

Breasts are for Feeding: An Anthropological, Archaeological Examination of Breastfeeding

By

Blaize A. Uva

Advised by

Dr. William Preston

ANT 461, 462

Senior Project

Social Sciences Department

College of Liberal Arts

CALIFORNIA POLYTECHNIC STATE UNIVERSITY

Spring, 2011

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Research Proposal

I will be researching the benefits of breast feeding through an anthropological, archeological, culturally relativistic, evolutionistic point of view within the Life History Theory (LHT) framework, considering constraints upon time and energy within the developmental period of infancy (Hill, K., 1999)¹. Throughout time women have evolved a specific set of design in their physiology (i.e. breasts) and biology (i.e. production of breast milk) in response to supplying their developing infant with the proper nutrition geared toward a healthy, fitness-enhancing development, [though there are many theories regarding the ambiguous motivation of evolution of breasts]. Infants also exhibit unique, dynamic characteristics latent in adulthood that have evolved for specific tasks and to ease transition from comfortable, stable life *in utero* to harsher environments characterizing life during the pre- and post-natal periods and beyond (Hill, 1999), for example, pre-weaning, the infant's epiglottis is able elevate and divide the isthmus faucium into two canals allowing the infant breath and swallow at the same time (Crelin, E.,1987)². Parental investment is tantamount for development as human children require an inexhaustible supply of time, energy and resources throughout their lives; breast feeding practices promote high parental investment and, ontogenically speaking (Tinbergen)³, it results in a plethora of life-long, favorable health outcomes for the infant. Evidence of actual breastfeeding is scant in the archaeological record, but recent capable analysis of carbon and nitrogen isotopes of bone collagen, found within dentition, reveals convincing evidence of ability

¹ Hill, Kim, and Hillard Kaplan. 1999. *Life History Traits in Humans: Theory and Empirical Studies*. Annual Review of Anthropology 28: 397-430

²Crelin, Edmund Ph.D., D.Sc. 1987. *The Human Vocal Tract: Anatomy, Function, Development and Evolution*, Vantage Press, New York:265

³ Tinbergen, Niko. 1963. *On Aims and Methods of Ethology*. Zeitschrift für Tierpsychologie 20: 410-433.

to determine weaning age of pre-historic skeletons (Wright, L., 1998)⁴. A more modern shift away from breast feeding toward formula bottle feeding is commonly endorsed by more urbanized, developed, contemporary societies, as noted through the demographic transition model (Thompson, W., 1942)⁵, though formula feeding offers different growth trajectories as well as a reduction in immune enhancing cells passed from mother to child through breast milk, this may bring light upon an adaptive lag between our foraging.

In my library researched senior project, I will be researching applicable, peer-reviewed, published, academic articles as well as other books and documents of suitable information. By reviewing these materials I will gain more insight to the archaeological evidence for and benefits of breast-feeding. With this knowledge, I wish to be an advocate for breastfeeding hoping that the body politic, the body social and the body individual (Scheper-Hughes, N., 1987)⁶ will accept and endorse breastfeeding.

⁴ Wright, Lori and Schwarcz, Henry. 1998. *Stable Carbon and Oxygen Isotopes in Human Tooth Enamel: Identifying Breastfeeding and Weaning in Prehistory*. American Journal of Physical Anthropology. 106:1

⁵ Thompson, Warren. 1942. *Population Problems*. McGraw-Hill. New York: 151-156.

⁶ Scheper-Hughes, Nancy and Lock, M. Margaret. 1987. *The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology*. Medical Anthropology Quarterly. 1(1):6-41.

Annotated Bibliography

1. Costello, Julia, Praetzellis, Adrian et al. 1999. *Historical Archaeology at the Headquarters Facility Project Site, The Metropolitan Water District of Southern California*. Applied Earthworks, Inc. Fresno. 194:(200-201). Costello and Praetzellis (et al.) published this archaeological site analysis of a historically significant red light district in Southern California. This dig offers a glimpse at the contents of a historically significant brothel, a breast pump present among artifacts retrieved, shows us realities of profession as a prostitute and allows archaeologists gain insight to historically modern alternative practices to actual breastfeeding. Breast pumping is significant because it offers a socially acceptable shift in practices from constant breastfeeding to a less time investing alternative of pumping. Breastfeeding can suppress fertility, so wet nursing may have been a form of birth control, as well as drug addiction to methadone or contraction of sexual transmitted diseases like syphilis which may cause sterility. I am interested in the breast pump retrieved as this gives insight to how prostitutes would balance child provisioning through breastfeeding while working for wages. The presence of a pump also signifies that women would be less invested to their children and would pump and store milk versus feeding on demand.

2. Crelin, Edmund. 1987. *The Human Vocal Tract: Anatomy, Function, Development and Evolution*. Vantage Press. New York. Crelin describes the physiological anatomy of the human vocal tract, including changes made in structure of the vocal tract of the course of the human Life History Theory. Infants show us a unique, dynamic trait that allows them to swallow breast-milk and breathe at the same time, a trait which becomes latent with the transition into childhood and on. This adapted feature became so directly in response to breastfeeding. I am interested in the physiological structure which allows infants to breathe and swallow simultaneously. I find it interesting that this characteristic ceases with age, also that this adaption is unique to infants whose only source of nutrition is through their mother's breast milk, the ultimate life fuel.

3. Dupras, Tosha, Schwarcz, Henry, Fairgrieve, Scott. 2001. *Infant Feeding and Weaning Practices in Roman Egypt*. American Journal of Physical Anthropology. 115:(204-212). In this article Dupras uses stable nitrogen and carbon isotope analysis to determine weaning age of infants from a cemetery at the Dakhleh Oasis, Egypt. Dupras and her colleagues indicate that infants were introduced to supplementary foods around 6 months old as well as goat or cow milk. I am particularly interested in this case study of archaeological evidence of weaning in the record. I can use different case studies to consider a cross-cultural analysis of approximate, normative weaning age over the evolutionary course of human beings. By comparing norm weaning ages throughout time and space I can see if there are certain body politic or body social endorsed norms, per ecology which influence parental investment via breastfeeding.

4. Gruber, Mayer. 1989. *Breast-feeding Practices in Biblical Israel and in Old Babylonian Mesopotamia*. Journal of the Ancient Near Eastern Society. 19:(61-83). In this article, Gruber identifies importance of breastfeeding as well as its suppression of fertility and negative outcomes like lactational amenorrhea. Gruber also points out multiple specific, ancient works of art depicting mother nursing child. Gruber uses biblical references to cite longevity of breastfeeding (there is one clear documentation of three years long) as well as inter birth intervals. I am interested in finding the relative weaning age of ancient Israel and Mesopotamia. Gruber also uses a cross-cultural technique in gleaning a normative weaning age per ecology, I will do the same though with supplementary information and case studies not investigated by Gruber.

5. Hamilton, William. 1968. *The Genetical Evolution of Social Behavior. Parts I and II*. *Journal of Theoretical Biology* 7:(1-52). Hamilton conceives Hamilton's Rule in which an actor does something, possibly an action or behavior, at a cost to themselves in order to benefit another, this is often correlated with higher degrees of relatedness. Parents act in a highly altruistic manner when engaging in childrearing efforts. Mothers undergo a high energetic and time consuming costs when bearing, raising, breastfeeding and caring for her child. I am interested in how Hamilton's Rule offers an analytical approach to costs to self (mother) while breastfeeding her infant to benefit it through transmission of nutrients, energy even immunities.
6. Hawkes Kristen. 2003. *Grandmothers and the Evolution of Human Longevity*. *American Journal of Human Biology* 15:(380-400). Hawkes analyzes the importance of longevity as a key factor for increased inclusive fitness when grandmothers are able to provision and act as an alloparent for grandchildren. Hawkes points out that when grandmother are involved in child rearing of grandchildren, this will increase inclusive fitness by decreasing inter-birth intervals, this is because children are able to be weaned sooner than if a mother had no maternal help and provisioning. This offers my paper an evolutionistic take on factors influencing longevity of breastfeeding. With increasing grand-maternal involvement, mothers have the novel ability to wean infants quicker, leaving her to return to optimal production rates as well as increased parental investment levels with her other children.
7. Hill, Kim, and Hillard Kaplan. 1999. *Life History Traits in Humans: Theory and Empirical Studies*. *Annual Review of Anthropology* 28:(397-430). Hill and Kaplan's article contributes important information on the Life History Theory (LHT) of Humans and attributes per stage of life. The various stages of the life history theory include: gestation, infancy, childhood, juvenile, adulthood and senescence. LHT is affected by ecological and time constraints which can alter ontogenetic trajectories. I will specifically be focusing of Hill and Kaplan's stage of infancy and the behavior of breastfeeding as a key factor in influencing health trajectories throughout all stages of life.
8. Israel, Fred. 1968. *1897 Sears Roebuck Catalogue*. Chelsea House Publishers. New York. Israel has compiled a comprehensive Sears Roebuck Catalogue from the year 1897. The catalogue includes a plethora of home and life goods ranging from tools to toys. I was particularly interested in the infant section of the catalogue as it offers bottles, rubber nipples, breast pumps, teething rings and popular baby attire associated with the year. This modern historical archaeological catalogue is further evidence of limiting infant breast to face time as nursing bottles, rubber nipples and breast pumps become more commercially available and widespread.
9. Kramer, Karen. *Children's Help and the Pace of Reproduction: Cooperative Breeding in Humans*. *Evolutionary Anthropology* 6:(224-237). In this article, Kramer analyzes the importance of children and their self-provisioning skills; they are extremely dependent and consumptive for a large portion of their lives, until they master skills of self-provisioning. When self-providing and surplus producing, children play a vital role in contributing to the family communal needs by engaging in cooperative breeding efforts proximately increasing inclusive fitness. I was interested in Kramer's writings on constraints on reproductive rates: balancing child rearing and food producing. Nursing mothers often have little time for anything else but caring for their infant and producing enough food (breast milk) for them. Having older children, especially females Kramer notes, increases fitness as these older girls are more likely to contribute to food procurement and provisioning as well as engage in alloparenting behaviors with younger siblings. For my paper because older children act as contributors to household needs, they hence decrease weaning age of younger siblings proximately reducing inter-birth intervals and increasing inclusive fitness.

10. Quinlan Robert, J. 2008. *Human Pair-Bonds: Evolutionary Functions, Ecological Variation, and Adaptive Development*. *Evolutionary Anthropology* 5:(227-238). In his article, Quinlan investigates the human pair bond, defining it as a long-term affiliation between two individuals. He wonders if the evolution of the pair bond came about as a consequence of male mating competition or whether it is an adaptation for paternal provisioning, but ultimately pair bond norms are derived directly in relation to environmental and ecological cues. Quinlan notes that while women are breastfeeding, this creates a critical period of time for male provisioning given the time consuming, deficit producing nature of breastfeeding as it reduces food gathering, procurement and provisioning investments and contributions of women. It is critical that men provide food to make up for his spouses deficit as well as provide her with enough caloric energy to continue breastfeeding with the optimal nutrition. I am particularly interested in the period of breastfeeding as being a critical time for male provisioning, as women are constrained by time and resources available when providing for children other than her nursing infant.

11. Scheper-Hughes, Nancy and Lock, M. Margaret. 1987. *The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology*. *Medical Anthropology Quarterly* 11:(6-41). In this article Scheper-Hughes seeks to define three major bodies which govern social norms, traditions and taboos. Scheper-Hughes three bodies are: the social body, the body politic and the body individual, all bodies are intertwined invisibly and play tantamount roles in governing acceptability of behaviors, practices, or thoughts, all influenced by ecological constraints. I am particularly interested in using the social body and the body politic as major influences in governing breastfeeding practices across the globe. The social body and body politic endorse whimsical norms which become indoctrinated throughout society, those individuals who rebel are squashed, shunned and gossiped about by the social body, forcing conformity. As breastfeeding behaviors and practices shift over time, this illustrates shifting norms of the three bodies.

12. Stuart-Macadams, Dettwyler, Katherine. 1995. *Breastfeeding; Biocultural Perspectives*. Aldine De Gruyter. New York. In this book, Stuart-Macadams and Dettwyler compile important works by differing authors on biocultural implications of breastfeeding. Stuart-Macadams seeks to explain processes of breastfeeding as influential factors in determining health trajectories throughout the LHT. She also examines socio-cultural, political implications and adaptive strategies surrounding breastfeeding. I am particularly interested in her section about breastfeeding in prehistory, natural weaning age in modern human populations and childhood health and longevity of breastfed infants for my senior project. Stuart-Macadams also offers a case study of the cultural context of breastfeeding in the United States which can be directly relatable to shifting social and political norms given ecology.

13. Tinbergen, Niko. 1963. *On Aims and Methods of Ethology*. *Zeitschrift für Tierpsychologie* 20:(410-433). In this article, Tinbergen seeks to explain why animals display a certain trait by asking four questions. Tinbergen's four questions involve the phylogenetic cause, or over the course of geological time, the ontogenetic cause, or within an individual's lifetime, the ultimate cause, determining survival rates and reproductive success, and the proximate cause or the trigger to adapt and evolve a certain trait or behavior. I will use Tinbergen's ultimate, ontogenetic as well as proximate lines of reasoning to determine normative weaning age across human evolutionary history given ecological constraints.

14. Thompson, Warren. 1948. *Plenty of People*. Ronald Press. New York. Thompson and fellow collaborators seek to describe the changing demographic transition theory in which less developed nations will urbanize and with increasing complexity and technology evolve to densely packed societies, he notes that more urban countries tend to have fewer births per mother. I will use Thompson's demographic theory and use it with shifting breastfeeding norms and weaning ages per society per stage of demographic transitions. I will see if there are shifting endorsed body politic and social body norms that influence mothers to steer away from breastfeeding in more urbanized, complex and developed societies.

15. Trevathan, Wenda, Smith, E.O., McKenna, James. 1999. *Evolutionary Medicine*. Oxford University Press. Oxford. This book is a comprehensive compilation of answers to biological questions, covering every stage of life within the Life History Theory. Trevathan goes into detail about breastfeeding as well as co sleeping and the plethora of positive benefits of both. I am mostly interested in breastfeeding behaviors and practices outlined by Trevathan as well as the reduction of morbidity and mortality of infants when breastfed.

16. Wiley, Andrea and Allen, John. 2009. *Medical Anthropology: A Biocultural Approach*. Oxford University Press. New York. In this text, Wiley provides a comprehensive guide to medical anthropology and investigates a plethora of biocultural approaches and perspectives as well as a multitude of health issues plaguing human societies over time. I am most interested in her section on breastfeeding health benefits as well as the comparison of breast fed versus formula fed infants and the correlating health and growth trajectories of each respective practice.

17. Wilkie, Laurie. 1968. *The Archaeology of Mothering: An African-American Midwife's Tale*. Routledge. New York. In this text, Wilkie investigates a site in Mobile, Alabama, and using the archeological artifacts recovered she explores the African-American approach to mothering. I will use information on norms of breastfeeding practices in this case study, paired with ecological constraints of working on a plantation, to determine a normative weaning age. By comparing weaning ages of infants in the American South, I can compare that with weaning ages of ancient Israelis, Egyptians and modern women today.

18. Wright, Lori and Schwarcz, Henry. 1998. *Stable Carbon and Oxygen Isotopes in Human Tooth Enamel: Identifying Breastfeeding and Weaning in Prehistory*. American Journal of Physical Anthropology. 106:1. In this article, Wright uses the stable carbon and oxygen isotopes in human dental enamel to reveal patterns of weaning and breastfeeding throughout prehistory. By testing dentition of skeletons from Kaminaljuyú, ranging from 700 B.C. to 1500 A.D. she has decided that Kaminaljuyú children were introduced to supplementary foods, often solid maize foods by two years of age but continued to drink breast milk for sometime after. I am particularly interested in the process of identifying weaning age through dental remains as well as the norm weaning age of Kaminaljuyú children. By comparing weaning age of Kaminaljuyú children with children from ancient Egypt, ancient Israel, historical United States and modern United States I can conduct a cross cultural analysis of weaning age to determine if there is a normative, universal weaning age or if weaning age is determined per ecology.

Outline

- A. Introduction to breastfeeding (BF)
 - 1. Within Life History Theory (LHT) frameworks
 - 2. Shifting social norms through time; use of pumps, bottles and formula
 - 3. Health Benefits to BF- health, growth and development
 - 4. Influences possible health trajectories throughout the LHT
 - a. MHC cells boost infant immunities
 - b. Mother-infant bonding
 - 5. Archaeological evidence for weaning age in prehistory
- B. BF vs. Formula- formula changes growth pattern of infants
 - 1. Formula fed increases bodyweight, more at risk for obesity
 - a. Possible increase risk of cancer- formula lacks essential, natural nutrients that are mandatory for optimal growth and development
 - b. Formula doesn't contain essentials provided by BF
 - c. Formula increases risk in ecologies with access to unclean water
- C. Cooperative breeding and Pair-bonding in supplementing maternal health while BF
 - 1. Fathers as providers
 - 2. Maternal kin as providers
 - 3. Older children (especially girls) as child care and household helpers
 - a. All increase inclusive fitness and are critical for provisioning supplementary foods/ resources during BF
- D. Archaeological Evidence for BF and weaning
 - 1. Can tell weaning age through oxygen and carbon isotopic analysis of prehistoric skeletons
Examples:
 - a. Prehistoric skeletons from Roman Egypt
 - b. Ancient Babylonian text and art references to BF and longevity
 - c. Prehistoric children of Kaminaljuyú
 - i. Try to glean 'normal' weaning age in prehistory

2. Shifting social norms from BF/pumping to formula
 - a. Red-light district in Southern California; Historical Evidence of pumping
 - b. Sears Roebuck catalogue; Historical Evidence for pumping
 - c. African American Slaves; Historical Evidence of midwifery and endorsing BF
 - i. Shifting norms due to demographic transition? Less altruistic?
 - ii. Adaptive lag between prehistoric ancestors and today's modern, urban fast-paced, independent ecologies.
- E. Anthropological look at Native American Breastfeeding and Weaning Practices
 - a. Native American Mother's infant feeding practices prehistorically
 - b. Native American mothers in WIC programs
 - i. Practices of breastfeeding mothers
 - ii. Increasing breastfeeding rates through peer counselor programs
 - c. Marginalization of Native American Women's health
- F. Conclusion
 1. Advocacy for BF
 2. Shifting body social norms

Introduction

I will be researching the benefits of breast feeding through an anthropological, archeological, culturally relativistic, evolutionistic point of view within the Life History Theory (LHT) framework, considering constraints upon time and energy within the developmental period of infancy (Hill and Hillard, 1999)⁷. Humans have evolved by adapting to environmental and ecological conditions, biologically there have been responses which strive to improve survivability of the individual and ultimately the species as a whole (Tinbergen, 1963)⁸. Prehistoric humans knew that to survive, infants must be fed breast milk. The length of time prehistoric infants were breast fed was unclear until the advent of a capability for analysis of carbon and nitrogen isotopes of bone collagen. These isotopes, found within dentition, provided the ability to determine weaning age of pre-historic skeletons (Wright and Schwarcz, 1998)⁹. By comparing various weaning ages throughout space and time, I can glean a range normative range of weaning ages [which are accepted by the social body (Scheper-Hughes and Lock, 1987)¹⁰] for analyzed groups through human history. These examples include: excerpts from ancient texts of Babylonia on longevity of breastfeeding (Gruber, 1989)¹¹, weaning practices in ancient Roman Egypt (Dupras et al.,

⁷Hill, Kim, and Hillard Kaplan. 1999. *Life History Traits in Humans: Theory and Empirical Studies*. Annual Review of Anthropology 28: (397-430).

⁸Tinbergen, Niko. 1963. *On Aims and Methods of Ethology*. Zeitschrift für Tierpsychologie 20: (410-433).

⁹Wright, Lori and Schwarcz, Henry. 1998. *Stable Carbon and Oxygen Isotopes in Human Tooth Enamel: Identifying Breastfeeding and Weaning in Prehistory*. American Journal of Physical Anthropology. 106: (1).

¹⁰Scheper-Hughes, Nancy and Lock, M. Margaret. 1987. *The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology*. Medical Anthropology Quarterly 11: (6-41).

¹¹Gruber, Mayer. 1989. *Breast-feeding Practices in Biblical Israel and in Old Babylonian Mesopotamia*. Journal of the Ancient Near Eastern Society. 19: (61-83)

2001)¹², weaning ages of children of the Kaminaljuyú of South America (Wright and Schwarcz, 1998), a look at modern social breastfeeding norms of Native American women given their socially oppressed lifestyle (Dodgson and Struthers, 2005)¹³, contemporary United States normative weaning age (Wiley and Allen 2009)¹⁴ as well as a historically modern examination of breastfeeding while working as in the sex industry (Costello and Praetzellis, 1999)¹⁵. By noting variation in weaning age I can pinpoint certain modern causes of variation, such as the innovation of formula feeding which has proven that it can alter socially and politically accepted breastfeeding norms. Breastfeeding has a plethora of positive health outcomes for infant and mother alike; I am an advocate for breastfeeding, especially in developing countries more susceptible to food and water borne illnesses that increases risk when using formula.

¹²Dupras, Tosha, Schwarcz, Henry, Fairgrieve, Scott. 2001. *Infant Feeding and Weaning Practices in Roman Egypt*.

American Journal of Physical Anthropology. 115: (204-212).

¹³Dodgson, Joan, Struthers, Roxanne. 2005. *Indigenous Women's Voices: Marginalization and Health*. Journal of Transcultural Nursing. 16: (330-346).

¹⁴Wiley, Andrea and Allen, John. 2009. *Medical Anthropology: A Biocultural Approach*. Oxford University Press. New York

¹⁵Costello, Julia, Praetzellis, Adrian et al. 1999. *Historical Archaeology at the Headquarters Facility Project Site, The Metropolitan Water District of Southern California*. Applied Earthworks, Inc. 194: (200-201). Fresno.

Chapter 2: Historical and Biological Context

Humans are unique in the high investment levels expected when carrying and rearing for their young; women carry a child for an extended period of time (nine months) and even still newborn infants are virtually helpless and require constant attention. Infants, however, exhibit unique, dynamic, adaptive, involuntary characteristics which become latent in adulthood, that have evolved for specific tasks and to ease transition from comfortable, stable life *in utero* to harsher environments characterizing life during the pre- and post-natal periods and beyond (Hill and Hillard, 1999). For example, pre-weaning, the infant's epiglottis is able to elevate and divide the isthmus faucium into two canals allowing the infant to breathe and swallow at the same time (Crelin, 1987)¹⁶. Women have the ability to bond on a physical and hormonal level with infants; this can be triggered by breastfeeding (Wiley and Allen, 2009). Mothers must be able to tune into their infant's needs and wants, this requires high levels of investment and altruism given the taxing self costs of breastfeeding (Hamilton, 1968)¹⁷.

Prehistorically, breast milk was the only 'life fuel' for infants and mothers had to insure that their infants would survive. Breastfeeding is a highly intensive process and requires an exhaustive supply of caloric energy and nutrients which is converted into developmentally friendly nutrients in the form of breast milk. Mothers must be highly

¹⁶Crelin, Edmund Ph.D., D.Sc. 1987. *The Human Vocal Tract: Anatomy, Function, Development and Evolution*, Vantage Press. 10: (265). New York.

¹⁷Hamilton, William. 1968. *The Genetical Evolution of Social Behavior. Parts I and II*. *Journal of Theoretical Biology*. 7: (1-52).

conscious of their caloric and nutrient intake to ensure provision of proper nutrients that enhance development while breastfeeding, they must abstain from harmful toxins like alcohol, nicotine and others. Evolutionarily, given the safety of a sedentary lifestyle while breastfeeding or bearing children, women face a deficit in their food collection and procurement quotas (Quinlan, 2008)¹⁸. Given this deficit women must rely on outside sources of provisioning, often relying on husbands [or stable, long-term, pair-bonds] (Quinlan, 2008), maternal kin networks (Hawkes, 2003)¹⁹, and even her own older children (Kramer, 2005)²⁰. Breast milk provides health benefits which improves infant health trajectories, testified by life-long health enhancements and immunities (Wiley and Allan, 2009). Longevity of breastfeeding an infant can tremendously enhance health trajectories as well.

¹⁸ Quinlan Robert, J. 2008. *Human Pair-Bonds: Evolutionary Functions, Ecological Variation and Adaptive Development*. *Evolutionary Anthropology*, 5: (227-238).

¹⁹ Hawkes Kristen. 2003. *Grandmothers and the Evolution of Human Longevity*. *American Journal of Human Biology*, 15: (380–400).

²⁰ Kramer, Karen. 2005. *Children's Help and the Pace of Reproduction: Cooperative Breeding in Humans*. *Evolutionary Anthropology*, 6: (224-237).

Chapter Three: Archaeological Evidence of Weaning

Evidence of actual breastfeeding is scant in the archaeological record, but recent capable analysis of carbon and nitrogen isotopes of bone collagen, found within dentition, reveals convincing evidence of the ability to determine weaning age of prehistoric skeletons (Wright and Schwarcz, 1998). By noting variation in socially accepted weaning age, across space and time, I can pinpoint an average weaning age for humans. Certain variations, which cause shifting social norms, such as innovation of bottle feeding, for example, have the potential to alter some societies socially and politically accepted breastfeeding norms and practices. By comparing various weaning ages throughout human history, I can glean a range of normative weaning ages [which are socially accepted and adhered to per ecology] through human history. These examples include: excerpts from ancient texts of Babylonia on longevity of breastfeeding (Gruber, 1989), weaning practices in ancient Roman Egypt (Dupras et al., 2001), weaning ages of children of the Kaminaljuyú in South America (Wright and Schwarcz, 1998), a historically modern look at socially accepted breastfeeding norms while working in the sex industry (Costello and Praetzellis, 1999) and finally a look at Fred Islay's *1897 Sears Roebuck Catalogue*²¹. With these examples I will try to show that various demographics of women, throughout time, have experienced pressure to conform to certain breastfeeding and weaning practices which are endorsed at the time.

Wright and Schwarcz (1998) identified that dental enamel preserves information on childhood diet, and is able to document introduction of solid foods into the diet or initiation

¹⁷Israel, Fred. 1968. *1897 Sears Roebuck Catalogue*. Chelsea House Publishers. New York.

of the weaning process. The study measured stable isotope ratios on “CO₂ liberated by reaction of enamel with H₃PO₄ in an automated carbonate system attached to a VG Optima mass spectrometer” (Wright and Schwarcz, 1998:1). By tracking ¹⁸O levels [in which breast milk is highly enriched] in prehistoric dentition the study was able to identify weaning ages of ancient children. Researchers supported this evidence with a study on the dentition of skeletons from Kaminaljuyú, Guatemala whose age ranges from 700 B.C. to 1500 A.D.

Wright and Schwarcz (1998) note that initially Kaminaljuyú children were, more often than not, exclusively breastfed during infancy, then with age, were introduced to some solid foods; in this case solid maize gruel was introduced at about two years. During the course of weaning, Kaminaljuyú children were diminishingly breastfed for some time, perhaps several years, after introduction to solid foods according to the study carbon and oxygen isotopic analysis found within the children’s dentition, which track dietary intake within stages of the LHT. The researchers take on the assumption that infants require supplemental foods at about six months of age. Due to cultural and ecological variation, food may be supplemented at three months and on [as among Rural Mayans today], or at and over twenty-four months of age, as in the case of the Kaminaljuyú, as the study acknowledges. Kaminaljuyú women practiced extended complimentary feeding as they did not completely wean their children until six to nine years of age. Women would then supplement their infants with *atole* or maize gruel, as gleaned from the study’s dentition analysis. Delaying food supplementation may incur developmental costs as additional

developmental enhancing macro-nutrients must be provided as they are not found in large enough quantities in breast milk alone.

Another interesting article that shows archaeological evidence for weaning was written by Mayer Gruber (1989), who uses Biblical texts to demonstrate weaning norms in ancient Babylonian Mesopotamia. He cites 2 Macc. 7:27 (2nd c. B. C. E.) and writes of a mother who stated she nursed her sons for three years. Gruber goes on to cite 1 Sam. 1:20-24 which states that Hannah nursed her son Samuel for two or three years. The author finds evidence that “the diet of a weaning child featured leben and date honey...a child could be expected to distinguish between sour and sweet” (68-69). He also finds that “it was common to wean children at the age when they could first learn to distinguish the letters of the alphabet” (Gruber, 1989: 69). So children were probably weaned around two to three years of age.

Gruber (1989) points out variation in social norms within ancient Israeli societies, of whether women even initiated breastfeeding or if they contracted wet nurses or used animal milk to feed their infants. In some cases, some women fed their infants not with breastmilk, but went straight to consumption of animal milk. This variation of feeding practices could be explained by a passage, cited by Gruber from the Babylonian Talmud *Ketubbot* 61a, implying that breastfeeding norms are drawn from familial custom, if a decision cannot be reached then customs are drawn from the spouse with higher rank on the socio-economic ladder. Gruber makes a point to write that in this ancient Israeli, patriarchal society, sex

biases existed which allowed for social norms to dictate earlier weaning of female infants over males. He also finds evidence of Old Babylonian wet-nursing contracts. Wet nurses were hired for a fee, either paid for in the form of precious metals or goods, based on initial contract of longevity of service. Often wet nurses were only attainable by higher classes, from more urban ecologies, who had access to more resources. I find it interesting that wet nursing contracts, court papers, legislation, litigation and correspondence upon behalf of wet-nursing employment were institutionalized this early on.

In another interesting archaeological example, Dupras et al., (2001) uses stable nitrogen and carbon isotope analysis to determine weaning age of ancient skeletons from a Roman-Christian cemetery (ca. 250 AD) at the Dakhleh Oasis, Egypt. The researcher and her colleagues indicate that during the Pharaonic period (2686 –332 BC) infants were introduced to supplementary foods at around 6 months of age, often in the form of millet fed goat's and/or cow's milk mixed with honey for the following 18 consecutive months. Weaning was then completed by about three years of age with introduction to cereals, and the study reveals that a honey- milk mixture was “consistent with traditional weaning practices of the Roman era as described by both Galen and Soranus” (Dupras et al., 2001:210), who were ancient Greek physicians (ca. AD 98 –200). Researchers note high rates of cribra orbital, megaloblastic anemia and fatal botulism at the Dakhleh Oasis cemetery, which may be attributed to high rates of consumption of honey paired with animal milk and a lack of other diverse, essential macro-nutrients. On an archaeological note, the researchers states that Egyptian “vessels decorated with images of women breastfeeding are thought to

be... for holding and administering animal milk to infants” (Dupras et al., 2001:204). This appears to be one of humanity’s earliest forms of the modern day bottle. Though the study makes no note to the abundance of these nursing vessels, this would be pertinent information allowing for critical analysis of the widespread usage of this practice.

Shifting to a more modern historical approach to breastfeeding norms, I particularly took a liking to Fred Islay’s *1897 Sears Roebuck Catalogue* (1968), a comprehensive catalog in which the infant section features: bottles, rubber nipples, breast pumps, teething rings and popular baby attire associated with the year. This modern historical archaeological catalogue is further evidence of social norms which seek to limit an infant’s face to breast time as nursing bottles, rubber nipples and breast pumps become more commercially available and widespread and socially endorsed. Shifting social norms can be seen in a CRM report by Costello and Praetzellis (1999), they provide site analysis of an archaeological, historically significant red light district’s privy in Los Angeles (ca 1900). This excavation offers a glimpse at the contents of a historic brothel, the presence of a breast pump among artifacts retrieved signifies “as least one nursing mother on the premise” (Costello and Praetzellis, 1999:194). The gritty life as a prostitute during the 1900’s gives way to harsh realities of struggling to obtain contraceptives as “pregnancies were usually viewed as personal and professional liabilities...in the prostitute’s favor opium addiction and chronic gonorrhea tended to produce sterility” (Costello and Praetzellis, 1999:194). The report makes note that breastfeeding can suppress fertility, so wet nursing may have been a form of birth control for

some prostitutes, paired with drug addiction or sexually transmitted diseases, there were fairly good chances sterility or birth control.

Mothers who pumped and stored milk, later to be administered via nursing bottle, could spend less time investing in her child and invest more time in economic ventures. Breast pumping and bottle feeding is highly significant because it offers a socially acceptable shift in practices away from constant breastfeeding to a less costly time investing alternative of parental investment: pumping and bottle feeding. Dupras et al. (2001) find of Egyptian nursing bottles illustrates that women have been limiting infant breast to face time for longer than originally thought. By reducing breastfeeding investments, women are able to go back to work (in modern ecologies), and continue to provide a steady supply of resources, often in the form of food or money (in the prostitutes case), for herself and her family. To offset the benefit of increased maternal resources (by not breastfeeding for an extended period of time) is the limiting inadequacy of infant's genotypic health trajectories from the lack of breast milk's highly nutritious and developmentally fostering value.

. With demographics transitioning to more urban based ecologies world-wide, at an increasing pace, social norms and environments shift rapidly, too quickly for the human mind to respond adequately, this results in an adaptive lag between modern human ecologies and that of our foraging ancestors (Duchaine, 2001)²². The socially accepted shift to supplementing breast milk with animal milk or formula and administered via bottle instead of breast has serious consequences, health-wise. Widespread political and social adoption of various breastfeeding practices vary per ecology, but humans as a whole, generally tend to

²² Duchaine, et al. 2001. *Evolutionary Psychology and the Brain*. Current Opinion in Neurobiology. 11: (225-230).

supplement infant diets by six months and wean completely at about three years of age. Documentation of weaning practices have been scant in the archaeological record, but by conducting stable carbon isotopic analysis on prehistoric skeletons, science have opened a door to gleaning weaning age of virtually anyone from anytime. By possessing such immense knowledge humans can advocate for initiation of breastfeeding, as many modern women simply exclusively formula feed.

Chapter Four: Native Americans and Breastfeeding

i. Prehistoric Breastfeeding Practices

Native American traditional culture has undergone multiple major upsets in: subsistence, economy and especially health throughout time. In the Americas, European colonists and their American descendants have both intentionally and unintentionally wrecked havoc upon traditional Native American life ways. Whites in America unintentionally passed on diseases and influenzas for which Native Americans had no immunities, ultimately killing millions and creating mass unintentional genocide of many culture groups. Caucasians have intentionally marginalized Native Americans through policy enforced segregation, forced acculturation, and other oppressive measures owing to perceived Western superiority. Native American women especially have been marginalized by accepted modern health practices, which is critical to pregnant or breastfeeding mothers. Given the surfeit of benefits surrounding breastfeeding, mothers should breastfeed their infants if they are able to. Native American mothers remain uneducated, in a culturally relativistic manner, on the benefits and outcomes of breastfeeding, and therefore many not initiate breastfeeding. The decision to breastfeed is often dependent on norms within the family unit (Dodgson and Struthers, 2005). Much is unknown about prehistoric Native American breastfeeding practices and to date it is an under studied area of interest. I will

attempt to find an average weaning age for prehistoric Native Americans gleaned from a burial site in Marsh Creek on the western edge of the California delta (Eerkens et al., 2010)²³.

Eerkens study (2010) attempts to analyze the dentin of six skeletons exhumed from the Central Californian, Marsh Creek Site cemetery which contains nearly 500 documented Native American burials, radio carbon dated from the Middle to late Holocene, or around 4300 to 3100 BP. Eerkens takes an individualistic based approach concerning variation in weaning age, between members of the same population, as well as establishing a norm weaning age among the population. The study analyzes stable nitrogen and carbon isotopes within small slices of dentin- using the first molar to track trophic levels for the first six years, and subsequent molars to track protein levels as an adult. By using this methodology, the study revealed the approximate ages of the six skeletons: three men about thirty years of age, a forty year old male, a twenty-five year old female and a fifteen year old of unknown sex at the Marsh Creek cemetery.

Eerkens et al. (2010) used carbon and nitrogen isotopes to glean weaning ages from the Marsh Creek cemetery. They found that nitrogen levels usually drop from about 14-10% in breastfeeding children to 7-9% in adults. The researchers realized that this adult drop in nitrogen signifies weaning from trophic rich breastmilk to low protein, solid foods. The study did show two burials that showed a reverse nitrogen trend post weaning, this was in the twenty-five year old female and the fifteen year old of unknown sex. Both of the previous

²³ Eerkens, Jelmer, Berget, Ada, Bartelink Eric. 2010. *Estimated Age of Weaning and Early Childhood Diet from Serial Micro-samples of Dentin Collagen*. UC Davis. Society of American Archaeology.

burials in their study research had post weaning nitrogen trophic levels of about 11%, higher than when they became adults; this reversal could be due to an increase in eating marine or wetland animal resources which are rich in nitrogen trophic levels. They speculate that these two may have had an alternative foraging strategy in which children forage on smaller freshwater fish, snakes, turtles or insectivorous species, which reside in close proximity to their camps. These species, which are usually avoided by adults due to their low caloric returns, allow children to supplement other protein sources into their diet independently.

Eerkens et al. (2010) also tracks stable carbon isotopes in dentin of one prehistoric Native American at the Marsh Creek Site, a thirty year old male; typically the carbon levels increase post weaning. They noted the environments limitations such as, low carbon rich plants for consuming, as well as the inland locations which would have limited access to carbon rich marine protein. For this male, the study concluded that carbon trophic levels increased and stabilized after about ten years of age, this increase can possibly due to the male mobility and access to distant resources.

By modeling different weaning situations (i.e. abrupt, gradual, etc.) and comparing that with the size and wear extent of teeth (to estimate age) Eerkens et al. (2010) were able to determine the approximate initiation and completion age of weaning, which seems to correlate well with average weaning ages reported for other modern hunting and gathering groups. On average, the initiation weaning age of the six individuals in the study at the Marsh Creek site was about 2 years of age, and the completion of weaning was at about 3-5

years of age with variation between individuals. One extreme outlier in their sample data, a forty year old man who appeared to be abruptly weaned at age one. Oddly enough this burial was one of seventeen burials at the Marsh Creek site buried with at least one charm stone. Indeed this man was also one of just six buried with a trophy head, denoting unusual status as an adult; the five other individuals analyzed in this study have very few or no graves associated with them. Central Californian Native American weaning age was about two years of age, prehistorically. Today breastfeeding and weaning practices for Native Americans have been altered dramatically due to European contact. I will attempt to find differences in weaning and breastfeeding practices between the Marsh Creek Site prehistoric skeletons in comparison to contemporary Native Americans in Washington and/or Utah; states that are participating in Women, Infants, and Children (WIC) Supplemental Food Programs.

ii. Contemporary Breastfeeding Practices

Fifty Pacific Northwestern Native American mothers living in eastern Washington, who had or were breastfeeding their children under five years of age, were literate, and were participating in the Women, Infants, and Children (WIC) Supplemental Food Program were questioned on their breastfeeding initiation and duration rates (Houghton and Graybeal,

2001)²⁴. Based on a national survey Madeline Houghton and Tara Graybeal acknowledge that Native American mothers have a lower incidence and duration of breastfeeding (compared to Caucasians). Their study conducted from October 1998 through January 1999, found that: 62% of the women in their study initiated breastfeeding, 70% of women made their breastfeeding decisions before or during early pregnancy, and only 36% said that Native American traditional culture influenced their decisions to breastfeeding. They found that in their study about 42% women felt support and encouragement from their social unit to breastfeed, and those who were encouraged by the baby's father, or their own mothers were more likely to breastfeed- making it clear that family networks and emotional support from the father helped form strong social support systems that directly affected infant-feeding decisions.

Houghton and Graybeal's (2001) study reveal that the mothers in their study breastfed on average for about twenty one weeks in length, or just over five and a half months with variations allowed lasting from one to one hundred fifty one weeks in length. Houghton and Graybeal's (2001) also found that mothers in their study with less than a high school education breast-fed a median of 23 weeks longer than those with a high school diploma or more. In addition, single mothers breast-fed a median of 25 weeks longer than married mothers. They note that women in the study who chose formula cited impediments like work or school. Single and less educated mothers, in the previous example would be less likely to

²⁴ Houghton, Madeline, Graybeal, Tara. 2001. *Breastfeeding Practices of Native American Mothers Participating in WIC*. Journal of the American Dietetic Association. 101:(245-247).

go to work or school so therefore were more likely to breastfeed and for longer periods of time (Houghton and Graybeal). Contradictory to the national average ten of the women in their study, living on reservations, breastfed for a median of six weeks less than the twenty one mothers who lived in more urban environments. The authors accredit the community, culturally relativistic health programs and the WIC mother's counselor support. It appears that Native American mothers, in the study breastfeed, on average just a few weeks shorter than Caucasians. However the sample size of their study was only fifty and spanned only four months. Perhaps it is not enough data to fully comprehend a complete contemporary breastfeeding average for Native Americans therefore I will analyze WIC mothers from Utah.

The Salt Lake Indian Health Care WIC program strives to provide education and support to improve the health of WIC infants, by increasing mother's infant feeding education and by raising family and community awareness in support of breastfeeding. Success would ultimately decrease health costs by lowering the incidence of infant illness caused by inadequate immune function as well as decrease federal spending on artificial milk (Long et al., 1995)²⁵. Long's study, was conducted with a quasi-experimental research design, primarily on Navajo and Ute tribes, which incorporated historical controls, inferred from a similar study conducted previous from January 1991 through January 1992. An experimental control group which made use of the effects of peer counseling, conducted

²⁵ Long, Debbie, Funk-Archuleta, Martha, Grieger, Constance et al. 1995. *Peer Counselor Programs Increases Breastfeeding Rates in Utah Native American WIC Population*. International Lactation Consultant Association. 11:(279-283).

from February 1992 through November 1992 was used for comparison. The study required all pregnant women to be: screened by a registered dietitian for contraindications to breastfeeding, not be HIV positive, not use drugs or alcohol during breastfeeding, be scheduled for bimonthly clinical visits and must receive at least two nutrition contracts with their dietitian or certified lactation educator. The peer counselors in the study were women who had experience with breastfeeding and were to, “provide information, counseling, and support to WIC prenatal and postpartum participants and to assist them in their breastfeeding experience” (280). These women were bilingual in Navajo and English, owned a telephone, were willing to speak with strangers and had access to reliable transportation. These peer counselors were required to create contact with participating WIC mothers by telephone, home visits and/or clinic visits before giving birth and at one, two and four to six weeks after birth. They were to keep confidential records of these meetings and refer mothers to doctors and nutritionists when appropriate (Long et al., 1995). Peer counselors were assigned assignments which were divided according to location of residence and risk factors associated with increased difficulty in breastfeeding. Counselors were given background information on a case by case basis.

In the Long et al. (1995) study, mothers were classified as breastfeeding mothers if she nursed at least one time per day, or as a non breastfeeding mother if she did not nurse. In the historic control group’s sample population, 78 persons, six of which were not Native American. The experimental control group’s sample population was 63 persons, three of which indentified themselves at not being Native American. Only 65 of the 78 women in the

historic control group had data for infant feeding practices six months post partum. The study's missing data was due to women who chose to discontinue WIC participation. The research found a correlation in demographic data between the control and experimental group was based on age, education, household size, monthly income, monthly prenatal care, previous pregnancies, number of live births and married status of the mother.

The results of Long et al. (1995) study showed that in the experimental group 75 percent of the women, during their pregnancy, reported that they decided that they intended to breastfeed, 16 percent chose not to breastfeed and 6 percent still remained undecided. Unfortunately comparison results of the control group remains unavailable for this data set. According to their results, 70 percent of 77 of mothers in the control group initiated breastfeeding, 36 percent of 67 were breastfeeding at three months and 31 percent of 65 continued to breastfeed for six months. In the study 84 percent of 45 of mothers initiated breastfeeding, 49 percent of 41 were still breastfeeding at three months and 21 percent of 34 continued to breastfeed at six months. The initiation rates for the experimental group was almost significantly higher than the control group, possibly attributed to the peer counselors education and encouragement for women to breastfeed confidently. However, the rate of mothers continuing to breastfeed at six months postpartum was lower than expected, possibly attributed to under-education of barriers attributed to long term breastfeeding.

Long et al. (1995) notes the monetary savings of the WIC program when women do not need artificial milk, as they are breastfeeding their children as a primary source of

nutrition. They use the study to illustrate savings: if all mothers in the control group had used artificial milk to feed their infants it would have cost WIC at least \$10,000 dollars (after a \$45,000 in rebates) to supply the milk. The cost of the peer counselors was less than \$1000, not to mention potential decreases in health care costs owing to the positive results of breastfeeding. There is tremendous savings correlated with women breastfeeding their children versus formula feeding. The results of the study can be generalized to the 80 WIC programs serving urban and some rural, low income Native American women. The report also credits the hard work of the peer counselors who had to be: assertive, good listeners, good problems solvers and be committed to raising family and community awareness and support of breastfeeding.

In the contemporary Westernized, urban world, Native Americans often avoid seeking out Western medical health but will do so if it is necessary. There are a variety of reasons which tend to hinder Native Americans from seeking out medical services. A few are attributed to: intergenerational/historical grief, historical trauma, distrust of outsiders based on past misuse of indigenous cultural information, and the cultural misunderstandings of the decision making in indigenous life (Dodgson and Struthers, 2005). Native Americans may undervalue modern health but Dodgson and Struthers (2005) believe that aversion may be due to: historical traumas associated with life marginalization, biculturalism experiences and interaction within a very complex health care system.

Dodgson and Struthers (2005) define historical traumas as “cumulative emotional and psychological wounding across the generations, including the life span, which emanates from massive group trauma” (341). Therefore they acknowledge that the current reality is shaped by past events. Some Native Americans in their research perceive that current illnesses common among Native Americans are because of lifestyle changes forced on indigenous ancestors by European colonists- notably diet and lifestyle. The authors note that Native Americans must also deal with issues of biculturalism especially in the health sector, as they undergo simultaneous health related experiences in both cultures. The study acknowledges that Western health and traditional health have very different foci; western health is causal related while traditional health holds collectivist orientation, calling for connection to others and the environment. Many participants in their research felt that disconnection from traditions, community, and environment was the cause of much of the illnesses seen in the Native American community, especially for those who live in urban environments and are misunderstood and isolated from others in their culture.

Dodgson and Struthers (2005) were interested in contemporary Native American infant feeding practices and the reasons why rates were so low within the demographic. The study found that the aversion to seeking medical health prenatally is due to: lack of understanding of the native decision making process, lack of respect and reticence to inform health care providers of sensitive details, health care providers were often viewed as abrupt, bad listeners and having an unauthentic demeanor. Native American culture is instituted by oral tradition and verbal communication is given careful consideration. The authors

interviewed one mother who advised a more culturally relativistic method to convince individuals to initiate breast-feeding. This could be done by talking about the woman's familiarity with the practice and how it had gone for her, not by speaking only about the promotion of the well-being of the baby- giving advice without being asked is seen as disrespectful.

Native American culture and Western culture have clashed over many issues and as a result, breastfeeding rates among Native Americans is generally low (Dodgson and Struthers, 2005). Archaeologists have discovered that in prehistoric times breastfeeding was the norm and weaning occurred within the first few years of life which is average compared to modern hunting and gathering tribes (Eerkens et al., 2010). Low breastfeeding initiation rates in Native Americans can be attributed to unfamiliarity and distrust of modern health care based on previous historical traumas suffered by the group (Dodgson and Struthers, 2005). The authors realize that Native Americans need to be given proper representation and a voice owing to their long history of marginalization, acculturation and forced assimilation. Native Americans also deal with a bicultural life in which traditional ways are ignored and undermined by mainstream, pervasive culture, or biculturalism. Native American, pregnant mothers especially need medical guidance in a culturally relativistic manner, one that emphasizes oral culture and adheres to behavioral taboos such as not giving advice unless asked. To Native Americans modern healthcare gives the impression of low quality involvement, on the physicians end, and this leads to a degree of distrust and avoidance among Native Americans (Dodgson and Struthers, 2005). Hopefully WIC and other

programs like it, whose goal is to advocate breastfeeding, can help raise knowledge and increase breastfeeding rates.

Conclusion

Breastfeeding can be credited as being the practice that began and saved human life. Shifting social norms and the fast paced modern world that we live in today is the cause of lowering incidence of breastfeeding. The initiation and continuation of breastfeeding practices are extremely varied in the world today. Widespread political and social adoption of various breastfeeding practices vary per ecology, but humans as a whole, generally tend to supplement infant diets with solid food by six months of age and wean children completely at about three years of age. However, due to cultural and ecological variation, food may be supplemented earlier or later. Some examples illustrate the wide variation of weaning practices: occurring at three months among rural Mayans today, to twenty-four months of age, for the Kaminaljuyú (Wright and Schwarcz, 1998). Kaminaljuyú women practiced extended complimentary feeding as they did not completely wean their children until six to nine years of age (Wright and Schwarcz, 1998).

Women have chosen to abstain from feeding their infants breastmilk throughout time and some societies have certain sex biases existing within cultural norms which may affect infant feeding practices. Gruber (1989) points out the variation in social norms within ancient patriarchal, Israeli societies. Sex biases existed which allowed for social norms to dictate earlier weaning of female infants over males. Gruber also notes that some women, in societies with domesticated animals, fed their infants not with breastmilk but went straight to consumption of animal milk. A Roman-Christian cemetery at the Dakhleh Oasis, Egypt, dating to the Pharaonic period (2686 –332 BC) shows that infants were introduced to

supplementary foods at around 6 months of age, often in the form of millet fed goat's and/or cow's milk mixed with honey for the following 18 consecutive months. Weaning was then completed by about three years of age with introduction to cereals or other local domestic staples (Dupras et al., 2001).

Prehistorically women were choosing alternative infant feeding methods such as administering animal milk to their infants, or in contemporarily formula feeding. Mothers, who engage in alternative infant feeding practices, could spend less time investing in high expenditure practices like breastfeeding and could invest more time in economic ventures. By reducing breastfeeding investments, women are able to go back to work (in modern ecologies), and continue to provide a steady supply of resources, often in the form of food or money for herself and her family (Dodgson and Struthers, 2005). Fred Islay's *1897 Sears Roebuck Catalogue* (1968), a comprehensive catalog in which the infant section features: bottles, rubber nipples, breast pumps, teething rings and popular baby attire associated with the year. These items denote a modern historical shift in social norms which accept limiting an infant's face to breast time. Shifting norms toward artificial milk and/or a shortened breastfeeding interval has been widely adopted, but this may come at unintended high health costs.

Contemporary Native American women shy away from seeking medical help which is critical for pregnant mothers. Because Native American traditional culture was often squelched by the White man, major upheavals caused the loss of elder women to teach their daughters and granddaughters about the importance of breastfeeding in a culturally

relativistic manner. In contemporary Native American life the decision to breastfeed is often dependent on norms within the family unit, and the baby's father or the woman's mother are highly influential in making the decision (Dodgson and Struthers, 2005). On average, the initiation weaning age of prehistoric Central California Native Americans showed to be about 2 years of age, and the completion of weaning was at about 3- 5 years of age (Eerkens et al., 2010). Today, due to Westernization, marginalization of native groups, breastfeeding and weaning practices for Native Americans have been altered dramatically and remain quite low, that is if initiation is even commenced. The study conducted by Long et al., (1995) sees that initiation rates of contemporary Native American women who received peer counseling in support of breastfeeding was significantly higher than women who do not. However, the study sees that the rate of mothers continuing to breastfeed at six months postpartum was lower than expected, possibly attributed to under-education and under-emphasis of barriers attributed to long term breastfeeding.

Many Native Americans purposely choose not to visit modern health clinics unless it is absolutely mandatory. the abhorrence to modern health has deep roots. Western culture has intentionally marginalized Native Americans through biased policy enforcing segregation, forced acculturation, and oppression because of perceived egocentric ways. Reasons which Native Americans do not typically seek out medical services are attributed to: historical trauma, historical grief, distrust of outsiders, and the daily bicultural experiences within a very complex health care system (Dodgson and Struthers, 2005). Native Americans deal with a bicultural life in which traditional ways are undermined- modern health is often

misunderstood by both parties (Dodgson and Struthers). Western health and traditional health have very different foci; western health is causal related while traditional health holds collectivist orientation, calling for connection to others and the environment the authors note. Pregnant Native Americans, mothers especially need medical guidance in a culturally relativistic manner, one that emphasizes oral culture and adheres to behavioral taboos like not giving advice unless asked.

Breastfeeding improves infant health trajectories and is very cost effective. For low income mothers who rely on federal aid to purchase artificial milk and formula, savings to the government would be at least \$10,000 dollars per 70 mothers (Long et al., 1995). Peer council seems to be an effective way to gear women toward initiation of breastfeeding for women. Modern views widely accept formula feeding with early weaning (about six months of age). Peer council, culturally relativistic education and political measures in favor of breastfeeding must be implemented and adhered to if widespread socio-political acceptance of breastfeeding is to be reached.

Bibliography

1. Costello, Julia, Praetzellis, Adrian et al. 1999. *Historical Archaeology at the Headquarters Facility Project Site, the Metropolitan Water District of Southern California*. Applied Earthworks, Inc. 194: (200-201). Fresno.
2. Crelin, Edmund Ph. D., D. Sc. 1987. *The Human Vocal Tract: Anatomy, Function, Development and Evolution*. Vantage Press. 10: (265). New York.
3. Dodgson, Joan, Struthers, Roxanne. 2005. *Indigenous Women's Voices: Marginalization and Health*. Journal of Transcultural Nursing. 16: (339-346).
4. Duchaine, et al. 2001. *Evolutionary Psychology and the Brain*. Current Opinion in Neurobiology. 11: (225-230).
5. Dupras, Tosha, Schwarcz, Henry, Fairgrieve, Scott. 2001. *Infant Feeding and Weaning Practices in Roman Egypt*. American Journal of Physical Anthropology. 115: (204-212).
6. Eerkens, Jelmer, Berget, Ada, Bartelink Eric. 2010. *Estimated Age of Weaning and Early Childhood Diet from Serial Micro-samples of Dentin Collagen*. Society of American Archaeology. UC Davis.
7. Gruber, Mayer. 1989. *Breast-feeding Practices in Biblical Israel and in Old Babylonian Mesopotamia*. Journal of the Ancient Near Eastern Society. 19: (61-83).
8. Hamilton, William. 1968. *The Genetical Evolution of Social Behavior. Parts I and II*. Journal of Theoretical Biology. 7: (1-52).

9. Hawkes Kristen. 2003. *Grandmothers and the Evolution of Human Longevity*. *American Journal of Human Biology*. 15: (380–400).
10. Hill, Kim, and Hillard Kaplan. 1999. *Life History Traits in Humans: Theory and Empirical Studies*. *Annual Review of Anthropology*. 28: (397-430).
11. Houghton, Madeline, Graybeal, Tara. 2001. *Breastfeeding Practices of Native American Mothers Participating in WIC*. *Journal of the American Dietetic Association*. 101: (245-247).
12. Israel, Fred. 1968. *1897 Sears Roebuck Catalogue*. Chelsea House Publishers. New York.
13. Kramer, Karen. 2005. *Children's Help and the Pace of Reproduction: Cooperative Breeding in Humans*. *Evolutionary Anthropology*. 6: (224-237).
14. Long, Debbie, Funk-Archuleta, Martha, Griger, Constance et al. 1995. *Peer Counselor Programs Increases Breastfeeding Rates in Utah Native American WIC Population*. *International Lactation Consultant Association*. 11: (279-283).
15. Quinlan Robert, J. 2008. *Human Pair-Bonds: Evolutionary Functions, Ecological Variation, and Adaptive Development*. *Evolutionary Anthropology*. 5: (227-238).
16. Scheper-Hughes, Nancy and Lock, M. Margaret. 1987. *The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology*. *Medical Anthropology Quarterly*. 11: (6-41).

17. Tinbergen, Niko. 1963. *On Aims and Methods of Ethology*. *Zeitschrift für Tierpsychologie*. 20: (410-433).
18. Wiley, Andrea and Allen, John. 2009. *Medical Anthropology: A Biocultural Approach*. Oxford University Press. New York.
19. Wright, Lori and Schwarcz, Henry. 1998. *Stable Carbon and Oxygen Isotopes in Human Tooth Enamel: Identifying Breastfeeding and Weaning in Prehistory*. *American Journal of Physical Anthropology*. 106 :(1-5).