural selection of domesticated teosinte was underway by 5,400 <sup>14</sup>C years before the present (about 4,200 dendrocalibrated years B.C.). The co-occurrence of two-ranked specimens with two rows and four rows of grain and numerous additional morphological characteristics of these specimens support hypotheses based on molecular and quantitative genetic analyses that maize evolved from teosinte. Domestication of the wild ancestor of maize occurred before the end of the 5th millennium B.C.



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Fig. 1. Photograph of three Guila Naquitz archaeological cobs. Specimens a and b from C9. Cob apex is at left (*Upper*) or at right (*Lower*). All three specimens have two ranks of cupules. Specimens a and b have a single spikelet per node, i.e., a single grain per cupule. Specimen a (*Upper*) shows abaxial side (away from axis), whereas specimen b (*Upper*) shows adaxial (toward axis) side of bilaterally symmetrical distichous inflorescence. Specimen a (*Lower*) shows one rank of spikelets on abaxial side, whereas specimen b (*Lower*) shows abaxial side. Perpendicular orientation of lower glumes of two-rowed specimens is visible in specimens a and b (*Lower*). Specimen c is the distichous four-rowed specimen from D10. The alternate arrangement of opposing rachids, shallow cupules, and the perpendicular to reflexed lower glumes are visible in *Lower*, whereas paired spikelets and open cupules are visible in *Upper*. Specimens are actual size. (Scale = 6 cm.)

6. Matsuoka, Y., Y. Vigouroux, M.M. Goodman, J. Sanchez G., E. Buckler and J. Doebley  
2002 A single domestication for maize shown by multilocus microsatellite genotyping.  
*Proceedings of the National Academy of Sciences USA* 99(9):6080-84.

**Abstract:** There exists extraordinary morphological and genetic diversity among the maize landraces that have been developed by pre-Columbian cultivators. To explain this high level of diversity in maize, several authors have proposed that maize landraces were the products of multiple independent domestications from their wild relative (teosinte). We present phylogenetic analyses based on 264 individual plants, each genotyped at 99 microsatellites, that challenge the multiple-origins hypothesis. Instead, our results indicate that all maize arose from a single domestication in southern Mexico about 9,000 years ago. Our analyses also indicate that the oldest surviving maize types are those of the Mexican highlands with maize spreading from this region over the Americas along two major paths. Our phylogenetic work is consistent with a model based on the archaeological record suggesting that maize diversified in the highlands of Mexico before spreading to the lowlands. We also found only modest evidence for postdomestication gene flow from teosinte into maize.

7. Smith, B.D.  
 1997 The Initial Domestication of *Cucurbita pepo* in the Americas 10,000 Years Ago.  
*Science* 276: 932-34. (9 May 1997)

**Abstract:** Squash seeds, peduncles, and fruit rind fragments from Archaic period stratigraphic zones of Guilá Naquitz cave in Oaxaca, Mexico, are assigned to *Cucurbita pepo* on the basis of diagnostic morphological characters and identified as representing a domesticated plant on the basis of increased seed length and peduncle diameter, as well as changes in fruit shape and color, in comparison to wild *Cucurbita* gourds. Nine accelerator mass spectrometer radiocarbon dates on these specimens document the cultivation of *C. pepo* by the inhabitants of Guilá Naquitz cave between 10,000 to 8000 calendar years ago (9000 to 7000 carbon-14 years before the present), which predates maize, beans, and other directly dated domesticates in the Americas by more than 4000 years.

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8. Sanjur, O.I. D.R. Piperno, T.C. Andres and Linda Wessel-Beaver.  
 2002 Phylogenetic relationships among domesticated and wild species of *Cucurbita* (Cucurbitaceae) inferred from a mitochondrial gene: Implications for crop plant evolution and areas of origin. *Proceedings of the National Academy of Sciences USA* 99(1) :535–540. (January 8, 2002)

**Abstract:** We have investigated the phylogenetic relationships among six wild and six domesticated taxa of *Cucurbita* using as a marker an intron region from the mitochondrial *nad1* gene. Our study represents one of the first successful uses of a mtDNA gene in resolving inter- and intraspecific taxonomic relationships in Angiosperms and yields several important insights into the origins of domesticated *Cucurbita*. First, our data suggest at least six independent domestication events from distinct wild ancestors. Second, *Cucurbita argyrosperma* likely was domesticated from a wild Mexican gourd, *Cucurbita sororia*, probably in the same region of southwest Mexico that gave rise to maize. Third, the wild ancestor of *Cucurbita moschata* is still unknown, but mtDNA data combined with other sources of information suggest that it will probably be found in lowland northern South America. Fourth, *Cucurbita andreana* is supported as the wild progenitor of *Cucurbita maxima*, but humid lowland regions of Bolivia in addition to warmer temperate zones in South America from where *C. andreana* was originally described should possibly be considered as an area of origin for *C. maxima*. Fifth, our data support other molecular results that indicate two separate domestications in the *Cucurbita pepo* complex. The potential zone of domestication for one of the domesticated subspecies, *C. pepo* subsp. *ovifera*, includes eastern North America and should be extended to northeastern Mexico. The wild ancestor of the other domesticated subspecies, *C. pepo* subsp. *pepo*, is undiscovered but is closely related to *C. pepo* subsp. *fraterna* and possibly will be found in southern Mexico.

9. Erickson, D.L., B.D. Smith, A.C. Clarke, D.H. Sandweiss and N. Tuross  
 2005 An Asian origin for a 10,000-year-old domesticated plant in the Americas.  
*Proceedings of the National Academy of Sciences USA* 102(51):18315–18320.  
 (December 20, 2005)

Abstract: New genetic and archaeological approaches have substantially improved our understanding of the transition to agriculture, a major turning point in human history that began 10,000–5,000 years ago with the independent domestication of plants and animals in eight world regions. In the Americas, however, understanding the initial domestication of New World species has long been complicated by the early presence of an African enigma, the bottle gourd (*Lagenaria siceraria*). Indigenous to Africa, it reached East Asia by 9,000–8,000 before present (B.P.) and had a broad New World distribution by 8,000 B.P. Here we integrate genetic and archaeological approaches to address a set of long-standing core questions regarding the introduction of the bottle gourd into the Americas. Did it reach the New World directly from Africa or through Asia? Was it transported by humans or ocean currents? Was it wild or domesticated upon arrival? Fruit rind thickness values and accelerator mass spectrometer radiocarbon dating of archaeological specimens indicate that the bottle gourd was present in the Americas as a domesticated plant by 10,000 B.P., placing it among the earliest domesticates in the New World. Ancient DNA sequence analysis of archaeological bottle gourd specimens and comparison with modern Asian and African landraces identify Asia as the source of its introduction. We suggest that the bottle gourd and the dog, two “utility” species, were domesticated long before any food crops or livestock species, and that both were brought to the Americas by Paleoindian populations as they colonized the New World.

10. Pope, K., M.E.D. Pohl, J.G. Jones, D.L. Lentz, C. von Nagy, F.J. Vega and I.R. Quitmyer  
 2001 Origin and Environmental Setting of Ancient Agriculture in the Lowlands of  
 Mesoamerica. *Science* 292:1370-73.

Abstract: Archaeological research in the Gulf Coast of Tabasco reveals the earliest record of maize cultivation in Mexico. The first farmers settled along beach ridges and lagoons of the Grijalva River delta. Pollen from cultivated *Zea* appears with evidence of forest clearing about 5100 calendar years B.C. (yr B.C.) [6200 <sup>14</sup>C years before the present (yr B.P.)]. Large *Zea* sp. pollen, typical of domesticated maize (*Zea mays*), appears about 5000 calendar yr B.C. (6000 yr B.P.). A *Manihot* sp. pollen grain dated to 4600 calendar yr B.C. (5800 yr B.P.) may be from domesticated manioc. About 2500 calendar yr B.C. (4000 yr B.P.), domesticated sunflower seeds and cotton pollen appear as farming expanded.

11. Bricker, H.M., A. F. Aveni and V.R. Bricker  
 2001 Ancient Maya documents concerning the movements of Mars.  
*Proceedings of the National Academy of Sciences USA* 98(4):2107–2110.

Abstract: A large part of the pre-Columbian Maya book known as the Dresden Codex is concerned with an exploration of commensurate relationships among celestial cycles and their relationship to other, nonastronomical cycles of cultural interest. As has long been known, pages 43b–45b of the Codex are concerned with the synodic cycle of Mars. New work reported here with another part of the Codex, a complex table on pages 69–74, reveals a concern on the part of the ancient Maya astronomers with the sidereal motion of Mars as well as with its synodic cycle. Two kinds of empiric sidereal intervals of Mars were used, a long one (702 days) that included a retrograde loop and a short one that did not. The use of these intervals, which is indicated by the documents in the Dresden Codex, permitted the tracking of Mars across the zodiac and the relating of its movements to the terrestrial seasons and to the 260-day sacred calendar. While Kepler solved the sidereal problem of Mars by proposing an elliptical heliocentric orbit, anonymous but equally ingenious Maya astronomers discovered a pair of time cycles that not only accurately described the planet’s motion, but also related it to other cosmic and terrestrial concerns.

12. Hosler, D.  
 1988 Ancient West Mexican Metallurgy: South and Central American Origins and West  
 Mexican Transformations. *American Anthropologist*, 90(4):832-855.

Abstract: Metallurgy first appeared in Mesoamerica at about A.D. 800, introduced via a maritime route from Central and South America into West Mexico. During the initial period of the establishment of the technology (approximately A.D. 800 to between A.D. 1200 and 1300) technical links were closest with the metallurgies of Ecuador, Colombia, and lower Central America. During the second period of West Mexican metallurgy (A.D. 1200-1300 to the Spanish invasion) new elements from these same regional metallurgies were introduced, in addition to technical components from the metallurgy of southern Peru. Although the roots of West Mexican metallurgy lay in the metallurgies to the south, the elements that had been introduced from those areas were reinterpreted and transformed, resulting in the development of a technologically original, highly inventive regional technology in West Mexico.