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ABOUT THE LAMBDA ALPHA JOURNAL

The *Lambda Alpha Journal* is a publication of student papers by members of the Lambda Alpha National Honor Society and is published regularly at Wichita State University, Department of Anthropology, 1845 Fairmount, Box 52, Wichita, KS 67260-0052. Professional, avocational, student manuscripts, and book reviews of recent publications are welcome. The Journal is made possible through the efforts of the Journal editorial staff residing at the founding chapter, Alpha of Kansas. Funding for the Journal is obtained through subscriptions and continuing sponsorship by the Student Government Association of Wichita State University.

LETTER FROM THE EDITOR

Greetings to all members of Lambda and congratulations to the authors who made it into print in the current volume. The Lambda Alpha has seen a number of submissions of manuscripts for the current year. Therefore it is worth mentioning the additional pages to the forty-ninth volume comprising 12 manuscripts and one book-review. More and more submissions also follow the journal submission guidelines offered. As always, the articles represent topical contributions from across the discipline of anthropology.

The manuscripts included in the current volume reports address topics such as: 1) the evolution of color vision in primates (Kulick); 2) challenges to carry forward African American identity and cultural continuity in rural United States (Jackson); 3) campus student culture and redefining indigeneity and identity among Native American students (Kainu); 4) the application of visual archaeology as a complement understanding of the dynamics and understanding of culture (Moses); 5) a call for solutions to continuing renegotiations of material culture and museum studies relative to identity formation among contemporary communities; 6) the recovery of human remains in a privy in Cohoes and the possible reflection the discovery offer social choices of 19th century working-class women in America (Murphy); 7) how to address wide-spread health risks related to poor sanitation in a city-neighborhood in Ghana integrating approaches from public health and anthropology (Sweatman); 8) a “net ethnographic” study the “review” component of online trade activity and operation, community formation (sellers and buyers), and eventual economic success (Milligan); 9) the practice of domestication of insects to create dyes for food and cosmetics and potential for an increased understanding of social complexity and status among “pre-contact” communities in the Americas (Clark); 10) a review and reassessment of skeletal variation in Neandertal cranial and postcranial skeletal morphology (Guerro); 11) the gendered history of public education in South Africa (Orzolek); 12) the impact of disease and inter population strife, on the Athenian demographic profile, economy, culture, and infrastructure (building projects) and how these changed the Athenian “landscape” (Stough). In addition, the journal presents a review of “The Bioarchaeology of Dissection and Autopsy in the United States” by K.C. Nystrom, courtesy of the reviewer, Audrey Yoo.

I extend my sincere gratitude to Gracie Tolley for her work as student editor, to Lisette Varela, Benjamin Moss, Haley Rodriguez, and Audrey Wheeler for their contributions as officers of Lambda Alpha. And to all of the above and to Hannah Cervenka for organizing the 21st Annual Lambda Alpha Student Symposium at Wichita State University. The day-long program included 21 undergraduate podium presenters speaking to research in archaeological, biological, and cultural anthropological investigations. Finally, I thank all of the authors and contributors to the current volume of the journal.

Sincerely,
Peer H. Moore-Jansen
Editor-in-Chief

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Peer H. Moore-Jansen
Editor-in-Chief

Monkey see... what? Evidence for Ecological and Social Selection in the Evolution of Primate Color Vision

Key Words: Chromatic, Diet, Optics, Phylogenetic

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Evolution of Color Vision

Vision allows us to perceive our world and gain information on our surroundings. It is an ancient trait that has evolved many times in the animal kingdom and has taken many shapes and forms in different organisms - from simple light detection in single-celled organisms to the extensive multi-chromatic vision of mantis shrimp which detects 16 spectral types, 12 of which are linked to color perception (Vorobyev 2004). The term 'chromatic vision' refers to the ability to perceive colors due to varying peak sensitivities of photopigments in the eye to certain spectral wavelengths of light, thus determining which colors are perceived and differentiated between.

Many vertebrates, such as reptiles and birds, are tetrachromatic, meaning that they have four photopigments in their retina which allow them to detect four distinct spectral wavelength peaks (Melin et al. 2017b; Jacobs & Rowe 2004). Evidence suggests that tetrachromatic vision is the ancestral, or plesiomorphic, state in vertebrates, having evolved in an early ancestor more than 540 million years ago as an adaptation to detect variance in lighting in shallow aquatic habitats (Vorobyev 2004). Around 250-230 million years ago, early mammals transitioned to and maintained an exclusively nocturnal activity pattern. During this period of evolutionary time, two photoreceptors were lost in these mammalian ancestors, perhaps through drift or selection, producing a fixed dichromatic state which has been widely retained in mammals today (Melin et al 2017b; Vorobyev 2004; Jacobs & Rowe 2004). Among the placental mammals, primates are the only clade to have re-gained a photoreceptor in their evolution to achieve a trichromatic state (Hiramatsu et al. 2008; Vorobyev 2004; Osorio & Vorobyev 1996), thus producing heightened visual acuity and an increased reliance on vision as the dominant sense (Moreira et al 2019; Melin et al. 2017b).

There are three opsin photopigments which produce chromatic vision in primates. The short-wavelength sensitive autosomal opsin gene (s opsin; SWS) detects blue pigments at the 440-nm spectral peak (Melin et al. 2017b; Osorio & Vorobyev 1996). Coupled with a mid-wavelength-sensitive opsin gene (Mopsin; MWS) which detects green pigments at the 533-nm spectral peak in primates, a blue-yellow spectral channel is produced which allows dichromats to differentiate luminance in their surroundings. Trichromatic primates, in addition to SWL and MWL photopigments, have a long-wavelength-sensitive opsin gene (Lopsin; LWS) which detects red pigments at the 565-nm spectral peak, thus allowing them to differentiate between red-green spectral channels and see colors in the red/orange/yellow color

range (Melin et al. 2017b; Heesy & Ross 2001; Osorio & Vorobyev 1996). MWS and LWS opsin genes are located on the X chromosome, thus are sex-linked in some primates. Variation in the presence and peak sensitivities of these three photopigments produce extensive variation in the allelic and phenotypic diversity of photopigments, thus producing multiple chromatic states and types of color vision in primates. Playing a key role in how organisms perceive and react to their environment, color vision directly contributes to individual fitness, thus it is likely to be under strong evolutionary selective pressures. Observed patterns of chromacy across the primate clade reveal frequent losses and gains of chromatic state within lineages, offering support for this idea (Jacobs et al. 2019) and begging further investigation of the fundamental evolutionary pressures selecting for different chromatic states.

Seeing Red: The Rise of Trichromatic Vision in Old World Monkeys, Apes, and Humans

Old World monkeys, apes, and humans (parvorder: Catarrhini; here on "Catarrhines") are routine trichromats, meaning both sexes can uniformly differentiate between red-green spectral channels. This ability is the result of an ancestral duplication of the OPN1LW opsin gene and subsequent divergence towards and fixation at different wavelength sensitivities (Moreira et al. 2019; Melin et al. 2017b). This mutation is estimated to have occurred about 40 million years ago, proceeding the phylogenetic divergence from primates in the New World (Vorobyev 2004). There remains much debate in the literature over the evolutionary pressures selecting for Catarrhine trichromacy. The leading hypothesis predicts an adaptive advantage for trichromats in foraging for reddish ripe fruit and young leaves (Matsumoto et al. 2014; Regan et al. 2001; Osorio & Vorobyev 1996). Other proposed hypotheses include a superior ability of trichromats to perform visual tasks which include spatial perception or reference, an improved ability to recognize objects or predators under patchy or variable lighting (Jacobs et al. 2019), and an adaptive role in social signaling via modulations in skin color which may reveal information on emotion, health, female ovulatory state, and dominance (ex. Hiramatsu et al 2017).

Polymorphic Chromacy: The Case of the New World Monkeys

New World monkeys (parvorder: Platyrrhini; here on "Platyrrhines") did not experience the same opsin gene duplication and fixation as the Catarrhines, thus each X chromosome possesses only one opsin photopigment gene at a locus, resulting in a sex-linked LWS/MWS polymorphism (Moreira et al. 2019; Fedigan et al. 2014). Hemizygous males (having one X chromosome), and females homozygous for a photopigment allele, are thus dichromatic and functionally red-green colorblind. However, females heterozygous for the LWS/MWS opsin allele produce both photopigments, detect both spectral peaks, and are thus functionally trichromatic and able to perceive red hues (Jacobs et al. 2019; Melin et al. 2017b; Valenta et al. 2016; Fedigan et al. 2014; Heesy & Ross 2001). The retention and maintenance of this chromatic polymorphism suggests selective pressures at work, as evolutionary theory otherwise predicts its loss through drift and a shift towards the fixation of the more advantageous allele (Jacobs et al. 2019). The leading hypotheses to explain the selection for this polymorphism include the heterozygote superiority hypothesis, which predicts an adaptive advantage based on the ability to differentiate between red-green color channels, as is the case in foraging (Fedigan et al. 2014), the idea that different genotypes are better suited for different tasks (Fedigan et al. 2014), and the idea of polymorphism maintenance through balancing selection, perhaps via niche divergence,

frequency dependent selection, or mutual benefit of association (Jacobs 2019; Melin et al. 2017a; Fedigan et al. 2014).

Interestingly, two genera amongst the Platyrrhines diverged from the allelic polymorphism to the fixation of a single chromatic state, thereby suggesting either a loss of allelic diversity through drift or, more likely, active directional selection. Howler monkeys (genus: *Alouatta*) evolved routine trichromacy independent of Catarrhines through an analogous duplication of the opsin genes (Hiramatsu et al. 2008; Heesy & Ross 2001). It has been suggested that, being the most folivorous species of the Platyrrhines, Howlers may have evolved this trait in convergence with Catarrhines due to the similar foraging advantage red-green differentiation would confer in the search for young, nutrient-rich leaves common on both continents (Melin et al. 2017b).

Likewise, evidence suggests that Owl monkeys (genus: *Aotus*) have diverged away from the polymorphic chromatic vision common in Platyrrhines to grey-scale MWS monochromatic vision through loss of S opsin function (Vorobyev 2004). A similar shift towards monochromacy has been reported to have occurred in the Old-World bush babies (genus: *Galago*), possibly as a result of drift due to relaxed selection by nocturnal activity patterns (Hiramatsu et al. 2008; Vorobyev 2004).

Strepsirrhines: Dichromatic, with Exceptions

Lemurs and lorises (order: Strepsirrhini; here on "Strepsirrhines") are generally dichromatic, possessing two functional photopigments, mostly commonly the SWS and MWS opsins. Interestingly, considerable variation has been reported in multiple lemur genera (*Eulemur*, *Varecia*, *Propithecus*), with trichromatic, polymorphic, and seemingly derived, or re-evolved, dichromatic vision being variably present across lineages (Melin et al 2017b; Kawamura et al. 2012; Changizi et al. 2006; Vorobyev 2004). It has been suggested that this variation may be explained by varying luminance and cryptic coloration in fruits, or as an adaptation to improve object recognition in lowly-lit rainforests (Jacobs et al. 2019).

Selection Pressures and Synthesis

Primates have undergone extensive niche specialization in the Old and New Worlds, producing extensive variation in life histories relating to diet, activity pattern, sociality, and mating systems adapted to specific environments and socio-sexual and ecological contexts (Moreira et al. 2019). Therefore, it is not surprising that adaptive selection would favor considerable variation in chromacy across the order. Yet, there remains much work to be done in identifying the social and ecological factors which are most closely associated with patterns of chromacy.

A trichromatic advantage in foraging for red, ripe fruits from a green leafy background, and young red pigmented leaves from older, tougher, less nutritious leaves, is widely hypothesized to be the primary evolutionary pressure selecting for routine trichromacy in Catharrhines and aiding in the maintenance of the Platyrrhine opsin polymorphism. However, evidence for the adaptive foraging hypothesis remains mixed. For example, some studies on Platyrrhines have reported a higher foraging efficiency in captive callitrichid trichromats

(*Callithrix*, *Saguinus*) compared to dichromats (Smith et al. 2003), and greater intake rates and a higher accuracy of trichromats white faced capuchins (*Cebus*) in selecting ripe fruits compared to dichromats in the same population (Melin et al. 2017a; Melin et al. 2013). In contrast, other studies have found no significant differences in foraging efficiency (Hiramatsu et al. 2008) or energy acquisition rates (Vogel et al. 2007) between trichromatic and dichromatic individuals in populations of spider monkeys (*Ateles*) and capuchins (*Cebus*), respectively.

A second hypothesis which has been gaining increased attention and support in recent years proposes a social signaling advantage of trichromats in perceiving red modulations in skin color, which may serve as honest or dishonest signals in revealing emotional state (for ex. blushing, flushing and blanching in humans), socio-sexual signals, health, and threat displays (Rigaill et al. 2019; Moreira et al. 2019; Changizi et al 2006; Vorobyev 2004). It is well documented that many Catarrhines, Platyrrhines, and the two genera of polymorphic chromatic Strepsirrhines (*Varecia*, *Propithecus*) have convergently developed large patches of bare skin on their faces, ano-genital area, chest and hindquarters (Rigaill et al 2019, Moreira et al. 2019; Changizi et al. 2006) and that changes in red-tone skin color occur due to variable concentrations of oxygenated hemoglobin in the blood which alters perceivable red color saturation and reflectance (Rigaill et al. 2019; Changizi et al 2006). Furthermore, estrogen receptors in the skin of primates modulates blood flow, producing perceptible changes in skin color in association with the female reproductive cycle and social status (Moreira et al 2019; Rigaill et al 2019). A study by Hiramatsu et al. (2017) offers support that trichromatic humans can successfully detect variation in red skin color. Overall, evidence for this hypothesis is building, but remains anecdotal and isolated to behavioral studies on a small number of species (see Moreira et al. 2019 for review). To assess the role modulations in skin color may play in the selection of trichromatic vision in different species, it is important to understand the social contexts in which they would function for each species in accordance to dominance hierarchies, social systems, and mating systems (Moreira et al. 2019).

Through this meta-analysis, I aim to take the first steps in filling this knowledge gap by synthesizing relationships between explanatory variables for the two leading hypotheses proposed to explain the role of and selection for primate color vision: the adaptive foraging hypothesis and the social signaling hypothesis. Specifically, by combining data on variables related to foraging behavior (diet, activity patterns) and social factors (dominance hierarchies, mating systems, skin exposure, skin color, and social system), I aim to identify variables which best correlate with and explain the most meaningful variation in primate color vision. By doing so, I aim to advance the field by adding to the growing body of literature on the evolutionary pressures selecting for different vision types, with the ultimate goal of elucidating how specific social and ecological factors shape foraging efficiency and communication amongst primates.

Methods

Data Collection

Data on skin color, skin exposure, and chromacy were gathered from a review of primary literature and further supplemented with information on diet percent composition, mating system, social system, and dominance hierarchies from a comprehensive encyclopedia on living

primate species (Rowe et al. 2016). Species were selected for analyses based on the availability of data categorizing facial skin color and skin exposure of primates, available in Moreira et al. (2019). Skin exposure was assigned by Moreira et al. (2019) to five categorical levels based on 2-5 forward-facing images: 1) predominantly covered face, with exposed skin around the nostrils; 2) mostly covered face, with exposed skin around the eyes; 3) mostly exposed face, with skin around the nose and eyes exposed, or around the nose and mouth exposed; 4) predominantly exposed face, with exposed skin around the eyes, nose, and mouth; and 5) completely exposed face, which includes cheeks, nose, eyes, and forehead. Skin color was assigned, using the same images, to four categorical levels: 1) hyperpigmented (dark) skin; 2) mottled skin, which is mostly depigmented with small pigmented patches; 3) depigmented skin; and 4) hypervascularized (red) skin. Data on phenotypic chromacy were then gathered for each species from a phylogenetic model reporting trends in primate chromacy created by Heesy & Ross (2001), then expanded to include monochromacy as a fourth chromatic category based on later reports documenting its discovery (Vorobyev 2004). Species were then cross referenced using an encyclopedia on primates (Rowe et al. 2016) to assign life-history information on rank dominance (presence/absence), mating system (four levels: polygynous, polyandrous, polygynandrous, monogamous), social system (seven levels: one male-one female pairings (1M-1F), one male-multifemale groups (1M-MF), multimale-one female groups (MM-1F), multimale-multifemale groups (MM-MF), all-male bands, solitary, and fission-fusion groups), and diet (percent composition and presence/absence; 9 levels: ripe fruits, unripe fruits, seeds, leaves, exudates, flowers, nectar/flowers, vertebrates, and invertebrates; average calculated if percent-range given). Combined, the complete data set includes 106 primate species of 49 genera and 20 sub families, representing 4 major groupings within the primate order: Platyrrhines (n=70), Catarrhines (n=28), Strepsirrhines (n=7) and Tarsiiformes (n=1) (Supplementary Material Table A). Selected species included in the study were dependent on available data. A limitation of this study is the uneven distribution of species included in this study from each order.

Data Analyses

Data analyses were performed using RStudio v. 1.1.456. The 'rda' function in the 'vegan' R package v. 2.5.3 was used to construct a principal components analysis ordination based on presence/absence data for foraging and social factors (Figure 1). Correlations between variables were assessed with Spearman's Rho tests using a 0.95 confidence interval, performed using the 'cor.test' function in the 'stats' R package v. 3.5.1 for foraging (Table 1) and social variables (Table 2).

Results

A strong positive correlation exists between trichromatic vision and a highly folivorous diet ($p < 0.001$) and a strong negative correlation between polymorphic chromacy and a folivorous diet ($p < 0.001$; Table 1). No other dietary component significantly correlated with chromatic vision.

Both monochromatic and dichromatic vision were found to have strong negative correlations with diurnal activity patterns ($p < 0.001$), and strong positive correlations with a

nocturnal activity pattern ($p < 0.001$; Table 1). Trichromacy and polymorphic chromacy did not significantly correlate with activity pattern ($p > 0.05$). Correlations between diet and activity patterns were assessed but were highly insignificant so were excluded from further analysis.

Trichromatic vision was found to have a strong positive correlation with skin exposure, polygyny, the presence of dominance hierarchies, 1M-MF social groups, a solitary social structure ($p < 0.001$), and all-male-groups ($p < 0.05$). Both monochromatic and dichromatic vision were found to have a strong negative correlation with skin exposure ($p < 0.001$). In addition, monochromatic vision was found to negatively correlate with the presence of dominance hierarchies, MM-MF social groups ($p < 0.001$), and 1M-MF social groups ($p < 0.05$), and strongly positively correlate with monogamy and 1M-1F social groups ($p < 0.001$). Polymorphic chromacy was found to have a strong negative correlation with polygyny, 1M-MF social groups ($p < 0.001$), and a solitary social structure ($p < 0.01$), and to have a strong positive correlation with polyandry and polygynandry ($p < 0.05$). Skin color did not significantly correlate with chromatic vision ($p > 0.05$; Table 2).

Table 1. Spearman's Rho Correlations between foraging variables and chromatic vision type for 103 primate species. Numbers indicate rho correlation values (-1,1). Significance levels are denoted with asterisks.

Foraging Variables		Vision Type			
		Monochromatic	Dichromatic	Trichromatic	Polymorphic
Diet	Fruits (Unripe)	-0.024	-0.034	0.022	-0.003
	Fruits (Ripe)	0.207	-0.113	-0.195	0.181
	Seeds	-0.105	-0.150	-0.021	0.101
	Leaves	-0.174	0.127	0.620***	-0.615***
	Exudates	-0.051	0.177	-0.138	0.086
	Nectar/Flowers	0.194	-0.144	0.226	-0.222
	Vertebrates	-0.030	-0.043	0.103	-0.079
	Invertebrates	-0.099	0.110	-0.081	0.066
Activity Pattern	Diurnal	-0.567***	-0.809***	0.201	0.237
	Cathemeral	-0.017	0.701***	-0.114	-0.135
	Nocturnal	0.701***	0.483***	-0.162	-0.192

N=103

Significance Values: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$; ^AS $0.05 < P \leq 0.07$; NS $P > 0.05$

Table 2. Spearman's Rho Correlations between social variables and chromatic vision type for 106 primate species. Numbers indicate rho correlation values (-1,1]. Significance levels are denoted with asterisks.

Social Variables		Vision Type			
		Monochromatic	Dichromatic	Trichromatic	Polymorphic
Facial Skin	Skin Exposure	-0.371***	-0.337**	0.370***	-0.010
	Skin Color	-0.166	0.197	-0.119	0.137
Dominance Structure	Hierarchical	-0.405***	0.022	0.421***	-0.171
Mating System	Polygyny	-0.190	0.178	0.481***	-0.412***
	Polyandry	-0.089	-0.053	-0.198 [^]	0.260*
	Polygynandry	-0.226*	0.002	-0.135	0.260*
	Monogamy	0.448***	-0.138	-0.204 [^]	-0.018
Social System	1M- 1F Groups	0.367***	0.089	-0.081	-0.171
	1M-MF Groups	-0.220*	0.006	0.575***	-0.420***
	MM-1F Groups	-0.131	0.106	-0.078	0.111
	MM-MF Groups	-0.385***	0.030	0.0979	0.121
	All Male Bands	-0.062	-0.037	0.266*	-0.203 [^]
	Fission Fusion	-0.202 [^]	0.0217	0.045	0.0678
	Solitary	-0.16707	-0.099	0.477***	-0.319**

N=106

Significance Values: *P≤0.05; **P≤0.01; ***P≤0.001; [^]AS 0.05<P≤0.07; NS P>0.05

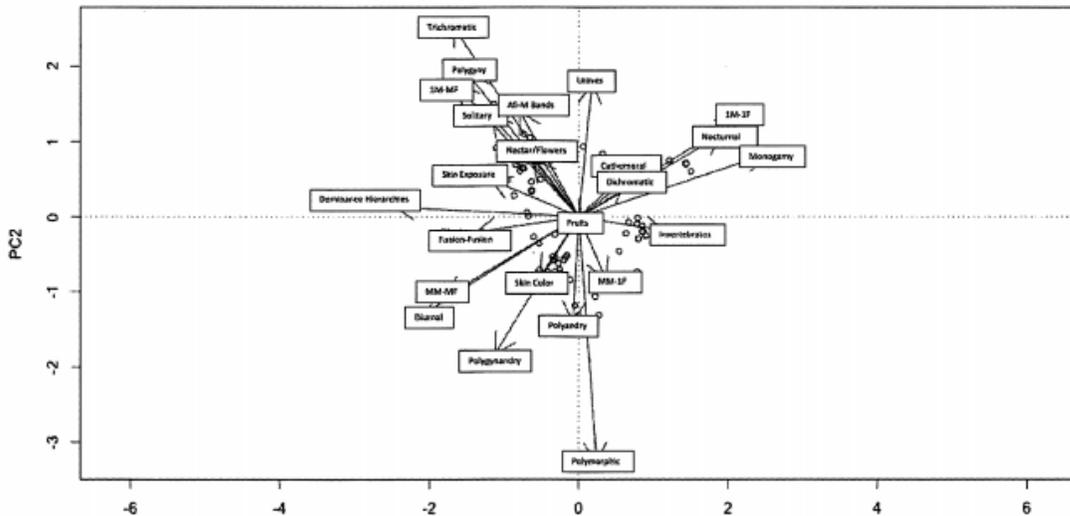


Figure 1. Principal components analysis mapping associations between chromacy, diet, skin exposure, skin color, mating system, social system, presence of dominance hierarchies, and activity pattern for 106 primate species. Closely grouped variables along a linear axis in the same direction indicate a positive correlation between the variables (for ex. "monogamy", "nocturnal" and "IM-1F"). If variables are opposite one another along a linear axis, a negative correlation between the variable exist (ex. "Polymorphic" (chromacy) and "Leaves"). Variables at a 90-degree angle to one another are unassociated or have very weak associations (ex. "Dominance Hierarchies" and "Polymorphic". The longer the arrow, the farther out the variable separated when plotted in 3-dimension. Shorter arrows/central placement (ex. "Fruits") indicates ubiquitous association with multiple variables widely separated on the ordination axes.

Discussion

Adaptive Foraging

Increased foraging efficiency between red-green spectra for species whose diet is composed largely of reddish foods would offer support for the selection of routine trichromacy in Catarrhines and Alouatta through directional selection towards adaptive spectral peaks, and maintenance of the Platyrrhine chromatic polymorphism via the heterozygote superiority hypothesis (Fedigan et al. 2014). Here, as expected by the adaptive foraging hypothesis, a highly folivorous diet was found to significantly positively correlate with trichromatic vision (Table 1), presumably because red-green differentiation aids trichromats in foraging by improving their ability and efficiency at locating young, red-pigmented leaves which provide more energy and nutrients than older leaves (Jacobs et al. 2011; Melin et al. 2017b; Lucas et al. 2003; Regan et al. 2001). Mirroring these results, a number of previous studies have reported greater fruit foraging efficiency (Smith et al. 2003), fruit intake rates (Melin et al. 2017a), and greater accuracy in ripe fruit selection of trichromatic Platyrrhines compared to their dichromatic counterparts (Melin et al. 2013). Hogen et al. (2018) reports a similar trend for conspicuously colored flowers, with trichromatic individuals (Cebus) being found to visit flower patches more frequently than dichromats. However, in opposition to the adaptive foraging hypothesis, no significant correlations were found in this analysis between trichromatic vision and fruit and nectar/flower consumption, both of which are often conspicuously colored in the red/orange/yellow color range.

Few primates would turn down the opportunity to forage on fruits if encountered given their high nutrient and caloric density. Hence, it is possible the insignificant correlation between color vision and the percent composition fruit makes up of the diet could be a relic of the ubiquitous presence of a base level of frugivory in the majority of primates included in this analysis. Figure 1 appears to offer support for this explanation, as the "fruits" category fails to separate within the ordination space. Instead, its central location in the ordination suggests an equal association with other variables grouped along the ordination axes, and thus an insignificant correlation with any individual variables within the sample space.

Furthermore, it is important to note that the "fruit" diet category is fully inclusive of all fruits eaten, with no further breakdown of categories based on important characters impacting their conspicuity - such as fruit color, fruit luminance, and fruit size. For example, there may be a fruit produced by a given plant species which cryptically ripens, remaining green/brown rather than turning reddish, thus making it less perceptible to trichromats. Couple this trait with heightened fruit luminance, and it would become increasingly more conspicuous to a dichromat and increasingly less to a trichromat. This idea is supported in a study by Hiramatsu et al. (2008) through their finding that luminance contrasts have the greatest effect on the foraging efficiencies of dichromatic vs trichromatic spider monkeys (*Ateles*). Incorporating measures on fruit hue and luminance contrast, along with having a larger sample size, would increase statistical power and would help provide the material required to tease apart the characteristics which may account for this variation.

Variation in ability between dichromatic and trichromatic individuals in detecting food sources in a given area offers support for a few of the hypotheses proposed to maintain chromatic

polymorphism in Platyrrhines (review in Fedigan et al. 2014). For example, if different genotypes, and thus phenotypes, are better suited to detect different foods, niche differentiation may be encouraged through differential foraging behaviors between phenotypes, thereby decreasing competition and increasing carrying capacity. Similarly, stabilizing selection may maintain the polymorphism as a result of frequency-dependent selection, during which the foraging success of a phenotype depends on its relative abundance in the population. For example, being a dichromat in a group of trichromats would provide an adaptive advantage to finding cryptic fruit due to relaxed intra-group competition. But, if the entire population were to be dichromatic and could equally see the cryptic fruit, competition for it would be expected to increase, thus decreasing the adaptive advantage at high abundance. An additional mechanism of balancing selection which may be actively selecting for patterns in chromacy within Platyrrhines is the idea of mutual benefit of association (Jacobs 2019; Melin et al. 2017a; Fedigan et al. 2014). This is the idea that dichromats and trichromats in a population would mutually benefit one another through social foraging, where for example, one individual's detection of a fruit tree leads the whole group there to benefit.

Environmental variables such as light levels and habitat structure, through variance in forest density and canopy cover for instance, may further exert pressure on chromacy through effects on luminance. For example, Melin et al. (2013) and Vorobyev (2004) suggest that luminance may be more important in forests with patchy, variable lighting. Since there is evidence that variation in luminance may substantially impact visual detection of contours and spatial depth (Hiramatsu et al. 2008), a dimly lit forest with a dense canopy and patchy lighting may indeed be expected to drive the co-evolution of fruit luminance for heightened conspicuity to dichromatic seed dispersers while maintaining selection on dichromacy to detect these differences. This may be what happened with *Eulemur rubriventer*, one of the aforementioned Strepsirrhines which had re-evolved dichromacy from a polymorphic ancestor. Similar to Hiramatsu et al. (2008), Jacobs et al. 2019, found high luminance contrasts and more cryptic coloration of the fruits found in the forests of Madagascar in which *E. rubriventer* lives, thus increasing selection for dichromacy and potentially explaining the re-derivation of the dichromatic state.

Although not significant, it was found that dichromatic vision is positively associated with an invertebrate heavy diet (insects, arthropods, spiders; Table 1), as would be expected by the adaptive foraging hypothesis. This idea is supported by previous evidence that dichromats are more efficient at gleaning insects than trichromats (in *Cebus*), likely due to a superior ability in vision to break camouflage and detect invertebrate contours against substrates (Melin et al. 2017a). A larger sample size may improve statistical power and allow for stronger detection of these associations.

Lastly, it is important to consider in light of the previous discussion that using diet percentage as a proxy for the relative importance of each food for a species as done in this analysis may not be the best indicator of selection for chromacy because hold-over foods during times of year when food abundance is low may have a disproportionately large effect on individual fitness and selection than would be expected by its given abundance or portion of the diet during other times of year.

Activity Patterns

Detection of luminance in low light may act as an important selective pressure for dichromatic vision (Melin et al. 2013). Thus, it would be expected that dichromatic vision would be more common in nocturnal and cathemeral primates, while trichromacy would be more closely associated with a diurnal activity pattern. Analyses here provide support for this concept (Table 1), with dichromatic vision being found to significantly negatively correlate with a diurnal lifestyle, and significantly positively correlate with cathemeral and nocturnal activity patterns. Trichromacy positively correlated with a diurnal activity patterns, however this result was not significant. Overall, activity patterns do not appear to be a reliable predictor of chromacy based on the considerable variation in chromacy observed in diurnal primates.

Social Signaling

In order for skin to provide a canvas on which social signaling information can be displayed through red modulations in skin color, two conditions must first be met: 1) there must be exposed skin; and 2) species must have trichromatic vision to detect changes in red coloration. Given these conditions are met, it is predicted that skin color modulations may reveal information on female reproductive cycling, emotional state, health, and dominance (Rigaill et al. 2019; Moreira et al. 2019; Changizi et al 2006; Vorobyev 2004). Thus, in the same vein of thought, it would be expected that factors such as skin color, skin exposure, and trichromatic vision would positively correlate with more complex social contexts such as in the presence dominance hierarchies, MM-MF groups, and polygamous mating systems. This hypothesis is well-supported by the results of this study. Strong positive correlations were found between trichromacy and skin exposure, polygyny, the presence of dominance hierarchies, 1M-MF groups, solitary individuals, and all male bands (Table 2). In these contexts, and specifically in large 1M-MF social groups, one could imagine that having trichromatic vision that aids males in their assertion of dominance, and helps to assess mate quality of females, and gauge female receptivity to maximize chances of siring offspring, would be beneficial due to its direct selection on reproductive fitness. Solitary individuals and individuals in all-male bands would similarly be trying to maximize reproductive success. Thus, being able to know when solitary females or females in other groups are fertile may similarly be select for in all-male bands and for solitary males as a means of timing courtship advances or sneak copulations. As expected by the social signaling hypothesis, negative correlations between trichromatic vision and monogamy were found. When monogamous, reproductive success is more assured for the individuals involved, thus receiving social information through modulations in skin color would not be expected to be under strong evolutionary selection. Interestingly, polyandry was significantly negatively associated with trichromatic vision. Future studies should be aimed at further teasing apart whether the social information being shared through skin modulations of these species are more closely linked to dominance hierarchies and indicative of rank status, or to female reproductive status. Changizi et al. (2006) confirms the observed pattern that many trichromatic primate species tend to have bare faces, likely to perceive these signals. In addition, evidence on spectral peak sensitivity has placed the optimal wavelength for primates to detect red modulations in skin color via blood oxygen saturation at 550-nm, seemingly perfectly centered at the trichromatic maxima of 535-562-nm (Osorio et al. 2004), Dichromatic individuals would not be able to perceive this saturation (Osorio et al. 2004). Taken together, this is strong evidence

that social evolutionary pressures have spectrally tuned photoreceptors for trichromatic vision (Hiramatsu et al. 2017), thus suggesting strong selection for its function in socio-sexual communication and offering strong support for the evolution of trichromacy being linked to the social signaling hypothesis. Anecdotal evidence from the literature supports that red modulations in skin color have been linked in behavioral studies to sexual solicitations, social rank, assessment of dominance, competitive ability, willingness to engage in fights, multimale social systems, and quantitatively assessed male androgen status (See full review in Moreira et al. 2019). Interestingly, beyond color alone, Rigai et al. (2019) found that skin color (face and hindquarters) in Japanese Macaques did not closely track female fertility phase. However, luminance values in the same skin patches did reveal differences between pre- and post-ovulatory time frames. Furthermore, Rigai et al. (2019) found that hindquarters tended to be redder in non-conceptive females, and that higher-ranking females tended to have darker hindquarters. In contrast, other species of Catarrhines may develop reddening of sexual skin around ovulation, as well documented in the chimpanzees (*Pan*), further offering support that skin color modulations and trichromacy are linked to social signaling (Vorobyev 2004).

In line with this theory, results from this analysis find that monochromatic and dichromatic vision are strongly negatively correlated with skin exposure, meaning that they have more fur covering their faces. Without skin exposure, any social signals conveyed through skin color modulations would not be perceived, and therefore should not be selected for and should not be closely associated with the complex group structures characteristic of trichromatic Catarrhines. In support of this theory, monochromacy was found to strongly positively correlate with monogamy and 1M-1F groups, and strongly negatively correlated with polygyny, dominance hierarchies, 1M MF groups, and MM-MF groups. Dichromatic vision did not significantly correlate with any of these social factors, possibly due to small sample size (Table 2).

It was found that there is a negative correlation between polymorphic chromacy and skin exposure, similarly, indicating that they have more fur around their faces. Given that the Platyrrhines vary extensively in this trait - from close to zero skin exposure (ex. *Saguinus mystax*) to entirely exposed faces and heads (ex. *Cacajao calvus*; Moreira et al. 2019)- the extensive variation and mix of correlations for this group may be expected, specifically since social signaling via modulations in skin color would only be socially relevant for the few species which have the phenotypic skin patches to display red saturation (see Table 2 for correlations). Moreira et al. (2019) reports that skin exposure seems to be an evolutionary plastic trait which is frequently gained and lost in evolutionary lines, specifically in Platyrrhines. Therefore, although social signaling may be actively occurring in the few bare-faced polymorphic chromats on a case-by-case basis, evidence suggests that overarching factors other than social signaling would better explain the extensive variation of skin exposure in Platyrrhines. A review of the literature suggests that balancing selection and heterozygote advantage hypotheses may better support the maintenance of polymorphic chromacy in these species (see full review in Fedigan et al. 2014).

Insignificant correlations were found in this analysis between skin color and all vision types (Table 2), likely because the categories created for this variable (hypervascularated, unpigmented, mottled, hyperpigmented) function as proxies to indicate how well modulations in

skin color could be detected (for example, a red flush in hyperpigmented skin would not be as conspicuous as a red flush in unpigmented skin), but do not themselves directly reflect modulations in red saturation.

It is important to note that categorizations of skin exposure in this analysis only included facial skin based on data availability. Future studies should consider skin luminance and skin exposure of the chest, hindquarters, and anogenital region to further assess evidence for the social signaling hypothesis (Moreira et al. 2019). It is important too to note that while significant correlations may suggest a role in social signaling, changes in color could alternatively be consequences of physiology and may not be involved in the signaling and receiving of social information (Changizi et al. 2006).

Conclusion

The two leading hypotheses proposed to explain patterns in chromatic color vision across the primate clade include the foraging advantage hypothesis and the social signaling hypothesis. Under the foraging advantage hypothesis, trichromatic individuals would be expected to better detect conspicuous reddish fruits and young leaves in the red-green color channel, meanwhile dichromatic individuals would be expected to better detect cryptically colored fruit based on luminance in the blue-yellow color channel and be more efficient in foraging for invertebrates through their heightened ability to break camouflage. This may lead to cases of balancing selection and heterozygote superiority amongst species with polymorphic color vision. Results of this meta-analysis offer some support for the adaptive foraging hypothesis through trichromatic advantage in foraging for young leaves. Other dietary correlations were found to be insignificant, however a review of literature provides support of this hypothesis when context-specific information on environment and luminance are considered. Under the social signaling hypothesis, trichromatic vision would be expected to allow for the detection of modulations in skin color due to differences in blood oxygen concentrations which create red saturation, which may reveal information on dominance, fertility, emotion, and health. Results of this meta-analysis provide strong support for the social signaling hypothesis in trichromatic primates. Future studies should focus on further examining interactions and co-variance between explanatory variables of each hypothesis, with the aim being to investigate whether evidence supports the idea of chromatic vision being an exaptation, or a trait that has been co-opted for another function different than that it was initially selected for.

Supplementary Materials

Table A. List of species including in data analyses, organized by order, sub-family, and genus (n=106 species total).

Genus	Sub-family	Parvorder/Order	Species ID
<i>Allenopithecus</i>	Cercopitheciinae	Catarrhini	<i>A. nigroviridis</i>
<i>Cercocebus</i>	Cercopitheciinae	Catarrhini	<i>C. chrysogaster</i>
<i>Cercopithecus</i>	Cercopitheciinae	Catarrhini	<i>C. diana</i>
<i>Chlorocebus</i>	Cercopitheciinae	Catarrhini	<i>C. pygerythrus</i>
<i>Erythrocebus</i>	Cercopitheciinae	Catarrhini	<i>E. patas</i>
<i>Lophocebus</i>	Cercopitheciinae	Catarrhini	<i>L. albigena</i>
<i>Mococa</i>	Cercopitheciinae	Catarrhini	<i>M. mulatta</i>
<i>Mandrillus</i>	Cercopitheciinae	Catarrhini	<i>M. sphinx</i>
<i>Miopithecus</i>	Cercopitheciinae	Catarrhini	<i>M. talapoin</i>
<i>Papio</i>	Cercopitheciinae	Catarrhini	<i>P. papio</i>
<i>Rungwecebus</i>	Cercopitheciinae	Catarrhini	<i>R. kipunji</i>
<i>Theropithecus</i>	Cercopitheciinae	Catarrhini	<i>T. gelada</i>
<i>Colobus</i>	Colobinae	Catarrhini	<i>C. guereza</i>
<i>Nasalis</i>	Colobinae	Catarrhini	<i>N. larvatus</i>
<i>Ptilocolobus</i>	Colobinae	Catarrhini	<i>P. rufomitratus</i>
<i>Presbytis</i>	Colobinae	Catarrhini	<i>P. potenziani</i>
<i>Procolobus</i>	Colobinae	Catarrhini	<i>P. verus</i>
<i>Pygathrix</i>	Colobinae	Catarrhini	<i>P. nigripes</i>
<i>Rhinopithecus</i>	Colobinae	Catarrhini	<i>R. bieti</i>
<i>Semnopithecus</i>	Colobinae	Catarrhini	<i>S. entellus</i>
<i>Simias</i>	Colobinae	Catarrhini	<i>S. concolor</i>
<i>Gorilla</i>	Homininae	Catarrhini	<i>G. gorilla</i>
<i>Pan</i>	Homininae	Catarrhini	<i>P. troglodytes</i>
<i>Hooleck</i>	Hylobatidae	Catarrhini	<i>H. hooleck</i>
<i>Hylobates</i>	Hylobatidae	Catarrhini	<i>H. pileatus</i>
<i>Nomascus</i>	Hylobatidae	Catarrhini	<i>N. leucogenys</i>
<i>Symphalangus</i>	Hylobatidae	Catarrhini	<i>S. syndactylus</i>
<i>Pongo</i>	Ponginae	Catarrhini	<i>P. abelii</i>
<i>Alouatta</i>	Alouattinae	Platyrrhini	<i>A. belzebul</i> , <i>A. caraya</i> , <i>A. guariba</i> , <i>A. macconnelli</i> , <i>A. palliata</i> , <i>A. pigra</i> , <i>A. sensiculus</i>
<i>Aotus</i>	Aotinae	Platyrrhini	<i>A. azarae</i> , <i>A. griseimembra</i> , <i>A. infuatus</i> , <i>A. lemurinus</i> , <i>A. nancymaae</i> , <i>A. nigricaps</i> , <i>A. trivirgatus</i> , <i>A. vociferans</i>
<i>Ateles</i>	Atelinae	Platyrrhini	<i>A. belzebuth</i> , <i>A. chamek</i> , <i>A. geoffroyi</i> , <i>A. hybridus</i> , <i>A. marginatus</i> , <i>A. paniscus</i> <i>A. fusciceps</i>
<i>Brachyteles</i>	Atelinae	Platyrrhini	<i>B. arachnoides</i> , <i>B. hypoxanthus</i>
<i>Lagothrix</i>	Atelinae	Platyrrhini	<i>L. lagothricha</i>
<i>Callitchebus</i>	Callitchebinae	Platyrrhini	<i>C. colmbrai</i> , <i>C. cupreus</i> , <i>C. donacophilus</i> , <i>C. hoffmannsi</i> , <i>C. lugens</i> , <i>C. moloch</i> , <i>C. nigritrans</i> , <i>C. personatus</i> , <i>C. torquatus</i>
<i>Callimico</i>	Callitrichinae	Platyrrhini	<i>C. goeldii</i>
<i>Callithrix</i>	Callitrichinae	Platyrrhini	<i>C. aurita</i> , <i>C. geoffroyi</i> , <i>C. jacchus</i> , <i>C. kuhlii</i> , <i>C. penicillata</i>
<i>Sagulnus</i>	Callitrichinae	Platyrrhini	<i>S. bicolor</i> , <i>S. geoffroyi</i> , <i>S. imperator</i> , <i>S. labiatus</i> , <i>S. leucopus</i> , <i>S. midas</i> , <i>S. mystax</i> , <i>S. niger</i> , <i>S. nigricollis</i> , <i>S. oedipus</i> , <i>S. tripartitus</i>
<i>Cebus</i>	Cebinae	Platyrrhini	<i>C. albifrons</i> , <i>C. capucinus</i> , <i>C. kaapor</i> , <i>C. olivaceus</i>
<i>Sapajus</i>	Cebinae	Platyrrhini	<i>S. apella</i> , <i>S. libidinosus</i> , <i>S. robustus</i> , <i>S. xanthosternus</i>
<i>Cacajao</i>	Pitheciinae	Platyrrhini	<i>C. calvus</i> , <i>C. hosomi</i> , <i>C. melanocephalus</i>
<i>Chiropates</i>	Pitheciinae	Platyrrhini	<i>C. albinasus</i> , <i>C. chiropates</i> , <i>C. utahicki</i>
<i>Pithecia</i>	Pitheciinae	Platyrrhini	<i>P. irrorata</i> , <i>P. monachus</i> , <i>P. pithecia</i>
<i>Saimiri</i>	Saimiriinae	Platyrrhini	<i>S. oerstedii</i> , <i>S. sclureus</i>
<i>Microcebus</i>	Cheirogaleidae	Strepsirrhini	<i>M. rufus</i>
<i>Daubentonia</i>	Daubentonidae	Strepsirrhini	<i>D. madagascariensis</i>
<i>Galago</i>	Galagidae	Strepsirrhini	<i>G. gallarum</i>
<i>Propithecus</i>	Indridae	Strepsirrhini	<i>P. coquereli</i> , <i>P. perrieri</i>
<i>Eulemur</i>	Leumuroidea	Strepsirrhini	<i>E. rufus</i>
<i>Loris</i>	Loridae	Strepsirrhini	<i>L. lydekkerianus</i>
<i>Tarsius</i>	Tarsiidae	Tarsiiformes	<i>T. dentatus</i>

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Book Review: The Bioarcheology of Dissection and Autopsy in the United States, Kenneth C. Nystrom

Key Words: Heath, Race, Personhood, Postmortem Examination, Medical, Socioeconomic

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In *The Bioarcheology of Dissection and Autopsy in the United States*, Kenneth C. Nystrom has compiled a range of articles that track the development of dissection and autopsy in the medical profession in the United States, as well as examine how these activities interact with race and socioeconomic status. Many of these articles use skeletal remains to draw sociocultural inferences with regards to status and personhood. Recurring themes throughout the volume include the changing perception of personhood as it pertains to the body, social marginalization, structural inequalities, and the changing practices in medicine throughout the development of the country's history. In the book's introduction, Nystrom emphasizes the importance of recognizing the different social implications related to autopsy and dissection. Autopsies usually indicate that the individual was important enough to have their death investigated. They could also be indicators of a disease outbreak. Dissections, on the other hand, were a way to dishonor the individual being dissected. The rest of the book is divided into sections that are organized by the chronology and geography of the cases, focusing almost exclusively on cases of dissection (rather than autopsy).

The first section of the book concentrates on early case studies from Colonial era North America. In Chapter 2, Crist and Sorg describe the oldest skeletal evidence of autopsy in America, dating between 1604-1605. These were conducted to diagnose a mysterious disease, later determined to be scurvy, plaguing the New France colony on Saint Croix Island. The authors provide a description of postmortem examination through cultural and philosophical lenses, concluding that social status and religion likely were not factors in who got autopsied. In Chapter 3, Bruwelheid and colleagues investigated human remains from Colonial Jamestown that were disposed of along with medical equipment. This treatment suggests that they were part of a collection owned by surgeons, and that the deceased individuals likely belonged to a low status class, probably criminals. In the fourth chapter, Chapman and Kostro describe evidence of postmortem examinations on bones excavated from a coffeehouse in Colonial era Williamsburg. Coffeehouses were social spaces, and their analysis suggests that coffeehouses may also have been used for medical training.

The second section of the book contains one chapter, which focuses on case studies from skeletons excavated in public cemeteries. In Chapter 5, Novak constructs a biographical history of individuals in the Spring Street Presbyterian Church cemetery in Manhattan who showed evidence of postmortem examination. She discusses their examinations through the lens of personhood.

The third section of the book focuses on case studies taken from medical institutions. In the sixth chapter, Hodge and colleagues investigate the skeletons in Holden Chapel at Harvard University where medical classes were held, placing the postmortem examinations in the historical context of the development of the medical profession in the United States. In the seventh chapter, Owsley and colleagues present an analysis of the 19th century dissected remains that were dumped in a well in Richmond, Virginia. They discovered that the majority of the remains belonged to individuals of African or African American descent, suggesting that free and enslaved African Americans were especially vulnerable to the practices of grave robbing and dissection. In Chapter 8, Halling and Seidemann contextualize the postmortem examinations late 19th-early 20th century bodies excavated from the Charity Hospital cemeteries of New Orleans in terms of socioeconomic status, arguing that dissection was a form of structural violence. In Chapter 9, Muller and colleagues provide a historical context of the Robert J. Terry Anatomical collection, which is comprised of socially marginalized individuals, providing a historical sample of socially marginalized individuals who were at risk of systemic violence.

The fourth section of the book focuses on skeletal case studies from almshouse cemeteries. In Chapter 10, Dougherty and Sullivan document the most common postmortem examination procedures done on late 19th century bodies of socially marginalized individuals in the Milwaukee County Institutional Grounds. In Chapter 11, Richards and colleagues distinguished between dissection and autopsies in the Milwaukee County Poor Farm of 19th century Wisconsin, placing emphasis on the marginalized status of people living in Almshouses. In Chapter 12, Crist and colleagues describe the Blockly Almshouse in mid-late 19th century Philadelphia in the context of the growing medical field. The marginalized people in this almshouse were buried, granting them more respect than the dissected bodies that were discarded as trash. In Chapter 13, Nystrom and colleagues discuss the structural violence implicit in the dissection of bodies from the Erie County Poorhouse in Buffalo, New York. They argue that certain marginalized groups in the nineteenth century were at heightened risk of violence by dissection. In Chapter 14, Grauer and colleagues demonstrate how the dissections done on bodies from the Cook County Poor Farm and Insane Asylum in Illinois serve to highlight the prejudice against the poor in the nineteenth century. In Chapter 15, Lowe analyzes evidence of postmortem examination conducted on bodies that were excavated from the Albany County Almshouse Cemetery in New York.

In the concluding chapter, Nystrom provides a synthesis of the evidence for postmortem examinations found on remains that were excavated from public cemeteries. He discusses factors such as race and personhood that may have factored into the postmortem treatment of the bodies.

The Bioarcheology of Dissection and Autopsy in the United States is organized in a clear and predictable way. Nystrom does a great job synthesizing and interpreting the information presented in each of the articles. He provides historical contexts to the claims being made about the cultural implications of dissection and autopsy, and he does so in language that is easy for a lay person to understand. This book is good for undergraduates and non-specialists.

Over Home: Rural African American Heritage at Lyles Station Consolidated School Museum

Key Words: Community, Documentation, Identity, Indiana, Slavery

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In the late 19th century, over twenty African American farming communities existed in the state of Indiana. They were populated by formerly enslaved people and free persons of color who, post-Civil War, were looking to establish a sense of identity and place in a nation that offered both opportunity and hostility. These enclaves fostered the ideals of collective progress and rightful independence amongst inhabitants. They also provided safe havens from a world that engaged in constantly evolving tactics to subdue and oppress any effort made by these refugees of the state to reclaim their humanity. These communities operated in an incubatory manner, which contributed to the building of a cooperative, self-sustaining way of living.

Today, only one of these communities remains: Lyles Station, located in Patoka township, Gibson county, in Southwestern Indiana. With a settlement history that extends back to 1814, this location is emblematic of the enduring tradition of African American farming practice and culture (Figure 1). The community, as it is currently known, began with the donation of 6,000 acres of land by the wealthy African American farmer, Joshua Lyles. This allotment was offered as an invitation to the Southern rail line's installation of track through the community. The presence of the railroad offered many benefits, including expanded commercial enterprise and increased mobility. During this golden period, which ranged from the mid-1870s to the early 20th century, Lyles Station flourished.



Figure 1: Fields on the way to Black Bridge, Lyles Station, Indiana. 7/30/2018 (Sacha Jackson).

The 20th century heralded discouraging changes for Lyles Station and its denizens. Repeated catastrophic flooding and the allure of fruitful external opportunities had a deleterious effect. In the ensuing years, a gradual exodus took place, with the younger generations relocating to different locales across the nation. Yet, there were still those who chose to stay and work the land. These two paths never truly diverged, as those who left returned with the rhythms of the seasons to renew themselves in the midst of their people and their place.

There is now little left of the Lyles Station of the booming rail days. Hidden amongst the verdant scenery are crumbling foundations and empty spaces that once hummed with industry. At the nexus of this unincorporated township stands the last two sentinels of the house that Joshua Lyles built. On the corner of the road, noted as North 500 West, stands the Wayman AME Chapel (Figure 2). Its worn, white slats have seen better days and more people. It sits diagonally from a massive, looming silo, the noise of which reverberates through the lightly populated countryside. There is a spectral quality to this house of worship, something that hints at the ephemeral nature of both it and its viewer.



Figure 2: Face of Wayman Chapel A.M.E. Church, Lyles Station, Ind. 6/17/2018 (Sacha Jackson).

Adjacent to this quiet timekeeper is a vibrant two-story wood and brick building that keeps watch over ranch houses and patiently growing crops from its hillside perch (Figure 3). The Lyles Station Consolidated School and Museum is a beacon. Built between 1919 and 1922, this edifice operated as a school for the children of Lyles Station, with education beginning at kindergarten and extending to the 8th grade. Its doors closed in 1958 due to a dwindling population and the implementation of integrated schools. It lay fallow for several decades until, in 1997, a group of community descendants purchased the property. The building was in a state of near collapse when it was acquired. The purchasing collective, what is now known as the Lyles Station Historic Preservation Corporation, was intent on saving the structure and turning it into a place where the community's history would live on. Through grassroots fundraising and the financial intercession of Representative Julia Carson of Indiana's Seventh district, restoration was achieved in 2001 at a cost in excess of \$1,000,000.

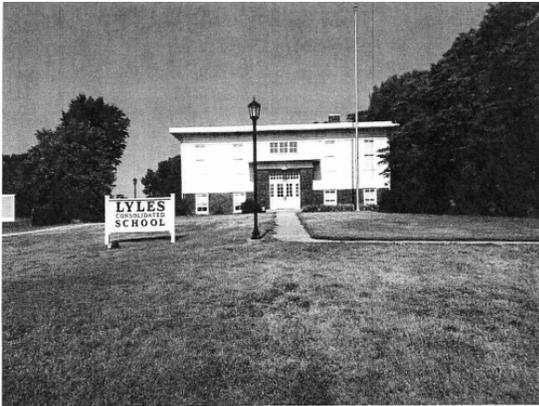


Figure 3: Lyles Station Consolidated School and Museum, Lyles Station, Ind. 6/17/2018 (Sacha Jackson).

In the mid-2010s, the site garnered the attention of the Smithsonian Institution. As a product of the Smithsonian's intensive involvement in exploration and cataloguing of their legacy, Lyles Station was included in the Power of Place Exhibition in the National Museum of African American Heritage and Culture (Interview with Stanley Madison, July 17, 2018). There is a powerful draw to this heritage site and to the stories of the African American farmers who have laid claim to this area (Figure 4). When considering the site and the surrounding community, it behooves the observer to recognize that Lyles Station is not a static place frozen in time, but a living entity that still survives under the communal concepts on which it was founded. The goal of this study is to illustrate the significance of the Lyles Station Consolidated School and Museum, as well as the township for which it is named, through the eyes of historic community members and descendants. Lyles Station is more than a heritage site, it is embodiment of the concepts of pride, farming, family and home that are the bedrock of this historic African American community.



Figure 4: Lyles at Harvest, Lyles Station, Ind. 6/17/2018 (Lyles Station Consolidated School and Museum).

The circumstances under which this locale was founded is colored by post-Civil War attitudes and practices. For African Americans, the reconstruction period yielded much less societal reconciliation than was hoped. Existing in a postcolonial limbo, the inhabitants of Lyles Station were forced to initiate a new way of life filled with insecurity and risk. Ghandi (2019) notes that the initial experience of the release of the yoke of colonial oppression is one of rebirth

and a renewed sense of personhood. The liberated attempt to fully embrace their new independence, one filled with a creative sense of personal redefinition (Ghandi 2019). Yet, there is a danger lurking in the victorious celebration of this newfound freedom, manifesting in the sublimated realms of unprocessed trauma that ties the formerly oppressed to the oppressor (Ghandi 2019). There is need for a sort of catharsis, a processing of these wounds that permits the persons of "other" status to reconcile a past that lacks continuity, which, in turn, gives the injured a chance to move forward with full comprehension of the condition in which they find themselves (Ghandi 2019). Homi Bhabha (as cited in Ghandi 2019) remarks that the act of remembering is dynamic -- fractured history coalesces for comprehension of the now. To discuss the nature of distinction between cultures, revision must be made to the relational state into which nascent narratives can be born (Bhabha 1994).

As a people without a land, the ancestral settlers of Lyles Station arrived with the intent of building one. From chattel slavery and forced dislocation, they established themselves in a new territory and forged a new identity. For over one hundred years, descendants have noted their bond to this location with none living able to remember a time before the "home place" existed. As a "rootless" people, this association with origin has lent itself to a form of quasi indigeneity for the descendants of Lyles Station. Harrison (2013) states that indigenous status is to be seen under a contextual perception. While the community of Lyles Station acknowledges that they are not the first inhabitants of the land, its status as a place of genesis resides deep in the subconscious of each descendant.

Planted as deep as the encompassing crops, the roots of the farming culture of Lyles Station snake back towards Africa. Bande (2007) notes the intense linkage between agriculture and the current and diaspora offspring of the mother continent. This long and proud tradition is not viewed the same with American eyes. Slavery and sharecropping are the most immediate reference points when addressing agriculture as it relates to African Americans. However, this consideration of forced labor as being the only African American contribution made to the growth and advancement of American farming and its practices is a great disservice (Bande 2013). This perception discounts the agricultural advancements made by not only noted innovators, such as George Washington Carver, but also those anonymous individuals who translated generational knowledge into yields for themselves and the farming industry.

This dearth of recognition concerning farming is symptomatic of a lack of African American representation within American consciousness. It is, of course, impossible to separate the American experience from African American history, as it underlines the majority view from the subaltern perspective (Ruffins 1992). It is with a calculated intent that the American master narrative proceeds, favoring a biased mythology in celebration of the achievements of one subset of the population at the price of another's violent suppression. To combat this myopic view, the African American cultural contribution must be recognized. This acknowledgement will assist in the reconfiguration of the American identity and redress the imbalance that beleaguers the relationship between majority culture and minority truths (Ruffin 2007). By complicating the narrative, the pervasive presence of European American cultural domination is thinned by the heavy interwoven undercurrent of African American influence (Fishkin 1995).

As location and identity are intimately linked, it is necessary to consider where Lyles Station is, or more accurately, is not. With fewer than 700 people living in the immediate community, there is a sense of removal from the outside world. The pace is meandering, a crawl that responds only to the needs of nature. Ching and Creed (1997) remind us that in these forgotten places exclusion occurs. Rural America is simultaneously romanticized and overlooked in a society that writes love songs to a fading way of life. In a country that has its beginnings linked to the concept of being a man apart in wide open spaces, rurality has become a monolith, a historical remnant out of place in a modern world (Ching and Creed 1997). This enforced ossification functions as a quarantine, leaving residents in a marginalized space. This leads to a retaliatory empowerment of rural peoples, who fight to retain their relevance.

The Lyles Station Consolidated School and Museum lies at the intersection of the racial, locational and historical factors that contributed to the founding and decline of this community. As a heritage site, it presents a narrative that deviates from canon to provide a link to a cultural inheritance that decries the erasure of its marginalized subjects and demands the recognition of their place collective American experience (Johnson 2015).

Methods

This study was conducted in the summer of 2018. Primary data collection was executed via interviews in two locations: Lyles Station, Indiana and Edwardsville, Illinois. The participants were three African American males, who were historic community members or descendants thereof, aged 87, 68 and 25-years-old. The interviews conducted were of a semi structured format, initiated by an interview guide with a range of questions as prescribed by H. Russell Bernard (2006). This method of interview was ideal to the situation, as due to the financial and time constraints of this project, there were no options for a viable follow up or repeated interviews.

All recorded interview data was transcribed verbatim. The raw data harvested was then assessed and refined using inductive and deductive coding. After which, the coded data was analyzed via thematic analysis. A coding table, containing time stamps, assigned code and category, and exemplar quotes, facilitated the process of uncovering the dominant themes within the data.

As this inquiry involved human subjects, all IRB protocols were implemented and followed. With the researcher being of undergraduate status, all data collection methods and other related research concerns were performed under the advisement of a faculty mentor. Each participant was notified of the intent of this project and was given consent forms, which were signed, dated and now stored in a secure location. All interviews were digitally recorded, and all recordings remain securely stored.

Participant observation was enacted during the course of this project, taking the form of a guided tour through the more remote regions of the community of Lyles Station. With the goal being complete immersion in the situation (Pelto and Pelto 1970), the destinations on this exploration were left up to the discretion of the native guide, who provided valuable information about previously unknown sites of interest, deceased community members and descriptions of how life worked in the community. Unstructured or informal interviews, an extension of

gathering of native experiential data, were used in the course of this study. This practice establishes trust and gives insight and access into the dynamics of participants' lives prior to formal interview (Bernard 2006).

Visual data was collected via smartphone. Ball and Smith (1992) and Stanczak (2007) state that the descriptive nature of ethnography demands the visual reinforcement of photography. 196 photos of people, locations and artifacts were taken over a series of three visits. Throughout the project's duration, field notes were taken to highlight and reinforce ideas and experiences. Wolfinger (2002) highlights the importance of field notes during analysis of seminal moments during the field work process.

Their Place. Our Place. The Home Place

One of the dominant themes within the data is pride. In discussing the theme of pride, there exists, for the community that remains, a sense of powerful connection with the past and the people who built Lyles Station for the community that remains. These two planes of existence seem to exist simultaneously for descended community members, as the latter pulls motivation and inspiration from the former. The historic generativity and self-reliance functions as a wellspring of power and hope. A romantic ferocity envelops past industry and is evidenced in descendants' attitudes. Community is paramount, and it is adept and capable. Introducing

Stanley Madison (Figure 5):

Because we became so independent in this 3-mile radius that we had no reason to go Outside not to Princeton, not to Mt. Carmel – to buy anything. We raised it all. We built it all. We developed it all. Right here. Home base. (Interview with Stanley Madison, 07/17/2018)



Figure 5: Stanley Madison, Lyles Station, Ind. 7/17/2018 (Sacha Jackson).

This prideful self-sufficiency, which is foundational for the descendants of Lyles Station, came from a knowledge that they were effectively on their own. External assistance would be

slow coming, if it came at all. Racist preconceptions concerning the nature of the African American work ethic disadvantaged them socially and economically. Shoulders were kept to the wheel. Half measures would not suffice for those with the deck stacked against them.

Our parents and grandparents instilled in our head that you're not going to get by sitting down like the other person. You've got to do a little more.... I had to prove myself, because [White people] wanted me to fail. Wanted me to take and go down to the McDonalds and go to work. 'Cause that's where we're supposed to be all the time. (Interview with Stanley Madison, 07/17/2018)

This “one-inch further” mentality is widespread in the African American community. Systemic oppression has forced their hands, demanding exemplary performance for meager rewards. The notion of a meritocratic evaluation, of work bringing worth and equity, is a long travelled road lined with poisoned hopes. It is a sick sort of irony that those now labeled feckless were, far too recently, worked to death. There is a dark humor in this knowledge, an ever-present undercurrent in the African American psyche.

This thread of pride is woven through concepts of legacy and ensuing loss. Lyles Station is filled with the phantoms of better days. For those initiated, each yawning, dusty lane holds the shadow of how things were and the people who made them possible. It is a wound that seeks salve and exposure. At 25 years old, community descendant and new site volunteer DeAnthony Jamerson (Figure 6), in trying to reconcile progress with fading memory, approaches Lyles Station with a tone of mournful reverence: “And that's why I'm like, the time is now. I can't let the ball drop and let these stories basically fade away, like the people of Lyles Station.” (Interview with DeAnthony Jamerson, 7/30/2018)



Figure 6: DeAnthony Jamerson, Lyles Station, Ind. 7/30/2018 (Sacha Jackson).

Those in the last generation born in Lyles Station are in their 80s and 90s. One by one they fall, taking with them echoes of forgotten places and faded faces. They are the last link to the high vibrancy that once filled and defined the community. Residual warmth and powerful memories radiate from them. A bank of embers, they cozy themselves and their recollections to those next in line. Remembrance is a form of reflection, and in that mirror, they find the best of themselves and home.

Another dominant theme is farming. With the working of land being profoundly tied to self-concept within this community, farming functions as an expression of identity and fortitude.

Life for the historic community of Lyles Station was not easy. Many residents were small hold farmers that functioned at a level just above subsistence. They relied on ingenuity and watchful preparation to augment their holdings. Robert Gooch (Figure 7), an 87-year-old historical community member evidenced these striving moments.

Well, yes. Made a livin', you know. Things were hard back there. If you had a dollar, you thought you had somethin'. You raised your meat and vegetables. You canned stuff. Most things you raised and put up in the summertime. And in the wintertime, that's what kept you goin'. (Interview with Robert Gooch, 8/1/2018)



Figure 7: Robert Gooch, Collinsville, 11. 11/11/2016 (Sacha Jackson).

For the people of Lyles Station, farming is more than away to make a living, it is a declaration of value of self and of production. They demand recognition of what has been accomplished and the circumstances that surrounded these victories. They want the public to know that it was and is African American hands that tilled and still till these fields. And as such, the dissemination of this knowledge lies at the foundation of the mission of the Lyles Station Consolidated School and Museum. “The key thing to this whole project here is to educate - our forefathers were just as prominent farmers as everybody else.” (Interview with Stanley Madison, 07/17/2018)

The next powerful theme in the data is family. The theme of family is expansive and inclusive for this small unincorporated community. Family is not just about blood. It pertains to the connections formed from over a century of interdependence of one homestead to the next. This reliance, augmented by marriages and enterprise, created a complex tapestry of relationality. These bonds were bolstered by supportive cooperative behavior between neighbors and kin. People came out to assist each other with harvests, canning and many other associated tasks, as well as lend support in good times and in bad. “If a guy - if a neighbor needs some help, you'd go help ‘em.” (interview with Robert Gooch, 8/01/18)

The final dominant theme is the notion of home. Where food and family are found, one

cannot be far from home. Stanley Madison remarked: "I have been here at Lyles Station for my lifetime. I am 68 years old and been here total time at Lyles Station." (Interview, 6/18/18) This continuity has crystalized the importance of Lyles Station in his perceptions. Yet, those who have transitioned into and out of the community also express a sense of completion and longing related to Lyles Station. Robert Gooch, who spent many years in various places around the world and throughout country, waxed poetic about Lyles Station (Figure 8).

So, it's somethin' we all remember, us older folks that lived down through there. Even when we go back there, it's just home. It'll always be home to us, no matter where we live or where we go. I've been all around the world. Every lick of the way. From the Pacific, all across the Atlantic, back to the Pacific, and back to California. But that's still Home. Always be home. (Interview with Robert Gooch, 8/1/2018)



Figure 8: White river from Black Bridge, Lyles Station, Ind. 7/30/2018 (Sacha Jackson).

Telling Our Story: Challenges in the Heritage Sector

While the heart of Lyles Station beats ferociously, the realities of operation of the Lyles Station Consolidated School and Museum proves to be a task with hard edges that are laden with frustrations. Its link with the Smithsonian has failed to yield anticipated visitor traffic. The wage a daily battle to keep LSCSM up and running. "Our budget is \$59,000 dollars to be able to meet the commitment that we will have the lights on." (Interview with Stanley Madison, 07/17/2018) Their limited funding also extends to the after school and interactive historic classroom programs that serve many schools in the region. Those involved in LSCSM wish to expand the reach and scope of the site but, without the needed funding, grander forms of progress are at a standstill.

Those deeply involved with LSCSM are achingly aware of the need for involvement of knowledgeable new blood to assist in the maintenance and growth of the site. "All of this has grants that are there, but you have to have a staff of people to be able to keep that going on a yearly basis." (Interview with Stanley Madison, 6/18//2018) The irony of needing funding to hire people to search and apply for funding is tart.

But we have to have the finances. And we have to have the commitment from others that are grant writers and are able to mold and shape who we are. And we an't to it on the

sponge dollars that Stan struggles 'round here from day to day, (Interview with Stanley Madison, 07/17/2018)

For this small rural museum, the importance tied to matters of representation are paramount. This representation extends past the stories being told. It involves not only national recognition but, encompasses the status of this site within local and state legislatures and public access that inclusion and promotion from in these bodies provides. There is some confusion as to why there has been a lack of inclusivity for the Lyles Station Consolidated School and Museum, as pertains to matters of not being included as a recognized state historic site (Interview with Stanley Madison, 6/18/2018). This large issue is illustrated in the smaller touches that are vital to places that are off the beaten path.

I don't understand. I've been 20 years at this thing, and we are not recognized in the state of Indiana as a top star site. I don't understand that... We don't have signage on the road. I can't even get cars off the highway because there is no brown sign out here saying historic site. African American historic site -- four and a half miles to the west. (Interview with Stanley Madison, 07/17/2018)

Long years of self-advocacy and grassroots efforts to promote the Lyles Station Consolidated School and Museum have supported the site. However, the situation grows tighter and tighter. The consternation and disappointment with the lack of bolstered support from the state of Indiana weighs heavily on the director and volunteer staff of LSCSM. They have great pride in both who they are and where they are located. Their identity is deeply bound to the state of Indiana and their contribution to it and the United States as a whole.

Despite the current barriers to its progress, the impetus behind the mission of the Lyles Station School and Museum to educate continues to proliferate. However, they know the message behind their mission will not thrive remaining only in its immediate sphere of influence. They seek to expand their solid contacts in post-secondary education to encourage research and collaborative educational ventures.

We have to get the universities on board. {So} that they can come, and they can actually help set up some programs. We can work some very good educational programs through Lyles Station if we get the right parties on board to pull it together. (Interview with Stanley Madison, 6/18/2018)

The Lyles Station Consolidated School and Museum pushes forward, seeking to share the story of African Americans resolutely establishing their own identities, reclaiming their bond to the earth and generating a legacy that persists. In these times of divisive identity politics and fear, the Lyles Station Consolidated School and Museum enlivens the stories of women and men who encountered terror, hardship, and the unknown with their feet proudly planted in the loam.

Interpretation

Viewed through the lens of a postcolonial framework, it is evident that the historical community members and descendants of Lyles Station are still processing the ghosts of a varied and rich history, one which featured both hope and fear. Through the conduit that is the Lyles Station Consolidated School and Museum, they are brought face to face with who they are and whence they came. In light of this introspective retrospection, there is both joy and mourning for an existence that was never easy. There is symbiosis between place and identity that is immutable, which colors the purview of each related party, who, in turn, transfers this innate knowledge into the world. This also emboldens the desire for recognition of the truth that has been inherited. With no room left for supplication, the formerly muted voices of this community demand their contributions be heard and included in local, regional, and national narratives.

Lyles Station can be viewed as a sanctum, a place where both the earth and the ancestral spirit are renewed. Nearly ten generations from conception, it resonates as a place of origin and unity. A synthesis has occurred between this location and its inhabitants. The durability of the land has been absorbed into the culture and the character of community descendants. They planted crops and hopes in Lyles Station, fueling an audacious dream of independence. Lyles Station is where they created something that was entirely theirs. Lyles Station provided a haven to unpack the burdens of the past to focus on healing and intimate connections. Lyles Station is their oasis in the desert. Lyles Station is home.

Conclusion

The Lyles Station Consolidated School and Museum has a resurrection tale that is fit for film, one of those feel-good tissue clutchers that acts as a balm on the American psyche. It has followed a rocky path that reflects the conditions of its community. From teetering on the brink of extinction, the site has inspired a resurgence of interest, hope, and a yearning for collective understanding. In its current incarnation as a cultural lighthouse, it is still pursuing its original purpose - to teach. It instructs visitors about a way of life that has been continuous for over 100 years. It shares the story of faith in self-generation held by a community that chose to forge its own path. It illuminates the story of African Americans who chose a life that taught them how to grow and to give.

Yet, Lyles Station Consolidated School and Museum is more than an instructive storehouse of days past. As one of the last remaining buildings of a time now faded, it gives tangibility to abstract concepts of identity, home and community. In this edifice, one can find reminders of the emergence of a collection of people who operated as a unit. The thought and remembrance of those people still makes the heart ache. Flashes of recognition and connection spark and smolder upon encountering half-remembered silhouettes. This site reminds that there remain names, spoken in the country lanes, that resonate and evoke the strength of family.

Surrounding the Lyles Station Consolidated School are the thousands of acres of farmland on which the community was founded. On this land, one can still find proud brown faces whose knowledge reaches back through time, each long shadow striving to provide for the themselves, their families, and the markets. These are masters of patience - keepers of the long watch over what is left of the birthright of the descendants of this community. They don't balk, they just do. They persist because the land still speaks to them, as it did to their forefathers.

Every turn of the soil raises a cry, calling them back to themselves and their purpose.

They speak the name of Lyles Station loudly down there. When they spell you on the story of the community of Lyles Station, a flame ignites. These members and descendants are self-possessed. The actualized energy that comes from them is refined down to its purest form at the Lyles Station Consolidated School and Museum.

Unlike Robert Frost's suggestion of obligation - Home is the place where, when you have to go there, they have to take you in -- Lyles Station offers a welcome out of inclusion and love. When in Lyles Station, one can sense the anchoring warmth that has endured in the community. Here is where you lay your burdens down. Here is where community members and descendants find peace. Here is home.

The Lyles Station Consolidated School and Museum is animated by all of these sentiments. It is a touchstone, a quietly respirating shrine to the past and future of the people who built it. The Lyles Station Consolidated School and Museum is a community rendered in wood and brick, a safe harbor for culture and care. To tour this building is to walk through the hearts of these rural African Americans and know the sandy soil that runs in their veins.

Interviews

Robert Gooch Recorded via digital audio by Sacha Jackson, August 1, 2018, Edwardsville, IL.
DeAnthony Jamerson Recorded via digital audio by Sacha Jackson, July 30, 2018, Lyles Station, IN.

Stanley Madison Recorded via digital audio by Sacha Jackson, July 17, 2018, Lyles Station, IN.

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Re-Defining “Indigeneity”: Understanding Claims to Indigenous Identity Amongst Native American Student Association Members

Key Words: Ancestry, DNA Test, Genetics, University

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When initially considering where to focus my gaze for a semester-long research project, I found myself drawn to various communities on campus and to student activities and interactions. As a student in several classes with research components, a majority of my time on-campus is spent interacting with an array of different groups that comprise, but are not limited to, focus groups and study groups for my classes, as well as student-member groups for organizations in which I led or took part. Among these, the one I felt most compelled to understand on a deeper level was that of the Native American Student Association. As someone who was interested in gaining a deeper insight into the indigenous community on campus as well as exploring and understanding my own connection to indigeneity, it seemed appropriate for a semester-long research project. Therefore, my research, and this paper, concerns a group of students who were active members of the recently revitalized University of North Texas student organization, the Native American Student Association (NASA) during the Fall 2018 semester. In this particular research project, I ask: how are the members of the Native American Student Association at the University of North Texas, in their attempts to claim or re-appropriate “Indigenesness”, redefining what it means to be or have an indigenous identity?

First, I would like to take a step back to provide some context for the organization as well as my involvement with it to date. I first learned about NASA the summer before the Fall 2018 semester after researching the university's OrgSync website - a database comprised of university student organizations - for multicultural student organizations to become involved in. As a student of anthropology, I was foreseeably intrigued to learn about and understand cultural beliefs, values and lifeways other than my own, which informed my particular search in this database. After a short while sifting through lists of organizations, I came across NASA. Upon further investigation, I learned that the organization had gone “delinquent” as the former officers had all graduated with no new members to take over, therefore, the organization had not renewed with the university's student activities center. This made me curious as to how many students at the university identified as Native American. It initially seemed like it would be a small number if all the former officers had graduated and there were no members remaining to continue on with the organization. According to University of North Texas Fall 2018-19 Fact Book, less than 2% of the students attending the university identified as American Indian/Alaskan Native, making it one of the most marginalized groups of students at the University and one of the most underrepresented considering that the only student organization pertaining to Native Americans was now “delinquent”.

As someone who was still exploring their indigenous roots at the time, I was curious and eager to learn whether there were current students interested in starting the organization back up and connecting with one another. So, I followed an attached link, listed on OrgSync, to their Facebook page to continue my search and reach out. Per the organization's 'About section on their Facebook Group page, written by one of the former members now University alumni, NASA exists "...to foster a sense of community & identity for native students and open a dialogue for everyone" (citation). It was here that I corresponded with a current graduate student every who was just as eager to get the organization back up and running and reach out to others who might be seeking ways to connect with one another. Over the duration of the summer, we continued to discuss what needed to occur to restore the organization and met with prospective members who had expressed interest through the Facebook page as well as through a professor who acted as the organization's advisor.

If one navigated to the organization's Facebook events section at the beginning of the Fall 2018 semester, they would have found that, for that particular semester, the group met every Wednesday at 6 PM on campus in the Language Building. Based on observations of the nine meetings and three events I attended and participated in over the Fall 2018 semester, NASA consisted of six recurring group members aside from myself. In the first Facebook meeting announcement, members commented that they planned to utilize their meeting time to "discuss and plan upcoming events" and to host "cultural discussions" regarding events within the Indigenous community, as well as to catch up with one another. During that first meeting, I learned that the active members come from various indigenous backgrounds spanning North America (United States and Mexico). One student introduced themselves as Blue Clan Cherokee from the Cherokee Nation of Oklahoma, another as a descendant of the Eastern Band of Cherokee. Continuing, the others introduced themselves as either Sioux, Métis, Chickasaw and Diné (Navajo) and provided some brief history about their tribes, clans, and/or bands. This introduction practice, introducing yourself and your tribe/clan/band, was continued during each meeting any time a new member attended or if we had a guest in attendance. From the initial meeting, I learned that it is considered impolite to just ask someone if they are Native American or assume their tribe. Instead, it is considered polite to ask what tribe they are from and introduce yourself accordingly if it applies.

While I did assist in activating the organization again and getting it in good standing with the university, I did not acquire an officer position and instead maintained a member status or assume their tribe.

While spending time with those six members who frequented the meetings each week and who would agree to become my research participants, there occurred many conversations surrounding important topics within the "indigenous community." Of the various topics discussed at our meetings, few continued to arise more often than the claiming of indigenous identity. Indeed, indigeneity revealed itself as a recurring theme from the sum of my observations. One of the very first conversations which took place was whether or not people preferred to be called "Native American", "Indigenous", or "Indian". As I sat around listening to the members discuss their thoughts on this topic, it became apparent that almost everyone in attendance had their own preference based on personal experience - there was no one term that felt appropriate for everyone and it was mutually agreed on that each individual should be asked

instead of just assuming how they would like to be identified from those groupings of words. As someone who was new to understanding language between indigenous people and the nonindigenous people, it was interesting to listen to their perspectives. One member mentioned that they didn't like being called "Indian" because they are "not from India". Another member mentioned they did not like being called "Native American" because the concept of American did not arise until their "ancestors' lands were colonized and renamed". This member then shared with everyone in the room that they preferred to be called by their tribal name instead of "Indigenous", "Native American", or "Indian". Overall, there was a great deal of variation amongst this small sample population, which was very informative for someone like I, coming in with an outsider's perspective.

One memorable conversation regarding identity occurred when first introducing myself to the members of the organization. I informed everyone present at the meeting that I was still researching my indigenous lineage - based on genetic testing results and family stories - but did not want to claim that I was indigenous until I had valid documentation to support the test and family stories. In response, one of the members told me that, "it's about what you do to be a part of the community and how you go about helping". They followed up this comment by noting that conducting my own research and showing interest in my lineage, as well as attending these meetings, was a good first step in being a part of that community. Another memorable conversation took place a few weeks later during one of the "cultural discussions"; specifically, we held a discussion surrounding Elizabeth Warren, an American politician, and her own claim to being Native (specifically Cherokee).

With the recent claims to Native ancestry - without initial verification for the claim aside from family stories - made by Elizabeth Warren, discourse on the topic of identity continued to take place during "cultural discussions" at the weekly NASA meetings. As a group, we discussed how Warren's claim resulted in her taking a DNA test, albeit being pushed by the presiding elected President of the United States. We discussed how the use of blood to confirm whether or not she had genetic markers for being indigenous, and in this particular case could claim having Cherokee ancestry, contributes to the inaccuracies of blood quantum level requirements and stereotypes within indigenous populations. How could a DNA test validate someone being Native American? Upon further research into this particular event outside of the weekly NASA meetings, I learned from a statement made by the Secretary of State of the Cherokee Nation, Chuck Hoskin Jr., that, "DNA testing cannot show that Ms. Warren is Cherokee or any other tribe.... Tribes set their own citizenship requirements, not to mention that DNA tests don't distinguish among the numerous indigenous groups of North and South America" (New York Times, 2018).

In response to Warren's claim, one NASA member shared with the group that, "blood quantum isn't the bottom-line requirement for native people. It's what you are doing in the community". They continued to explain what someone could do within the indigenous community and what someone else claiming to be indigenous meant to them: "Are you talking about the issues? Are you involved? If I met someone who was 1/500th Cherokee and they knew elders and were learning about the heritage and the people, the culture and the trade then they are a full native person to me. It's not always about what's in your blood it's about what's in your heart". She then informed us that Elizabeth Warren, instead of doing any of what she had just

mentioned, claimed she was Native (Cherokee) only once at the beginning of her campaign and never brought it up again nor did anything to help with indigenous communities. This member's statement was further justified by a statement from Dr. TallBear, a member of the Sisseton Wahpeton Oyate tribe in South Dakota, who confirmed: "While many people see "Native American" as simply a racial category, we have additional ideas about how to identify when one is Native American that aren't really consistent with the way most Americans think. Our definitions matter to us (and when people such as Warren make claim to Native lineage] what they're telling us is they are privileging nonindigenous definitions of being indigenous" (The New York Times, 2018).

These nonindigenous definitions could mean using DNA testing companies, such as Ancestry.com and 23andMe, which has become a hobby among many people who are interested in peering into their ancestral lineage and history. According to one source, DNA tests work by looking for, "the locations on the genome where people commonly vary from one another" (Vox, 2019). These variations are called "single nucleotide polymorphisms, or SNPs (pronounced "snip") ..." and the "more SNPs we share in common with another person, the more likely we share a similar, and more recent, ancestry" (Vox, 2019). However, it's important to note that, even though these types of tests have roughly a 99.9 percent rate of accuracy, "they are prone to making tiny errors"... "even with that high level of accuracy, when you process 1 million places in the genome, you might get 1,000 errors" (Vox, 2019). Furthermore, while these tests do provide averages, they are often based upon small reference groups - for example, a group of people whose ancestry comes from a single location, thus lessening the change for genetic mutation and variations - or upon people who are considered genetically isolated within their respective regions. These groups are often self-reporting their ancestry; consideration should be made that they are only averages of the population, that the math and science behind them varies between each company, as well as between each person that takes it, and that the numbers are constantly being updated. That being said, NASA's consensus was that DNA testing should not be considered as a way to confirm one's identity - especially indigeneity; it is only an estimate based on algorithms and sample averages, not the collective human experience of the person who is taking the test.

Regarding the claim by Warren and genetic testing, the President of the Native American Student Association commented,

"It's not completely accurate, and unfortunately, that really oversimplifies, in a really negative way, what it means to be Native American; what it means to be Chickasaw; to be Diné...to be any of these different tribes that have their own traditions and cultures and ways of life... When we talk about DNA testing the dangers of that is really the oversimplification that ignores the other nuances that go into creating and living an identity which is language, culture, tradition, community, kinship, homelands".

Violence often formed the context of why claiming Native American heritage based on DNA tests is troubling. Mr. Hoskins, the Cherokee Nation Secretary of State, noted that "those of us who are Cherokee citizens, we know our ancestors in some cases perished along the Trail of Tears" (Vox, 2018). Another NASA member stated, "the main thing that bothers me about white people claiming Native heritage... is it seems it's only brought up when it's profitable to

them conversationally or in Warren's case, politically...Being indigenous isn't always easy". And, in reference to the Murdered and Missing Indigenous Women, another NASA member added, "it's hardship, discrimination, and for Native women, it can be straight-up scary. It's not a choice. It's an all-the-time-thing. Either wear it on your sleeve all the time or not at all - because it's scary and it's bold".

These reactions of the NASA members to this situation appeared juxtaposed to their reaction of my informing them about my own genetic test results and search for indigenous documentation during my beginning-of-the-semester introduction. As I developed better rapport with members over the passing weeks, I shared with them that I was finally able to document my indigenous ancestry but, due to colonial stipulations as well as the tribe's own qualifications for registering as a tribal member, I would never be able to enroll. Personally, this raised insecurities about my identity within the indigenous community and about my ability to claim an indigenous identity at all. Later, the President of NASA privately shared with me their own experience with identity after researching their ancestral roots and what was once said to them by a tribal elder: "You're not claiming it? So why are you doing your ancestors like that? Why are you denouncing your ancestors like that"? They also asked me to consider another aspect:

"Think of how many generations have gone by and the knowledge wasn't passed down - and now here you are generations later trying to learn it... Think about those ancestors and think about seven generations prior to you. Would they be proud that you are working towards preserving their heritage and their culture when, in their time or during their times of when your family had a full-blooded ancestor living...the government was trying to actively wipe them off the face of this continent".

They then continued with discussing how indigenous identities have essentially been erased from our heritage and erased from our worldviews by hegemonic and colonial history; it has been detrimental to Native Americans.

One example of this can be observed through census records and how marginalized populations of people didn't always necessarily want to be identified as such out of fear they would be subject to further discriminatory practices by the rest of the population, as well as the government. They would often classify themselves as White or were altogether "opposed to the census process" (Lujan, 1990) which lead to a gross inaccuracy of the documented indigenous population. In 1930, Native American's were still being classified as Indian by their blood quanta. According to the 1930 Census: Enumerator Instructions, "a person of mixed white and Indian blood should be returned as Indian, except where the percentage of Indian blood is very small, or where he is regarded as a white person by those in the community where he lives". In their article, Haozous, Strickland, Palacios, and Solomon (2014) relay that "the indigenous peoples of the Americas have systematically faced barriers to their ability to thrive," such as experiencing, "loss of ancestral land, forced removal to reservations or other lands not originally used, genocide, ethnocide, warfare, disease, starvation, imprisonment for practicing traditional beliefs, sterilization campaigns targeting women, and assimilation methods such as boarding schools and relocation to urban areas" (Haozous et al., 2014). Furthermore, the concept of blood quantum was a colonial construct to justify land allotment: "During the allotment period between 1887 and 1934, the term "blood quantum" was officially integrated into the legal status of native

identity for the purpose of dividing reservation land into individual allotments” (Schmidt, 2011). But, despite all detriment, Native Americans indigenous identities and heritage have endured.

By the semester's conclusion, and therefore the conclusion of my research project with the members of the Native American Student Association, I had gained valuable insight into what the members find important when considering indigenous identity and who has the right to claim that identity. There are no pamphlets or "How-To" guides that outline how someone who is indigenous should look like or how they should act; "there are no checkboxes”.

Each member of the Native American Student Association has their own, very personal, experiences regarding claims to being indigenous and what it means, to them, to be indigenous. Each member has their own view of what is and is not acceptable when making claims. These views have been, in part, outlined in the previous paragraphs. The members of the Native American Student Association have been utilizing re-appropriation and examples of specific claims to being indigenous to educate; to educate me, a fellow member, as well as to educate others who attend not only the weekly meetings but events hosted at the University of North Texas, about what it means to be indigenous. What does it mean to lay claim to an identity during a trying time where politicians can easily make claim to indigenous ancestry and spread inaccurate information regarding those claims so rapidly via social media and news outlets? Provided more time for this research, I'm certain that additional themes of identity would have surfaced from the observations I made and the interactions I had with NASA members.

Therefore, in the conclusion of my research with the members of the Native American Student Association at the University of North Texas, we can identify initial themes of ancestry and identity and note that members of the organization, in their attempt to claim or re-appropriate "Indigenusness”, are redefining what it means to be or to have an indigenous identity.

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Visual Archeology: Native American Photographs as Artifacts of the Past

Key Words: Cultural Portrayal, Family History, Native American, Representation

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Woven throughout this paper is the thread of family photography, that concentrates on the importance of photographs to both researchers and descendant communities and considers why historical collections of photographs should be integrated into cultural research within modern anthropology. The following quote from *Photography's Beginnings* appropriately captures much of the same sentiment: "From the beginning, photographs have been family treasures – heirlooms sure that amount to a bond of faith with future generations ... even without a personal connection to these pictures, we can feel a commonality of spirit and emotions with their subject. In a way, they are ancestors for us all" (Cameron 1989 67). Walk into any antique mall in the United States and more than likely you will find a booth selling old photographs, sometimes they are placed neatly into plastic sleeves or more often gathering dust in an old shoebox. A photograph of someone's mother and father, sister and brother, high school sweetheart, or best friend now being sold for fifty cents, but the subject matter often extends beyond typical western culture and experiences. How many more collections of historical photographs are tucked away and forgotten in a closet for decades? When all of this happens after a photographer has created an image that gets "buried in a descendant's attic, unrecognized. Do they matter? The answer, of course, is that the works matter very much, once they are unearthed and appreciated" (Cameron 1989 72). Keeping this in mind, there will be situations in which collections of photographs are rediscovered, and although each group holds different responsibilities, both researchers and descendant communities are united by a similar bond of faith.

While not limited to the following characterization, the photographs of concern for this paper are typically from underrepresented communities and cultural groups, taken from the perspective of insiders, and that represent historical moments in time that might overlap with the established observations of anthropologists. However, these types of photographs are not always available and depend on two fundamental principles for their usefulness. First, communities and cultural groups must have had access to the technology that allowed the capture of photographs from their own perspective. Second and more importantly, anthropologist and other researchers must gain access to private photographs under ethical conditions. Given that historical photographs will not always be in the possession of the communities they represent, researchers have an ethical responsibility to reconnect descendant groups with the history and visual experiences recorded in the photographs of their ancestors. (Moses 2019) Like most formative arguments, specific examples come to mind that demonstrate the usefulness of private photography to anthropologist under the model of both situations, especially when applying borrowed theories, methodologies, and qualitative conventions.

My decision to write about photography resulted from a combination of opportunity and circumstance, both of which should be acknowledged. Credit goes first to Dr. Garrick Bailey, a senior faculty member of the anthropology department at the University of Tulsa, who provided the opportunity to work with an Osage photo album from his personal collection (Webb, Unpublished). It includes about forty historical documents—all of which are from the late 19th and early 20th centuries—consisting of professional and candid photographs, postcards, and one stand-alone birthday invitation. The original organization and assembly of the album has been attributed to Ruby Webb, an Osage woman from Hominy Oklahoma. Many of her family members that appear in photographs are listed on the 1906 Osage tribal roll, a documentary byproduct of the federal government's allotment of tribal lands. Credit goes second to my own circumstance and possession of a family album—one of many—arranged by my own great-grandmother, Annie Allen (Allen, Unpublished). Our shared ancestors made their homestead in rural Creek County, building a farmhouse that has stood since the 1880s—well before the allotment of Muscogee- Creek Nation tribal lands—and remains continuously inhabited by family. She, like many members of my extended family today, remained active in the Yuchi community; more specifically, the Polecat stomp-grounds near Kellyville Oklahoma. The one album contains more than two-hundred photographs, letters, postcards, obituaries, and newspaper clippings, making it significantly larger than the first example. While covering essentially the same period of time as the Webb album, a portion of the photographs from my family's album extend into the early 1970s, creating documentation of cultural experience that spans generations. Because of these circumstances, I began with and still have more familiarity of my family's photo album than the one belonging to the Webb family.

This paper attempts to answer several of my own questions, that I asked myself before beginning to work-in an academic capacity--with images from either collection. What should be done with the photographs? How should they be analyzed? And what responsibilities do I have to the images as a researcher? It supports another paper, *Bonds of Historical Faith: The Importance of Family Photography to Researchers and Descendant Communities*, in which I've considered the value of historical Native American photographs as an alternative to harmful cultural narratives, which can either confirm or contradict academic research that has occurred outside of communities entirely through the example of the Webb family photo album (Moses 2019). Varying combinations of context and visual information available in photographs allow for the reconstruction of cultural experiences. Both family album examples come from individuals living in what is now the state of Oklahoma and, by their historical context, could be used to explore the complicated relationship between Native American groups and the federal government of the United States. This includes the allotment of tribal lands, transition to statehood, economic depression, and assimilation policies of the United States Federal Government. Alternatively, photography originating from within Native communities might be better suited to research that focuses on the adaptation and survival of Indigenous communities in the face of cultural change. By design, this paper establishes methodologies that will aid my consideration of historical and cultural relationships like those just mentioned through private family photography. We'll begin with an introduction to trends within visual anthropology, followed by a brief characterization of concerns for Native representation and cultural portrayals, a few strategies for photographic sampling, and finally the methodologies within visual anthropology and archeology that have been borrowed for this project.

Trends in Visual Anthropology

Like the necessity of trowels and hand brushes to the practicing archeologist, the camera provided cultural anthropologist with methods of recording field observations independent from their pencils and notebooks. Visual anthropology might represent the most lasting and objective method of observation-focusing on the study and production of ethnographic photography, film, and other technological mediums—yet many arguments persist against the academic credibility of image-based research. Often resulting from months of field work and established relationships, photographs can be reviewed for missed details. Films can be rewound. In the introduction to 1975's *Principles of Visual Anthropology*, Margaret Mead famously wrote that “relying on words, anthropology became a science of words, and those who relied on words have been very unwilling to let their pupils use the new tools, while the neophytes have only too often slavishly followed the outmoded methods that their predecessors used” (Mead 1975 5). Nearly fifty years after her passing, Margaret Mead's impact within the field of anthropology remains almost unnecessary to state. Before visual anthropology had been seriously considered as a discipline, her work with fellow anthropologist Gregory Bateson, titled *Balinese Character* (1942), represented an excellent combination of analytical framework, original research, and included both photographs and written words.

With the exception of Mead's introduction, the following section highlights—in order of publication—three resources within the sub-field of visual anthropology that center on methodologies of photographic research and analysis. While we will spend more time on some than others, each has been chosen based on the high frequency to which it seems to be referenced, hoping that the collection will be familiar to anthropologist that engage directly with photographs in both academic and professional contexts. First, John and Malcolm Collier's *Visual Anthropology: Photography as a Research Method*, originally published in 1967. Second, Jon Prosser's contribution to *Image Based Research: A Sourcebook for Qualitative Researchers*, published in 1998. The most recent is Sarah Pink's *Doing Visual Ethnography*, published in 2001, which criticized aspects of previous methodologies as objectifying how-to-manuals. While each example only addresses professional photography originating from the perspective of the academic, this paper will attempt to build upon their points and establish an academic baseline for the inclusion of private and family photography in cultural research.

The textbook formalization of visual anthropology begins in 1967 with the publication of *Visual Anthropology: Photography as a Research Method*, written primarily by John Collier Jr. with contributions from his son Malcolm. To a greater extent than the others referenced in this section, both seem permanently connected to the history of Native American studies in the United States, resulting from both their impact on visual anthropology and family heritage. John Collier Jr was named after his father, John Collier, who served as the commissioner of the Bureau of Indian Affairs during the presidency of Franklin Roosevelt (Philp 1985 244). Within the bureaucracy of American government, John Collier Sr. had long opposed forced assimilation of Native Americans, repealed the DAWES Act ending the allotment of tribal lands, and during the presidency of FDR established mechanisms for their self-government. Provided this history, it seems appropriate to give the Colliers' work a central role.

Visual Anthropology had been based on John Collier Jr.'s experience working with Native American communities in the western United States. However, it was more concerned with “wholistic and accurate observation than any self-representation and non-Western perspectives occurring in those communities. Alluding to the observational bias that often-accompanied visual anthropologist, the Colliers' connected photographic accuracy to the complexity of cultural circumstance, arguing that “an observer's capacity for rounded vision is certainly related to the degree of involvement with the environment” (Collier 1967 5). They viewed the ways in which the western photographer and subjects with limited technology interacted with the environment very differently. The photographer had been “oriented to commanding nature by super-technology ... making it difficult to accomplish holistic understanding” while the subject often “lived in harmony with surrounding nature” (Collier 1967 6). Hoping to avoid distorted observations based on these institutional and pre-conceived differences between the photographer and subject, the Colliers' established phases of visual field research that demonstrated practical applications for photography (Colliers 1967 15). The first phase required an ethnographic overview and descriptive study of the cultural environment being observed, while the second narrowed focus to specific evidence that related to goals of within research. At this point, the Colliers' recommended drawing preliminary conclusion, supported by photographic evidence that had been “abstracted in the same way as all other data, verbalized, translated into statistics, even computed electronically in order to become a genuine part of the fabric of scientific insight” (Colliers 1967 16). Stated quite bluntly, they argued the camera is not a research tool in modern anthropology” without the methodology of this process. (Colliers 1967 16). While their model involved actively operating a camera, what should stop the same qualifications from being applied to preexisting collections of photographs from within communities?

Jon Prosser, an innovative visual researcher and founder of the *International Visual Sociology Association* (IVSA), wrote in the introduction to *Image-Based Research* that “taken cumulatively, images are signifiers of a culture; taken individually, they are the artefacts that provide us with very particular information about our existence.” (Strosser 1997 1) Unfortunately, it seems that within anthropology and cultural research, either professional or private photographs are not given appropriate consideration. In another contribution to *Image-Based Research*, Strosser listed six ethnographic texts published between 1984 and 1992 that he had arbitrarily pulled from a library shelf, three of which had no images and only one contained more than ten. (Strosser 1997 98). What was his conclusion for the reason? Anthropology and academic publishers favored qualitative research, while at the time image-based research included very little. As such, an analytical approach to historical photographs that includes qualitative methodologies might anticipate greater application among researchers within modern anthropology.

Another problem with visual anthropology--at least in the earliest forms is its tendency to exclude the communities being observed. In her exploration of the use and potential of photography to ethnographic and social research, visual anthropologist Sarah Pink acknowledged the rightful criticisms of early research methods within the field. She recognized that some early literature had been “centered on how-to manuals of method and analysis ... (that) aim to distance, objectify and generalize, and therefore detract from the very qualities visual images offer ethnography” (Pink 2001 3). While the acknowledgement included other

publications, Pink specifically referenced Prosser's qualitative approach to visual methodologies and the Colliers' *Visual Anthropology*. In addition to these criticisms, she wrote on the limitations imposed by strict methodologies--although not always the case--both on academic possibilities and cultural representations. Very concisely, Pink wrote that "different and competing methodologies, linked to specific theoretical approaches co-exist in academic discourse" (Pink 2001 4). The relationship between conventional modes of academic representation and experienced realities of communities can be complementary, communicated in a range of textual and visual methods that support different types of ethnographic knowledge (Pink 2001 5) Essentially, there is no right-or-wrong approach to the incorporation of photography, other than a conservative limitation to existing methodologies.

At no point did the Colliers, Strosser, or Pink apply their research or disciplinary concerns directly to private photography, but my arguments to include family albums in ethnographic research have been impacted by their work. Historical private photographs--specifically those originating from contextual complete collections--represent experienced realities and add to wholistic understandings of culture and ethnographic knowledge. But if photographs utilized within visual anthropology are only produced from a camera held by western researchers, only analyzed within western institutions of higher learning, and result in conclusions founded only on western academic theories, how could they even begin to represent non-Western perspectives?

Concerns of Representation and Cultural Portrayal:

While the productions of visual anthropologist and documentary photographers support critical understandings of culture, historical images that originate from within communities have the ability to challenge cultural misconceptions, stereotypes, and overplayed narratives. The work of Native scholar and writer Devon Mihesuah speaks to issues of representation, specifically who should present stories and traditional perspectives from within cultural groups to outsiders. In the context of North America's Indigenous communities, do we give first preference to the outsiders and non-Natives, or those with strong cultural connections and personal interest in the topic being discussed? (Mihesuah 2005 4) One research example comes to mind within visual anthropology that addressed similar concerns: Sol Worth and John Adair's pioneering *Through Navajo Eyes*, first published in 1972. Rather than taking the photographs, they asked Navajo communities to capture representations of their own culture, erasing the distinction between the "outsider researchers and their subjects by creating a bridge between the two (Strosser 1997 119). Rather than defining what they wanted to see, they gave instructions only on the mechanics and operational functions of the camera (Strosser 1997 101). While Worth and Adair's pioneering research model has been replicated many times, it remains in the minority of visual anthropology. Typically associated with environmental immersion and other well-intentioned approaches to academic observation, the discipline does not promote the self-representation of non-Western communities by the design of its methodologies.

Alternatively, the combination of my family's album and the Webb family album for this paper argue in favor of one solution, that historical collections of photographs should be more often integrated into the cultural research of anthropologists. Both examples show that camera technologies were being used organically around the turn of the century, without any

influence from academic researchers in the decision-making process. Similar private family photo albums could take the self-representation of non-Western communities one step further than *Through Navajo Eyes*, in which the authors acknowledged that photography was not a medium of representation for their subjects prior to the study (Strosser 1997 120). Regardless of origin, photographs continue to play critical roles in cultural understandings of Native communities and tradition, but useful images should not be limited to those produced or influenced by academic photographers. In the foreword he provided to the Colliers' *Visual Anthropology*, anthropologist Edward Hall writes, they have given us ways of penetrating the cultural cliché—the projection of our own western patterns for organizing the visual world onto non-Western peoples ... they have put in our hands tools which enable the Western viewer to see a little more of the worlds others inhabit” (Collier 1987 xv). To fully understand the ability of Indigenous self-representation to challenge historical cultural narratives promoted throughout western art, politics, and academia, an argument for the inclusion of private photography in cultural research must include an acknowledgement of those clichés. As Edward Hall conveniently described, the Colliers' methodological offering to visual anthropology concentrated on the photography of non-Western peoples for the Western viewer, and the nondescript use of 'others' implied an inherent separation between the two. This characterization reminds us of dominant theories in the history of anthropology—namely social evolutionism—and the way they impacted an already complicated relationship between Native American groups and the United States government.

While there are no universal standards for cultural experience in Indigenous communities, the ethnographers, politicians, and photographers of the late 19th and early 20th centuries were not so sure. Many professional photographers intentionally documented what the western world viewed somewhat romantically as the 'vanishing Indian. Perhaps the most acclaimed and famous individual associated with the movement was Edward Curtis, who wrote the following account in 1905:

“Alone with my campfire, I gaze about on the completely circling hilltop, crested with countless campfires, around which are gathered the people of a dying race ... the life of these children of nature is like dying day drawing to an end; only off in the West is the glorious light of the setting sun, telling us, perhaps of light after darkness.”
(McLuhan 1972 VIII)

Curtis spent thirty years of his life and professional career traveling throughout the United States with the goal of photographing members of every Indigenous tribe, and the thousands of images he produced remain incredibly valuable to both cultural research and historical records. However, this does not mean that his efforts are not without critique; the western symbolism and emphasis on a 'dying race' represents the attitude common among early professional photographers and guides much of their work. Native scholar and visual researcher Hellueh Tsinhnajinnie wrote that “Because of a preoccupation with survival, Native people became the subject rather than the observer. The subject of judgmental images as viewed by the foreigner – images worth a thousand words. As long as those words were in English.” (Tsinhnajinnie 1998 45) Their need for survival, in defiance of incredible social change, was of course the byproduct of exploitive practices and policies from the United States Government. At the turn of the century, cultural anthropologist produced libraries full of ethnographies

documenting and 'salvaging' Indigenous cultures before they were wrongly predicted to have been lost. With this understanding, if we are to consider anthropology a 'science of words' often supported by professional photography, both exist within Tsinhnajinnie's framework. As substitute, private-use photography employed within communities documented cultural continuance that contradicted the image of the 'vanishing' Indian. Maybe this distinction could be attributed to a focus on family or community? But no definitive conclusions should be made, only plausibility's based on comparable situations and visual evidence.

Methods of Photographic Arrangement and Sampling:

Between the two albums included in this paper, more than three hundred photographs, letters, postcards, and other historical documents have been scanned and arranged using computer-based technology, of which images and visual representations are the overwhelming majority. In order to avoid what the Colliers' would have called saturated documentation or an overload of a complex details, we must develop strategies to sample photographs and other cultural resources. For both the photographer and researcher, this means that "a whole view is the product of a breadth of samples that allows us to comprehend the whole through systematic analysis of those carefully selected parts" (Colliers' 1967 162). From personal experience, much difficulty lies in working with large collections and the responsibility to determine which, if any, photographs should be used. Simply put, small collections of related images are intended to represent larger cultural circumstance. Admitting to the necessity of sampling, four strategies have adapted from the broad scope of visual anthropology: sampling based on similarity of visual content, contextual information and identity, geographic location, and comparisons through time. Since this paper's concern does not include cross-cultural comparisons, each photographic arrangement and example of sampling has been limited to only one of the family photo albums.

The first strategy approaches sampling based on similarities in visual content; figure 1 through figure 4 are photographs that display agricultural and farming practices at the turn of the century (Allen, Unpublished). All images are within a range of a few years and include a variety of similar activities. In figures 1 and 2, men are shown branding and working cattle; they could have been either hired hands or family members. Provided the likeness of rounded borders between the two photographs, they were probably captured by the same camera and operator. However, there are no written inscriptions providing accurate dates or identifications for the individuals, but an assumption can be made that both photographs are from the early 1900s and associated with the Jesse Allen farm.



Figure 1. Men branding cattle near the Jesse Allen homestead, Creek County, circa early 1900s



Figure 2. Working cattle near the Jesse Allen homestead, Creek County, circa early 1900s

The same characterization should be applied to figures 3 and 4. The first photograph shows a man, child, and three dogs standing in what appears to be a livestock pen. In addition to their style of clothing, two pole-mounted bird houses and a stretch of hog-wired fence can be seen in the background. The second photograph shows two farm wagons heavily loaded with hay, unidentified men hold the reigns of each wagon, and one younger boy is seated facing the photographer. All are looking in the direction of the camera. For this grouping of photographs, the circumstances around each aspect of material culture could easily be explored to a much deeper extent in research that sought to better understand agriculture practices.

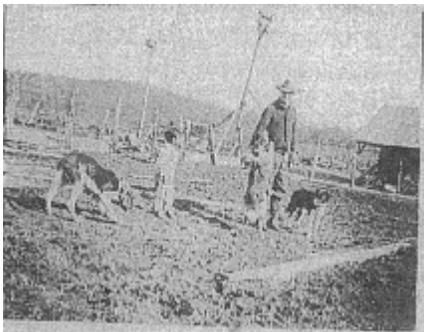


Figure 3. Man, boy, and three dogs in livestock pen, near the Jesse Allen homestead, Creek County, circa early 1900s



Figure 4. Transporting hay with wagon and mules, near the Jesse Allen homestead, Creek County, circa early 1900s

The second approach to photographic sampling relies on contextual information and sequentially organized images, including the ability to identify individuals appearing in photographs. This creates increased opportunity for qualitative research methods, similar to those recommended by Strosser. Looking for aspects of material culture, it should be possible to

count, measure, or compare what the researcher can observe in a photograph. Under the Colliers' brand of visual anthropology, reliable photography should be "observed and recorded in the form of the responsible, selective composite. Only in clinically controlled situations, not in the outer world, is it possible to approach total documentation" (Colliers' 1967 163). Admittedly, the idea of a 'clinically controlled situation does not immediately lend itself to concerns of self-representation within non-Western communities. However, serious value should be placed in what the individual chooses to record, especially when photography occurs in the absence of outside influence. If applying the Collier's consideration of visual anthropology to the contextual information and frequent sequential organization of family photo albums, similar methodologies might be used. The final product should consist of images that can be analyzed using qualitative methods.



Figure 5. Allen Webb, posing in ornate chair for portrait. Date Unknown



Figure 6. Allen and Elda Webb, holding their children Bertha and Leroy. Wearing mix of traditional Osage and western style clothing Approximately 1907-1908.



Figure 7. Elda Webb's mother, holding grandchildren Bertha and Leroy. Wearing mix of traditional Osage and western style clothing. Approximately 1907-1908.

For this sampling approach, consider the photographs labeled as figures 5 through 7. All are from the Webb family collection and although they belong to a private album--can be characterized as semi-professional portrait photography (Webb, Unpublished). Based on the inscriptions, the origin of this album can accurately be attributed to Ruby, and most of the individuals pictured can be identified by name. The greatest evidence for a singular origin comes from phrases like My Sister, Momma, or My Own Dad written on the back of photographs; these inscriptions also establish necessary contextual information. The visible mixture of traditional and western clothing styles also gives the sampling credibility for qualitative research. For example, figure 5 shows Alan Webb-Ruby's father-wearing heavily beaded moccasins, leggings, a broadcloth shawl, and other traditional styles. At some point, the photograph had also been intentionally colorized with blue, red, white, and yellow pigments, which are commonly associated with traditional Osage art and culture (Bailey 2004 12). Figure 6 includes Edna Webb, with her children Leroy and Bertha-Ruby's mother and siblings. Figure 7 shows Edna's own mother, who we cannot identify by name from the available information. The physical appearance of Bertha and Leroy, combined with their known birth years, suggest that these photographs were taken in either 1906 or 1907. From what we can observe, a greater mixture of traditional and western clothing styles are present than in the example (Fig. 5) that only includes Alan. For whatever reason on the day these were taken, clothing styles were unequally distributed between males and females in the Webb family. Furthermore, the last two figures (6 and 7) are believed to have been taken on the same day by one photographer, determined from similarities in the children's clothing. These conclusions are only some of the possibilities that result from qualitative research, and similar approaches would be possible given family photo albums that could be sampled based on contextual information and sequentially organized images.

The third sampling strategy depends on photographs that can be linked to geographical locations, as with as figures 8 through 10 (Webb, Unpublished). Also from the Webb album, inscriptions provide details of a family vacation near Colorado Springs, most likely to the Garden of the Gods or the Mt. Manitou Park Scenic Incline. Although the images are grouped based on location, we can focus on other aspects of material culture and their relation to the setting. Pictured again are Ruby and her mother Edna, along with an unidentified girl and toddler. Unlike previous examples, this group of photographs documents cultural experience occurring later in the early 20th century, likely during the 1920s, when many of the Osage had gained significant personal wealth as the result of oil headrights. By the late 1910s and early 1920s, an Osage family "consisting of two parents and three minor children who had all been born before July 1, 1907, had a total of \$15,000 in trust funds, five head-right incomes, and more than 3,200 acres of land" (Bailey 2004 141). Accounting for modern inflation, this made the Osage among the richest people in the world per capita, and with their increased economic freedom came more time for leisure and the increased ability to purchase expensive western products.



Figure 8. Unidentified girl and unidentified toddler, near Colorado Springs.



Figure 9. Ruby Webb, unidentified girl, and unidentified toddler, near Colorado Springs.



Figure 10. Elda Webb holding unidentified toddler, near Colorado Springs.

All of this had occurred as the Webb sisters were reaching adulthood, which meant personal decisions about style and clothing. For example, the generational differences visible between Ruby (Fig. 9) and Edna (Fig. 10) are striking. In Osage communities, the younger generation “drove automobiles, while older members of the family could be seen traveling in chauffeur-driven limousines or touring cars. While older Osages still usually dressed in Osage

cloths, the younger men and women were choosing to wear their Osage cloths only for special community events, me preferring the more stylish cloths they bought in Tulsa or Kansas" (Bailey 2004 137). This academic conclusion remains upheld by visual evidence present throughout the figures; both of the younger girls are fashionable in the flapper style of the 1920s, while their mother Edna wears a more conservative style and traditional wool skirt. This sampling of photographs based on geographic location reveals some of the cultural experiences associated with social change in Osage communities at the time, and as aspect of non-Western experience seemingly absent from early ethnographies, it's interesting to see a visualization of family vacations and generational differences.

The final approach to sampling photography can be applied to any location, individual, cultural activity, or subject--so long as the photographs record different moments in time. Comparisons of historical images can be a powerful measure of change, as we take photographs from the past and put them together with more recent examples, including the present. As with the previous example from the Webb album, photographs of family members in varying demographics and years might accurately capture generational differences. Images that document change in one family's residential patterns throughout history might reveal increases in economic resources, housing requirements based on family structure, or even the evolution of popular architectural styles. Photographs of agricultural practices from both the early 1900s and 1950s might record the transition from plows pulled by horse to plows pulled by tractors.

For this sampling strategy, consider figures 11 and 12, which document traditional Yuchi stomp dances at the Polecat Creek ceremonial grounds during the early 1900s (Allen, Unpublished). How might they compare to figures 13 and 14, which document similar culture experiences at the same location during the late 1970s, likely more than fifty years later? From first glance, the presence of vehicles in the later photographs are one of the most notable differences. As manufacturers and models of those vehicles are identified, we can establish a no earlier-than date for the figures 13 and 14 based on their known production years. With no inscriptions for year, the earlier examples are difficult to accurately identify; only plausible date ranges based on the characteristics, overall condition, and the context of photographs are possible.

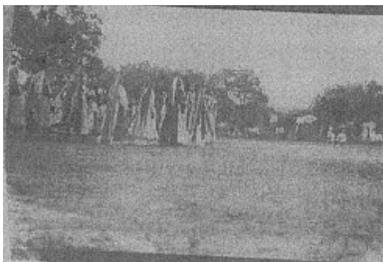


Figure 11. Stomp dance at Polecat Ceremonial grounds, early 1900s. Inscribed "Euchee's, the ribbon dance by the women."



Figure 12. Stomp dance at Polecat Ceremonial grounds, early 1900s. Inscribed "Euclhee Indian men & boys dancing."

With regards to the observable clothing, the early photographs retain their open-ended range of dates, while the later photographs can again be connected to specific years and styles. Like other southeastern tribes, the Yuchi retained styles characteristic of everyday American clothing from the previous century for ceremonial wear; clothing from figures 11 and 12 would have been "derived from clothing styles common to frontier life in Eastern American during the seventeenth and early eighteenth centuries" (Jackson 1998 33). Figures 13 and 14 include several men who wear denim-jeans with large flared hems, often called bell-bottoms, popular throughout the late



Figure 13. Stomp dance at Polecat Ceremonial grounds, early 1970s. Men getting ready for a dance.



Figure 14. Stomp dance at Polecat Ceremonial grounds, early 1970s. Men dancing.

1960s and early 1970s. While comparison between the two time periods show increased combinations of western and traditional clothing, many ceremonial styles remain. Why would commercial goods supplement but not completely replace traditional clothing styles? One possible conclusion that results from sampling strategies based on time as a measure of change: cultural circumstance and the relationships between people and material objects are too complicated the limited applications of observation and visual analysis alone.

Other than the obvious advances in style, technology, and transportation, what might the presence of vehicles say about social developments in Yuchi communities. What might the lack of vehicles in early photographs say about social structure, residential practices, and individual experiences related to attending and traveling to ceremonial grounds? Due to the limitations of visual anthropology that become obvious when attempting to answer similar questions, this introduction to the methods of photographic arrangement and sampling ends with an argument. Without supplemental theories and methodologies, anthropology lacks sufficient procedures to examine private historical photographs originating from within communities. To fully integrate such collections into cultural research, the discipline must consider appropriate solutions.

So Why Visual Archeology(?) and Other Conclusions:

Returning once more to the Colliers' and foundations of visual anthropology, collections of historical photographs that maintain their original context should be thought of as the 'breadth of sample that can produce a glimpse at cultural circumstance. They become even more personable representations of culture when applying contemporary archeological theories to connected research, analysis, and conclusions. While an image visualizes our experience and documents aspects of material culture, they are themselves objects produced by other objects resulting from human intervention. Of this relationship, anthropologist Ian Hodder writes, "many would accept that as humans we have evolved with certain physical and cognitive capacities because of our dependence on things Much thought may be impossible without something to think of" (Hodder 2011 155). If true, what an individual chose to record with the camera, how they framed an image, and what they might have wrote on the physical photograph certainly have deep cultural implications. An archeological mindset applied to cultural research and objects—how they were made, used, repaired, discarded, or what they mean-might reveal the 'traces of culture (Hodder 2011 158). This may seem unfitting yet working with historical photographs often involves uncovering something hidden. Metaphorically 'digging up an idea, lost history, or a shoebox full of photographs tucked away in a closet. Other scenarios certainly exist, but the assumed regularity of family photo albums and their prevalence as historical records warrant argument for the integration of private photography into cultural research.

While our 'dependence of things' acknowledges the role of objects on cognitive thought, an implication of human superiority remains ever present. This is an anthropocentric view in which objects have been "designed to be secondary ... forming the backdrop to our lives, of which we are of course the stars, the decision-makers, the agents" (Knappett 2008 ix). Objects have cultural significance because of their relationship with humans; photographs support memory by giving us something to think of. This is what Carl Knappett calls 'agency by association or a "kind of secondary agency, in which primary human agency is delegated or transposed onto materials, the primary agency or authorship may be obscured; and this property may come to be deliberately exploited" (Knappett 2008 140). While the meaning of agency continues to be discussed, exactly what do individuals gain from potentially exploitative relationships with photography?

Visual anthropologist Richard Chalfen, well known for (1987) *Snapshot Versions of Life*, adds to our understanding of the relationship between people and things in his qualitative approach to family photographs. Distinguished from other methods of visual analysis by

focusing on the “communication process of snapshot photography, meaning the sequence of events that includes making (encoding), interpreting (decoding), and many uses of photographs (Chalfen 1997 215). Chalfen's definition of snapshot applies to amateur and vernacular photography, collections of personal family photographs, and other types of non-professional visual documentation. His approach to photographic analysis first describes the processes and content of images, organized into list of either 'communication events' or 'components that describe the operation of each event, and produces the chart pictured below in Figure 15 (Chalfen 1997 216). Aside from accepting how this approach might reveal patterns of activity, we will not define or explore each of the communication events and components.

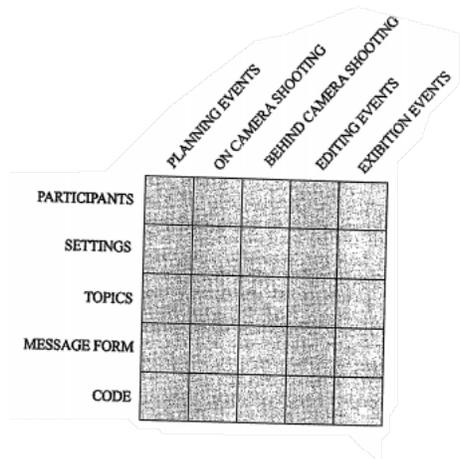


Figure 15. Twenty-five cell chart for Richard Chalfen's descriptive approach to the 'communication process of snapshot photography.

Descriptive visual analysis acknowledges both the photograph and camera as objects with larger connections to our material world, substantiating comparisons of private photography that traverse social class, communities, and cultural groups. Chalfen writes that “each of these twenty five cells represents a relationship between a specific event and a specific component and can be used to generate certain kinds of questions that are useful in both describing and comparing specific examples of image communication” (Chalfen 1997 217). Considering the focus of this paper and the integration of historical photographs into cultural research, the relationship between event and component occurs on several levels in an image's past, present, and future.

As a physical object and product of human intervention, the most obvious relationship exists between the photographer and participants, photographer and setting, or photographer and topic. Yet, for photographs from the early twentieth century to have survived until now, the relationship between the individual organizing the photograph and intention becomes equally important. Furthermore, if an album has left the context of family, the researcher or current custodian now working with and handling the photograph enters the communication process by editing, preserving, or exhibiting images. You might be asking how all of this relates to archeology? Hodder writes that “the bricks and other human-made artefacts (have) entrapped people in long-term relationships of material investment, care, and maintenance - people become entangled and domesticated by things.” (Hodder 2011 161) From working with

photographs and other types of historical objects, things change through time. They deteriorate, fade in color, get lost, and are rediscovered. Innovations in technology--especially true for photography and the camera---affect the relationship between people and things.

The 'digital' or 'information' age has produced cameras no longer dependent on film, dark rooms, or even physical photographs. While each seems separate and bounded, Hodder argues that "all things depend on other things along chains of interdependence" that we could easily adapt and identify from Chalfen's descriptive approach to photography (Hodder 2011 157). Greater focus on photographs as material objects that interact with, record, and influence culture might help distance research in the social sciences from anthropocentric views and conclusions; this approach could fall under aspects of Actor Network Theory (ANT) that are used in modern archeological analysis. Knappett writes that ANT "was devised as an approach to social phenomena that decentered the human subject, seeking to overcome the assumed ontological primacy of humans by adopting an analytical impartiality" (Knappett 2008 141). As Sarah Pink recognized, much criticism comes from the objectification of human participants in ethnographic research, but what changes if the subject of cultural research is an object? In our case, historical photographs. This is not to say that the ethical responsibility of a researcher is nonexistent, for photographs depict individuals, communities, and aspects of cultural experience. The essence of ANT is the argument that material culture may not simply reflect but also actively construct or challenge social reality, on the necessary condition, however, of human agency and intentionality." (Knappett 2008 x). Pseudo-archeological approaches to visual research--meaning the application of materiality and actor network theories to historical analysis--complements our understanding of the combinations, interactions, relationships, and meanings of culture for both people and the things we produce. This indicates a methodology that should be called visual archeology.

Being careful not to discredit the work of any particular researcher, we should consider the accuracy and interpretation of anthropological photography, film, and other mediums on a case by case basis. Photographs should be seen as shared problems to be resolved cumulatively rather than treated as battlegrounds of twenty-first century methodological theory" (Strosser 1997 1). As a matter of precaution, this paper has not been designed to discredit visual anthropology, its intended applications, or other disciplines that utilize professional photography in some form or another. Visual archeology and the integration of private photography into cultural research could succumb to the same limitations as visual anthropology if this approach refused to acknowledge other possibilities and solutions. Rather than internal fighting between disciplines and existing methodologies, we should "recognize different starting points, and seek out ways of building links between different approaches to image-based research" (Strosser 1997 2). My hope is that this paper directly supports the inclusion of private photography as an innovative tool for cultural research, much in the same way that photography, film, and other mediums of observation were revolutionary for visual anthropologists not all that long ago.

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The Presentation of Identity in Museum Culture

Key Words: Cultural Anthropology, Ideology, Material Culture, Structuralism, Theory

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The study of material culture is often affiliated with that of museum studies, both of which, comparatively speaking, are relatively young disciplines that have the ability to alter the personal identities and affiliations of global audiences. The initial intent behind the creation of these disciplines were to create categories to marginalize and hierarchize cultures that were of non-Western origin at the "height of their primitivism" and compare them to that of the highly evolved culture of European society. As this ideology was dominant for quite some time, it became prevalent for museums as well as individuals to create a distinction between the "self" and the "other". While the implementation of this ideology has gradually fallen out of favor, contemporary academics have not only had to salvage the reputation of non-Western cultures by educating others to view them in a more objective manner, they must adjust the field to fit the possible ideologies of the future. For many, Bourdieu is vital to understanding the past as a way to prepare for the future and yet, they should not be satisfied with the mere identification of a problem. Understandably, there are many factors that must be carefully considered prior to potentially applying programs that Bourdieu alone cannot contribute; by utilizing the work of anthropologists like Nancy Scheper-Hughes and Lila Abu-Lughod, the system of collection, preservation, curation, and interpretation of the future may have the potential to benefit all. In this paper, I will attempt to highlight the milestones of museum and material culture in chronological order while addressing the concerns of modern academics using Bourdieu, Scheper-Hughes, and Abu-Lughod to prepare for where the discipline could head in the future.

To understand the present, we must first look to the past. The modern assumption that those of the ancient world were defined by identity, culture, and ethnicity is inapplicable because the assumption is made based on modern understandings of these topics. These identities may be "defined as the collection aspect of the set of characteristics by which something or someone is recognizable or known," (Hodos 2010: 3) with ethnicity being the "buildup of personal and social identity" (Hodos 2010: 3). Culture itself represents "a coherent system of values, norms, and habits that, through repetition, engender a sense of unfilled belonging, individually and collectively, over time" (Hodos 2010: 3). This sense of collective similarities regardless of object or individuals, implies that "the very notion of identity also depends upon opposition through contrast with something else" (Hodos 2010: 3). For the ancients, their identity was bounded locally, not globally. Habitual and repetitive behavior of local culture created a sense of belonging but also allowed for a sense of distinction that created the other. According to Pearce, "many societies have defined themselves explicitly by contrast with others" (1989: 24). For example, the Greeks identified themselves from others based on language, for those who could not speak Greek were a barbaros. The initial study of identities of past civilizations has its origins in the eighteenth and nineteenth-century Romantics who were trying to discover their own sense of nationalism by using the Greeks and Romans as inspirations to

reinvent themselves. However, this was further tainted by the culmination of Darwinian evolutionary thinking that there was a biological inequality between groups. This later came to cover cultural differences between Western and non-Western societies because many believed that natural selection accounted for biological evolution to allow some to utilize culture while others weren't. This would also allow for the justification of European control to "promote the general progress of the human species by advancing Western ideals" (Hodos 2010:6). That being said, "romanticism and modernism defined ideas of identity, not only going back to nationalism and racialism but also, via psychoanalysis, by defining for the Western white audience a sense of self and other, of identity and identification" (Hodos 2010:6). This is not a justification for an exclusive way of thinking, but identity formation is complex and the capacity for change is also available for the future.

Prior to arriving at both private and public museums by the 1850s, artifacts were divided into two groups: "artificial curiosities" (Pearce 1989: 3) and fine art, which included the standard paintings and sculptures as well as ceramics, fine metalwork, and coins. The accumulation of these pieces were by no means systematic, but they were expected to be "high quality" pieces that had the "finest design and craftsmanship of their kind" (Pearce 1989: 3). This practice was altered by the creation of a general classification system by Augustus Pitt-Rivers which was based on typology, rather than geography or where they were found. Like many of his colleagues, Pitt-Rivers was partial to Darwinian evolution however, his material was "not for the purpose of surprising anyone, either by the beauty or the value of the objects exhibited, but solely with a view to instruction" (Daniel 1950: 171). Despite the widespread application of his ideas, the influence of Radcliffe-Brown and Malinowski in the period between 1914 and 1950 further overcame the field by applying a functionalist approach concentrating on the detailed studies of single societies through which it could be seen as a self-sufficient whole. Individual artifacts no longer had the capacity to be more than their material use, they were dismissed as 'simply the outcome of social processes and gave them little significance in their own right' (Pearce 1989: 4). Subsequently, it was Gordon Childe who popularized the combination of the historical approach with that of Pitt-Rivers which valued the use of spatial distribution to produce a relative dating. There was still a prevalence of studying material culture through fixed, singular structures but its prioritizations of museum culture led to corresponding displays.

Through the 1960s and 1970s, the concept of structuralism, led by Levi-Strauss became the dominant standard with which artifact interpretation and material culture came to be studied by. Currently, much material culture seems to arrive in collections as the result of three processes, giving the artifacts the label of either souvenirs, fetishes, or collections. Again, "in practice the motives behind their accumulation are frequently mixed, but the underlying strands may be distinguished" (Pearce 1989:6). Souvenirs are loosely defined as artifacts that may have been preserved because they represent the starting point for a personal narrative and the tangible essence of a past experience (Pearce 1989: 7). They are also romantic in nature, as there is an underlining nostalgia which suggests that the past was better than the present. As they are intensely personal artifacts with a singular interpretation, it is very difficult to display them because they are separate pieces that tend to remain separate. Fetishes, as used by Marx and Freud, are artifacts that are "given meanings beyond their original ones by individuals or societies, who pass their own emotional needs over to the objects concerned" (Pearce 1989: 7). As they tend not to have historical links, these artifacts are deliberately acquired because they

can be used to justify the desires of an individual. The personal and public collections acquired during the Renaissance and the post-Renaissance are examples of fetishes and although the intellectual basis behind Romanticism and Hellenism have been discredited, they are still collected and displayed in modern museums although, their mode belongs to the archaic phase” (Pearce 1989: 8). Led by Pitt-Rivers, collections have an internal coherence which went beyond the accumulation of samples and were not complete until curators could gather artifacts from each category. These interpretations have changed over the years which is indicative of the alterations we are willing to make on global thought processes. Now that the basic background for material culture and museum studies has provided a general framework for identity and affiliation formation, it is now important to discuss the nature of modern cultures of display. The notion that, “Our material culture reveals our spending power, it reinforces our sense of gender and age group, it emphasizes the cultural affiliations we hold, and sets them out for other people to see our social status,” (Hurcombe 2007: 3) is one that will be discussed later in this paper.

During my research, it was apparent that there were many concerns, theoretical and physical, that could not be answered that pertain to different aspects of this field of study, but I thought it important to mention nonetheless as it impacts both the present and future for multiple fields as well as marginalized groups of people. Firstly, Pearce mentioned a concern that the current standard for valid collecting policies has become a daunting task because "we must recognize that the collectible material culture of past societies is finite and should sometimes be left undisturbed for those who will come after with superior techniques" (1989: 8). Not only will this affect current museum practices and cultures of display, this will directly impact the archaeological field tremendously. Traditionally as a field that is associated with the past, one tends to forget how our actions will then impact the future. If we are able to establish a controlled field, how would it impact our current understanding of material culture? Similarly, there is a concern that the mass-consumerism of the twentieth century being labeled as material culture provides problems for how we preserve items that “are reminiscent of an almost forgotten youth,” (Pearce and Jenkins: 1989 119) which we have kept for nostalgic purposes. Jenkins claims that “the preservation and conservation of historically important buildings, sites, and artefacts is, of course, vital, but has the conservation movement gone too far” (1989: 120)? He continues by pondering the value of the things we preserve, which is a viable concern as we are focused on fixing the past but not conserving for the future. However, how are we able to judge what will be deemed important in the future? The rate at which we are changing physically, mentally, and culturally, is something that has to be taken into consideration without neglecting the past.

For Abu-Lughod, her argument in “Writing Against Culture” is that the notion of culture creates a divide between the anthropologist (or in this case, curators as well as academics) and the subject, the self-versus the other, and that it establishes a structure that disregards marginalized communities. In museums, curators become the mediators in the relations of consumption because the “curator both extends and constricts the public's opportunities to obtain what has been, hitherto, only curatorial knowledge” (Pearce 1989: 76) and as recognized specialists, “the public expression of knowledge, therefore, is part of the productive relations of museums, as institutions, and of their curators, as servants of these institutions” (Pearce 1989: 75). The public is forced to trust the curator as all-knowing and in line with Foucault's post structuralist theory, “the relationship of the professional curator to the public, and the balance of

power within such a relationship raises questions about “Whose history? and ‘Produced for whom?’ (Pearce 1989:9). Perhaps we are stuck in a cycle of marginalization. Major museums around the world still have the expectation of being better, of being a representative of a country's cultural wealth. As Pearce has pointed out, the production of knowledge from the past are “selected from the large range of possible choices by individuals who acted in light of their own ideologies, conscious and unconscious” (1989:9). Every source I read had similar concerns, but it seems important to repeat to those privileged enough to determine the identities of themselves and others that this discipline, like many others, was “built on the historically constructed divide between the West and the non-West” (Abu-Lughod 1991: 139).

Despite the relative ease of acknowledging individual biases, it is also important to note that the origin of museum studies stemmed from Romantic notions of projecting our desires through exhibition. Not only are they representative of an ideological personal identity, they are also forms of cultural production. According to Fred Myers, “What was collected, selected, and exhibited constructs a framework for the representation of people, their culture, their history” (38). The use of primitivism as a form of power to producing and sustaining a distinct Western identity has come at a detrimental cost to marginalized communities. Critics have argued that exhibitions subject others to representative “traps” and has power over their identities; if they are to continue using indigenous artifacts, natives should have the option of creating a production of value for themselves. We must also learn to look beyond the confines of “a hierarchy in the making,” of appropriation- of “two distinctly defined groups with no relation to the other” (Myers 2008: 44) because the subject realizes that this apparently alien other is in fact a product of itself, created as a mirror by means of which the subject might further his or her own self-awareness” (Myers 2008: 21). These identities are created through sustained social performances which become legitimized over time through repetition In terms of material culture, “the culture gives rise to and from the material. Thus, material and visual cultures embody strategies of communication that may be articulated and mediated through shared cultural codes” (Hodos 2010: 19).

While Scheper-Hughes wrote “The Primacy of the Ethical: Propositions for a Militant Anthropology” for anthropologists to become more ethically grounded and constantly questions, “What makes anthropology and anthropologists exempt from the human responsibility to take an ethical (and even a political) stand on the working out of historical events as we are privileged to witness them?” (1995: 411), it ties with Abu-Lughod's argument especially because they both criticize the lack of action as “a lapse in moral courage by those empowered to protect the well-being of the social body...” (Scheper-Hughes 1995: 410) and explain that “anthropologists as witnesses are accountable for what they see and what they fail to see, how they act and how they fail to act in critical situations” (Scheper-Hughes 1995: 419). Myers notes that, “Historically, it has been the poor, the mad, children, animals, and the “lower” order of humankind who are revealed to by being exposed to view,” (49) in which we only have ourselves to blame. This meaning is created and ascribed from ourselves to ourselves. I believe this to be especially true with human remains displayed in museums; as with the popularity of “slumming” in the early twentieth century, our fascination with human remains calls into question the ethical and moral obligations we must afford one another. This “social pornography” (Kirsheblatt-Gimblett 1991: 49)- the private made public, “generates a voyeuristic excitement...in a convergence of moral adventure, social exploration, and sensation seeking, the inner city is constructed as a socially

distant but physically proximate exotic-and erotic- territory” (Kimblatt-Gimblett 1991b: 413). Although we prize and exoticize the remains of Native Americans, we flaunt our social power by both offering and denying them a pedestal in death which we deny to them in life. As Westerners, we praise ourselves in life as we do to marginalized communities in death and yet, there is never an issue when it comes to our bodies being dug up and subsequently placed in a museum. As archaeologists, as anthropologists, as curators, as academics, as human beings, in our pursuit of higher knowledge, we cannot forget that we are tethered to society and our responsibility lies not just with ourselves but with the wider public as well. We owe due diligence to both the living and the dead, animate and inanimate objects, to those we perceive as self and other.

Again, I believe this responsibility is applicable to everyone involved, more so for those with an anthropological background but this is not my biggest issue with the discipline. Understandably, a discussion must be facilitated for people to acknowledge there is a problem and my sources have excepted the blame for their predecessor's mistakes and have brought up valid points that could impact how we see material cultures, especially those from marginalized communities through time but there appears to be no progress. This topic should be handled with care; however, it is infuriating to watch the lack of progress in the things that appear straightforward. Understandably, there are political, legal, and financial limitations but as Pearce mentioned, time is moving fast. What we consider as the incontrovertible truth may not be so in the future. Ideas change, people change, as we've seen from the various theories presented since the discipline's creation. How we perceived ourselves in the past is no longer how we see ourselves in the present and I imagine that it will not be the same in the future. The complications surrounding modern national identity, repatriation, and the culture of display will be difficult to resolve but if we continue to endlessly argue over old problems, our exploration and acceptance of identities will become a burden.

On the other hand, without the application of social power and symbolic capital, what will become of museums and the artifacts that lie within? There is an expectation that once out of the ground, there is a brief period where only a small group of people come in contact with them before they are relocated to a more secure facility. By constantly restricting access, these objects gain immediate status as venerated objects because of where they are placed, how they are handled, and who is able to work with them” (Hurcombe 2014: 36-37). The concept of value changes from an individual, to a local, to a national basis and yet, artifacts are not just mere objects but physical expressions of “people’s needs, capabilities, and aspirations” (Hurcombe 2014: 3). We use them to build social personae. We use them to see people in their social contexts. We also use them to create new meaning and value to our everchanging society. That is why we must be cautious of taking artifacts out of their original contexts and imbuing them with so much cultural meaning that they become "dense”. According to Weiner, this “denseness accrues through an object's association with its owner's fame, ancestral histories, secrecy, sacredness, and aesthetic and economic values” (9). Once this occurs, “people covet them as prized collectibles, “art,” or ancestral relics” (Weiner 2008:9). Rare objects are also more highly prized because they cannot be replaced. Especially in a museum culture system, they lose ethnicity and cultural value after they are assigned new meaning due to our blurring of the boundary between high and low culture with our attempts at turning commodities into inalienable possessions (Myer 2014: 10).

Despite the loss of cultural value once they enter a museum, they are bestowed with a different sort of value by visitors, who would not go out of their way to see something meaningless. Hurcombe states that because people, as well as objects and material culture, are in a constant state of flux, they have the ability to “reinforce, reinvent, and renegotiate social relationships between people” (103). Thus, we should try to move away from the framework of objects as cultures to objects as the material remains of human activity (Hurcombe 2014: 99). Despite the best efforts of capitalism, these artifacts “offer value that cannot be reduced to economics” (Myer 2014: 12).

The theoretical framework presented by other academics already addresses why material culture and museum studies is important for things like identity formation, but it does not seem like they have any viable solutions ready for implementation because they are focused on controlling the damage caused by our predecessors. Like my sources, I agree with using Bourdieu as a modern precursor to understanding these fields to better educate ourselves and our audiences but I disagree with the pace with which we are considering our options. This is a complex topic with centuries worth of problematic thinking that was appropriate for the time and we are on the right track of understanding why it was wrong and trying to rectify our mistakes, but the world is rapidly changing and without immediate action, these mistakes could cause more harm.

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Privy to Their Secrets: A Discussion of Fetal Remains from a New York Privy

Key Words: Archaeological, Burial Patterns, Children, Historical Approach

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Introduction

During the excavation of a privy shaft in upstate New York, archaeologists discovered the remains of a 36-week-old fetus. An unusual archaeological find, this discovery led to discussions of 19th century America and the experience of both women and children during this time. Though prominent players in society, conceptions of children vary in different cultures and time periods: the way American society conceives of children is vastly different today than in the early 1800's. The literature on children in the archaeological record is scarce due to minimal data and the difficulty of finding indicators of children and their value. Potential sources of information concerning the value and conceptualization of children include artifacts, primary historical documents, and burial patterns, each of which give different information on the function and status of children in society. Burial patterns provide an opportunity to understand the lives, behaviors, and identity of children, specifically how they were valued and conceptualized by their families and society and insight into the choices of their mothers. Through burials, child behavior can be examined in a thought-provoking way, giving archaeologists an opportunity to explore all facets of life and identity.

The excavation of the privy represented one such opportunity, as the fetal remains in the privy was surrounded by domestic, personal, and food artifacts. Excavated from a late 1800 privy shaft in a town filled with textile workers, these remains provide insight into the lives and choices of working-class families. This context raises questions about how the circumstances of women at the time might lead to placing a fetus in a privy. Additionally, uncovering this skeleton provides a unique path to understanding how children and fetuses were visualized by their society and families: how did working class Americans conceptualize children in the early 1800's?

In this paper, I will focus on the lives and identity of children during the late 1800's in America and how they were conceptualized by their culture. The history of the town itself is integral to this work, as Cohoes exemplifies an industrialized town of the late 1800's, where children's labor in factories ties into their value. The town of Cohoes offered hundreds of jobs and significant housing for families, creating an environment of working-class individuals. In a working class society, access to proper burials and expensive ones were out of reach for these inhabitants of Cohoes, which may account for the unusual placement of these remains. This paper analyzes firstly the history of women in the specific town where the remains were discovered, working class women, sexuality, and reproductive rights. Next, it moves into

children, looking at their experience in the workforce and the relationships between child and parent. Looking at both women and children will help give broader social context to these remains and a better understanding of the circumstances that led to such a burial.

Theoretical Foundations

To approach the analysis of the fetal remains, gender theory and childhood theory were employed. In this unusual burial of fetal remains, the conceptualization of both children and women during the 19th century are at play and tie heavily into the choices and opportunities given to these groups. Children and women were previously marginalized in literature and only recently have historians and archaeologists begun to study them in depth (Agarwal and Glencross 2011).

Gender theory, the founding theory of childhood studies, contributes to the framing of this archaeological discovery. The status of women, their rights and options in the late 1800's, and expectations surrounding motherhood and womanhood would have had an impact on decisions like the one that led to the unusual placement of these fetal remains. Early anthropologists treated women as invisible in the historical record, ignoring their position in society until the rise of feminist movements in the 1970's, which altered this research bias (Mascia-Lees and Black 2000). The rise of feminist anthropologists and historians aided this movement, allowing for past women to be accurately represented in the archaeological record (Rosaldo 1974). Perspectives shifted at this time away from treating women as a male counterpart to understanding their individuality, agency, and status in culture (Reiter 1975).

The study of childhood, previously imbedded in gender theory, progressed with the realization of children as active agents in history (Lewis 2007). As researchers gave more attention to the status and agency of gender in culture, the concept of age arose with it, leading to a more attentive look into age as it pertains to identity and a focus on childhood as a distinct category. Previously, the literature on childhood portrayed children as invisible characters with little agency, valued little by their parents and expected to perform as adults in society (Aries 1960). As archaeology progressed, a debate emerged questioning the truth of this portrayal. In the 1970's, archaeologists began to broach a different understanding of children and challenged past understandings of childhood: rather than a stagnant stage in life, childhood came alive and further research and showed a deep value of children, seen predominantly in burials and coming of age ceremonies (De Mause 1974; Shorter 1976). The progression of gender theory in the 1990s impacted childhood theory and studies, with a specific focus on archaeological evidence of children (Lillehammer 1989). The value of children is called into question in such studies: is there a stark contrast between the conceptualization of children today as compared with previous years? Many archaeologists in the 1990's argued otherwise, stating that parents had a deep connection to their children, primarily studying burials and texts to understand how parents, families, and societies viewed their own children (De Mause 1974; Shorter 1976; Lillehammer 1989).

In past research, fetal remains from privies have been examined in terms of infanticide, abortion, and stillbirth/miscarriage, tying heavily into gender theory on the rights of women at that time. Thomas Crist's (2005) article looked at the skeletal remains of two full term neonate

and one fetus discovered during the excavation of New York City's Five Point district, in the context of a brothel. Crist employed gender theory to examine the status and viewpoint of the mother in such a situation: what were her options in this case, and what were some possible explanations for the choices of the mother? In this specific case, Crist explored the status of lower class women working as prostitutes and possible answers to the unusual burial context; he answered such questions through an analysis of the laws governing reproductive health and women's rights in this time period. Additionally, he discussed abortion and prostitution. He explored the impact of socioeconomic status and acknowledged that these problems were more impactful in the lives of working-class women than upper class women. Crist discussed the role of sexuality for these women and how a fear of women's perceived promiscuity led to abortion and infanticide.

Sharon Burston (1982) discussed the skeletal remains of one neonate and one fetus discovered in a privy during the excavation of Head House Square in Philadelphia. The remains existed in a limited archaeological context as the remains had been transferred from another area to fill in the abandoned privy and had no connection to the lot in which it was found. Here, Burstein also discussed the remains in terms of women's rights and opportunities during the 1800's, including abortion, contraception and reproductive rights. Her article looked at the status of women and the historical context surrounding the remains, concentrating on the role of religion, burial patterns, and potential motives that tied into this unusual deposition.

John Mccarthy and Nicole Kirby (1997) represent the third and final example of published literature on fetal remains discovered in a privy. Their piece looked at a 6-month-old fetus discovered in a privy at the Bridgewater site in Minneapolis. These remains were discovered in connection with a saloon, though the context was similar to the Head House Square as the site was ill defined. Again, the remains were connected to the social connotations of a saloon and the history of reproductive rights in America.

Previous literature discussed fetal remains in terms of women's rights and reproductive history. To understand the fetal remains discovered in Cohoes, this paper will look at the background of women and reproductive rights in the 1800s as well as push the analysis further into the experience of children in this time period. The remains discovered on Sargent Street provide an opportunity to take a closer look at the child and how the view of children impacted this burial.

Historical Background

The fetal remains were discovered in Cohoes, New York, a town rich in the history of working-class individuals, industrialization, and capitalism. Cohoes was a farming community until the 1800s when the impact of industrialization led to the formation of the Cohoes Company, transforming the small town into a manufacturing community. The town was situated next to a water source which was used by early inhabitants to create a grist mill, representing one of the first examples of industrialization in Cohoes. Early influences of industrialization attracted capitalists who stimulated the towns industry and economy with the settlement of companies and industries in Cohoes (Munsell 1877). The town progressed in industrial ventures and shaped the population into a working-class body. Specifically, the town supported textile

mills that employed a majority of the inhabitants, including women, who played a large part in the textile mill industry. Textile mills included cotton mills and knitting mills, such as Harmony Mills, which represented the largest cotton mill of its time and was known for the production of calico and muslin (Munsell 1877). Women comprised around 60-70% of employees in the textile mills, even supporting immigrants from Ireland and Canada who flocked to Cohoes seeking employment in the textile mills (Sargent St., Personal Communication 2019). Though the town in suffered a brief depression in the early 1800's, the Civil War stimulated the economy and fostered the population: the war invigorated the need for cotton and wool, provided to the war front by textile mills. Not only did the war cause rapid growth in terms of industrialization, it nearly doubled the population by the late 1860s.

The house associated with the privy was located in the north half of a large working-class neighborhood that lined the streets west of the Cohoes Company Canal. The dwelling was built by 1866 and inhabited by two widows, one of whom raised her 5 children in the home. These women also had two teenage daughters and worked at the textile mills during their time in the house, as did their daughters.

Women

Working Class Women

The status of the mother, whether she played a part in the deposition of the remains or not, influenced her choices and options during her pregnancy and/or birth. In a working-class town, where the local mills employed a majority of the inhabitants, the rights of working-class women would have applied to the mother of this specific fetus. The 1800's marked a period of change for women in terms of work and family life; the Industrial Revolution, heavily influenced by capitalist ideology, altered not only the workforce, but gender roles and family life, with the development of technology increasing life expectancy and decreasing family size (Dublin 1994).

In particular, the development of textile mills gave women an opportunity to join the workforce and alter their gender role in society; paid labor, previously assigned mainly to men, was now offered to women, though on a much smaller scale. Gender roles pressured women to work in the production of clothes and women transferred this work from the domestic sphere to the textile mills (Pinchbeck 1985). Entering into the workforce marked a change in the way women perceived themselves: women began to question their traditional role in the home and desired work outside of motherhood. Thomas Dublin, in his book, *The Lowell Mills* commented, “[t]hat they came to challenge employer paternalism was a direct consequence of the increasing opportunities offered them in these years... Mills both exploited and liberated women” (Dublin 1994). Despite progress in women's working rights, there was still concern and critique surrounding women who worked, specifically by progressive movement (Weiner 2016). To justify women's work, Progressive ideals introduced the concept of work preparing single women for future domestic roles (Weiner 2016); even though women were partially liberated in their labor, social connotations surrounding this labor remained stuck in gender roles of previous years.

This new experience of labor was mostly limited to white women: immigrant women and minority women inhabited the labor force for many years before whites, and dealt with even

more social stigma (Lamphere 1987). Their experience included racism, poverty and alternative social stigmas. Few at the time worried about the mothering status of immigrant or minority women, the focus rather was on white women who chose to work. Though we are unsure of the mother of this child, it is important to understand the different impact that race and immigrant status has on the social pressures for women during this time period and place.

Shifting gender roles impacted both women and their families in 19th century America. The development of textile mills encouraged families to leave their farms and congregate around the factories which led to the creation of cities, such developments impacted the family, as the change in space supported a smaller family rather than a large one. Historians debate the impact this had on child life: some argue that children represented an asset on farms which did not transfer to the city, as young children performed less work in the mills and instead represented a mouth to feed (Reiss 1974). Other historians argue that working class children participated heavily in the factory work force and represented a valuable asset in cities as well (Casebeer 2011).

Though home on Sargent Street housed two widows, working class women represented both married and single women. Many men and husbands died in the Civil War, making it necessary for women and mothers to enter the workforce as the main breadwinners of the family; one such example was the Maltese family in New York City, whose father died during the war, leaving his widow and her two daughters to work in the local textile mills to support their family financially (DeVault 2013). Desperate times placed many women in the workforce, yet once they were given this opportunity, they were loath to return to their gendered role as exclusively mothers. The financial responsibility of several children encouraged these mothers to remain in the workforce and potentially influenced their decision to limit their births.

The women of this home on Sargent Street, the two widows and their two teenage daughters, represented working class women with the responsibility of both motherhood and financial providers. This entrance into the workforce for women in the United States marked a significant social change and a difference in the role of women in society. Gender roles shifted and allowed more freedom for women, with new technologies impacting the control over family size (Pinchbeck 1985).

Sexuality/Protestant Influence

Sexuality in the 19th century is often described as repressive and has its roots in Puritan belief systems; as such, the sexuality of both men and women were often scrutinized and criticized if seen as anything but utilitarian. Puritanical traditions rooted in self-control encouraged sexuality that fulfilled the purpose of sex, namely, to reproduce. Those who migrated from Europe to America brought religious ideals shaped by the Protestant Reformation concerning concepts of sexuality. Such ideals often including a distinction between proper sexual relations, inside marriage, and unacceptable ones, such as sex outside of marriage and sex for reasons other than reproduction (Brodie 1997). Men emphasized the chastity of women to confirm the legitimacy of their own children, putting special focus on women to remain loyal to their partners before and during marriage (Brodie 1997). Brodie commented on this relationship between sex and reproduction, stating, “Americans had to cope with the implications of a

separation between sexuality and reproduction. The promise was liberating yet disquieting. To some it was a religious issue. Did not God condemn such a separation?" (Brodie 1997,88). This accepted form of sexuality, purely utilitarian, assumed both parties participating in sex would be married; any form of relations outside of marriage was severely critiqued, both socially and legally. Many women employed abortion and contraception to conceal an illicit relationship, such as adultery or fornication, and infanticide represented perhaps the last attempt to conceal a socially unacceptable relationship (Engelman 2011).

During the late 1700s and early 1800s, Enlightenment views pushed society to focus more on individuals and gave more room for pleasure in sexuality, shifting traditional societal views on marital relations. However, while this resulted in an emphasis on love within marriage and choice in picking partners, similar social disapproval remained in terms of illegitimate relationships. Society discriminated against women in particular for indulging in societal unacceptable relationships.

Adultery represented an illicit relationship that was punishable by the Church and the law. Such punishments ranged from death, to paying fines, or enduring whipping; Adultery often led to divorce, separation, violence, and public shame. By the 20th century, social stigmas remained and adultery led to "divorce, social ostracism, and a loss of custody over her children" (Freedman 1982, 82). Fornication, the term used to describe sex outside of marriage, also had severe consequences in the 19th century. Emilio and Freedman commented on the consequences of fornication, stating, "Fornication carried heavy penalties, including fines, whipping, or both... Throughout New England the find of nine lashes awaited both parents of a child born too soon after marriage" (Freedman 1982, 22). Women who became pregnant as a result from such a relationship often feared the social stigma and burden of raising an illegitimate child and would commit infanticide or abortion. Performance of such actions led to a concealment of the remains, as the law convicted mothers as guilty of murder if infant remains were discovered (Crist 2005). One such example was Elizabeth Emerson, an unwed mother living with her parents. Emerson killed her child and buried it in her garden in an effort to conceal her child resulting from a socially unacceptable relationship (Freedman 1982). Examples such as these, which mirror the context on Sargent Street, give more insight into possible explanations surrounding the concealment of a fetus or infant body.

Reproductive History in the United States

Women in 19th century America had limited access to birth control. The impact of industrialization altered gender roles and removed women from their exclusive role as mother, yet still prevented the restriction of family size. As previously discussed, society promoted sexuality as purely utilitarian for women and any engagement of sex without the motivation of children was shameful, tying into the development of reproductive control. Brodie related the comments of a New England doctor, who stated, "-the New England Family,' stated, "The "arts of prevention' which are also being extensively employed are a far more dangerous foe, not only to the family, but to the virtue and the purity of the community" (Brodie 1997,98). This quote illustrates the societal outlook on birth control and aptly demonstrates societal reaction to women who performed control over their family size: to conceal the use of birth control reflects society's views and approval of such actions. Prior to modern contraception technology,

abstinence and withdrawal represented the most common forms of birth control, though vaginal sponges and douches developed in America in the 19th century as a form of birth control that women had power over (Engelman 2011). However, these methods of birth control and attempts to limit family size were unreliable and often resulted in pregnancy, leading mothers to seek out abortion or infanticide.

Family size declined 50% from 1800 to 1900, with historians citing the emergence of women from the exclusive role as mother and into a more authoritative figure in the family (Engelman 2011). Society viewed controlling family size as negative and women often concealed their use of birth control and aborted their children after becoming pregnant. Legalization of birth control in the 1870 altered family life, motherhood, and conceptualizations of children, however, this legalization likely did not have significant impact on the choices of the mother in this specific context, which likely occurred in the late 1860s.

Women employed abortion, induced miscarriages, and infanticide when they did not want their child. In early months of pregnancy, women often used drugs and herbs to end their pregnancy and took more interventional measures when such medication was unsuccessful (Brodie 1997). Infanticide in American dates back to the 1600's and often resulted from illicit relationships. In legal terms, there is often an, "association between infanticide and illegitimacy." (Kellett 1992), and the main agents in such examples were often single and widowed women (Swartz and Isser 2000). Common motives included bastardy, and, as Hoffer and Hull stated, "Inleonicide was a deliberate form of delayed abortion. It involved concealment and probably was the most common among poor, unwed mothers" (Hoffer and Hull 1981, 130). The context of a child found in a privy as a result of infanticide is not unheard of as the privy represented an ideal hiding spot for a mother to conceal her crime. One such example was Ann Trabern, a working-class girl who threw her newborn into a privy in the late 1600's and was sentenced to death (Hoffer and Hull 1981). Often, women blamed accidental death, such as stillbirth or miscarriage for the placement of the remains in a privy and argued that the child "fell from them when they sat upon the vault and they did not know or were too weak to save the infant." (Hoffer and Hull 1981, 70) One such woman, Ann Jones, argued that she was unaware of her labor when her bastard son fell into the privy vault. Examples such as these depict the privy as a common place to deposit the remains of a child killed by its mother, and potentially act as an explanation for the remains discovered at Sargent Street.

The historic record of abortion is muddled and lacking in data, as much evidence of abortions has been destroyed or kept concealed; hiding an abortion and any information pertaining to it reflects the social and legal consequences of the 19th century. The majority of primary documents on abortion come from legal cases, when law enforcement caught abortionists performing illegal acts, or when the mother passed away. Engelman, in his book, *A History of the Birth Control Movement in America*, stated, "...most poor and working class women had to resort to inferior birth control and disreputable and unsafe abortion providers." (Engleman 2011, 18). In the 19th century, many women would attempt to perform an abortion on themselves or employ the assistance of a midwife or doctor illegally; urban women in particular accessed 'female physicians,' the colloquial term for abortionist. Brodie, in her book, *"Contraception and Abortion in 19th Century America,"* stated, "In the cities of New England and of the Middle Atlantic states, women could find a variety of offices, clinics, and

boardinghouses offering lying-in services and illicit abortions” (Brodie 1997, 228).

Women often dealt with other reproductive struggles, such as miscarriage and stillbirth. Data on stillbirth burials is scarce: the legal responsibility of recording the dead was not established until the mid 20th century, resulting in a lack of data on fetal mortality rates and burial records (Woods 2009; Mooney 1994). Sharon Burston looked at stillbirth burials in a town where fetal remains were discovered, looking to see if mothers often buried their children (Burston 1983). The results showed that many parents in from the 1600s leading into the 1800s did bury their children, though occasionally in unmarked graves. Such burials reflect the attachment of many parents to their newborn/fetus: parents often cared for their children. Romola Davenport, in her work, “The Relationship between Stillbirth and Early Neonatal Mortality: Evidence from Eighteenth Century London,” also looked at stillbirth burials and discovered that parents often buried their stillbirth children (Davenport 2010). The number of stillbirth burials occurring around the time period of the fetal remains at Cohoes suggest that many parents did value their children emotionally and buried them to reflect such value. However, contradictory evidence exists Shannon Witcombe's recent book (Witcombe 2018) narrates mixed experiences of miscarriage and stillbirth, as some women do not conceptualize their fetus as a child and have little emotional connection to miscarriages, while some have a strong connection to it. In future research, I hope to look at the burial records in Cohoes, NY and gain a clearer understanding of the context in which the remains were deposited.

Children

19th Century Children

The 19th century, with the development of industrialization in America, changed the perception and lifestyle of children, impacting their work, education, and family life. Children represented a vital aspect of the American labor force: mines employed 14,000 children legally in the late 18th century and 10,000 illegally, illustrating the usefulness of children in American labor. Early labor reform, though not outlawing child labor, differed from state to state, with some states enacting education laws to go along with labor, or decreasing the workday of children from 12 hours to 10 (Abbott 1908). Eventually, Connecticut and Massachusetts enacted laws that prohibited children under 9 to work in the mines, though likely this was often ignored to meet the needs of the family. By 1880, 20% of all children in America were employed (Abbott 1908). Through such data, it is clear that 19th century children held value in terms of labor; they made up a large part of the labor force and assisted their families in difficult times.

Ideals on children shifted in the 19th century, with the impact of European Enlightenment ideals shifting focus to the individual and the proper raising of children, with authors like John Locke and Rousseau showing the effort that society put into caring for children. Such conceptions of childhood transferred to America, impacting the treatment of children. Mortality rates of children stagnated, remaining as they had for the past several centuries and influencing the attachment of parents to their children.

Parents and Children

Different classes had variable respective relationships to their children, yet the historical record shows a strong relationship between parents and children in every class. When referencing the pet names and fondness with which mothers describe their children, one scholar wrote, "Is such detailed description of children's behavior and the many expressions of affection that fill these writings attest to the richly textured emotional bonds between middle-class women and their children" (Dye and Smith 1986, 334). One mother, when discussing the recent death of her infant child, wrote, "I seem to have lost all interest in the future and can enjoy my children only from hour to hour. I feel as if my lost darling were drawing me to her--as I controlled her life before birth so does she me now" (Dye and Smith 1986, 333). Stories such as these, though from higher classes rather than lower, shows a strong bond between mother and child.

Working class families who were unable to feed or house their children often sent them to poorhouses as a way to provide for their children and relieve a financial burden. Children born as a result of intimate relationships were often placed in poorhouses to avoid the shame that accompanied their birth, reflecting social stigmas surrounding children born outside of wedlock and the treatment of such children. The government and social reforms instituted poor houses with good intentions, namely, to, "educate and redeem destitute children" (Katz 1998, 103). Children were often separated from their family in an attempt to remove the child from an undesirable family situation. In the historical context surrounding the fetal remains, placing children in poorhouses was a viable option for mothers who were impregnated under financial or social pressure, though the treatment of children was unsuitable in such establishments. By the late 1800's, the welfare system recognized the weakness in the poorhouse system and the treatment of children which led to changes in the social welfare programs with an emphasis on saving the children from poorhouses (Katz 1998). The status of poorhouses shows the impact that social stigmas had on mothers as well as the financial difficulty that led mothers to place their children in such establishments.

The relationship between mother and fetus evolved in the late 19th century with the development of embryology and the expansion of knowledge surrounding the fetus. Such developments emerged from the progressive era movement which encouraged social activism to combat issues that arose with industrialization, immigration, and urbanization. Technological advances accompanied social change and gave mothers a deeper, scientific look into the status of their unborn child. Within the progressive movement, the social role of motherhood was emphasized, specifically for middle class women; working class women were targeted as unable to fulfill their role and duty as mother properly which led to middle class women imposing social mothering upon these working-class mothers. Social mothering focused on the perceived problems with working class families and mothers: mothers refused to fulfill their exclusive role as mothers and worked, while their children participated in work as well. Part of this concern for motherhood and children stemmed from perspectives on children during the 19th century. The influence of Calvinism and romanticism changed perceptions of childhood in the 19th century, leading mothers to view their children as innocent and to look to preserve their time as children. Lengthening of childhood occurs in the 19th century for middle class children, yet working class children joined the workforce early in an effort to assist their families economically (Broder 2002). The contrast between middle class children and working-class children was significant

and reflected the social luxuries that economically stable families were able to produce for their children. Child welfare reformers represented societal concern for children that appreciated the age and vulnerability of this age group; this is not to say that working class families did not associate with these ideals, but rather that they did not have the luxury of treating their children with such appreciation. Broder commented on motherhood for working class women, stating, "[t]he need for women to work, coupled with the low wages of women's work; the precariousness of the family economy, particularly for widowed, deserted, and single women with children; the stigma of illegitimacy and the shortage of appropriate childcare all pointed to the increased likelihood of child abandonment or abuse" (Broder 2002, 158). Motherhood for the working class differed from upper classes: economic deprivations prevented lower class women from giving their children the same social experience as upper-class women.

The need for fetal bodies that emerged in the late 19th and early 20th centuries in response to embryology studies and the desire to understand unborn children also impacted working class mothers. Fetal bodies were sought out by doctors and sourced both ethically and unethically; doctors often procured such skeletons from lower class and racially marginalized women (Muller and Butler 2018). Such procurement reflects how the status of a mother can influence the burial of a stillbirth. The structural violence perpetrated on these women prevented them from giving their child a proper burial and instead used their status against them, pressuring them into giving their child to science rather than burying them. Embryonic collectors sourced their bodies through doctors who dealt with fetuses; doctors would take fetal remains from stillbirth, miscarriages, and abortions to supply such collectors. Muller and Butler commented on this supply and demand, stating, "procedure-related pregnancy terminations, or therapeutic abortions, provided a significant source of fetal remains" (Muller and Butler 2018, 12). Women who previously would have given their child a burial or disposed of the child themselves were prevented from such with the creation of laws in the early 20th century that prohibited personal burial of stillbirths and miscarriages. Muller and Butler stated, "By the early 20th century, laws required the reporting and proper disposal of miscarriages, stillbirths, and infants. This provided ample opportunity for physicians, and then embryologists, anatomists, and anthropologists to obtain their specimens' from miscarriages, stillbirths, and deceased infants" (Muller and Butler 2018, Morgan 2009; Wilson 2015). Such laws encouraged families to turn their stillbirths over to the doctor, assuming that the doctor would bury it. Often unknown to the parents, the doctors would supply the stillborn to embryologists; there is little to no evidence of informed consent. Muller and Butler commented on this, stating, "Records from anatomical collections (e.g., the W. Montague Cobb Skeletal Collection) indicate that families turned the bodies of infants and stillbirths over for disposal by the state, county, or district. However, they do not indicate that women were aware that the remains of their infants and fetuses were to be dissected, macerated, and kept in skeletal collection" (Muller and Butler 2018, 13). This quote illustrates the status of working-class women and their choices when it came to the burial and deposition of their deceased children.

The Excavation

The archaeological excavation of Sargent Street was completed by Hartgen Archaeology in September 2017, excavating seven trenches and two features using mechanical trenching. The two features were discovered in trench 6 and identified as privy structures. The first feature held

mostly domestic artifacts, architectural artifacts, and personal artifacts, with ceramics making up a majority of the artifacts found. This second feature, a privy vault, contained an array of artifacts used to date the construction. Two stratigraphic levels were identified in the second feature, the first being a layer of coal likely used the fill in the privy after abandonment and the second being a cultural bearing strata of night soil. Seven hundred and thirty-six artifacts were recovered from this particular privy vault, with the vast majority of cultural materials representing domestic artifacts that included kitchenwares and tablewares used for the consumption of food and drink. Archaeologists used the artifacts found to date the privy, dating the construction to during the Civil War Era and the abandonment to the late 1870s. The night soil was screened for artifacts, revealing a multitude of ceramics, pipe stems, etc; it was also in this layer that the skeletal remains were recovered.



Figure 1: South profile of privy after partial excavation.



Figure 2: 1885 Sanborn Fire Insurance map showing location of the privy.

After excavation, the remains were analyzed at SUNY New Paltz to determine the elements and the age of the fetus. The bones were laid out on inert polyethylene foam to prevent breakage and identified as a right femur, left tibia, right radius, and right humerus.



Figure 3: Anterior view of right humerus and right radius.



Figure 4: Anterior view of right femur and left tibia.

After the initial examination, the bones were measured to calculate the age of the fetus. Maximum diaphyseal lengths were used to estimate the age based on formulae published by Scheuer et al. (Scheuer et al 1980), which give an average age of the fetus based on the measurements of the bones. These formulas approximated the age of the fetus between 33-38 weeks. The mean age of the individual was between 35 and 36 weeks (Table 2). These ranges lead to two possibilities: firstly, on lower end of the range, the skeleton possibly represents an unborn developing fetus (approx. 33 weeks). This age would correspond better with the context of miscarriage, stillbirth, or abortion. Secondly, on the higher end of the range, (approx. 38 weeks) the fetus would be viewed as “full term” and possibly a neonate, which would imply the child died after its birth and potentially represents a case of infanticide.

Element	Measurement	Length
Right humerus*	Maximum width at distal extremity	14.14 mm
	Maximum diameter at midshaft	5.92 mm
	Maximum diaphyseal length	58.70 mm
Right radius	Maximum diaphyseal length	48.05 mm
	Maximum diameter at midshaft	4.13 mm
Left tibia	Maximum diaphyseal length	59.46 mm
	Maximum diameter at midshaft	6.47 mm
Right femur	Maximum diaphyseal length	69.38 mm
	Maximum diameter at midshaft	6.49 mm
	Maximum width at distal extremity	16.42 mm

Table 1. Measurements taken of remains based of description in Buikstra and Ubelaker (1994)

Element	Formula	Age estimate
Humerus	0.4585 (HUM) + 8.6563	35.57 ± 2.33 weeks
Radius	0.5850 (RAD) + 7.7100	35.82 ± 2.29 weeks
Tibia	0.4207 (TIB) + 11.4724	36.49 ± 2.12 weeks
Femur	0.3303 (FEM) + 13.5583	36.47 ± 2.08 weeks

Table 2. Age estimate in weeks

Discussion

The inhabitants of Sargent St., the two widows and their daughters, potentially represent the mother of the fetus and give insight into the experience of working-class women supporting their families during the late 1800s. It is unlikely we will ever uncover the specific context and agents in the deposition of the remains in this privy, however, knowing the context and individuals involved in this house gives some viable ideas. Previously considered exclusively mothers, the impact of industrialization opened up doors for women and allowed a gradual shift into the workforce; the time period in which the privy was active, 1850-1870, represents a period of transition, where women were just beginning to work and the beginnings of the women's suffrage movement. The Civil War, with the majority of men fighting, allowed women a place on the farm and forced them into intense manual labor as well as mothering children. This shift created a culture that discriminated against women who chose to work instead of pursuing motherhood; in a social context as this, it is clear how these social concepts surrounding motherhood and womanhood could have influenced the placement of these remains. The status of working-class women left these women with a perceived need to limit their family size; financial reasons motivated women to prevent the birth of children, as did the departure of women from their traditional role. Exploring the context and broader themes that influence the decisions of these women gives an opportunity to explore possible factors that influenced the placement of these remains.

Potentially, the remains represent abortion, infanticide, stillbirth, or miscarriage. Pregnancy resulting from an "illicit" relationship additionally influenced women, as both societal and legal consequences met women pregnant as a result of adultery or fornication. Abortion came with consequences as well which often resulted in the concealment of procedures and remains. Such societal and legal outlooks on abortion led to the concealment of abortions or infanticide; potentially, the remains found at Sargent Street fall into this category and represent a hidden abortion. Stillbirth represents a potential explanation for the placement of the fetal remains in the privy, with a mother depositing the remains of her child born dead in a convenient place. However, the emotional attachment to the child often leads to a burial, as mothers feel the loss of their children deeply and honor them with a burial in modern day. Minimal data on stillbirth in 19th century America includes both a deep emotional connection to stillbirths and infants and mothers without such connection. Without conclusive data, it is difficult to assume the emotional connection between this specific mother and fetus.

Many working-class parents in this time period, however, did have a deep relationship with their children and often grieved at stillbirths or infant death. Scholars have discussed the impact of mortality rates and found that mortality rates have little relation to burial patterns of upper class parents, but have a significant impact on lower class parents (Cannon and Cook

2015). This is not to say that lower class families did not have an emotional connection to them, but rather that their economic status could have impacted the manifestation of this connection because their children died more often. Mothers in the 19th century held a close relationship to their children despite high mortality rates: diaries and journal entries show a connection and closeness to children that evolved in the 19th century. In terms of the infant at Sargent Street, potentially the mother felt unable to experience a connection due to economic or societal pressures.

Though the assumption is often that the mother herself deposited the remains in the privy, it is possible that she had minimal or no involvement. Potential agents include other family members and medical persons; the father of the child could have deposited the remains and forced the mother into an abortion or infanticide, or perhaps other family members provided similar pressure. In a medical setting doctors and midwives often had the responsibility of depositing of the remains; ethically or unethically, a medical individual could have been tasked with depositing of the remains, to either conceal an illegal abortion or to dispose of a stillbirth.

Conclusion

The context of the fetal remains in the privy at Sargent Street will likely never be fully discovered and leaves a large question mark on the potential explanations. Despite the ambiguous nature of this archaeological context, the remains offer insight into the larger historical picture for working class women in 19th century America. The impact of social norms and legal systems influence the choices and options of working-class women: the consequences of puritanical, repressive sexuality led to discrimination against pregnancies that occurred out of adultery, fornication, or other seemingly illicit relationships. Working class women, specifically, felt both financial and social pressure; the changing ideologies surrounding working women shifted and placed women in both the domestic realm and the labor force, creating a contrasting outlook on where women belonged and how she related to her children. Working women employed both themselves and their children in the workforce and had not the luxury of creating a childhood environment that upper classes had access to. The status of a working-class woman in the 19th century impacted the way she related to her children.

Potential explanations for the deposit of remains at Sargent St. range from natural causes to interventions, from stillbirth to infanticide. Women reported mixed feelings on the relationship to their fetus during the 19th century: some felt a close connection to both their fetus and their infant, yet many did not recognize a stillbirth as a child yet and had little attachment. However, this case at Sargent Street does not represent the way in which mothers viewed their stillborn children, but the mammoth societal and financial issues that impacted their relationships with their children.

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Access to Proper Sanitation in the Okponglo Community: The Need for Public Toilets

Key Words: Ghana, Public Health, Safety, Waste Management

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Introduction

Personal background and purpose

The Boren Scholarship, a program focused on introducing Americans to less commonly taught languages, awarded me a yearlong scholarship to Ghana to study the language Twi. I spent twelve months in Ghana from August 2018 to August 2019 living and studying at the University of Ghana, Legon in Accra, Ghana. While there, I became involved with an NGO called Play and Learn Foundation (PAL). This NGO is a grassroots organization, primarily based in Okponglo, Bawaleshie and Legon. I was involved with writing project proposals, numerous reading literacy programs and home tutoring in Okponglo. Through tutoring in the community, I began building very close relationships with some of the children and their families. After gaining the trust of the girls' families, our tutoring relationship evolved into more of a mentorship or big sister relationship. I would attend birthday parties in the community and take the girls to see movies or go to the mall. Their mothers and older sisters (tried) teaching me how to make banku and jollof rice--which I quickly realized was more difficult than it looked (I'm looking at you, banku). If they finished their homework early, they would come to my hostel and have fun creating dance routines and doing makeovers.

These relationships became a significant part of my experience in Ghana. When I received the GAAP research scholarship from my school, I knew I wanted to work on a project that would be useful and impactful. I spoke with the director of PAL to see if he had any ideas for research projects that I could look into. He had recently conducted a National Health Insurance survey in Okponglo to register the residents for free national health care. One of the questions asked in the survey was "What facility would you like to see built in Okponglo?" Out of options such as a community center, library and public toilets, the overwhelming response was public toilets. It was important to me to choose a project that was chosen by the community, not by myself, so I began brainstorming what a research project concerning public toilets would look like.

After careful consultation with the director of PAL, local doctors and Okponglo community members, the research part of the project was complete. The long-term goal of this research is to present it to potential donors in order to raise enough money for public toilets to be installed in Okponglo. As this is an ongoing process, this paper only covers the initial research process, including interviews with local doctors and survey results from the residents

of Okponglo. It identifies the necessity of having access to proper, sanitary toilets and looks at some of the health and safety risks associated with not having access to a proper toilet.

Okponglo

Okponglo is a neighborhood in Accra, Ghana. It is situated between Legon, East Legon, Shiashie and La Bawaleshie. The surrounding neighborhoods are home to many middle and upper class residents. East Legon in particular is an increasingly popular neighborhood for wealthy families and booming businesses. Legon is home to the University of Ghana, Legon which enrolls around 40,000 students. Despite their affluent neighbors, Okponglo does not seem to share the same socioeconomic status as them. There are no official statistics or demographics recorded from Okponglo, and when asked about the population size of Okponglo, the residents did not have a specific number either. Answers ranged in size from a couple hundred to a couple thousand people.

Okponglo could potentially be categorized as an informal settlement. The neighborhood's layout starkly contrasts the well-planned streets, shops and homes of neighboring East Legon, Legon, La Bawaleshie and Shiashie (Figure 1) shows the approximate location and layout of Okponglo, Figure 2 shows the layout of Shiashie, Bawaleshie and East Legon). The indications that show a person is in Okponglo are the Okponglo tro-tro (bus) stop, Okponglo taxi rank and the Okponglo Junction, which is comprised of the La-Bawaleshie Road and Legon E Road intersection. The houses in the community range from cement structures, to wood and metal, to kiosks turned into homes. The main part of Okponglo is compact with many houses and shops close together. However, there is a large open area filled with trees and bushes where many residents live in make-shift housing. While there is no official data on the demographics of Okponglo residents, the community members have said that the majority of residents belong to the Ga-Adangbe ethnic group and a sizable portion of the population comes from surrounding African countries such as Côte d'Ivoire and Burkina Faso. There are also some Akan and Ewe families living in Okponglo, as well as people from multi-ethnic backgrounds, such as Ga and Akan. It should be noted that the original inhabitants of Accra are the Ga-Adangbe people, and the location of Okponglo today belongs to the Ga people, although others live there now as well. Many Okponglo residents work in the informal job sector. Some of these jobs include hawking (selling food and items to car passengers at stop lights), food vending and selling at the market. These, of course, are only a few of the many jobs that Okponglo residents engage in, and not all residents work in the informal economy. Once again, there is no official data or statistics to understand the employment positions of the entire community.

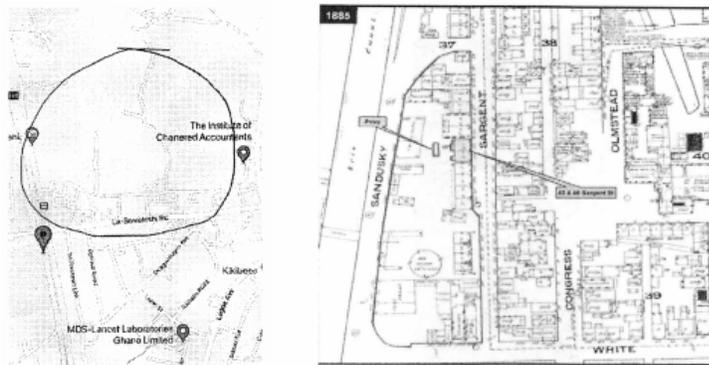


Figure 1 & 2. Maps of Okponglo

Methodology

My ethnographic research had, unintentionally, begun long before this research started. Through daily experiences in Okponglo, I observed and immersed myself in the community. This, in turn, gave me a strong foundation and background for when I officially began this project. My intermediate language background in Twi also made it easier to build trust and a relationship between myself and many of the Okponglo residents.

Qualitative research was the primary method used to collect data in this study. Through interviews with two Ghanaian doctors, I was able to understand the health-related risks related to a lack of access to proper toilets. To understand the residents' current situation regarding toilets, I created a survey questionnaire for them to fill out. A team of eight social work students from University of Ghana, five residents from Okponglo and myself went into Okponglo to find participants to fill out the surveys. We split into groups to cover ground quickly. Most residents in the community are fluent in Ga and Twi, so the Ghanaian students and Okponglo volunteers helped translate for the community members who weren't fully fluent in English. Involving Ghanaian locals in every step of this research project ensured that I gathered accurate data in an ethical and respectful way.

A total of 82 surveys were completed in paper form. I later uploaded this data on the computer in order to have the responses digitized. All questionnaire participants were told the purpose of the research and agreed to give their answers. Participants were chosen by going door to door in the neighborhood. One question on the survey asked the participants how many people were living in their household with the purpose of understanding how many people in that house had access to toilets. To ensure that we were not getting repeated household population numbers and to find an accurate number of how many people in total this survey represented, we tried to limit each household to one survey.

Limitations

The largest limitation of this research was the lack of available data on the Okponglo community. Not having previous data limited my ability to fully understand the composition of Okponglo. In addition, I cannot compare my research results to any previous work.

Understandably, there is some mistrust between the residents and NGOs who make large promises. While I was talking to one lady in the community about the project, she quickly let me know that she didn't think it would actually happen. She walked me to an area in the community where an international NGO had previously installed public toilets. These toilets were not installed properly and stopped working shortly after the NGO left. Now, they just sit around taking up space and reminding the community that once again, they've been let down.

This incident motivates me to materialize this project in a respectful, ethical and sustainable way. That being said, I fully acknowledge my own personal limitations. Being a white American will inevitably limit my capacity to fully understand the Okponglo community and its diverse cultures. Due to this limitation, I rely heavily on information and knowledge from local residents and other Ghanaians that have strong ties to the community.

Additionally, some of the survey participants indicated that they did not want to answer certain questions on the survey. That was completely fine with me, as their comfortability and trust was my number one concern. A question many people chose not to answer was the health related question as they did not want to disclose any health problems they faced. Therefore, not all questions have a 100% answer rate in the survey results.

Access to toilets in Ghana

Access to proper sanitation has been a pressing topic throughout the world, and in Ghana it is no different. A study funded by USAID that examined toilet use in Kumasi noted that only 23% of urban Ghanaians own a private toilet (WSUP 2019). The Ghana Statistical Services 2014 report, Ghana Living Standards Survey - Round 6 (GLSS 6) reported that 38.7% of all urban Ghanaian households use public toilets. Throughout Ghana, 18.8% of the population has no access to any toilet facilities--however this statistic becomes much higher when looking directly at certain rural regions. For example, in the rural savannah regions, 72.6% of the population does not have access to any type of toilets. This is sharply contrasted by the 7.4% of urban Ghanaian households that do not have toilet access (Nyarko 2014).

Toilet construction can be expensive and complicated in Ghana. Water and Sanitation for the Urban Poor (WSUP) estimate that it can cost anywhere from \$200 to \$1,000 (1,109 - 5,545 Ghana Cedis) which is far above the average monthly wage in Ghana (~\$46). In addition to the expensive price tag, it can be difficult to find one company that does everything from installation to plumbing. Many people end up having to contract multiple people to complete the job (WSUP 2019). These realities make having a private toilet a mere fantasy for many working class and rural Ghanaians.

Access to toilets in Okponglo

Okponglo does not have a nearby public toilet facility for the majority of its residents. Out of the 82 responses to the Okponglo survey, 30 participants stated that their home or compound has access to a private toilet, leaving 63.4% of respondents without access to a private toilet. Only eleven respondents said they had access to a public toilet, while 86.4% said they had no access to public toilets. Out of the people surveyed, 52.4% marked that they had no

access to a private toilet nor a public toilet. This statistic is alarming considering the GLSS 6 report indicates only 3% of Accra residents have no access to toilet facilities (Nyarko 2014).

For those who do not have access to any type of toilet or those who only have partial access to a toilet, the areas they use to relieve themselves are limited. When asked where they go to urinate and defecate, the vast majority answered, “the bush” or “refuse dump”. The bush, according to Okponglo residents, is what they call a bushy area in the community that many use to relieve themselves. The refuse dump is a common dumping ground in the community where people dispose of their garbage and sometimes dispose of their human waste (feces) as well. A couple responses indicated that they use their neighbor's private toilet when they can, but one person noted that they have to beg them in order to use it. Alternatively, one lady wrote that her household relieves themselves in polythene bags and then dispose of the bags with the rest of the garbage.

Having access to proper sanitation is a human right that every single Okponglo resident deserves. A little over 87% of all participants selected “yes” when asked if they would utilize the public toilets after they were installed. Around five percent selected “not sure/undecided” and 7.4% said they would not use them. The people who said they would not use them all had access to private toilets. Nevertheless, every person who participated in the survey questionnaire said “yes,” they believe installing public toilets in Okponglo would make a positive impact in the community.



Harms of not having access to a toilet

Health

The lack of access to a proper toilet comes with a long list of health and safety risks. I had the opportunity to speak with two Ghanaian medical doctors, one working locally in Accra and the other currently working in the United States. Dr. Gameli Aheto is a medical doctor who works at Korle Bu Teaching Hospital in Accra, Ghana. He thoroughly understands how important proper, sanitary toilets are to public health. Dr. Aheto explained the correlation between sanitation and disease spreading by saying,

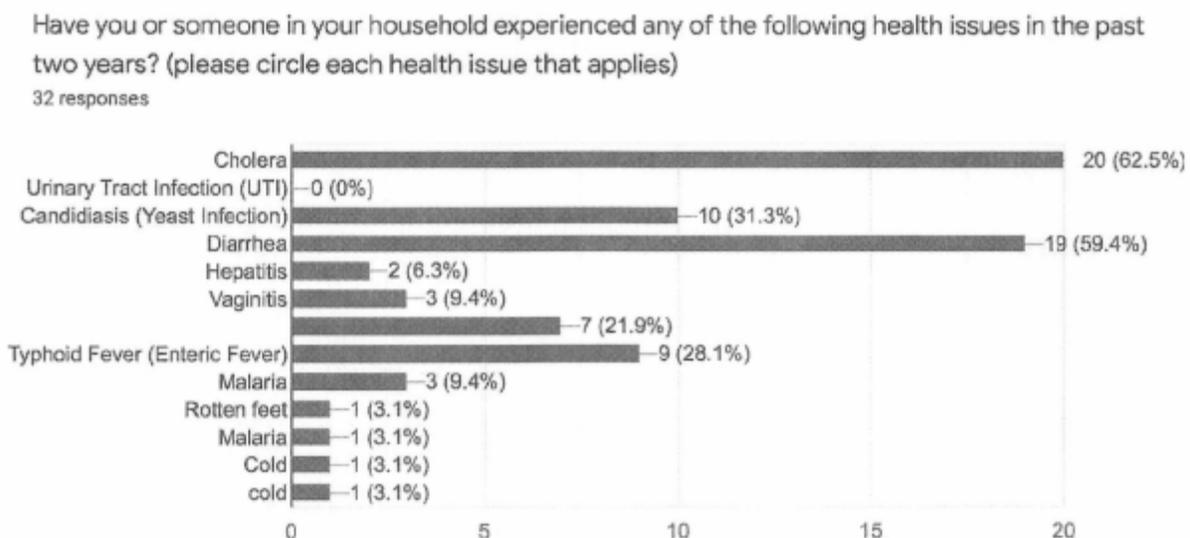
"Almost every parasite or bacteria that's transmitted from person to person is through the oral-fecal route. Access to clean toilets reduces the risk of you contracting an infection

through that. So, not having access to proper toilet facilities will put you at risk of any parasite, any bacteria that's transmitted through the oral-fecal route. Why? Because we do not know where the human excrete ends up when you do not have access to proper toilets. It could end up in the water bodies from which you drink, which is the main source of how people get their infections. It could also end up in the water bodies used in the preparation of meals for people and then sold to the general public. And so having access to proper toilet facilities, where there's a full chain from where you need to use the bathroom to the point where the final excretion is treated, processed or discarded is absolutely essential in keeping people away from parasitic and mycobacterial infections" (Aheto 2019).

He also stressed the importance of distinguishing between a sanitary toilet and an unsanitary toilet. If a toilet is not properly cleaned and maintained, it would then run the risk of spreading multiple parasites and infections (Aheto 2019).

Dr. Prince Samuel Nuamah is a medical doctor originally from Ghana, but is now practicing at Johns Hopkins University. Both he and Dr. Aheto identified cholera, helminthiasis (parasitic worms) and hepatitis being among some of the common health concerns regarding poor sanitation. Dr. Nuamah advises washing hands thoroughly before and after going to the bathroom and before cooking and eating to avoid contracting these infections. He also emphasized that it is important to avoid coming in contact with fecal matter (Nuamah 2019).

However, avoiding fecal matter can be difficult for the Okponglo residents who don't have access to a toilet. Some of the responses from the survey mentioned accidentally stepping in other people's fecal excretions and how relieving oneself in the bush is not hygienic--especially after it rains. The survey asked the participants to check the box of each health issue people in their household had in the past two years. Twenty respondents said they had cholera while nineteen said they had diarrhea. Other common answers included candidiasis and typhoid fever.



Safety

Numerous responses from Okponglo residents about safety issues they encountered went beyond the health risks. Over half of the residents said they have personally encountered a safety issue while relieving themselves in the bush or refuse dump. Some of the most common concerns were about snake bites, animal bites and insect bites. In fact, twenty-two separate answers specifically wrote about these issues. When asked what safety issues they have encounters, some of the answers stated:

“[1] Once saw a snake in the bushes.”

“A snake can bite a person easily while using the bush.”

“Snake bite and ant bite and parasitic] worms.”

“The place is also where rubbish is being disposed and so one can get cut from sharp objects such as glass, tins and others.”

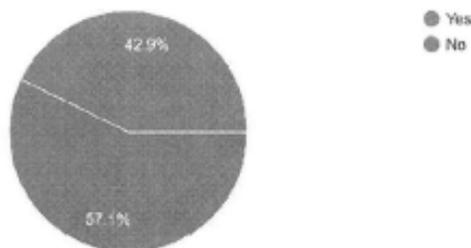
“Insect bites, likelihood of snake bites.”

Prone to animal bites.”

“Reptiles and broken bottles.”

Something so universal--going to the bathroom--has become a daily experience full of dread because there is no guarantee that they won't be attacked by a snake or another animal. These are the real-life fears that people have to live with. On top of fearing animal bites and cuts from broken bottles, women and children deal with even more safety concerns.

Are there any safety issues that you have encountered while using the above mentioned areas to go to the bathroom?
63 responses



Women and children

Both women and men emphasized the safety issues that specifically affect women and children. Among these safety issues were fears of rape, abduction and going to the bathroom in the bush at night. Multiple respondents noted the uncomfortableness of relieving themselves while men are in the bush or refuse dump at the same time. It is well known to the community that there is a group of men who smoke marijuana in the bushes as well. The presence of these men loitering and smoking was mentioned quite often in the survey responses. Women noted that some men would purposely look at their private areas while they were relieving themselves,

causing them to feel exposed and uncomfortable.
Some of the written responses from the survey include:

“Sometimes in the night when they want to go to private they are scared and afraid that someone will kidnap them or rape.”

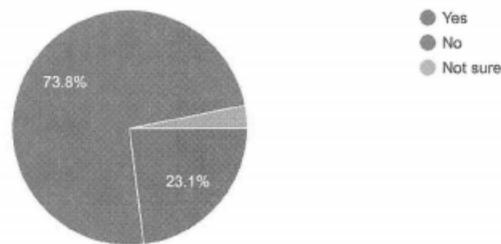
“Complaints of men watching them, smokers in the bush could harm them.’

“Women may be raped and kids abducted.”

“The women feel exposed as their lower part of their bodies are exposed and don't feel comfortable due to the presence of males.”

“Sometime[s] when you go to the bush or refuse dump some men will be spying [on] them.”

Are these areas safe for women and children to go to the bathroom during all hours of the day (including at night)?
65 responses



Conclusion

Okponglo's lack of access to proper toilets has long been a cause for concern in the Concen community. Being forced to relieve themselves in unsafe places such as the bush or the refuse dump has created many health issues and safety concerns--from Cholera to snake bites to rape. This thriving, dynamic community should not have to deal with these problems in one of Africa's most developed cities. There is absolutely no reason that public toilets cannot be properly installed in this neighborhood.

Installing public toilets in Okponglo will mostly eliminate the usage of the bush and refuse dump as a makeshift bathroom. In order to maintain the upkeep of these toilets, the toilet facility will most likely follow the example of the many other public toilets systems in Ghana, where it is pay per use. This will generate revenue to employ a person who'll collect the money and maintain the cleanliness of the bathrooms. However, the question arises of whether everyone can afford to pay the small fee each time they use the public toilet. To ensure the facility is accessible to all residents, a community meeting will be held with residents to discuss the logistics of the installation and upkeep of the public toilets.

It is imperative that the community members themselves stay at the center of this project, because no one knows a community's needs better than its residents. By taking steps to approach

sustainable development issues through an anthropological lens, the residents of the community become the overseers and decision makers, which in turn creates lasting solutions. Although this project is not yet complete, the process thus far has proven the importance of working alongside the local people, not above them. Furthermore, it highlights the necessity of access to proper sanitation--a right that all humans deserve.

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Exploring the Amazon Fake Review Economy

Key Words: China, Ethnography, Online Shopping

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Maybe you've received one before: a small note, tucked away in an Amazon package, with a message like "if you have any issues please contact our customer service" or "receive a free second product in exchange for your valuable feedback." Often small pieces of cardstock, they come with grammatical, syntactical, and punctuation errors, inviting you to scan a QR code, join a Facebook group or reach out to a certain email address. These notes are the entryway into the sprawling networks of Amazon vendors, intermediaries, and "reviewers" who have created an entire economy for fake Amazon reviews.

It is a somewhat well-documented fact that a large percentage of reviews on Amazon products are fake;¹ however, little attention is given to the who and how of those fake reviews. In this paper, I will employ autoethnography and netnography to describe how Amazon third-party sellers, intermediaries, and reviewers create a vast web of Facebook, Whatsapp, and Wechat groups to form the underground economy of fake Amazon reviews. This fragile economy is built on trust and word of mouth and bolstered by a diffuse community structure.

To understand the world of fake reviews, it's important to first understand how the majority of items for sale on Amazon work: in an effort to sell absolutely everything, early on Amazon opened up its website to third-party vendors -- that is, people who are otherwise unaffiliated with Amazon.com can post listings and sell items on the site. In 2006, Amazon began the Fulfilled by Amazon (FBA) program². FBA allows for third-party vendors to house their products in Amazon Warehouses and have logistics including packing and shipping handled by Amazon instead of by the individual seller. This innovation made selling on Amazon only a matter of having some minimal capital and a good understanding of a market. Most items on Amazon today are sold by FBA sellers. Having selected their product by using sites that provide analytics about selling trends, the sellers then order wholesale on Alibaba³ and ship to Amazon Warehouses.

The problem with this system then becomes that there could be 10 or 20 or 3000 people selling virtually the exact same mid-century modern plant stand with little variation. The average shopper is left swimming in a sea of listings for identical products and is unlikely to go past the first page of listings before they make their selection. This means that in order for FBA sellers to turn a profit, they must have their listing appear on the first page of search results for

¹ Although Amazon disputes this, claiming less than 1% of reviews are likely fake

² Kiri Masters, "Amazon Revolutionized Order Fulfillment, But This Company Is Creating Prime-Like Shipping For All," *Forbes*, June 21, 2018, accessed February 27, 2020.

³ Alibaba is a Chinese wholesale website.

any given keyword. In order to promote more popular products to a higher place in the listings, the Amazon algorithm which determines a listing's placement in search results heavily weighs the number and quality of reviews. In theory, this is a great system, but in practice, we know that people are more likely to leave a comment or review about a negative experience over a positive one. The result? Sellers must obtain positive reviews or else risk losing the money they put into the venture.

This dynamic creates a demand for positive reviews and an entire economy around them. First, sellers make contact, often via an intermediary, with buyers in the U.S. and request that they purchase the seller's product from Amazon using their own credit or debit card. After the person in the U.S. has received the product, they can leave a "verified purchase" review on the product. This is essential to the process; while anyone can review any product on Amazon regardless of whether the account has purchased that item, Amazon weighs the reviews of known purchases as far more important in their rating algorithm. Typically, once the review is "live," which can take anywhere from a day to a week, the seller will refund the whole or partial cost of the item via Paypal, sometimes even including a commission on particularly hard-to-sell items, such as phone charging cables. There are three main roles within the fake review economy:

Sellers

These are mostly smaller-scale businesses in China that select products to sell via FBA. They facilitate shipment of products from wholesalers in China to the U.S. and then solicit reviews for those products either directly from reviewers in the U.S. or via an intermediary.

Intermediaries

The intermediary is a professional review solicitor, they post pictures of products to review groups, build relationships with "trusted reviewers," track the status of a product from purchase through review posting, and facilitate refunding the reviewer. When I first started tracking the review economy, nearly all intermediaries were Chinese. However, about a year ago I noticed a growing number of Bangladeshi men, usually in their early 20's to early 30's, acting as intermediaries. Unlike the Chinese intermediaries who have to hop the Great Fire Wall to get onto Facebook and therefore often have very sparse Facebook accounts (1-2 stock photos and a few random memes at the most), the Bangladeshi intermediaries often conduct business using what appear to be their own personal accounts set to public, with photos of family and friends and information about their location and education. I have also recently observed a rise in Middle Eastern men working as intermediaries in the past 4-6 months, with a mix of "fake" and "real" accounts. I also know of at least two U.S. international students living in China who have attempted to be intermediaries, with limited success. The unique challenges of these non-Chinese intermediaries, how they become part of the fake review economy, and their interactions with both sellers and reviewers present a great opportunity for further research.

Reviewers

Reviewers are people in the U.S. with Amazon Prime⁴ accounts who have, either from ads in a previous product or from clicking on a Facebook or Instagram ad, entered the fake review economy. They purchase a product, provide a seller or intermediary with their order ID number, post a five-star review of the product several days after it has arrived, and then receive an agreed upon refund in exchange for that review. For the purposes of this paper, I am focusing on U.S. reviewers, but there are paid reviewers for most major Amazon marketplaces across the globe, including Japan, Germany, Italy, Spain, and the UK.

After spending so much time in these groups and becoming part of both U.S. and China-based groups for facilitating these transactions, I feel it is worthwhile to record what I know in an ethnographic and analytical way, particularly because I have yet to come across a similar type of analysis on this topic. I have not found any ethnographic literature on the Amazon fake review economy⁵. The most in-depth English-language writing I've come across mostly deals with the mechanics of the transactions and the problems they pose to Amazon and to consumers; several major expose-style articles about the fake review economy have been published. There are also many shorter articles from industry specific sites usually targeted at U.S. Americans who are starting their own FBA businesses. Two of the most in-depth pieces I've come across are this report from Vox⁶ and this somewhat ethnographic look at the life of one Amazon reviewer from BuzzFeed⁷. And while these articles do begin to document how the fake review economy works, they do not specifically take an anthropological frame of analysis to the ecosystem of sellers, intermediaries, and reviewers - one which centers and analyzes the people and interactions within this community. For example, when the above BuzzFeed article came out, many U.S. reviewers were outraged; they felt that the article, which was widely shared on Facebook, was written only to highlight the "problem" of fake reviews, and many believe it led to a "sweep" on Amazon which resulted in a large number of wiped accounts. To sum up the literature more frankly: the majority of writing on the fake review economy focuses on the nuisance aspect of fake reviews without asking questions about how these interactions occur and what they mean to the people involved.

With these gaps in mind, I wanted to shape this paper in a way that aligns with anthropological ethics: namely, to do no harm. To accomplish this, I hope to employ the principles of both autoethnography and netnography in a way that 1) does not reveal any previously unpublished information about how these transactions occur, 2) draws only on ethnographic examples which are accessible to the online public, and 3) protects the identity of all accounts, real and fake, with which I've interacted. The goal of this paper, then, is not to reveal any secrets of this economy but rather to analyze the interactions of community

⁴ Although Prime is not an absolute requirement for reviewing, because shipping is rarely refunded most reviewers have prime so their packages ship for free.

⁵ Ironically enough, I think the lack of Amazon-style predictive search function might have hindered my ability to find such material - I kept finding information about people who live in the Amazon Rainforest.

⁶ Jason Del Ray, "Amazon can't end fake reviews, but its new system might drown them out." Vox, Feb 14, 2020, Accessed February 27, 2020.

⁷ Nicole Nguyen, "Her Amazon Purchases Are Real. The Reviews Are Fake." BuzzFeed, November 20, 2019. Accessed February 27, 2020.

members and understand how participation in these online communities' shapes members' understandings of themselves and of the online world around them. To that end, I will primarily provide ethnographic examples and analysis based on interactions I have been directly involved with.

One of the things that surprised me while working on this paper is the current development of anthropological discourse around ethnography in online spaces. It is clear some anthropologists, as well as market researchers, have been practicing various kinds of online ethnography since the 1990s; however, even in some of the most recent literature I've examined it is also clear that this is not the most broadly recognized and accepted practice.

There are several writers who have been consistent over the past 30 years in writing about theory, method, and practice of online ethnography, "netnography," and they lay out both compelling reasons for the practice as well as rigorous methodological guidelines. In writing this piece I have paid particularly close attention to the works of Robert Kozinets, who laid out six steps of netnography in his 2002 essay on netnography and market research⁸. Those steps include research planning, entrée, data collection, data analysis, ethical standards, and research representations⁹. Because that essay dealt mainly with netnography as a practice for market research, for this essay I will primarily focus on the middle four steps. Building on the works of Kozinets and others, Leesa Costello et. al. makes the argument that netnography is a more rich and meaningful practice when a researcher takes an active, engaged, and participatory role in online communities¹⁰. They build upon the work of others arguing that instead of passive forms of research, such as downloading an archive of posts or "lurking," active participation as well as autoethnographic analysis enable productive research while acknowledging that these understandings are filtered through the eyes of the researcher¹¹ -- something I found particularly important as a digital native who knows all too well that interactions online are not consistently or uniformly interpreted by those involved or observing.

For the past two years, I've been an active participant in over 50 Amazon fake review-related Facebook groups, Facebook Messenger groups, Wechat groups, and for about 3 months one Whatsapp group¹². Leveraging my ability to read and write Mandarin, I've had the unique ability among my U.S. reviewer peers to also take part in groups exclusively for Chinese sellers and intermediaries.

My own entrée into the world of fake Amazon reviews came from two separate introductions that occurred almost simultaneously. I had recently purchased a lamp that was meant to help my house plants grow, only to find that the cord happened to be broken. I contacted the customer service email address on the card that came with the light and was

⁸ 8 v Journal of Marketing Research 39 (2002): 61.

⁹ Ibid., 63.

¹⁰ Leesa Costello, Marie-Louise McDermott, and Ruth Wallace, "Netnography: Range of Practices, Misperceptions, and Missed Opportunities," International Journal of Qualitative Methods 16 (2017): 7.

¹¹ Ibid., 6.

¹² I was never a big whatsapp user, and quit using the app altogether, thus terminating my participation in that group.

offered a second free lamp shipped directly to me at no charge if I would leave a five-star review. At the same time a friend of a friend in Shenzhen was looking for people in the U.S. to buy his decorative lamp on Amazon and leave a positive review. From there I was gradually added to Facebook and WeChat groups via word or mouth (or keyboard, I suppose) where I could find more products for review. After being added to the first few groups by sellers, I was easily able to find more groups through Facebook's "suggested groups" feature. For most of these groups to join I simply had to type "yes" or "agree" in reply to a set of questions such as "this group is for U.S. reviewers, do you agree?" or "no online harassment, do you agree?" Once added I could see that the moderation structure for these groups fell in one of three categories: highly moderated by a team of U.S. reviewers (most restrictive in terms of admission into groups and tolerance for different kinds of posting), semi-moderated by a group of Chinese seller/intermediaries (virtually no restrictions on admission barring blacklists), and non-moderated groups where even I as a regular group member would be prompted by Facebook to allow admission into the group.

I also began to occasionally be served Facebook and Instagram ads offering Amazon "product testing" opportunities -- more fake review opportunities. By leaning into the Facebook ad algorithm I was able not only to have more of these ads served to me in my Facebook feed, I was also able to have them more often. I would occasionally scroll through my Facebook feed at a fast pace, only stopping on the free product ads, so that I could see more new products being offered up. Often, when clicking on such ads, I was met by a Facebook chat-bot who would walk me through the first few steps of the process. I'm not entirely sure what about my online activity triggered these ads to begin with, particularly because it is apparent that Facebook cooperates with Amazon to curtail this practice by shutting down groups and deleting the burner accounts used by sellers and intermediaries; nonetheless, these ads enabled me to be in contact with more sellers and intermediaries and in turn be added to more groups.

In my time in these groups I've been a moderately active member, learning how the purchase and review system works, sharing what I had learned with newer members, inquiring about other groups and other tangential Amazon related-schemes, occasionally acting as a cross-cultural mediator and taking part in community discussions. All of the groups I have been a part of are public in the sense that their posts are not immediately visible, however the groups accept all requests to join and their posts are then visible to anyone who selects to join them. I want to re-emphasize that Amazon does not condone fake reviews of products on their site. Not only is Amazon well aware of the phenomenon, they are continually taking measures to entirely extinguish fake reviews¹³. After pushing for more Chinese sellers on their platform in 2015, Amazon saw a drastic spike in fake reviews¹⁴. In 2016, they implemented a ban on paid reviews." In the years since, they've worked on other programs to stop the fake review economy, including "wiping "suspicious accounts by deleting their past reviews and banning them from further posting reviews. Questions about being "wiped" or even somehow altogether blocked from Amazon are common in review groups, and a frequent topic of discussion. Senior reviewers and intermediaries will take it upon themselves to create lists of best practices to

¹³ Zachary Crockett, "5-Star Phonies: Inside the Fake Amazon Review Economy." *The Hustle*, April 13, 2019, accessed February 29, 2020.

¹⁴ Sean Ogino, "New Amazon Ban On Incentivized Reviews." *Annex Cloud*, October 5, 2016. Accessed February 29, 2020.

avoid detection. Beyond that it appears that Amazon works with Facebook to attempt to shut down groups and accounts that are linked solely to the fake review economy. Amazon also may be working with Paypal to find ways to flag accounts that might be involved. Finally, I can report that once an account begins to make too many or suspicious reviews the time it takes for a review to be processed and go live on Amazon can take significantly longer. Where a review might have only taken a few hours to post a review from an experienced reviewer may take several days or even a week to post. All of this poses a threat to the fake review economy, but that threat is not as critical as I'm sure Amazon hopes.

One of the reasons the fake review economy is able to continue to prosper is disperse-community building. The groups are like some combination of whack-a-mole and the French Resistance, where most sellers, intermediaries, and reviewers might have a strong relationship with one or two other community members, and possibly a loose connection to a handful more, as groups constantly form and disappear. The groups for U.S. reviewers, in particular, are highly ephemeral, often gaining traction and members (sometimes as many as 10 or 20 thousand) and then fizzling out as new groups become more popular or as older groups are eventually shut down. Within these loose connections and dynamic community spaces it becomes very difficult to entirely eradicate any key players or primary community spaces that facilitate the transactions.

That being said, there are clear communities forming usually along language lines. For the past two years I've been part of two very stable Chinese groups: one specifically for sellers in Shenzhen and another for "worldwide" Amazon FBA sellers, although the membership is almost exclusively Chinese. Some of the U.S. review groups are more community forming than others, typically the aforementioned most moderated groups controlled by U.S. reviewers which end up more curated and include more community discussion posts.

What is particularly interesting from my vantage point are the similarities and differences the community aspects of these groups. For example, in the Chinese groups the three most common kinds of posts are job postings, housing postings (available sublets, requests for suggestions, etc.), and posts for collective commiserating about the difficulties of the job. Because these aren't the groups where people intend to solicit reviews, they are much more oriented around sellers and intermediaries to exchange information. By contrast the majority of community-type posts in the U.S. groups are new people, skipping over group descriptions to ask, "How does this work?" and posts about the repeatability of sellers or intermediaries. These same posts exist in some of the Chinese groups; however, I've observed that most sellers and intermediaries are less likely to discuss the trustworthiness of a reviewer in a group, and more likely to add someone directly to a blacklist.

The entire Amazon review economy, therefore, has to be built on trust and word of si mouth -- things that can be very easy to get from U.S. Americans on Facebook, but also very hard to hold on to. In order to regulate the system on both the Chinese side and the U.S. side sellers, intermediaries, and reviewers have created numerous, separate blacklists. These blacklists are used to check the reliability of an intermediary or a reviewer and are for the most part unregulated. They consist of Facebook groups, google docs, and other shared documents on platforms popular in China. One of the more prominent and well trafficked blacklists for sellers

and intermediaries is 卖家乙家(“Seller's Home”) which is a site with a searchable blacklist as well as business and lifestyle articles for Amazon sellers. Virtually anyone can add a person's name, email address, or Amazon account link to these lists without any outside verification process and for many people making transactions in the fake review economy a name on the blacklist can be a career ending move. For example, I was scammed about 9 months ago and had a suspicion that the scammer would add me to a blacklist. Recently, when I clicked an ad on Facebook and began interacting with a chat bot I was informed that my email address was added to a blacklist. I checked all of the blacklists I knew about and never found my email or any of my names. In the end, I simply didn't message back that account and was able to move on.

Being a “scammer” is the main reason sellers and intermediaries are added to blacklists. Often they either solicit purchases of an expensive product and do not return the refund, or solicit a review for a competitor's product and then aggravate the reviewer into leaving a bad review or reporting the account to Amazon. During the political demonstrations in Hong Kong in the summer and fall of 2019, I had the unique advantage of watching the large-scale planning of one such scam. Mainland Chinese sellers and intermediaries became enraged after seeing “both” (the political movement's main slogan) t-shirts for sale in the U.S. Amazon marketplace. The group planned to have multiple agents solicit bad reviews for the t-shirts both directly, and by posing as sellers looking for good reviews but then ghosting the buyers. While I never saw this scam come to pass, the incident did make the news as Chinese nationals reported and spammed the listing¹⁵.

Another major cause for blacklisting sellers and intermediaries appears to be cultural and linguistic miscommunications complicated by distrust and impatience. About two to three times a month I try to investigate cases of such miscommunications. Usually, it begins with a poster in a U.S. based group sharing screenshots of a conversation. The most common problem reviewers cite in sharing these screenshots is delay in refund which is presumed will eventually end in the seller or intermediaries ghosting the buyer and never returning the money to the reviewer.

When I have looked into some of these cases, I've found several themes of distrust: distrust because of language, distrust because of race/nationality, and distrust from lack of cultural knowledge. The easiest of these to uncover are when a reviewer distrusts the person they are working with because of language barriers, sometimes the intermediaries or sellers have used a word that is a direct translation or common machine translation of a Chinese phrase that doesn't make sense in English, this will put the reviewer on guard or even result in a literal miscommunication of information such as the time the refund will be sent. The next area of mistrust in these situations comes when a reviewer is distrustful of the seller or intermediary's racial or national identity - overall, I sense that reviewers have a higher trust of Chinese people compared to their non-reviewer U.S. American peers, because of the positive interactions they've had with sellers and intermediaries¹⁶. However, I have and continue to see some

¹⁵ Josh Horwitz, "Amazon Faces Backlash in China for T-Shirts with Hong Kong Democracy Slogans." Reuters, August 15, 2019, accessed February 28, 2020.

¹⁶ I invite any interested political scientist to contact me about this.

blatantly xenophobic posts about Chinese sellers and intermediaries as well as the Bangladeshi and Middle Eastern intermediaries. In some of the cases I have observed, this xenophobia has led to the blacklisting of agents who probably were not ill-intentioned. I predictably notice an increase in these kinds of posts whenever China is a top news item in the U.S.

Finally, one of the kinds of distrust I've taken a more active role in dissecting with community members is the distrust that arises because of cultural differences. Some of the differences are as basic as understanding how time difference and Chinese government holidays can delay a refund. Other times the disconnect seems to come from different cultural attitudes about the morality of these reviews. For Chinese sellers and intermediaries, the reviews are seen as a standard cost of doing business -- if Amazon didn't want people to purchase the reviews they shouldn't have designed a system that put a monetary value to them. Whereas there is a significant subsection of reviewers who are not comfortable with the idea that they are being paid for 5-star reviews. They feel they can only be paid for "honest" reviews and maintain that by only ever promising an "honest" review they do not break Amazon's Terms of Service. Sellers and intermediaries will use the word "honest" to avoid detection by anyone who might be monitoring a chat or posts and to maintain some amount of deniability about what they're doing, but at the same time believing there is an implicit understanding that the reviews should be 5-stars. Conflict then arises when a reviewer receives a low-quality product (and most of them are) and decides they can't "honestly" give a 5-star review. This becomes a particularly big problem for intermediaries, who then have both an angry boss and a stubborn reviewer who doesn't know how to play along. In these kinds of cases I've seen intermediaries be blacklisted by both U.S. reviewers and Chinese sellers. I have also seen resolutions to these scenarios where only the reviewer is blacklisted, but these are less likely as they most frequently occur in groups where the culture of "honest" reviews is more prevalent than the more transitional 5-star review groups. Trust underpins every relationship within the fake review economy, and while its disparate, web-like structure strengthens this economy, lack of trust, earned and unearned - weakens it.

In a world where Jeff Bezos is the richest man alive and makes more money in an hour than any seller, intermediary, or reviewer will likely make in their lifetime, there are still reviewers and intermediaries who contact Amazon customer service asking to speak with Jeff. Amazon sees fake reviews as a nuisance, and publicly tries to dissuade people from posting them. However, in reality, fake reviewers are still buying products, engaging in the Amazon App, reviewing the products they receive, creating competition, and fostering new markets on Amazon.com. While this might not be beneficial to some more earnest online start-ups, in the long run, the fake review economy creates a great deal of economic activity centered around Amazon. If Amazon truly wanted to end fake reviews, there are any number of possible routes they could take to more aggressively eliminate them. The final point in the web of the fake review economy, I therefore suspect, is Amazon itself - the one player whom everyone distrusts.

Because of the lack of any substantive literature on the topic, this paper was limited in its analytical and ethnographic scope. Instead, I have devoted the majority of this paper to laying groundwork by explaining the general workings of the fake Amazon review economy. However, there are many more questions to examine within the fake review economy. I have

alluded to some of these above, including a critical exploration of non-Chinese intermediaries, and examination of how participation in the fake review economy affects U.S. reviewers' impressions of China and Chinese people. Further research might employ different ethnographic methods, particularly interviews with those participating. I would suspect that surveys might not work unless compensation can be offered because many reviewers are also taking part in paid survey type side-hustles. Finally, I would be remiss not to mention that I am actively tracking how the global Covid-19 crisis is affecting this group. Preliminarily, I can report there are demonstrations of concern, compassion, and opportunistic mask selling. Further, I can report that the overall flow of reviews, while initially slowed, is back to its normal pace since sellers and intermediaries require little more than an internet connection to conduct their business - once again demonstrating the resiliency of their unique community.

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Nuances of the Nochtli

Key Words: Aztec, Craft, Central America, Insects, Molecular Analyses

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Introduction

The domestication of insects in order to create dye for textiles, food, and cosmetics has been practiced all over the world for much of human history. For instance, the scale insect called kermes, native to coastal Mediterranean regions and parts of the Near East, was removed from the kermes oak tree to also provide a red dye, with evidence traced back as early as 300 BC (Donkin 1977). Additionally, other red dyes produced by the Polish cochineal of eastern Europe and the female lac insect of southern and southeastern Asia also have a deep history in the art of their respective culture (Donkin 1977). All these examples, though deeply rooted in their respective geographic region, have scant early archaeological evidence of organic dyed textiles and even less evidence of full-bodied insect remains. This assumption of poor archaeological data remains holds true in Mesoamerica and South America - both of which are areas that the cochineal beetle and its favored prickly pear host (*Opuntia ficus-indica*) currently call home.

Cochineal beetles, or nochtli, as they were originally called by the Nahuatl, a Uto-Aztecan people of Mexico and El Salvador (Donkin 1977), are currently categorized into nine distinct species, most of which are still wild. Very few species, including the focus of this study (*Dactylopius coccus* or *D. coccus*), became domesticates of early Americans (Chavez-Moreno, Tecante, and Casas 2009). Eventually, female *D. coccus* beetles were and continue to be exclusively reared on the prickly pear (*Opuntia* spp.) plant in which they produce all of the dye. Meanwhile, the male beetles are much smaller in size, winged, and only reside on the prickly pear during the mating season (Donkin 1977). *Dactylopius coccus* is the single remaining domesticated species of cochineal in which dye is still found in textiles and food today throughout the Americas and across the world. *D. coccus* is particularly identifiable in that it is double the size of wild cochineal beetles, lacks an exterior waxy coating, and females have a life cycle nearly twice as long as all other members of the *Dactylopius* genera (Donkin 1977). The loss of the waxy layer decreases the insect's protection from adverse weather conditions and predation, allowing for an increase in cochineals' defense mechanism of producing carminic acid (Campana et al. 2015). The production of this chemical, rich in anthraquinones, increases the production of red dye, serving as a human-mediated adaptation with little to no ecological benefit for the insect. Such an adaptation means that many cochineal beetles, especially those farmed today in Oaxaca, are unable to live and reproduce without the help of human support and a sufficient prickly pear host (Van Dam et al. 2015, Donkin 1977, Chavez-Moreno et al 2009).

In regard to the ecological specificity in rearing the cochineal beetle, the most common prickly pear species used as a host in pre-Columbian times up until present-day is *Opuntia ficus-indica*. This species is the victim of a parasitic relationship with *D. coccus*. Stationary female

cochineal beetles live their entire lives on the plant, draining the plant of its nutrients while producing carminic acid (Chavez-Moreno, Tecante, and Casas 2009). This plant is incredibly efficient in converting water into biomass and, like *D. coccus*, is not found at all in the wild today (Griffith 2004, Donkin 1977). The domestication of the *O.ficus-indica* has very early origins, potentially spanning back as far as 12,000 years ago, as noted in association with coprolites from a Paleoindian site in the Tehuacan Valley of central Mexico (Callen 1965, Griffith 2004). Therefore, it can be inferred that the prickly pear must have been domesticated much earlier than the cochineal beetle based on existing evidence (Donkin 1977).

From extensive ecological research and subsequent molecular analysis of this plant, the domestication of *O. ficus-indica* occurred within the modern-day Oaxaca region of Mexico (Griffith 2004). Based on these findings, Van Dam et al. (2013), (2015) makes the claim that for the cochineal to be as successful as it has, while almost exclusively reared upon *O. ficus-indica*, the domesticated *D. coccus* must have also originated within the Oaxaca region. This claim could be upheld by the additional molecular studies referred to below, but from a purely ecological perspective, such an argument carries little weight. In fact, there are several confounding ecological variables that could interfere with this assumption. First, the prickly pear can grow almost anywhere, as it is drought-resistant and can live in nutrient-poor soil (Griffith 2004). This could infer that the highlands of Peru are not an unreasonable location for early distribution and cultivation of the cochineal even though *O. ficus-indica* is found only sparsely within the region today. Also, any sort of obligate, parasitic relationship with this kind of potential for human exploitation is very rarely found in an unexploited, natural environment. This ecological interaction could be characteristic of human introduction of one species into an environment in which there are no natural predators. Therefore, it could still be possible that the ancestral *Dactylopius coccus* organisms originated and later differentiated in a region outside or away from the domestication of *Opuntia ficus-indica* in Oaxaca. Yet, any sort of ecological claim of this magnitude is most stable with supporting evidence from molecular data, and additionally archaeological evidence.

Cultural Background

The earliest remains of textiles in the Americas with a red dye appear to be from the Chavin culture of Peru from 900 to 200 BCE and were used to dye cotton (Phipps and Shibayama 2010). Though the type of dye from these sites cannot be affiliated with a type of pigment, it can be assumed that it was not cochineal because these textiles were produced from cotton. The cochineal beetle was almost exclusively used to add pigmentation to animal fibers (Phipps and Shibayama 2010). However, by 300 BCE, the wool fibers from camelids specific to coastal sites, may have remnants of cochineal dye (Phipps and Shibayama 2010). Similar animal fibers from the Paracas mantles around 300-200 BCE also appear to use cochineal, but it appears from mass spectrometry analysis that use of cochineal dye here is only supplementary to the redbunium dye produced from the Madder plant of this region (Saltzman 1992, Phipps and Shibayama 2010). This is odd, however, as the dye produced from the Madder plant is much more difficult to produce and requires a prolonged boiling process of the plant, as compared to a simple crushing process of the cochineal (Saltzman 1992). Yet, peoples of early South America do not appear to use exclusively cochineal dye until 600 CE within the Moche Culture, also of Peru (Saltzman 1992). Peruvian evidence of the widespread use of the cochineal persists within

the record of written accounts among the Incan empire starting in the late 13th century (Phipps 2003). Such widespread written evidence as late as the Columbian period during European contact could infer that early use of the cochineal beetle within textiles may have been just as prevalent in the highlands as what is found in coastal sites. However, it is impossible for archaeologists to truly confirm this idea as the environmental conditions of these high-elevation locales are not suitable for protecting organic archaeological material.

It is true that early archaeological evidence of cochineal among coastal Peruvian sites is much more highly concentrated, but it also should be noted that the earliest, most clear examples of domestication of the *D. coccus* are found much farther north. The trade and distribution of cochineal became such an instrumental part of life among the Mixtec people and the rest of Mesoamerica during the colonial period that it was believed that the cochineal could not have come from anywhere but Mexico. It is also agreed upon that the earliest example of widespread cochineal cultivation and processing is found at a Tolteca settlement in Mexico (Pelham 1963). Yet, this site dates to around 1000 CE and other archaeological evidence of domestication of the cochineal as far north as Oaxaca remain few and far between. Therefore, it is molecular data that may give archaeologists and ecologists, alike, the clearest picture of the story of the domestication of the cochineal.

From theories developed by Dr. Steve Lekson and others of extensive trade and commerce throughout southern Mexico, Mesoamerica, and the American Southwest/Northwest, one would think that cochineal could even be found as far north as the United States. However, very few textiles with evidence of specifically cochineal dye this far north have been found. In one example of Casas Grandes, the red textiles that remain in the archaeological record in association with the Medio Period (1200-1450) are charred to the point in which identification of a pigment source is improbable, if not impossible (King 1974). Yet, evidence of other animal and plant dyes that could produce a similar color (like that of shellfish and madder) also remain absent. The madder and plant dyes in general, prior to high-performance liquid chromatography (HPLC) analysis, were thought to be the only source of pigment-producing substances this far north. However, it is now known that shellfish was used in addition to, and not as a substitute of, dye produced from the indigo plant, which completely alters this ideology. Such determination of the presence of the cochineal this far north must therefore depend on trade and commerce throughout this region based on findings of other goods in archaeological context.

It is apparent from the prior paragraphs that the archaeological evidence of the cochineal throughout South America and Mesoamerica is limited. Limited archaeological analysis does not have to limit all inquiries of domestication, however. The capabilities of using molecular analyses, including that of mitochondrial and nuclear genomic sequencing, may provide additional avenues of determining a lineage. Some of these analyses taken from information obtained from the mitochondrial genome may also hint at the time of domestication by determining a mitochondrial clock. With access to this technology, in addition to a wide range of samples that span Mesoamerica and South America, it may possible for archaeologists and molecular anthropologists to determine the time and place of the domestication of the cochineal beetle.

Molecular Background

Throughout the field of molecular anthropology's short academic history, there have been very few examples of insect domestication studies. As I make the claim above, the cochineal is not the only widespread insect to be domesticated in the world. Therefore, the quantity or availability of insects is not the limiting factor. It is instead the quality of samples and the ability to find an appropriate primer, or short piece of single-stranded RNA, to amplify the DNA for sequencing that makes these studies so difficult. To further complicate this matter, much of insect DNA is unknown, so constructing one's own primers is often necessary. Yet, once the DNA from these insect samples is successfully extracted, amplified, and sequenced, anthropologists and ecologists alike will be much closer to identifying a definitive location(s) of cochineal domestication. To analyze the existing variation between and among samples from Peru, Oaxaca, and elsewhere, it is critical to recognize the strengths and weaknesses of mitochondrial, nuclear, and endosymbiont genetic material outlined below.

The mitochondria is an organelle within all plant, animal, and fungi (eukaryotic) cells that formed initially around 1.45 billion years ago when a bacterial, or prokaryotic, cell was consumed by a larger eukaryotic cell and slowly became integrated into the function of the cell as a whole (Martin and Mentel 2010). This relationship allowed eukaryotic cells to take on additional genetic information and subsequent additional functionality that allowed the mitochondria, better known as the "powerhouse of the cell," to become what it is today. The mitochondrial genome of all eukaryotes is much shorter than of the nuclear genome, maternally inherited in all animals, and is highly conserved, meaning, it provides the perfect opportunity in identifying small changes in the genome as two populations diverge. These small changes are referred to as substitutions, or more specifically, single nucleotide polymorphisms (SNPs), and provide detailed information about human ancestry as well as the phylogenetic organization of multiple other eukaryotic species. For these reasons, mitochondrial analysis may be the best determinant in finding the time and place of cochineal domestication.

There are multiple regions of the mitochondrial genome that may be suitable for the analysis. These include the 12S, the COI (or COI-11), and in some cases the hypervariable, or control, region. The hypervariable region remains a common and useful approach in analyzing much of human mtDNA, but unfortunately the length of this region is highly variable across arthropods and is not well understood (Simon et al. 2006). Therefore, both research groups referred to below have chosen to amplify and sequence the COI region of the mitochondrial genome instead because this region has played a particularly robust role in the barcoding of multiple vertebrate and arthropod species (Allendorf, Luikart, and Aitken 2012).

Other potential sources of variation among cochineal beetles may be found in the nuclear genome. The nuclear DNA of any organism is often much more conserved, or similar if not the same across species, because there is much greater pressure than that of mitochondrial DNA to produce consistent, functional genes that retain the reproductive success of the organism. However, there continue to be several fragments of arthropod genomes that mutate at a fast-enough rate to determine a lineage.

As discussed below, the 18S rRNA region of nuclear DNA, used by Campana et al. (2015) is a very common region to amplify among nuclear samples. Yet, it is still unknown if this sequence truly has enough variation among beetles, much less within the Hemiptera family to which the cochineal beetles belong or throughout the entire phylum of Arthropoda. Additional studies, like that of Regier et al. (2008) have attempted to improve upon the collective understanding of arthropod's genetic structure by identifying the ten fastest mutating regions of nuclear DNA among this phylum. However, the sampling of this study remains limited in the context of this study as no close relatives to the cochineal beetles were included. Nevertheless, Van Dam et al. (2013) and (2015) still attempted to amplify all of these regions, but only two (E+P-tRNA synthase and GTP-binding protein) amplified. This in addition to the amplification of the popular phylogeographic nuclear marker, EFl -u, also from Van Dam et al. (2013), still provide little nuclear variation among an animal in which only female, or mitochondrial, markers are critical. From review of this and other analyses, it remains debatable whether mitochondrial or nuclear DNA is the preferred method in determining close arthropod lineages.

An additional potential difficulty of targeting and amplifying the correct sequence in insects is avoiding the other various sequences that may come from an insect's bacteriome or from a bacteriocyte (Vera-Ponce de Leon et al. 2017). Both of these elements contain genetic information that is not unique to an insect in which the bacteriome is an entire region composed of bacteria, while the bacteriocyte is a bacterial cell that has integrated itself and is able to reproduce among the insect's own cells. This factor alone can make the process of DNA extraction, namely mitochondrial DNA extraction, quite difficult (Hurst and Jiggins 2005). Yet, this problem is not impossible to overcome. It can be as simple as targeting the correct, distinctive mitochondrial sequence that will lead to targeted sequencing capable of producing enough diversification that discovering a lineage or origin may become possible.

Molecular Analyses

Past studies in regard to this topic have been conducted with sample sizes from few geographical regions. One such analysis from Campana et al. (2015), tracked the 12S rRNA and cytochrome c oxidase 1 (COI) regions of the mitochondrial genome. The researchers targeted these sequences in 40 samples from a small-scale farm in Oaxaca; 75 samples from large commercial farms in Mexico, Peru, and Chile; and 41 wild samples from Oaxaca. The results of this study only obtained nine distinctive SNPs between both regions and was therefore not able to determine enough differences between the domesticated and wild beetles. This study was also not able to create an effective mitochondrial clock because aphids, which are the closest relative to the cochineal genome and that were going to serve as their paleontological calibration point, had low coverage. To elab, the aphids, or the genetically dissimilar outgroup that would be expected to have a similar rate of evolutionary change, had poor quality DNA and, therefore, could not reliably point to a time of a most recent common ancestor among the cochineal beetles. In this case, their nuclear genomic analysis was more successful because they were able to ascertain 82 high-confidence SNPs (Campana et al. 2015). Yet, this relationship only allowed the researchers to ascertain that the large-scale, domesticated samples from Peru and Mexico more closely related to one another than the Oaxaca sample is related to either.

An additional study attempted to improve upon the findings and analyses of this study by using a larger variety of samples from Peru to give less biased information than that of Campana et al. (2015). However, the authors of this research admitted that the samples pulled from the Oaxaca sites were in fact all originally from the same farmed source. Even with this in mind, from the results of their study, it was still quite evident that the large number of samples obtained, amplified, and sequenced from Oaxaca did, in fact, have much greater genetic variation (Van Dam et al. 2015).

The increased presence of variation among local sources could point to a cultivation or domestication event in Mexico. This biological evidence is backed up by historical records, since, as they note, a large bottleneck event occurred in Mexico immediately after European contact in this region. As noted by Van Dam et al. (2015), domestication events, whether they occur all at once or as multiple events are often marked, by one or multiple bottleneck events. This could represent a secondary domestication event or simply a significant decrease in reproduction of cochineal as an effect of colonization. This would have biased the data in a way that would demonstrate increased variation in Mexico more so than other areas (Van Dam et al. 2015). These ecological arguments put forth by Van Dam et al. (2015) in regards to domestication locale appear to be valid upon first glance, but more data that is not included in these studies is necessary to back up these statements.

In regards to data collection alone, both Campana et al. (2015) and Van Dam et al. (2013) both struggle in identifying previously known phylogenetic structure of cochineal beetles as well as recognizing and producing primers that will accumulate greater variation. For instance, the study initially produced by the Van Dam et al. (2013) dissertation research chose to sequence the common mitochondrial genome (COI-Ii), while Campana et al. (2015) only built upon the mitochondrial study by including the 12S region. The Campana et al. (2015) authors realized this lack of variation and went so far to even request that future researchers pursue the control region. However, no such work, even by the subsequently published Van Dam et al. (2015) article has completed this work. Therefore, holes within the molecular data of cochineal domestication still exist.

Table 1. *Dactylopius coccus* mitochondrial primer sequences used by previous studies.

Marker	Forward primer	Reverse primer	Reference
12S	5- AAGAGTGACGGGCRATTTGTACATA- 3	5-GTGCCAGCAGTWGCGGTTA-3	Campana (2015)

COI	5-TCCTTATCAGAAATGGAAAAC-3 (F1) 5- TTTATGCAATAATCTCTATCG GAGTT-3 (F2)	5-CCATTCGTTGTTGAATGATTTT-3 (R1 and R2)	Van Dam (2013)
COI	5-TCCGRATAGAACTWATAAAYACYAA-3	5-TAAACTTCAGGGTGACCAAAAAATCA-3	Campana (2015)

Table 2. *Dactylopius coccus* nuclear primer sequences used by previous studies:

Marker	Forward primer	Reverse primer	Reference
18S	5-CTGGTTGATCCTGCCAGTAG-3	5-CCGCGGCTGCTGGCACCAGA-3	Campana (2015)
GIP-binding protein	TAGRGT ACCTGTTCCCGATG (F1) TGTTGAAGGGGAAGTTGACC (F2 mid)	GGTCCGGCAGTGAAGAAATA (R1 and 3) ATGACAGCACCAGGGTCATT (R2)	Van Dam (2013)
E+P-tRNA synthase	CGGAGATTTTACTACCACYG (F1)	ATTTCCAACCGGAAGAATAG (R1)	Van Dam (2013)
EFI- <i>a</i>	AGCTGAACGTGAACGTGGTA (F1)	CAGTTGGCCGGGT AGGAG (R1)	Van Dam (2013)

Discussion

To consider ways to improve upon the data analysis collected on behalf of both of these research teams, one should repeat the work of Campana et al. (2015) in analyzing the COI, 12S rRNA, and 18S rRNA sequences. Once successfully amplified, future researchers should make further attempts in building primers that will effectively analyze the control region of the mitochondrial genome. As previously described, the hypervariable region is an excellent set of alleles to examine very recent changes within diverging populations in humans and many other animals. However, in arthropods, the control region is not only often variable in content, but also in length, making targeting of this region quite difficult (Simon et al. 2006).

The multiple lines of ecological, archaeological, written, and molecular evidence can be extremely influential in determining the history of the domestication of the cochineal beetle. The domestication of this small insect played such a large role in developing social stratification among pre-contact communities of the Americas. Therefore, the information gathered here may give future generation of researchers of multiple fields an improved understanding of several ecological and social implications of domesticating an animal on this scale. The field of

Molecular Anthropology is growing quickly and the drive to use rapidly improving methods and equipment will also benefit from the results of this study. The information provided by future studies has the power to improve understanding of the cultivation and development among past peoples.

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New Interpretations of Cranial and Postcranial Material in Neanderthals Amanda Guerrero

Key Words: Adaptations, Biological, Homo Neanderthalensis, Human Remains, Traits

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Introduction

Homo neanderthalensis, colloquially known as "Neanderthals", were first discovered in 1856 at the Kleine Feldhofer Grotte in the Neander Valley near Düsseldorf, Germany. Neanderthals persisted through multiple glacial-interglacial cycles in mid-late Pleistocene Eurasia (Wroe et al., 2018). Since their discovery, they have continued to puzzle and fascinate scientists due to their uniquely derived traits (Weaver, 2009). Of particular interest is Neanderthal skeletal morphology and its implication to our own evolution. Neanderthals are often described as relatively "short but massive" (Gracia-Martinez et al., 2018), heavy-bodied hominins with wide trunks and short distal limbs in comparison to modern humans. Neanderthals also possessed a wide pelvis (Tompkins & Trinkaus, 1987) and a wide central-lower thorax (Franciscus & Churchill, 2002). Neanderthal proportions mirror contemporary cold-adapted human populations, though comparatively heavier and more muscular (Holliday & Trinkaus, 1991). Additionally, studies have shown Neanderthals had larger brains than contemporary humans with an average cranial capacity of approximately 1300 cc for females and 1600 cc for males (Gunz et al., 2010). However, new insights suggest when body mass is considered, Neanderthals have significantly smaller adjusted endocranial capacities than contemporary anatomically modern humans (AMHs). With that being said, there are still compelling differences found in Neanderthal's brain anatomy compared to our own. Early proposals suggested Neanderthal skeletons were pathological modern human skeletons, yet the discovery of new fossils with unique features, revealed that hypothesis to be unsound (Weaver, 2009). These interpretations may have been based on the fact that pathological lesions are abundant on Neanderthal skeletons, especially healed traumatic injuries, which may have contributed to such assumptions (Weaver, 2009; Berger & Trinkaus, 1995).

Neanderthals last shared a common ancestor with modern humans approximately 350,000 years ago (Weaver et al., 2008) and lived until about 35,000 years ago (Higham et al., 2006). Neanderthal populations became isolated from contemporary human lineages further south due to geographic barriers formed by climate fluctuations (Howell, 1952). Neanderthals originated in Europe but later became widespread in western and central Asia. Neanderthal populations may have extended as far south as Israel and as far east as southern Siberia (Krause et al., 2007).

The purpose of this paper is to discuss current discoveries and interpretations of the skeletal morphology of Neanderthals, with consideration to both cranial and postcranial

material through the lens of multiple approaches such as examining neonate and juvenile morphology, experiments used on other mammals, Neanderthal brain organization using primate data, and evolutionary explanations to understand Neanderthal morphology

Cranial Morphology

Both metric and nonmetric attributes distinguish the crania and mandibles of Neanderthals from those of modern humans. These features include a wide, tall nasal aperture, a depressed nasal floor, a wide projecting nasal bridge, a retro-molar gap, and 'swept back' zygomatic arches (Wroe et al., 2018). The derived features seen in the fossil record points to directional natural selection, while the more primitive features are indicative of stabilizing natural selection (Weaver, 2009). Juvenile Neanderthals display these unique cranial features, suggesting they are not the result of mechanical loading patterns made by lifetime behaviors. To illustrate this, Weaver (2009) describes well-preserved neonatal skeletons from Mezmaiskaya, Russian Federation and Le Moustier, France. In the Mezmaiskaya specimen, the overall cranial shape is akin to adult Neanderthals including an elongated foramen magnum, mid-facial prognathism, an inferiorly positioned posterior semicircular canal, and an inferiorly positioned mandibular condyle. The Le Moustier 2 specimen demonstrated the absence of an infraorbital concavity, while the nasals are comparable to those of adult Neanderthals (Maureille, 2002). In addition, a somewhat older skeleton from Israel dubbed "Amud 7" displayed an oval foramen magnum, an enlarged medial pterygoid tubercle, and an absence of a mental eminence-similar to other described Neanderthal cranial features (Ponce de Leon et al., 2008).

As these unique cranial features are present very early in development, scientists infer that cranial differences among Neanderthals are likely due to different allele frequencies at loci underlying cranial form rather than lifetime behavioral explanations (Weaver, 2009). In other words, these features are justified through an evolutionary approach. With that being said, there is some experimental evidence that lifetime behavior distinctions may influence cranial form. Liberman et al. (2004) examined rock hyraxes to investigate the way food processing effects cranial growth and morphology. In rock hyraxes, the maxillary molars are positioned directly beneath the orbits like in humans. In this study, the hyraxes were divided into two groups of four. One group was fed cooked food, while the other group was fed raw/dry food. The group that was fed cooked food displayed about 10% less growth in a subset of facial dimensions. The study suggests that diet, and maybe other behaviors, may have an effect on facial size such as in rugosity. It should be noted that many studies on subadult Neanderthals mostly focus on features that are present instead of utilizing systematic assessment of the percentages of absent vs. present features (Weaver, 2009).

In addition to facio-maxillary features, cranial capacity in Neanderthals are also of significant importance. Previous studies have established a number of similarities and differences in the morphology of Neanderthal and modern human brains (Pearce et al., 2013). For example, both Neanderthals and modern humans share a degree of asymmetry and gyrification as well as non-allometric widening of the frontal lobes (Pearce et al., 2013). However, Neanderthals possess a uniquely globular brain shape, and the temporal pole is relatively larger and more forward-projecting in comparison to modern humans.

Additionally, Neanderthals display lateral widening of the parietal, like modern humans, but an overall flattening of their parietal bones (Bruner, 2010).

Many studies on Neanderthal and fossil AMH brains rely on endocasts and the internal morphology of the cranium. However, this is a limited approach to analyze external surface features, and overall shape and size of the brain. Moreover, this methodology offers no information about internal brain organization. Pearce et al. (2013) evaluated the organizational differences in the brain of Neanderthals and anatomically modern humans by using comparative primate data to estimate internal brain areas. The results showed Neanderthals had significantly larger orbits than AMHs, which suggests larger eyeballs and visual cortices. Contemporary humans (<200,000 years) with larger visual systems often have larger brains (Pearce & Dunbar, 2012). Therefore, it is relatively safe to assume that Neanderthal visual cortices would likewise drive overall brain enlargement when compared to AMHs. Yet, a study by Pearce et al. (2013) showed no significant brain size difference between Neanderthals (dated 27-75 ka) and AMHs when body size was accounted for. The authors suggest the brains of Neanderthals and AMHs were organized differently and concluded though both Neanderthals and AMHs originate from *Homo heidelbergensis*, they experienced separate evolutionary trajectories which resulted in different organizational patterns. This includes Neanderthals possessing enlarged visual and somatic regions, while AMHs increased other brain areas, like their parietal lobes.

Evolutionary Explanations for Cranial Morphology

Researchers agree that the Neanderthal cranium is distinctive. What is up for debate, however, is whether, or to what extent, these distinctive traits are adaptations to heavy para-masticatory activity (teeth as tools); better conditioning of cold, dry air; increased ventilatory flows in response to higher energetic demands; genetic drift; or retained plesiomorphies found in earlier *Homo* (Wroe et al., 2018). The three main evolutionary explanations put forth for Neanderthal cranial morphology are: 1) adaptation to cold climate, 2) adaptation to anterior dental loading, or 3) genetic drift (Weaver, 2009).

Weaver (2009) explains that the cold-climate hypotheses is centered around Neanderthal's geographic range-northern Europe-which often had cooler temperatures especially around the time Neanderthals were evolving. Many Neanderthal cranial features are attributed to the morphology of the nasal region as an adaptation to cold climates (Holton & Franciscus, 2008; Wroe et al., 2018). Studies suggest that their large nasal cavities would have warmed and humidified cold air more effectively, however, this remains difficult to test quantitatively (Maddux et al., 2017). In addition, Neanderthal's paranasal sinuses being a result of adaptations to the cold climate has come into question (Churchill, 1988). Current studies based on modern human samples have asserted that it is the shape, not the size of the nasal cavity, that serves to warm and humidify inspired air (Wroe et al., 2018). Moreover, airway size is probably related to the energetics of the organism, and airway shape may be more suggestive of physiology and climate.

The anterior dental loading hypothesis (ADLH), which suggests the Neanderthal face includes adaptations to sustain high loads applied to the incisors and/or canines, is the most popular hypothesis to explain cranial morphology. Indeed, heavy wear on the anterior teeth have been observed in numerous cases, yet, the same could be said about modern humans (Clement et al., 2012). One generally accepted interpretation is that facial prognathism in Neanderthals results in a trade-off between demands for high bite force at the anterior teeth and increasing the functional surface area of the molars for the mastication of resistant foods while maintaining compressive forces at the temporomandibular joints during anterior and post canine loading (Wroe et al., 2018).

Another hypothesis suggests Neanderthal facial morphology is an adaptation to facilitate greater ventilatory demands driven by high energy expenditures (Wroe et al., 2018). High respiratory demands have been suggested for Neanderthal body masses and routinely strenuous hunting and foraging (Wroe et al., 2018). This idea has been put forth for other 'archaic' humans, like *H Heidelbergensis*. Neanderthals may have further increased these attributes due to high cold resistance costs (Wroe et al., 2018) and energetic hunting strategies (Berger et al., 1995).

Finally, genetic drift is used to explain cranial morphology in Neanderthals. Weaver (2007) used predictions from quantitative population genetics consisting of 37 cranial measurements collected on 20 Neanderthal specimens in addition to 2,524 recent humans. The results of the study could not conclusively deny genetic drift as a factor in Neanderthal morphology. Moreover, genetic drift seems to be supported by the fossil record. The features in Neanderthal's cranium do not emerge all at once; they gradually build up over a course of >300,000 years (Weaver, 2009). This is the pattern we would expect with genetic drift at play.

In sum, Neanderthal facial morphology is suggested to have evolved to withstand cold, dry air, and to move greater air volumes in response to higher energetic requirements (Wroe et al., 2018). Furthermore, Neanderthal and modern human nasal cavities condition air more effectively when compared to *H heidelbergensis* (Wroe et al., 2018). An alternative explanation is that their cranial morphology reflects an adaptation to a more strenuous, energetically demanding lifestyle with high caloric intakes (~3360-4480 kcal per day).

Postcranial Morphology

Neanderthal postcranial morphology, like their cranial morphology, is distinctive when compared to modern humans. Generally, Neanderthals possess wide bodies with short extremities (especially in the distal limb segments), long bones tend to have bowed shafts and thick cortical bone, and robust, rounded rib shafts. Additionally, postcranial bones tend to be robust with rugose muscle attachments (Weaver, 2009). Much attention has been focused on fossil remains from northern portions of Europe to gain insights into the paleobiology of the Late Pleistocene European Neanderthals. Fossil remains of associated partial skeletons have been found in Belgium, France, Germany, and Ukraine, however, there is an absence of skeletons in Mediterranean Europe (Walker et al., 2011).

Walker et al. (2011) described the remains of an adolescent-to-young adult female Neanderthal in Palomas 92. Although fragmentary, the specimen represents associated postcranial remains from the early last glacial levels of the Sima de las Palomas de Cabezo Gordo, Murcia, southeastern Spain. Despite her small body size, the evidence of elevated upper limb hypertrophy conforms to the Neanderthal pattern. Additionally, there is no difference in locomotor resistance relative to early modern humans. This individual's body proportions are consistent with those of European Neanderthals, and they differ with Middle Paleolithic and earlier Upper Paleolithic modern humans. This, therefore, raises the question of the magnitude of ecogeographical patterning in body proportions amid European Neanderthals.

Much like their cranial anatomy, the postcranial anatomy of Neanderthals differentiates them from contemporary humans (Trinkaus, 2006). Individuals as young as one year of age, and in some cases younger, display Neanderthal postcranial features. Weaver (2009) gives several examples: Mezmaiskaya displays a femoral diaphysis that is long in proportion to the tibial diaphysis, bowed long bones, a medially directed radial tuberosity, a long superior pubic ramus of the pelvis, and overall robust skeleton—which is unique and distinctive of Neanderthals, and contrasts with modern humans. An additional specimen from Crimea named "Kiik-Koba 2", who is thought to be 3-7 months old, possesses an incipient scapular dorsal axillary sulcus which is indicative of Neanderthals, while Amud 7 displays a relatively long clavicle. Other Neanderthal postcranial features such as thinness of the superior pubic ramus and thick long-bone cortices, occur later in development (Cowgill et al., 2007). Weaver (2009), speculates that mechanical loading history would explain the variation in cortical bone thickness between Neanderthals and modern humans, but also suggests some differences may be caused by genetic influences as well.

Evolutionary Explanations of Postcranial Material

The two main ideas put forth to explain Neanderthal postcranial morphology are 1) adaptation to cold climates and/or 2) patterns of activity (Weaver, 2009). Many warm-bodied (endothermic) species, including modern humans, have body proportions similar to Neanderthals with lineages in cold climates, while individuals with lineages in warm climates demonstrate proportions most similar to early humans and *Homo erectus* (Freckleton et al., 2003; Holliday, 2000).

Neanderthals have a wide pelvis, relatively short limbs compared to trunk height, and short distal limb segments. In contrast, early modern humans have narrower bodies with relatively longer limbs (Pearson, 2000). These differences have led scientists to believe that thermoregulation influenced body size and shape. The climate hypothesis is supported by laboratory experiments like that of Tilkens (2007) who demonstrated that human subjects with long legs relative to body mass displayed higher resting metabolic rates than individuals with shorter limbs when sitting in a temperature-controlled room. Their experiments showed that individuals with bodies adapted to warm temperatures need to expend more energy to stop their body temperatures from dropping due to heat loss. However, a more recent study by Collard and Cross (2017) challenged that hypothesis.

Collard and Cross (2017) considered body segment differences in surface area, skin temperature, and rate of movement in order to determine if the current consensus concerning the size and shape of the bodies of *Homo erectus* and *Homo neandertalensis*. The authors utilized various limb bone data belonging to modern humans from around the world, which includes, but is not limited to Inuit, Yugoslavians, Lapps, Amerinds, Melanesians, Egyptians, etc. In addition, they used fossil remains belonging to *H. erectus* and European *H. neandertalensis*. While their study did show whole-body and whole-limb heat loss estimates were consistent with the thermoregulation hypothesis, the limb segment heat loss estimates were not consistent with the thermoregulation hypothesis. They concluded that the general consensus of thermoregulatory significance influencing the size and shape of *H. erectus* and *H. neandertalensis* may need some reexamination. Moreover, Collard and Cross (2017) suggest that activity patterns (mechanical loading, wind resistance, and locomotion) could be partly responsible for some postcranial features.

Conclusion

Neanderthal anatomy differs from modern humans in that they displayed more robust, shorter bodies, and an array of unique morphological features. Their morphology poses a unique challenge to the understanding of human evolution. Explanations of lifetime behaviors or alleles passed from generation to generation that were influenced by evolutionary pressure have been put forth by numerous researchers interested in deciphering the meaning of Neanderthal skeletal morphology utilizing a variety of methods. The consensus seems to be that Neanderthal cranial features are the result of genetic drift that occurred after Neanderthal and modern human populations were isolated (>350,000 years ago). The body proportions of Neanderthals may be influenced by adaptations to cold climates, though there may be other factors at play. Future research could illuminate other factors such as locomotion, mechanical loading, and wind resistance and their effect on the unique skeletal morphology of Neanderthals.

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Gender, Culture, and the State in South Africa Empowerment and Education

Key Words: Female Representation, Inequality, Policy, Poverty

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Introduction

When looking at gender South Africa, there are obvious disparities that exist across the nation. According to the World Economic Forum, a Swiss NGO, South Africa is the 19th worst country in regard to gender inequality (France-Pressé 2017; WEF 2017). While 19th place is nowhere near winning an unfortunate race, it is still incredibly high. The World Economic Forum report also stated that even though female representation in political institutions has increased, other disparities - like the gender pay gap (in South Africa, currently at 23%), have increased and that it would take decades to right these wrongs (France-Pressé 2017). Despite the perception that South Africa is progressive in regard to gender equality, specifically in policy and in the constitutional law, public policy is not implemented in a way that can promote greater gender equality. One clear example of this is that women in South Africa have the right to legal abortion (with stipulations occurring after 12 weeks), but access to facilities capable of performing abortions is limited due to factors such as social stigma, distance, cost, and the overall lack of such facilities (Driesens 2018). It is easy to see that there are gender disparities in South Africa, but what is more important is how these disparities intersect with one of the leading indicators of success and equality: education. Education has been seen as an equalizer of people around the world, as it allows access to opportunities like almost nothing else can. A good educational background often can provide the means to succeed and make it possible for some to break out of cycles of poverty and inequality. Gender disparities amplify other socio-cultural inequalities and gender is an additional barrier for women that reduces access to education. This paper explores the history of the education of black women in South Africa within the broader context of social inequality to demonstrate that education may be a key factor in the effort to combat gender disparity in South Africa and in efforts to help women break out of cycles of poverty and inequality.

Gendered History of Public Education in South Africa

South Africa's education system did not begin during apartheid, although much of its history is still tainted by colonialism. The education of girls during this colonial period (1652-1910) in South Africa shows an interesting connection between colonial paternalism and Western ideals about "taming" the "other". One common way the South African colonial

government sought the "taming of the native population" was via missionary schools that taught the Christian doctrine along with other western standards such as speech and dress. (Healy-Clancy 2013). In this way, missionary schools used assimilation through education as a clear means of establishing control over parts of the population. Some of these missionary schools sought to forcefully teach anyone they could, but African girls, in particular, proved to be a problem, since they had to have their father's permission in order to attend school. Healy-Clancy (2013), explains that the decision to accept only girls who had been given permission to attend school was "Entirely keeping with the gendered and generational basis of colonial governance ... what Jeff Guy has termed an 'accommodation of patriarchy'" (Healy-Clancy 2013, 54). In other words, the early colonial education of young women, which was more an assimilation attempt than a real educational experience, was designed around the girls' fathers. The claim of the patriarch over minors, which included unmarried women of any age, meant that the colonial governments had to bow to local customs of patriarchy, which matched their own (i.e. Western) customs regarding the control of women.

During the period of apartheid in South Africa (1948-1991), which separated racial groups to the extreme both physically and socially, the education of African women followed a similar pattern. Education - to the South African government - was "working for a patriarchal mission within a patriarchal state" (Healy-Clancy 2013, 88). The actions of state schools that sought to teach and control black students through western education were still part of the colonial endeavor. Young black women were being taught when their patriarchy allowed, and then only if they could even afford an education. In addition, access to education was often stratified by race, location, and social class. Black women could pursue an education only if their government, families, and economic situations could allow. In addition to this, race was now - during Apartheid - a greater factor than ever before, since attending segregated schools was now institutionalized by law, rather than just a factor of location. Healy-Clancy notes that when black women were able to seek an education, "The state sought to ensure the reproduction of a black labor force on a shoestring, it increasingly relied upon the work of educated African women in the core social service professions of teaching, nursing, and social work" (2013, 88). So, the few elite black women who were able to seek out an education were limited in the academic endeavors they could pursue. These areas of education further facilitated the colonial project, situating black women in positions of service. According to Healy-Clancy, social workers, nurses, and teachers all perform services that the government often neglected, especially in black communities (Healy-Clancy 2013). Thus, by educating black women, the apartheid government in South Africa was helping itself rather than helping black women. White women, on the other hand, were provided a greater variety of academic endeavors and career choices and had the certainty that apartheid South Africa would have a job well suited to their whiteness. White women also had access to Model C schools - well-resourced, white-only schools that easily transitioned them from one education level to the next.

Schooling was a way for black students to be assimilated into South Africa in a way that was positive for the government, but the colonial education system did succeed in "taming" South African women. Starting in the 1970's, school attendance for young women actually increased despite protests across the country. Healy-Clancy argues that this increase in educated women arose as "Patriarchal apartheid policies exploded, exposed as the fictions that they were, young men cultivated 'struggle masculinities', violently asserting their control over young women. In this fraught context, young women sought mobility - to provide for themselves and their families" (Healy-Clancy 2013, 168). As students were protesting and violence erupted, school then became a haven for young women to educate themselves and move up in the world, regardless of race. An education was one of the best ways out of poverty and, at the time, the best way into the better white communities, so young women knew what path they needed to take in order to remove themselves from the patriarchal control that had been following them their whole lives. In the waning years of apartheid (mid 1970s- 1991), students were pushing for change in South Africa, and women and girls were part of this effort. Although often removed from the national narrative of resistance, students and educated women were active in protests across the country, including the Soweto student protests (Healy-Clancy 2013).

Legally speaking, apartheid ended in 1991 followed by the first free election in 1994. However, the social, economic, and political effects of apartheid are numerous. With the legal end of apartheid came new governments and new laws, one of which allows students of all backgrounds to have access to free education. However, like many contemporary South African laws and social policies, the ideal doesn't necessarily relate to reality. In particular, girls often receive the brunt end of the stick, such as with the cycles of poverty and inequality that continue to affect them. As Holmarsdottir et al. (2013) state, there are other challenges which impact negatively on learners' access to quality education and on the teaching and learning process in South Africa... These challenges relate to socio-economic factors such as poverty, lack of teaching resources and facilities in poor communities and socio-cultural factors which have influence on gender equality in the school system" (Holmarsdottir et al. 2013, 119). These intersectional factors play a part in how education, especially for young women is experienced.

Intersections of Race, Class, and Gender

Based solely on enrollment statistics, black girls in South Africa appear to have equal access to education; however, this access is not translated into equality in opportunities, participation, employment, wages, or overall treatment in school and in life (Holmarsdottir et al. 2013). Specifically, gender-based violence (GBV) experienced in school and on the way to school are problems faced by contemporary South African school children. Holmarsdottir et al. explain, " Gender-based violence (GBV) is also one of the factors which interrupt girls' studies and often lead to girls dropping out of school" resulting in what they call, "invisible forms of exclusion" (Holmarsdottir et al. 2013, 120). When 40% of students are victims of violence and

47% of girls have experienced sexual harassment in school environments, GBV is arguably a major issue in the retention of girls in school (Legotlo 2014, 101). For many students in school, especially women, getting an education does not feel as safe as staying home or finding work because of the threat of violence. While girls may technically have equal access, that does not mean they have equal opportunity due to this fear. Without equal opportunity in education, it is easy to see how the cycle of poverty and inequality begins.

For women who do not finish their schooling or go onto higher education, the workforce also contains numerous disparities that can lead to inequality and poverty. Because of this, one of the first things to look at when it comes to women and the cycle of poverty, besides education, is the fact that women are paid less. Women in South Africa make 23% less than men (France-Press 2017), so from the very beginning, they are already behind in the race. In addition to this, 68% of all single-parent families are single mother households, which means many women cannot afford to put their children in better school (Driesens 2018). If a child lives in a single parent household with a female head, then that child is already closer to poverty than another child. In addition to this, women only make up 35% of the workforce and are often in lower paying jobs, which once again adds fuel to the fire (Driesens 2018). These numbers apply to the mothers of poor daughters, but also to the daughters themselves since they will someday likely be in these places. Colette Muller, a senior lecturer at the University of KwaZulu Natal's school of accounting, economics, and finance, explains, "[Men and women] typically work in different occupations and different industries associated with different rates of pay and benefits... South African women dominat[e] the informal sector, part-time employment and domestic work" (Makou 2018). In other words, what jobs women work are often gendered, such as with domestic work or teaching. Women can enter these jobs, but they pay less and are typically viewed as less important than male gendered jobs in the hard sciences. This is further evidenced in the fact that 35% of men participate in industry, compared to 13% of women, whereas 83% of women participate in the service industry in comparison to 59% of men (LBD 2011).

For young black women who aren't able to get an education, they often find themselves stuck in a cycle of poverty that also denies their children an education. Factors of gender, race, and social class intersect and make access to education specifically difficult for black, low-income girls in South Africa. The failures of education today are the failures of education tomorrow and poverty becomes generational. When society and resources limit access and opportunity, tensions, like the violence that has plagued South Africa, appear. Visible inequalities stress those who experience them, which means that these cycles perpetuate themselves in a cycle. Poverty is one of the greatest barriers to education because it falls under the "invisible forms of exclusion". Students may have access to education but may not have access to a quality education with the resources they need to succeed in school and in society. Legotlo (2014) argues, "Poor villages are not short of brainy individuals, but poverty of homes

and communities is responsible by far for denying children from poor homes chances to a brighter future" (2014, 69).

In South Africa, race and poverty are key barriers to a quality education and socio-economic advancement. South African cleaners, maintenance staff, and other menial workers are predominantly people of color, whereas the white population, making up only 8.4% of South African population often have the highest paying jobs (Driesens 2018). Whereas whites only make up 9.5% of the economically active population, they take up 68.5% of the top management positions, whereas the 78% of economically active black South Africans make up 14.4% of these positions (Mthunzi 2018). These disparities in the workplace are, of course, the symptoms of apartheid

Apartheid South Africa allowed for white people to have greater opportunities in every aspect, including preferred jobs, housing, and education (Driesens 2018); therefore, many of the disparities in modern South Africa intersect racial lines. If white men have the money, power, and jobs, then it is black South African women who are lagging behind due to both their gender and their race. Looking at education, these apartheid lines are still evident. Healy-Clancy states, "As elites elsewhere attempted to deploy schooling for nation building, black South Africans found their political organizations banned and their children mostly consigned to inferior state schools" (Healy-Clancy 2013, 2). Black South Africans have a history of being denigrated to worse education. Like Healy-Clancy mentions, schooling is a form of nation-building, so when an entire population is forbidden from entering better schooling, they are forbidden from helping to build and participate in the nation. And yet, the damaging effects of apartheid are not only in the past. According to an article in South Africa's *Sunday Times*, of the top 100 schools in South Africa, 94 of them were formerly white institutions that still have a white majority, averaging 67% white in 2009 (Govender 2009). Thus, formerly white institutions still flourish despite the lawful end of apartheid policy and white South Africans continue to have better access to better economic and educational resources. These disparities are compounded by the fact that these educational institutions are paid institutions.

Social and economic disparities have led to significant barriers to educational access within South Africa. In 2015, school enrollment from grade 1 to grade 12 in South Africa dropped from 1,244,208 to 687,230, resulting in a roughly a 55% loss of students over time (Education Statistics 2018). According to this same dataset, each year only 22% of South African students move on to attend higher education. The result, only 1 out of 5 students continue on to the tertiary level of the South African school system (Education Statistics 2018). Together, this information paints a poor picture for students in South Africa. It appears that a majority of South African students drop out of school before completing their education, and very few continue on to higher levels, thus effectively removing access to higher paying jobs. As Geo-JaJa et al. (2009) state, "Education in development, in poverty reduction, in human development, and

economic growth is a necessary and sufficient means of promoting equal rights and opportunities for women" (Geo-JaJa et al. 2009:115). So, while education is freely available in South Africa, the dropout rate shows how many people are truly being left out. And those who are being left out are lower-income and not white.

Access to primary and secondary education may be readily offered by the state, but that does not mean that "accessible" education in South Africa has made tertiary and higher education available and more accessible to the majority of students. For many students, barriers that exist for them in their early education are even stronger when they seek higher education. In general, the strongest barrier to higher education is money. According Eynon, "The [South African] government 's share of covering the cost of higher education declined from 49 percent in 2000 to 40 percent by 2012, while that of students increased from 24 percent to 31 percent" (Eynon 2017, 135). These numbers show that the government is providing less financial aid as more and more students are entering higher education. This is combined with rising university prices, which is why it is no surprise that student movements such as "fees must fall" exist in South Africa. Another important factor affecting student access to education is racism on campus. South Africa is a post-apartheid state, but apartheid's vile leftovers exist everywhere. In a country with a black majority, higher education in South Africa serves a predominately white student body, despite the fact that whites represent less than 9% of the overall population (Eynon 2017). Language of instruction serves as an additional barrier. In South Africa, in many schools, the language of instruction is English and/or Afrikaans. This is a barrier to many students whose first language is not English or Afrikaans. Moreover, many students, especially those from poor areas and who have not had access to a private education are underprepared for the academic rigors of higher education. Eynon states, " Only 7 percent of first-year college students [in South Africa] were proficient in mathematics and only a quarter fully quantitatively literate" (Eynon 2017:137). In other words, of the students who do manage to overcome all of the social barriers (i.e. poverty and race) to education, public education they did receive likely left them without the skills and tools necessary to succeed at university.

For many students, these are the silent factors that prevent equal access to education. However, for women, the problem is increased. This is especially true for women and students of color. Eynon argues, " Even if the student receives a substantial bursary, he or she may send as much as 80 percent of it back home to help his or her family" (Eynon 2017, 136). Women are even more expected to participate in this process, as there are expectations for them to help with the family and domestic care. These competing family demands not only affect their budgets, but they take away from the student's time to devote to an education. Young women must often work a job or even travel regularly to assist kin (Eynon 2017). These kinship obligations further limit girls' and women's access to quality higher education. Not only are the social and economic barrier worsened by gendered kinship obligations, but there are also barriers involving their bodies and safety. Violence against women is a problem throughout South Africa, including

tertiary and higher education campuses. This is especially true for women and girls who must travel to the city for education. Women's safety can be especially at risk in these areas. In addition, leaving home for an education may add the burden of risk of sexual assault or other gender-based violence. These violences alone may cause a woman to leave school due to the personal risk, but they also increase the incidence of unwanted pregnancy. If the woman becomes pregnant and chooses to keep the child (or is unable to get an abortion because of lack of access, money, transportation, or time), then she will likely be unable to care for that child for those same reasons and will then be even less likely to continue her education.

The gender disparities within the South African educational system are intersectional. Young white women, face fewer barriers to higher education due to the fact they are significantly more likely to have gone to a private or quality public school during their primary and secondary education and they are less likely to face economic hardship. While not all white South African women share the same educational experience, gender disparities continue to be a problem in South Africa. According to Eynon (2017), South African women have lower education levels than men. For most, sexism is a barrier to a quality education. Eynon argues that the patriarchal structure of the South African educational system affects women's aspirations: "A by-product of this patriarchal attitude is that, in some cases, people don't expect much of women in terms of their performance" (Eynon 2017:175). The legacy of colonial and apartheid eras has resulted in an educational system that has followed gendered lines, designed to subdue women (especially black women) or train them to serve the nation via government social programs. Because of this legacy, many contemporary institutions expect women and girls to follow set career paths such as education, the social sciences, and nursing. These career paths further the gender pay gap women experience after higher education, as they typically pay less than the male-dominated fields such as engineering (Akala and Divala 2016). While it is true that all South African women face disparities in access to quality education, black South African women have the lowest educational outcomes overall (Eynon 2017). Since black women in South Africa make up 96% of all rural women, it can be argued that rurality combined with gender and race significantly limits access to education (Eynon 2017). The major factors that affect rural women, besides poverty, tend to be language, access to and familiarity with technology, and transportation.

After examining women's barriers from primary to tertiary education and how poverty, race, and other structures affect them, it is no surprise that education access is different for women than it is for men. At the primary and secondary level, women are technically given the same access to education as their male counterparts, but when taking in to account the fact that many students face invisible barriers such as risk of gender violence and sexism, it is not surprising that women and girls are less represented in the South African education system overall: only 12.3% of all South African women complete higher education and 62.5% complete less than grade 12 (Statistics South Africa 2011: 19). When barriers due to race and poverty are

considered, women and girls of color are even less represented within educational system, and especially so in higher education institutions. Despite these disparities, access to public education is important for South African women. Education allows women to be empowered not only by the knowledge itself but resulting careers also to provide the means to be independent. 50% of women in South Africa with a grade 12 education or higher are employed, in comparison to the 14.2% who have never had any schooling at all (Statistics South Africa 2011, 29). When women are educated, they have the means to support themselves and may gain the means to break the cycle of poverty. This corresponds with Geo-JaJa et al.'s argument, "This strong correlation of education on empowerment, coupled with the exceptional high social and economic returns to girl's education, led to the call for immediate action by all stakeholders to support and recognize the right of girls and women to education, and to develop appropriate education programs and curricula that provides for the participation of women. Clearly, the expansion of women's paid employment and knowledge, contributes to more equality in gender partnership and a reduction in gender inequalities because of the links between women's empowerment and their decision-making role..." (Geo-JaJa et al. 2009:115). Having even some education drastically increases a woman's chances of living in stability rather than in poverty. This education then gives them a greater chance of being employed and having a stable life that slowly begins to chip away at structures such as the gender wage gap, and instead of a cycle of poverty; education can create a cycle of success. While education barriers and boundaries are different for different women in South Africa, it is clear that the power of an education is key in increasing equality for all women regardless of class or color.

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How the Athenian Plague Affected the Topography of Athens and Vice Versa

Key Words: Agriculture, Diseases, Epidemic, Greece

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Diseases have been the biggest killers of humans. Some of the deadliest diseases that have afflicted humanity, including smallpox, the flu, tuberculosis, malaria, the bubonic plague, measles, and cholera, are "infectious diseases that evolved from diseases of animals, even though most of the microbes responsible for our own epidemic illnesses are paradoxically now almost confined to humans." By around 10,000 B.C. agricultural communities and domesticated animals were appearing. Along with the perks of agriculture, such as a generally more reliable and nutritious food supply, came some major setbacks, like epidemics of crowd diseases, some of which were previously mentioned. Crowd diseases could "not sustain themselves in small bands of hunter-gatherers and slash-and-bum farmers." An entire group could be wiped out by a disease from the environment or a foreigner due to the lack of antibodies among the small groups, leaving diseases unable to transition to an epidemic status as the populations had limited interactions. They did have infections, "but only of certain types," with some "caused by microbes capable of maintaining themselves in animals or in the soil, with the result that the disease [didn't] die out but remain[ed] constantly available to infect people," while others were chronic diseases, and some were "nonfatal infections against which [people] don't develop immunity to," meaning the same person can become re-infected after recovering (Diamond, 197- 204). According to Jared Diamond, the crowd diseases "could have arisen only with the buildup of large, dense human populations," which "began with the rise of agriculture . . . and then accelerated with the rise of cities starting several thousand years ago" (Diamond, 204-205). Hunter-gatherers had frequently shifted camp and left behind trash and fecal matter, whereas sedentary populations have lived amid their own sewage, "thus providing microbes with a short path from one person's body into another's drinking water" (Diamond, 205). Irrigation, fish farming, and forest clearings can also be breeding grounds for various microbes or carriers of certain diseases. In past years it has been proven that many of the "crowd" infectious diseases originated from diseases carried by domesticated animals. As is the case with humans, "epidemic diseases require large, dense populations" among animals and are "confined mainly to social animals providing the necessary large populations. Hence when [humans] domesticated social animals, such as cows and pigs, they were already afflicted by epidemic diseases just waiting to be transferred to" humans (Diamond, 206).

Throughout history there have been several major epidemics; such as the Plague of Justinian which began in 541 A.D. and continued on and off for 200 years, the bubonic plague which ravaged Europe mainly between 1347 and 1353 A.D., the smallpox epidemic brought to the Americas by Europeans, and the influenza Pandemic of 1918 are just a few of such. Another was the Athenian plague which devastated Athens for four to five years. It first struck the city in May 430 B.C., then it struck a second time in 429 B.C., and again in the winter of 427-426 B.C. (

Plague of Athens). Thucydides depicted the se outbreaks in Athens as "virgin-soil epidemic[s]" as the disease had a "high attack rate and an unvarying course in persons of different ages, sexes and nationalities" (Littman, 456-461). It is estimated that one-fourth to one-third of the Athenian population was killed, ranging from at least 30,000 deaths to as many as 100,000 (*Plague of Athens*; Littman, 456). Such a devastating epidemic would have resulted in topographical changes for a city on its own, as the inhabitants would be left incapacitated to do any major building projects, try to appease the gods, and then appease themselves as they realized the futility of the situation. Furthermore, they would have to deal with the growing number of the dead. However, in addition to the plague, the Athenians were also fighting a major war, which further affected building as resources were spread thin, the political situation continued to change, more of the population was being killed, and conditions created inside the city due to the refugees and soldiers allowed the epidemic to thrive.

The disease that caused this epidemic is unknown. Scholars have thought it was various diseases including the bubonic plague, smallpox, typhus, cholera, typhoid fever, Ebola, ergot toxin, anthrax, or measles, just to name a few (Horgan; *Plague of Athens*). Some scholars have tried arguing that it was a combination of diseases, however the majority think that is unlikely for a couple of reasons. Most of what scholars know about the plague comes from Thucydides' accounts, as he was not only a witness to the epidemic, but a survivor as well. He wrote that it "originated in Ethiopia and spread into Egypt and Libya and through the Near East before arriving at Piraeus," and once it arrived at Piraeus it quickly moved through Athens. He also mentioned that those who survived it, developed an immunity, which counters the idea that it was multiple diseases. Some of the symptoms he described were "redness and inflammation in the eyes, the inward parts, such as the throat or tongue, becoming bloody and emitting an unnatural and fetid breath. These symptoms were followed by sneezing and hoarseness, after which the pain soon reached the chest, and produced a hard cough. When it fixed in the stomach, it upset it; and discharges of bile of every kind named by physicians ensued, accompanied by very great distress." Also "externally the body was not very hot to the touch, nor pale in its appearance, but reddish, livid, and breaking out into small pustules and ulcers. But internally it burned so that the patient could not bear to have on him clothing or linen even of the very lightest description; or indeed to be otherwise than stark naked. What they would have liked best would have been to throw themselves into cold water; as indeed was done by some of the neglected sick, who plunged into the rain tanks in their agonies of unquenchable thirst" and towards the end many suffered from "severe diarrhea." Another important factor that Thucydides noted was that all "birds and beasts that prey upon human bodies, either abstained from touching them (though there were many lying unburied) or died after tasting them" (qtd. in *The Plague*, 2.48.1- 2.50.2). None of the diseases mentioned above match all of the symptoms Thucydides described. It is very possible that the symptoms "may have mutated over time, or that the plague was caused by a disease that no longer exists," (*Plague of Athens*).

Just prior to the first onslaught of the epidemic, was the start of the Peloponnesian war. The Peloponnesian war broke out around 431 B.C. due to tensions between the Athenian Empire and the Peloponnesian League, which was led by the Spartans. Who exactly is to blame for the war has been disputed as Thucydides tried and succeeded in making his account concerning the war "scientific, not epic; abstract, not emotional." He wanted the war

to be about the imbalance between the states, not individuals. Many readers of Thucydides believe the Athenians goaded the Peloponnesians into war, however some scholars do blame the Spartans or Corinthians for starting the war, like Donald Kagan (Tannenbaum, 535-536). In 433 B.C. Athens allied itself with Corcyra, which was a former colony of Corinth and their rival at the time. Corinth was at war with Corcyra at the time, fighting over Northwestern Greek colonies. Athens made this defensive alliance around when the Corinthians were planning to attack, thus making it impossible for Corinth to carry through with their advances, forcing the city state to stop the war and surrender. This parallels the start of the first Peloponnesian war (460-446 B.C.), when Athens aligned itself with Megara "with whom Corinth was then at war...that caused Corinth, and ultimately the Peloponnesian League, to make war on Athens," thus it is likely that Athenian politicians knew that by aligning Athens with Corcyra, they were risking war. To add fuel to the fire, Athens ordered the Potidaeans to "tear down part of their wall, to hand over hostages, and to expel the present (and refuse future) Corinthian chief magistrates," and Potidaea was a Corinthian colony, but a subject-state of the Athenian empire. This caused the Corinthians to encourage a revolt and sent "volunteers" and mercenaries to Potidaea. There were other back and forth issues, and eventually Sparta had enough of Athens as a great empire, and the war commenced (Tannenbaum, 537-540). The war lasted until 404 B.C., when the Athenians lost a fleet at Aegospotami in the Hellespont. There was a temporary halt to the war with the Peace of Nicias in 421 B.C., and the peace lasted until the Sicilian Expedition (415-413 B.C.).

Since the first wave of the Athenian plague broke out so soon after the war started, the Athenians initially blamed the Spartans. Thucydides mentioned that " the Peloponnesians had poisoned the reservoirs" of Piraeus, and then the sickness traveled to the heart of Athens (qtd. in *The Plague*, 2.48.2). Poisoning water was not unheard of in ancient Greece. In 590 B.C., Kirrha, Greece was defeated by poison in their water supplies. There had been a rule declared after the First Sacred War against poisoning water supplies, however "many incidents and rumors of poisoning besieged towns and enemy troops were recorded" after the incident at Kirrha (Mayor, 106). Initially, I thought the Athenian plague would have spread similarly to the London cholera outbreak in 1854. However, Athenian water supplies were not connected, and depending on what disease the epidemic was, it may not have been water-borne. Out of the main ones previously listed, only typhoid fever and cholera are transmitted easily through water, but others, such as Ebola , can be transmitted through bodily fluids, so if the sick threw themselves into public water supplies, as Thucydides mentioned, it could be possible that the water became contaminated. However, this would not have caused the widespread outbreak of the disease as water sources were localized. The plague and fear of poisonings promoted modernization of the water system of Piraeus. Thucydides mentioned that there were "no wells" in Piraeus. Instead they had relied on cisterns, which were not connected to any other water sources and were "unassociated with sewage channels" (qtd. in *The Plague*, 2.48.2; Morens and Littman, 284). The polis of Athens relied on wells for water, which were on higher ground, so ground sources would have flowed from Athens to Piraeus, not vice versa (Javier, 139; Morens and Littman, 284). It is possible that Meton, the Athenian astronomer, constructed wells in Piraeus before 414 B.C., possibly during the Peace of Nicias (Hope and Marshall, 60). Unfortunately, there is no exact record that could be used to determine precisely when Piraeus made the switch from

cisterns to wells. However, if much of the population believed that the cisterns had been poisoned by the Spartans, as Thucydides makes it seem, that would provide incentive to modernize the water-supply to prevent any future poisonings as quickly as possible. Peace from the war during the Peace of Nicias would not only allow the time to build wells, but also the money and manpower would be more readily available during a halt in the conflict.

Prior to the war and before the epidemic, the Athenian population would have been at least 100,000 people, with Gomme believing it was as high as 155,000 consisting of "60,000 citizens, 25,000 metics, and 70,000 slaves." Athens had a very powerful navy, but could not match the Spartan army on land, so the Spartans laid siege to Athens over land, where they knew they would have an advantage. Pericles responded to the Spartan siege by asking the Athenians who lived outside of the city walls to move within. This increased the population to 300,000 to 400,000, with many modern scholars estimating the number was closer to the latter (Morens and Littman, 276). The introduction of so many people led to changes of the topography, and increased the spreading and deadliness of the plague, which resulted in further topographical changes. Since there was a large influx of people into such a small area in a short period of time, there was "not enough space inside the city's walls to house all the refugees from the countryside without overcrowding, and the majority had to camp out in any open space," including in the temples and sanctuaries (Martin). This influx also turned the area in between the long walls connecting into a shanty-town-esque area, as not everyone could move in with their relatives or had relatives to take them in. There were probably around 10,000 dwellings in between the long walls, with 10 to 40 people per dwelling during the siege (Littman, 461). It "overstretched the city's infrastructure and resources," and turned essentially any open space into a shelter, and additionally altered the use of public and religious buildings, such as the temples and fountain houses, to be places where the diseased and dead were congregated (Martinez, 136). "Dead bodies in the temples and the dying crawling in the streets - or driven by a raging thirst - massed around the fountain houses," just trying to find relief and help from their suffering (Camp, *The Archaeology of Athens*, 118). Due to the overcrowding and unsanitary conditions, "the mortality was. . .without all form; and dying men lay tumbling one upon another in the streets, and men half-dead about every conduit through desire of water. The temples also where they dwelt in tents were all full of the dead that died within them (qtd. in *The Plague*, 2.52). The refugees living between the long walls, were very vulnerable to the lack of water sources, as prior to the arrival of the country dwellers, the water supply was adequate for the environment, and there were no additional resources built to accommodate the addition of the refugees (Iversen, 48). In addition to inadequate water supplies, the crowding caused by the refugees also led to inadequate food supplies and an increase in insects, lice, rats, and waste. In such close quarters, with the diseased and dead being found almost everywhere, including in the public water supply and frequently visited areas of the city, the disease had no limits to who and how it could spread, especially in the overcrowded areas where there was poor air, poor sanitation, and a lot of close contact. With lack of food came lack of nutrition, making people more vulnerable. There were also no areas officially quarantined, so some people refused to leave their homes and doctors often refused to see their patients as they became afflicted (Longrigg, 213).

The burial practices of Athenian society changed as well since the city quickly developed an issue of discarding the bodies of the deceased which began to pile up and putrefy throughout the city. So, as with many other epidemics, mass plague burials were added to the topography of Athens. During the mid-nineties, a mass burial site containing at least one-hundred-fifty bodies was excavated in the Kerameikos ancient cemetery of Athens. The mass grave was a basic pit, of an irregular shape "6.50 m long and 1.60 m deep." The bodies were discovered laid out in a disorderly fashion in more than five successive layers, with no soil between the layers of bodies, indicating the bodies were thrown on top of one another. The bodies at the lower level were placed more distant from each other, although the manner of their placement remained more or less as disordered as in the upper layers. Overall, more care for the burial of the dead seemed to have been taken at the lower levels of the mass grave, possibly before the epidemic was in full swing. The upper levels indicated that the grave was completed in a very "hasty, improper and impious manner," with such certainty that it was not possible for these individuals to be war dead. It was likely that the Athenians "hastily buried a large number of hapless and poor dead people as a means to protect its still-surviving population from an epidemic." Among the dead of the upper layer, eight pot burials of infants were found. Contrary to the careless inhumation of the adults that were buried in the same pit, children seemed to have had special care at their burial. Overall, "the quality and quantity of the offerings was extremely poor and absolutely disproportionate to such a large number of buried people." The majority of the vases found in the grave were dated around 430 B.C., with only some dating to the decade of 420 B.C., further supposing that most of the grave goods with the burials, and thus the burials themselves, were from the plague. To be buried without burial rites was as degrading as to "be disposed of like an animal." The fact that so many burials were so inadequate emphasizes the dire situation that Athens was facing (Papagrigorakis, Manolis J, et al.; Lindenlauf, 87). There were neither as many mass burials nor as many individuals in this mass burial, as one may suspect because usually the relatives of the deceased went with more common ways of burial, like cremations or individual inhumations, wherever room could be found (Papagrigorakis, Manolis J, et al.). Also, mass burials of "uncremated bodies were rare in Classical Greek society" and were "linked with times of pestilence," hence this mass grave's existence (Martinez, 142). A more frequent sight and disposal method was the use of funeral pyres. Thucydides described the chaos with the funeral pyres: "when one had made a funeral pile, another getting before him would throw on his dead and give it fire. And when one was in burning, another would come and, having cast thereon him whom he carried, go his way again," completely disregarding the proper traditions (qtd. in *Political Consequences of the Plague of Athens*, 137 (2.52)).

One of the most important Athenian historical figures who fell victim to the plague was Pericles. Pericles was a brilliant and skillful politician, general, and orator, described as "the first citizen" of democratic Athens, according to Thucydides. Pericles' time in power coincided with a period of "Athenian political and economic dominance as well as time when art, theater, philosophy, and democracy flourished to a degree not seen before and only rarely since," and is often considered the high point of the Classical period (Camp, *The Archaeology of Athens*, 72). This time period, from about 449 to 431 B.C., which were years of peace between the Persian and Peloponnesian wars, is often referred to as the "the Golden

Age" or apogee of Athens (Camp, *The Athenian Agora*, 77). After a failed Athenian attack on the Persian in 454 B.C., Athens took over the Delian League's treasury, and three years later a coinage decree "imposed Athenian weights and measures throughout the league." During the 440s and 430s, Pericles utilized the treasury to fund "cultural projects" in Athens, including many on the Acropolis like the temple of the Athena Nike, the Parthenon, and the Propylaia. In the lower city, it is possible that the Hephaisteion was under construction during this period and "the Odeion south of the Acropolis certainly dates to the 440s." As many as a dozen temples and other structures can be attributed to the Periclean building program of the third quarter of the fifth century B.C. (Camp, *The Athenian Agora*, 63). However, when the Peloponnesian war broke out, construction on the structures for the Periclean building program stopped, leaving many unfinished, like the Propylaia on the Acropolis, while others were only left unfinished temporarily. Neither the war nor the plague though could fully stop Athenian building, although both did alter it due to the labor force, cost, and death of Pericles (Camp, *The Athenian Agora*, 63). During the first outbreak of the plague, his two legitimate sons were killed, and he died a few months later in 429 B.C.

During the years of the Plague outbreaks, all major construction projects were halted and nothing new was started. Pericles estimated the manpower of Athens at the beginning of the war was 13,000 hoplites, and 16,000 others on garrison duty at home, as Pericles' strategy did not involve fighting the Peloponnesians armies on land outside of the city walls. He also estimated "1,200 cavalry including mounted archers, 1,600 archers, and the crews of 300 Triremes," which would have been around 60,000 men (Smith, 360). Triremes consisted of crews of about 200 men. The crew included the captain, and about 10 dignitaries, 2 archers- bowmen, 14 soldiers and 170 or 180 oarsmen. 200 multiplied by 300 of these ships, is about 60,000 men (*Ancient Greek Trireme*). Although not many of these soldiers were from the main city of Athens itself, some were, and some were from the demes, surrounding the city, which had listened to Pericles and moved within the walls. Athens prided itself in the fact that free citizens made up its naval crews (*What was ancient Athens' military like*). However, slaves were sometimes soldiers in the army or attendants to the soldiers. Often times they were in the army as noncombatants and helped "prepare food, act[ed] as guides, rescue[d] wounded men, serve[d] as attendants to generals, carr[ied] important messages," and most often were the general caretakers of the hoplites' armor and their assistants (Pritchett, 51). For some battles there were as many as one slave per hoplite. Both slaves and freemen worked on the construction of monuments, religious structures, and public buildings in Athens, however the majority of workers were slaves (*Why the Parthenon was built*). Due to both the freemen and slaves of Athens being involved in the war, and the devastation brought on by the plague, there was just not a sufficient labor force for construction. The plague also did not just strike the main city of Athens, it afflicted the Athenian soldiers too, meaning even fewer men were available for construction labor when fighting was calm. According to Thucydides, "Hagnon at Potidaea lost 1,050 out of 4,000 hoplites in forty days as a result of the plague" (Smith, 361). The crowded and unsanitary conditions of the Athenian army camps provided an atmosphere similar enough to Athens, so that the plague still struck with a very high mortality rate, a little over twenty-five percent. As the epidemic slowed and stopped, building was able to commence again. The plague would also have an effect on the number of soldiers and able

workers available later in the war, as the plague killed many children and women of child-bearing age, thus decreasing the birth rate and population.

However, thanks to the devastation brought by the plague and the randomness of the victims, building emphasis shifted from "religious structures to civic ones" (Camp, *The Athenian Agora*, 63). People who were in good health had been struck without warning, as the plague did not discriminate by class, sex, or age (Longrigg, 214). During the initial outbreak of the plague, the people of Athens prayed in temples and asked for the help of the gods. They performed different rituals to try to appease the ones they had thought that they had angered (Longrigg, 216). As with what happened later with the bubonic plague, and other large epidemics, people soon realized that it did not matter whether or not they prayed or did something to appease the gods. People who continued to worship the gods perished, and people who did not worship the gods perished. Others believed that the Gods were supporting Sparta (Paolo, 50). So, why waste the time, money, and energy on gods who were not intervening or who were supporting the enemy? These beliefs led to a decline of the restraint of law and morality, as well as an increase in unnecessary spending, as people did not know when they were going to die and wanted to enjoy the possible little time that they had left (Longrigg 216; qtd. in Hobbes, 2.53). As a result, civic buildings which benefited the public became the priority.

Since Pericles perished, he could not push for all of his previous building projects to be finished. The combination of his death and the plague also spelled disaster for Athens and its future as his "strategies were quickly abandoned and the leaders who followed lacked Pericles' foresight and forbearance," instead "committing even the conduct of state affairs to the whims of the multitude," (*Pericles*). The generals who followed him were Demosthenes, Kleon, Nikias, and Alkibiades (Camp, *The Archaeology of Athens*, 117). The change in strategy and leadership also contributed to the loss of the war, as when Pericles was in charge, it seemed possible that the Athenians were going to win (Starr, Chester G., et al., 184). Thus, the political changes which resulted after Pericles' death also affected the topography of Athens. In 404 B.C., after Athens lost the war, Sparta instructed the Athenians to destroy the long walls, which had been vital to the defense of Athens, and to choose thirty men to "manage the affairs of the polis," resulting in the brief eight-month reign of the Thirty Tyrants (Planeaux). The Thirty Tyrants "were not in power long enough to initiate any serious building projects, though they are associated with a change in orientation at the old meeting place of the Assembly, the Pnyx" the seat of democracy (Camp, *The Archaeology of Athens*, 132). The Thirty Tyrants reversed the arrangement of the auditorium. "A high semicircular retaining wall was built to the north; it supported an earth embankment sloping down to the south, that is, in the opposite direction to the slope in the first period," of the area. The citizens now had their backs to the city, so they would no longer be distracted by "the site of the Agora and of their houses and fields" (Travlos, 466). Also, by reversing the relative positions of speaker and audience from Pnyx one, the Tyrants may have been trying to secure "a more seclusive gathering place, the entrance to which might be more readily controlled," by the new stairs (Kourouniotes, and Homer; 136). The retaining wall also sheltered the area from the north wind (Travlos, 466). Even after Democracy was restored in 403 B.C., very few, if any, comparable building projects to that of Pericles' occurred over the next few decades.

The buildings under Pericles had been "built to the highest standards of aesthetics, engineering and mathematics," and "these white marble structures were decorated with intricate statues and friezes carved by the era's greatest sculptors" (*Pericles*). The buildings built during the rest of the war were "generally more modest in their building materials, made of limestone and mudbrick as opposed to marble, with simple floors of packed earth," so after the plague most of the buildings were not as elaborate or nice as the ones built before the plague and before the war (Camp, *The Athenian Agora*, 63). Some of these buildings were the new Bouleuterion, South Stoa I, the Temple of Athena Nike, the Erechtheion, and the Stoa of Zeus Eleutherios (freedom). A new bouleuterion was built for the senate of five hundred around sometime between 416 and 409 B.C., based on "scraps of associated pottery and literary sources." It was built just a little west of its predecessor, the Old Bouleuterion (Camp, *The Archaeology of Athens*, 127). South Stoa I was a long colonnaded public building also constructed in the Agora. There are dozens of coins and an inscription that "suggest that it served a commercial function." Based on pottery from beneath the floor, the stoa was built around 430-420 B.C., probably after the plague, and as the war began to slow down (Camp, *The Archaeology of Athens*, 127-128). Construction for the Athena Nike began in the 430s and an inscription from 424/3 B.C. of records "for payments of fifty drachmas to the priestess of Athena Nike," is generally seen as evidence that the building and its altar were ready to be put into use in that year indicating that the building had probably been put on pause due to the plague and the war (Camp, *The Archaeology of Athens*, 92). There is no precise evidence for when the construction of the Erechtheion began, and it is possible that construction may not have started "until the late 430s," or the late "420s" after the Peace of Nikias, and it was under non-continuous construction during the war, and presumably during the plague as well if it had started that early (Camp, *The Archaeology of Athens*, 95; Thanjan, 116). The architectural details of the Stoa of Zeus Eleutherios suggests that the building should be dated to the years around 430 - 420 B.C., and is "unusual in that it is dedicated to Zeus, but takes the form of a civic or public building rather than a temple" (Camp, *The Archaeology of Athens*, 104). The epithet for the name "is said to derive from the freedom the Greeks won at the battle of Plataia [in 479 B.C.], the final victory over the Persians on Greek soil" (Camp, *The Archaeology of Athens*, I 04). It may have been chosen to be built then to raise morale within the citizens in regard to the current war that they were fighting. It is a good example though of the polis not wanting to build a religious building for a god, after the plague.

One religious structure that did come as a direct result of the plague was the Temple of Asklepeion. Asklepius was the god of medicine and healing (Caton, 8; Mitchell-Boyask, 3). According to legend, Asklepius, was the son of Apollo and Koronis (a mortal woman), and was born in the Hieron valley, the Argolic peninsula, so his principal sanctuary was located at Epidaurus (Caton, 8). He was born human, acquired divine honors as a hero, and eventually became a full-fledged God (Camp, *The Archaeology of Athens*, 122).

An inscription from the fourth century indicates that the cult of Asklepius was brought to Piraeus, which is where the Plague broke out first. Then in 420 B.C., an Athenian named Telemachus established the Asklepieion on the south slope of the Acropolis. It is likely, that this was Telemachus' first opportunity to bring the cult to Athens, thanks to the Peace of

Nicias (Mitchell-Boyask, 106-7). This Athenian shrine is like no other Asklepius sanctuary in neither form nor function. Even then urban crowding was associated with unsanitary conditions, so "Asklepius sanctuaries tended to be extra-urban, if not rural, in location." There was also a prevalent belief at the time that the more effort it took to reach a holy place, the greater the reward for the traveler. So, this made more remote locations for the temples more favorable too. It was thought that "sanctuaries need to be separated from everyday life to preserve their sanctity and enhance the experience of the worshipper." The Athenian Asklepieion does not fit this pattern as it was amongst the urban crowding and easy to access, with it being located on the slope of the Acropolis within the city wall. It may have been built so close to the Theater of Dionysus because of "traditional associations between song and healing in Greek culture." Asklepius and Dionysus also share some similarities in their histories. Like Asklepius, Dionysus was saved by his divine father from the burning corpse of his mother, and Dionysus himself later killed his mortal lover Ariadne for betraying him with Theseus." Asklepius also helped Dionysus, in that he mediated between Dionysus and more ascetic gods such as Apollo and Artemis. Another reason why the sanctuary could have been built so close to the theater is that Asklepius developed a strong link with poetry, and the theater at Epidaurus was very famous. Asklepius was represented as "a patron of the arts of the word" (Mitchell-Boyask, 3-115). Also, according to Caton, "the locality was probably as healthy as any of the immediate neighborhood of Athens, could supply. The heat was no doubt great in summer, but we may conclude that a large grove of trees afforded grateful shade to the sick" (Caton, 122).

Prior to the Asklepieion, Athena had been worshipped on the Acropolis as Athena Hygieia "Athena of Health" and her function as goddess of health was directed to the well-being of the community as a whole," (Mitchell-Boyask, 116). The cult of Asklepius essentially made the cult of Athena Hygieia obsolete, after she failed to help save the population from the raging plague. Athena Hygieia received state sacrifices at the annual Panathenaia, at least during the fourth century, but no "private dedications to her can be dated after 420/19," when the cult of Asklepius was brought in (Hurwit, 199). The statue of Athena Hygieia is said to have been dedicated after Pericles' favorite workman fell, and was miraculously healed after Athena told Pericles what medicine to use in a dream, but it is likely that the statue was actually dedicated after Pericles died, during the plague outbreak, in hopes that she would help remedy the plague (Hurwit, 199). In addition to Asklepius, some other cult activity can be attributed to the plague as well. Pausanias recorded that on the Acropolis there were two statues named Hygieia. One was a statue of Asklepius' daughter Hygieia, and the other was that of Athena Hygieia (Mitchell-Boyask, 162). In the Agora, a statue made by Kalamis was "dedicated to Apollo Alexikakos (Averter of Evil) for his help in stopping the epidemic (Pausanias 1.3.3) and another to Herakles Alexikakos was set up in his sanctuary near the Agora" (Camp, *The Archaeology of Athens*, 124). The cult of Bendis, a healing deity from Thrace, was also introduced to Piraeus (Camp, *The Archaeology of Athens*, 124). By 404 B.C. there was recorded existence of a Bendis sanctuary in Piraeus, located in the eastern part of the port, next to the temple of Artemis Munychia (Janouchova, 100). One last healing deity rose in prominence in Athens during the war, most likely because of the plague: Amphiaraos. He was originally a hero and "lost his life in the war which erupted between the sons of Oedipus. He and his chariot were swallowed up by the earth, after which he became a healing deity. His principal sanctuary was in the territory of

the small city of *Oropos*, on the northeast frontier of Attica" (Camp, *The Archaeology of Athens*, 126).

Although the Athenian plague did not lead to a complete remodeling of Athens, combined with the effects of the war, it left quite a few lasting impacts on Athenian topography. It affected the topography directly through the mass grave and introduction, and thus building for certain cults, as well as wells, the interruption for other building projects and it also caused the new favor of public over religious buildings. It affected the topography indirectly by killing off the great Athenian leader Pericles, who had been in charge of many building projects, and could have possibly led the war in a different direction. It also killed off many able-bodied men and reduced the population who could serve in the later years of the war. Thus, new buildings and construction products were introduced with the changing political situations. The war and the city itself helped maintain the plague, as there were no mandatory quarantines, overcrowding, and gatherings of the sick in very public, frequently visited, areas. In sum, the war, the plague, and the city itself worked in tandem to change the topography of Athens. If the plague had not struck, would Pericles have continued all of his projects that had been put on hold? Would a shift from religious to public works taken place anyway? Would Athens have won the war, and what would that have meant for new construction projects? Unfortunately, there is no way to fully gauge what would have been, only what had resulted.

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**21st Annual
Lambda Alpha Symposium
Wichita State University**



Abstracts
Wichita State University
April 13, 2019

Sponsored by Alpha Chapter of Kansas & the
WSU Department of Anthropology

Aubrey Koonce *Four Fields, Two Anthropologists, and a Brief Encounter*

American anthropology has a complex and complicated history with numerous profound influences that resulted in the formation of the four-field approach in anthropology, these being Biological, Cultural, Archaeology, and Linguistic Anthropology, each with considerable variation in their naming. To fully comprehend the methodology and theoretical implications of these subfields and their institutionalization, one needs to look to the past. Understanding the beginnings of anthropology provides scholars with insights into how some of the most influential contributors of yesterday and today have utilized various approaches to a holistic view for their conceptual breakthroughs. Well-informed and thorough education in all fields of anthropology often lead to more complete theories and conclusions. In order to develop this point in the history of anthropology as an academic discipline, this paper focuses on an examination of correlations and differences between Adolf Bastian and Franz Boas, regarding the initial stages of the four-field approach in anthropology, and the psychic unity of humankind. Franz Boas is considered the 'father' of American Anthropology, and many of his foundational thoughts and theories can be correlated with Adolf Bastian's writings, the 'father' of German anthropology and museum studies. A closer comparison of these two key figures in the history of anthropology contributes to the main objective of this paper that is to develop the understanding of these theorists' works, ideas, and concepts, and to establish a better understanding for why these four fields are systematically interconnected and foundational even for the anthropology we practice today.

Justine Ely and Madison Bates *Cotton Textile Decomposition Study*

This paper addresses concurrent evidence of patterns of decomposition in cellulose-based textiles and soft tissue as it seeks to identify baseline data on which to establish guidelines for further research in the area of recent historic and crime scene recovery. As a part of everyday life, clothing provides valuable insight in forensic and archaeological contexts. It is regularly encountered in crime scenes as well as recent historical burials. Many studies have been conducted to explore the decomposition of human cadavers, but to date, only a handful of studies examine the effect clothing has on cadaver decomposition. The major variables that affect the degradation of organic material are soil and temperature. Research shows that by assessing more than one variable in a burial, the range of error in estimating the depositional time frame can be reduced. The present research examines decomposition of cotton textile, a natural fiber, in outdoor exposures over time. The findings presented here illustrate how cotton fiber changes, buried or exposed, in and out of context with soft tissue remains. The findings of this study demonstrate how the presence of soft tissue contributes to variation in the pattern of breakdown of cotton textiles and in reverse, the presence of cotton textiles affects the pattern of decomposition. This research is part of a long-term research project conducted at the Wichita State University Biological Anthropology Laboratory, Skeleton Acres Research Facility (SARF) in Leon, Kansas.

Tiffany Nutter Trejo *An investigation of reflections of Osteoporosis and Obesity in the Lower Vertebral Region of the human skeleton*

This study reports on an investigation of the potential relationship between measures of body size qualitative and quantitative evidence of degenerative bone diseases (osteoporosis).

Nine measurements capturing the size and shape of the lower vertebral elements (T11-S1) of 261 White individuals, 108 females and 153 males, ages 30-60 years among a studied group from the William M. Bass Donated Skeletal Collection at the University of Knoxville Tennessee. (FAC UTK 2018). The vertebrae were also score for the presence or absence of skeletal evidence of osteoporosis. Additional measures including, but not limited to body mass index (BMI) were also recorded. Preliminary results identify an apparent relationship BMI or body size and osteoporosis and that this relationship is more prominent in females. The findings presented for the particular study sample are considered consistent with previous established research documenting the relationship between osteoporosis and obesity in different populations..

Elayne Rye *Ethnobotany of the southern plain*

The purpose of this research was to discover the ethnobotany of the Southern Plains Indians, specifically the Wichita tribe(s). The study of the plants native to the Southern Plains is important to add to our understanding of the Wichita culture, and to compare current vegetation to the botanic diversity of the past. Knowing the plants found in archaeological sites, as well as which plants are edible or medicinal, can lead to speculating and understanding how these plants have been used by indigenous peoples. The use of electronic databases and hardcopy sources were used to research the plants and their uses in the Kansas and Oklahoma areas. A number of sources were consulted but not much data was found that tied to the Wichita tribe(s) specifically, however a substantial amount of plants and their uses were found for the Southern Plains area. Due to the difficulty of associating the botanical history with the Wichita, my research focused more on the Kansas and Oklahoma regions.

Cailyn Trevaskiss *Trauma Analysis in a Midwestern Environment: A Visual-Centric Observation Record of Decomposition in Eastern Kansas*

The study of exposure of soft tissue in varied conditions to different environments can provide opportunities to document temporal and spatial variation in and among potential factors associated with the process of decomposition. This research documents an experimental research effort focused on the comparison of trauma and non-trauma induced carcasses for the purpose of further understanding the decay process under different circumstances. Pairs of domestic pigs, (*Sus scrofa*), including one control animal dual (no trauma induced) and one individual with deep lacerations induced on the hind or shoulder region were laid out at the Wichita State University State University Biological Anthropology Laboratory, Skeleton Acres Research Facility (SARF) in rural Kansas. Three pairs of carcasses were placed in double-layered cages for protection and were recorded by a camera suspended above them. Each pair was placed at a different location, in varying levels of sunlight and exposure. This protocol was repeated for three three-month-long consecutive experiments were conducted to examine the potential impact of seasonal changes. Observations recorded throughout the study report on seasonal and locational differences among the patterns of cadaver decomposition and place the observations made here in the context of past decay research results.

Jakob Hanschu *Archaeological space is an archaeological product: Theorizing Archaeological Spaces*

Archaeologists have long been concerned with the spatiality of the sites they excavate. For example, in the latest edition of *American Antiquity* (vol. 84, iss. 1) one hundred percent of the articles and reports included one or more maps. Much of these concerns with spatiality view space as scientific or abstract, though some archaeologists have attempted to discuss spaces as “humanized” (e.g., Tilley 1997). However, very few scholars seem to be concerned with the types and meanings of spaces that they are actively producing and reproducing through the processes of excavation, mapping, publication, and other activities. In this presentation, I wish to examine how present-day archaeology and archaeologists become involved in creating and portraying sites as particular types of contextualized spaces. This will be accomplished through an exploration of my own experience excavating, mapping, and publishing on 14RY652, a prehistoric burial mound in the north-central Flint Hills, and a synthesis of literature from archaeology, anthropology, human geography, and Science and Technology Studies

Gracie Tolley *Untitled Jackman Project: Renovation Of A Museum Gallery*

In the past few years, Anthropology departments across the country have been making dramatic changes to their museum studies programs. Primarily, this is due to the increase in museology and coordinating academic fields of interest. These programs promote hands-on learning and real-world work experiences at the undergraduate and graduate level. Using applied practices, the subfield of museum studies tries to comprehend the past by curating artifacts and other physical remains. During spring 2019, students at Wichita State University are in the developmental stages of the renovating of the Lowell D. Holmes Museum of Anthropology. Notably, the renovation is over the Jackman gallery, and the exhibit “Journey Around the World” will inhabit the gallery for the next several years. Updating exhibits is a crucial task for museums as they present new narrative elements of culture and art to the public. This exhibit will be kept up by current and future museum studies students. It will feature numerous cultures from across the globe and will display items from the museum's ethnographic collection. The presentation demonstrates the procedure of which the exhibit was planned and constructed in. The project includes examining different aspects of the other fields within anthropology under a contemporary museum context and perspective.

West Ryan *Differential Rate of Human Decomposition in an Enclosed Vehicle Compared to an Outdoor Environment*

This study compared the decomposition rate of two cadavers in different locations and body positions in a closed vehicle, with two cadavers (controls) in similar body positions but in an outdoor surface environment. All the research was conducted at the Applied Anatomical Research Center at Sam Houston State University. It was predicted that the study would show slower rates of decomposition for the vehicle cadavers versus the control cadavers placed outdoors. It was expected that the controls would reach all stages of decomposition faster than the cadavers in the car would. This was expected because 1) controls would be exposed immediately to insects while there would be a delay in access for the vehicle subjects, 2) the controls would have complete access to normal atmospheric conditions allowing the body's after death biochemical processes to occur without hindrance, and 3) the vehicle cadavers would have

a reduced amount of oxygen levels and air circulation, with the potential for an increase in carbon dioxide, and higher humidity would increase the possibility of adipocere formation. The Total Body Score was used as a standardized reference to describe the stages of decomposition for all four subjects. Results showed that the control cadavers went through the fresh and early stages of decomposition faster than the experimental cadavers.

Madison Wrobley *Life as a Hydraulic Citizen: An Analysis of Water Access in Kathmandu, Nepal*

While Kathmandu is located in a country with abundant water resources, people across the city have limited access to potable water in their homes and must spend extensive time and resources to secure and manage a sufficient supply. Through a description of the ways people access water including municipal supply lines, private delivery, vendors, wells, and community taps, I show the complex ways people navigate their environment to make life in the city possible. In this thesis, I analyze what it means for there to be a lack of water in Kathmandu both in the official discourse and the lived reality. The water infrastructure is not only a set of pipes or even a collection of different sources, formal and informal. It is a network that both shapes and is shaped by the daily act of collecting water and the conversation surrounding water availability and quality. The conflicts that arise from unequal access and the disruptions that are present at every level have consequences on the way people perceive their position in the city. The ways people conceptualize, and experience scarcity affect everyday life in the changing valley.

Haley Rodriguez *Trepanation and Scalping an Analysis of Contrast and Technique on the Cranium*

Trepanation and scalping are two separate techniques seen performed on the cranium, in which significant lesions are left upon it. Trepanation also known as “burr hole” has been used throughout history as a surgical procedure during which a hole is scrapped or drilled into the cranium to relieve pressure or malevolent spirits that were thought to be causing abnormal behavior. Evidence of trepanation has been seen to appear as far back as the Neolithic era and still appears until present day. Scalping is a similar practice in which the scalp is separated from the cranium along with the hair with the use of a thin blade or what is sometimes referred to as a scalping knife. This practice has appeared in different cultures from nearly all continents, usually in connection to war trophies, or accidents. In this research, I am identifying the difference between these two practices from not only each other but also from other pathological features that can appear on the cranium, such lesions caused by yew or syphilis. This analysis was done through a review of literature on these techniques and the methods that were used to perform them, allowing for a distinction to be made between the two and how to separate one from the other.

Jasmine Garcia *Does Hydrocephalus Interfere with the Estimation of Ancestry Derived from the Skull?*

In a forensic context, identification of an unknown individual, based on skeletal remains, involves the expertise of a Forensic Anthropologist. Estimating the ancestry of an individual is based on observation as well as metric assessment. The most reliable and accurate area of the skull to estimate ancestry is the face, more specifically the nose region of the face.

Measurements of the skull and mandible are input into FORDISC®, a discriminant function analysis, to distinguish the unknown's ancestry from multiple ancestral groups. When pathologies are present in the skull, such measurements may be skewed and if not removed from the analysis, can distort the results. In this study, we examined the possibility of having a pathology of hydrocephalus, an abnormality that results from an abnormal build-up of cerebrospinal fluid (CSF) in the brain, increase of intracranial pressure, and abnormal skull growth, and still use the skull to estimate ancestry. In this study, a skull with Hydrocephalus was provided by the Applied Anatomical Research Center, Measurements were taken of the entire skull and then were placed into FORDISC to estimate ancestry. As predicted, skewed measurements were removed. However, measurements of the face region produced results of a probability of 99% African; the correct ancestry.

Rachel Wendt *Fire at the Footprint Site: experimental burn study and the response of buried bone*

The purpose of this research is to analyze the distribution and nature of burned bone recovered from the Footprint Site, located in the Texas Panhandle. The site occupation is estimated to 1200-1450 A.D. and was originally excavated by F.E. Green in 1964. The structure showed evidence of burning, resulting in the collapsing of the roof on top of archaeological features, such as human cadavers or shallow burials. The remains recovered from Room I at the site, which is estimated to be around 32 individuals, became commingled. This, combined with unclear provenance, has led to further analysis by multiple researchers (Moore-Jansen, 2005). During analysis, approximately 8% of the skeletal material were identified as exhibiting burn lesions. This experiment simulated a burn that reasonably replicated the type of fire that would have occurred in an Antelope Creek Style home. In the structure, dry bone, green bone, and bone with soft tissue were placed in multiple locations at various depths, and will be analyzed for charring, calcination, and discoloration to serve as comparative tools and provide insight into the skeletal material at the Footprint Site.

Benjamin Moss & Hannah Cervenka *Blunt force trauma versus burn fractures: An experimental study*

Reconstructing and analyzing burned skeletal materials to accurately differentiate between potential antemortem, perimortem, and postmortem trauma are addressed in the present study. Past literature defines a multitude of effects related to burning, including bone color change, shrinkage, deformation, and fragmentation. This research explores the potential to effectively isolate different types of fractures or fracture patterns in burnt bone. Blunt force trauma was applied to three crania of *Sus scrofa domesticus*, a common breed of large white pig, all of which were then burned to the point of showing some degree of calcination. The remains were recovered from the burn site and examined in the Wichita State Biological Anthropology Laboratory. Through the process of stabilization, reconstruction and comparative analysis, the findings of this demonstrates that different types of fractures are observable in each of the crania, it remains inconclusive as to whether that trauma is perimortem or postmortem in nature. It is also inconclusive so far as to whether the fracturing present reflects applied blunt force trauma or the trauma resulting from the exposure to heat. It is concluded that additional investigation is necessary to explore further the potential for distinguishing burn versus blunt force trauma.

Alfredo Jahn VI *Identity and Belonging Among Young Adult Bosnian-Americans in St. Louis*

Questions of assimilation, ethnic presentation, and cultural understanding are necessary to examine in the changing contemporary rhetoric and politics surrounding immigration in the U.S. This ethnographic study investigates personal understandings of cultural identity and community belonging among second-generation Bosnian immigrants. Through semi-structured interviews and participant observations at cultural community events, the study explores the importance of transnational practices, material culture, the role of community, and engagement with family stories and religion to understandings of Bosnian identity and positionality within the broader historical narrative of diaspora. The study critiques traditional understandings of second-generation immigrant assimilation patterns, finding respondents retaining an affinity for their parents' culture and language. Stories of the homeland and opportunities to visit were for many indispensable in shaping conceptions of identity, while experiences of religion, though popularly considered elemental to ethnic identity in the Balkans, were found to be relatively less influential. The study provides a characterization of contemporary assimilatory trajectories of second-generation immigrants, examines cross-generational cultural reproduction, and informs understandings of conceptions of delineations of Balkan ethnic identities decades after the Bosnian War.

Margaret Spell *Degradation of Human Cadaver Phalanges Using Household Chemicals*

Forensic Anthropology studies, using household chemicals to degrade bone and soft tissue has only been completed on animal bone and tissue and human cadaver teeth. Even though criminals have used chemicals to dispose of their victims, there is limited published data concerning the chemical effects of household products on human remains. The present study observed and documented the effects of household chemicals on hand phalanges from a cadaver at the Applied Anatomical Research Center (AARC) at Sam Houston State University, Huntsville, Texas. The distal and intermediate portion of the second, third, and fourth phalanges of the left and right hands were placed into six different household chemicals: Coca-Cola®, hydrogen peroxide, bleach, muriatic acid (hydrochloric acid), and acetone to observe if and how long the soft tissue and bone would degrade. Distilled water was used as the control. It was predicted that muriatic acid and bleach would cause the most degradation, while distilled water and hydrogen peroxide would not cause any change. Day 22 of the study, muriatic acid was the most caustic, with no bone/tissue remaining. Bleach also had significant effects, while no significant changes occurred with distilled water, hydrogen peroxide, acetone, or Coca-Cola.

Walker Burgett *Morphometric Variation of the Human Femur and Tibia*

Anthropologic research is critical to the ability to identify individuals based on skeletal material alone. This project examines the femur and tibia bones of the human leg using metric analysis to examine skeletal variation between individuals. Seventeen measurements – 12 standard and 5 non-standard were taken from the right femur and tibia of 408 individuals from the Hamann-Todd collection located in Cleveland, Ohio along with 28 individuals from the WSU collection in Wichita, KS. Statistical analysis was conducted using a combination of Microsoft Excel and SPSS (Statistical Package for the Social Sciences) software. This research confirms the validity of metric observations by examining simple measurements in establishing differences between sex and group affiliations, and establishes that skeletal measurements

provide important information that can accurately be used to identify unknown individuals. Based on the quantitative analysis of the collected data, it is determined that variation between sex and group does exist. Results demonstrate strong accuracies with simple measurements that have low inter-observer error and can be easily replicated. This study adds to what is known and what can be learned about sexual dimorphism and group affiliation, increasing our knowledge about variations between population and the mechanisms that operate within them.

Stephanie Baker *The Microanatomy of Bone Trauma*

Trauma morphology in human bones provides evidence regarding the mechanism of injury or death. For example, weapon type, caliber of bullet, and the trajectory of impact can all be estimated from the damage to bone. Such damage is generally examined at the gross anatomical level. However, recent work with computed tomography scans suggests more data may be available on a finer scale. Here, we study asymmetry in human bones with identifiable trauma by examining skeletal specimens housed at the Applied Anatomical Research Center (AARC) in Huntsville, TX. The specimen included in this study is a skull with ballistic trauma. The bone was scanned at the University of Texas Computed Tomography Lab. Amira 5.6.0 was used to visualize, render, and collect data. Cortical bone thickness was measured using the provided measuring tools in Amira 5.6.0, and microfractures were counted each at regular intervals around the circumference of each wound by observing the internal and external surfaces of the bone. Nonparametric methods were used to analyze data, and preliminary results suggest asymmetry in both variables. Our ultimate goal is to provide law enforcement and the medicolegal community with a larger, more refined data set to better estimate the causes of bone trauma.

Joan Bayles *Investigating The Origins Of The Great Bend Aspect Through Reanalyzing Lithic Assemblages of Pratt Phase Sites, Zyba Site, 14RC410, and Two Early Hunting Camps*

The Great Bend aspect is the designation for proto-historic Wichita sites in central and southern Kansas, dating from A.D. 1425 – 1700. The origins of the Great Bend aspect have not been studied in depth previously, but comparisons with the earlier Central Plains tradition suggest that the latter was not directly ancestral to Great Bend. Patterns of tool-stone acquisition, ceramic vessel forms and surface treatments, and formal stone tool types all differ. This research employs stacked outline comparative analysis of lithic assemblages from sites of the Pratt phase, the Zyba site, an early Little River site in Rice County, and early hunting camps along the Walnut River. These sites appear to date immediately before the emergence of Great Bend and at least half a century after the disappearance of the Central Plains tradition. This research tracks the changes in material culture as the Great Bend aspect developed; the origins of the Great Bend aspect provide implications for the broader context of movement and social change on the Great Plains.

Rachel Yanko *Digitizing historical radiographs and their potential use in future research.*

The WSU Biological Anthropology Laboratory (BAL) houses a collection of historic radiographs that are in rapidly deteriorating condition. The process of digitization can be an extremely expensive process which requires the proper resources and time to achieve the desired result. In a joint venture with the BAL and the Ablah library we are designing the procedure for

scanning and building the database with the intention of placing it in Open Source. The potential uses of this database, if deployed properly, can be useful in not only biological, medical/cultural anthropology but also in the medical field as chronological, serial studies of tuberculosis as well as potentially a source for influencing social policies relating to contained populations in the hope of minimizing the spread of infectious diseases.

Lissette Varela *Sexual Dimorphism in the Upper Arm: An Analysis of Humerus Size Variation Between Two Collections*

Past research on the cranium and pelvis have demonstrated greater reliability for estimating sex. Recent studies have shown high accuracy rates in postcranial long bones foregrounding the relevance of the humeral bone. (Ogedengbe et al. 2017). This preliminary review of sexual dimorphism in the humerus examines size and shape variation between males and females. Current standards are reassessed and tested through comparative examination between samples of size and shape variation. Research was done by characterizing and quantifying the main direction of size variation and whether the two groups; Cadaver and Odd Fellows differ significantly in some aspect of size. The collection consists of a total of fifty-five humeri including twenty-eight males, twenty-five females and two of unknown sex representing different collections. Osteometric board, sliding calipers, and measuring tape were used in humerus measurements. Many standard humeri-metric measurements (Moore-Jansen et al. 1994) were included. Measurements were divided into seven groups; maximum length, epicondylar breadth, vertical diameter of humerus head, horizontal diameter of humerus head, maximum and minimum diameter of humerus at midshaft, and circumference of humerus at midshaft. The measurements of comparison were mean, range and standard deviation. In the comparisons made, there's considerable correlation between male and female maximum diameter of humerus at midshaft and circumference of humerus at midshaft measurements. The data suggest that male and females shape does not change while its size does. The t-test results revealed significant differences between the mean values of males and females ($P < 0.001$), which indicated the presence of sexual dimorphism in the measurements of the humerus for each collection.

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