HABITUAL POSTURES *of the* MEDIO PERIOD CASAS GRANDES PEOPLE: A COMPARISON *of* VISUAL REPRESENTATIONS *and* SKELETAL MARKERS

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by

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The undersigned, appointed by the Dean of the Graduate School, have examined the thesis entitled

HABITUAL POSTURES OF THE MEDIO PERIOD CASAS GRANDES PEOPLE:
A COMPARISON OF VISUAL REPRESENTATIONS AND SKELETAL MARKERS

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a candidate for the degree of Master of Arts,

and hereby certify that, in their opinion, it is worthy of acceptance.

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HABITUAL POSTURES of the MEDIO PERIOD CASAS GRANDES PEOPLE:
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Abstract

One of the most distinctive forms to come out of the Medio period (AD 1200– AD 1475) Casas Grandes ceramic tradition were human effigy vessels. These vessels exhibit primary and secondary sexual traits, and the males and the females are seated in different postures. The males are usually seated in a squatted position, whereas the females typically sit with their legs straight out. To see if these vessels reflected real-life habitual postures, Medio period skeletal remains from Paquimé were examined. Habitual actions leave markers on the skeleton, and one such marker is squatting facets. These facets occur on the tibia and talus, and as the name suggests are indicative of habitual squatting. Given the postures of the male vessels, it was expected that the male skeletal remains would have a higher frequency of squatting facets. This is not the case. Instead, the female remains have a significantly higher frequency of squatting facets. This is likely due to the posture assumed when grinding corn, a traditionally female activity. I suggest that the positions assumed by the vessels are the typical postures for social or ritual activities (not day-to-day activities), and that the ceramic effigy vessels represent specific individuals or specific subsets of the population.

Chapter 1. Introduction

The Medio period (A.D. 1200–1475) Casas Grandes culture was a distinct cultural and religious system in northwest Mexico, southern Arizona, southern New Mexico, and western Texas (Schaafsma and Riley 1999). The economic and political center of this Casas Grandes region was Paquimé (previously known as "Casas Grandes"). The research presented here focuses on skeletal markers reflecting differences in habitual postures of Medio period inhabitants of Paquimé. Previous research based on ceramic effigy vessels from this time period indicates that there may be culturally specific rules regarding acceptable sitting positions, with women sitting with their legs outstretched in front of their bodies and men sitting with their legs drawn to their chests or underneath them (VanPool 2003a; VanPool and VanPool 2006). If the ceramic effigies are indeed reflecting habitual postures, the skeletal remains should indicate that men are squatting more frequently than women. However, this is not the case: squatting facets, which are skeletal markers of habitual squatting, occur more frequently on female remains than on male remains. This is likely due to a sexual division of labor, as ethnographic evidence indicates that females in the American Southwest spent large amounts of time in the squatting or kneeling position during food processing (VanPool and Leonard 2002). The ceramic effigy vessels then mostly likely represent specific individuals or specific subsets of the population, or they could be depicting non-mundane activities that aren't related to day-to-day tasks.

Paquimé and Casas Grandes Ceramic Traditions

Archaeological evidence indicates Paquimé had remarkable social complexity and its pottery portrays a distinct iconographic system. Di Peso, the original excavator of Paquimé, suggests that the city had a large mercantile and manufacturing center (Di Peso 1974; Kelley 1995).

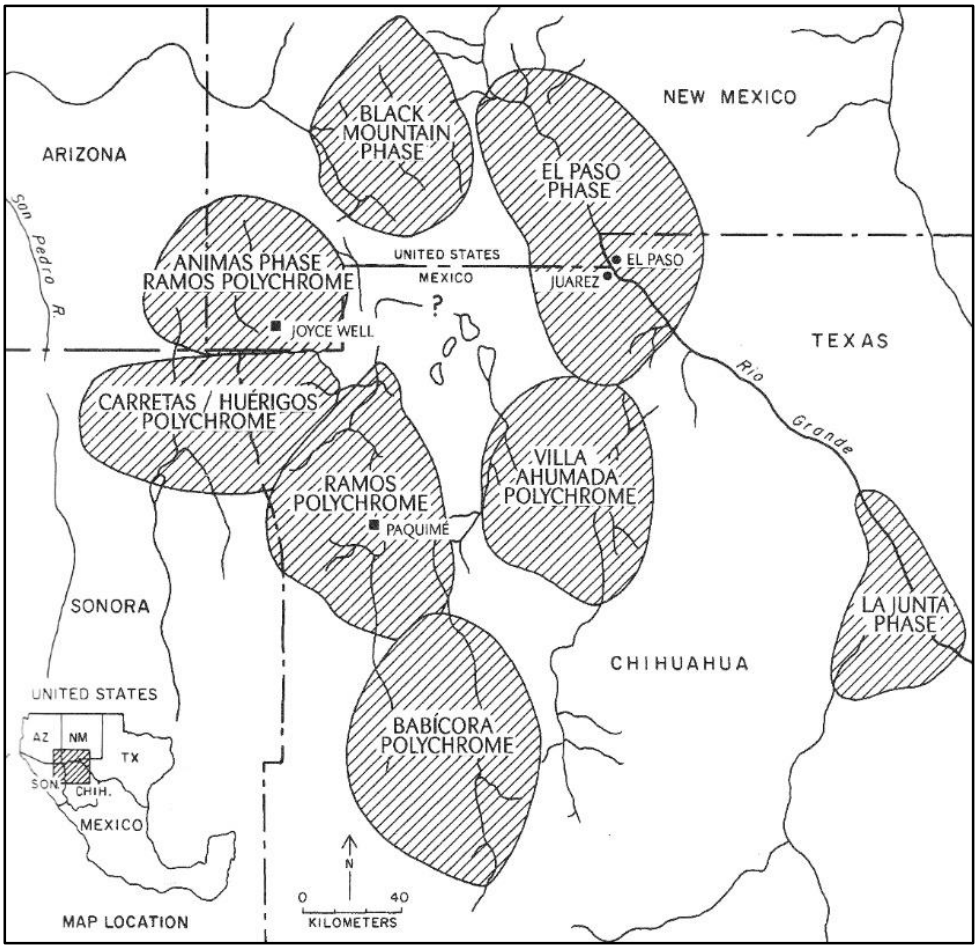

Figure 1. A map of the Casas Grandes Region and ceramic type spatial distribution (Fish and Fish 1999, adapted from Carpenter 1992)

Paquimé was pueblo-like in that it had poured adobe apartment complexes and an extensive irrigation system. However, it also had ceremonial platforms (including the Mound of the Serpent) and three ballcourts—two of which were I-shaped, which are Mesoamerican traits. Many of the smaller settlements surrounding Paquimé shared the religious beliefs of Paquimé based on a similar iconographic system and ritual architecture (VanPool and VanPool 2015; Whalen and Minnis 1996). The most recognizable feature of the Medio period Casas Grandes region is its distinctive polychrome tradition, known for its horned-plume serpent and macaw imagery (Schaafsma and Riley 1999, Di Peso et al. 1974).

Casas Grandes polychrome ceramics have been recovered from a large region spanning as far east as Sierra Madre in eastern Sonora, as far northeast as Roswell, New Mexico, as far north as Pottery Mound (just north of Socorro, New Mexico), and as far south as Chihuahua City (VanPool et al. 2008; Schaafsma and Riley 1999). Although recovered from multiple areas, the exact spatial distribution for Casas Grandes polychromes is not well defined. A map of the Casas Grandes region and general geographic distributions for a few of the Casas Grandes ceramic types is presented in Figure 1.

Some Casas Grandes Medio period polychromes (Ramos, Villa Ahumada, Babicora, and Heurigos) take the form of human figures (effigies). These effigy vessels exhibit distinctive primary and secondary sexual characteristics in terms of the physical form of the vessel (Figure 2 and Figure 3). Thus one can examine the variation in the vessels based on the sex of the effigies. As mentioned above, a previous study by VanPool and VanPool (2006) found many traits that were significantly different between males and females, including posture. Male vessels were

Figure 2. Male Effigy Vessel (Photograph by Art MacWilliams)

Figure 3. Female Effigy Vessel (Photograph by Art MacWilliams)

typically shaped to depict the male sitting with one or both legs drawn up to the chest, or a leg tucked under the buttocks. Females effigies, in contrast, were typically shaped to show them sitting with their legs straight out in front of them. These depictions raise the question: do postural differences between the sexes portrayed in the effigy vessels reflect differing real-world habitual activities conducted by men and women? Because male and female postures were differentially depicted based on sex, the vessels may be reflecting actual sitting behaviors of Casas Grandes people, or what were socially acceptable postures in Medio period Casas Grandes society. VanPool and VanPool (2006) suggest that it did, and that it fits well with ethnographic evidence from the Pueblos in the American Southwest, where women's "proper" sitting position was with their legs together stretched out in front of them. Men could sit on their legs, tucked underneath them. To test this hypothesis based on ceramic depictions, I will examine human skeletal data from Paquimé to determine if males and females frequently sat in different stances.

For this study, I use Dr. Robert Benfer's skeletal data from Paquimé, which he collected for his doctoral dissertation (1968). Although he focused on the cranial characteristics of the adult burial population, he also recorded and briefly noted postcranial characteristics. Among these recorded characteristics were squatting facets of the tibia and talus. Squatting facets are indicative of habitual squatting, which provide the necessary information needed to examine past habitual postures of the Casas Grandes people (Ari et al. 2003; Dlamini and Morris 2005; Trinkaus 1975; Ullinger et al. 2004). If the effigy vessels are truly reflecting habitual postures, males should have a greater frequency of squatting facets, whereas females should have fewer. Although Benfer previously analyzed squatting facets in this population, I reanalyze his data

using more recent sex assignments and examine only Medio period individuals, which may allow me to determine differences that he could not.

In Chapter 2 I provide a summary background on the Casas Grandes region and Paquimé. I also discuss the archaeological context of both the effigy vessels as well as the excavated burial population at Paquimé. A review of squatting facet anatomy and previous posture studies is also included to help better understand sitting postures. Chapter 3 discusses the materials and methods (e.g., the means of data selection and the statistical methods employed) used to address the relationship between skeletal indicators of posture and the artistic representations of posture. Chapter 4 reports the results and statistical findings from the skeletal data, which indicates that ceramic effigies are not reflecting the range of sitting postures reflected in the mortuary data. In Chapter 5 I discuss the implications of these findings and the extent to which they can be used to interpret artistic postural depictions. I also provide suggestions for expanding this study, and proposals for future studies are also given. In the final chapter are my conclusions that are drawn from this study. Ultimately, I suggest that the effigy vessels are not a generalist representation of the Medio period Paquiméan people conducting daily activities, but are probably representations of particular individuals, particular subgroups of people or individuals, or are depictions of particular sitting behaviors within specific settings (e.g., social or ritual).

Chapter 2. Background

Site Background

The city of Paquimé, site CHIH:D:9:1 (Figure 4), was the political and economic center of the Casas Grandes region. It flourished during the Medio period, AD 1200–AD 1475 (Shaafsma and Riley 1999, Rakita 2009). At its height, Paquimé encompassed over 500,000 sq. meters (Rakita 2009). Based on architecture and room size, the population of the excavated portion was estimated to be 1,452 (Di Peso et al. 1974:8:325), and the population for the total site was estimated to be 4,700 (Di Peso et al. 1974:4:Figure 134-4). The site was extensively excavated in 1958 by the Joint Casas Grandes Expedition under the direction of Charles C. Di Peso and Eduardo Contreras and with the sponsorship of the Amerind Foundation, Inc. and the Instituto Nacional de Antropología e Historia (Di Peso 1974). Due to the magnitude of exotic materials excavated as well as problematic dating techniques, Di Peso hypothesized that Paquimé was founded by the legendary Toltec traders from central Mexico (Nielsen-Grimm 2008).

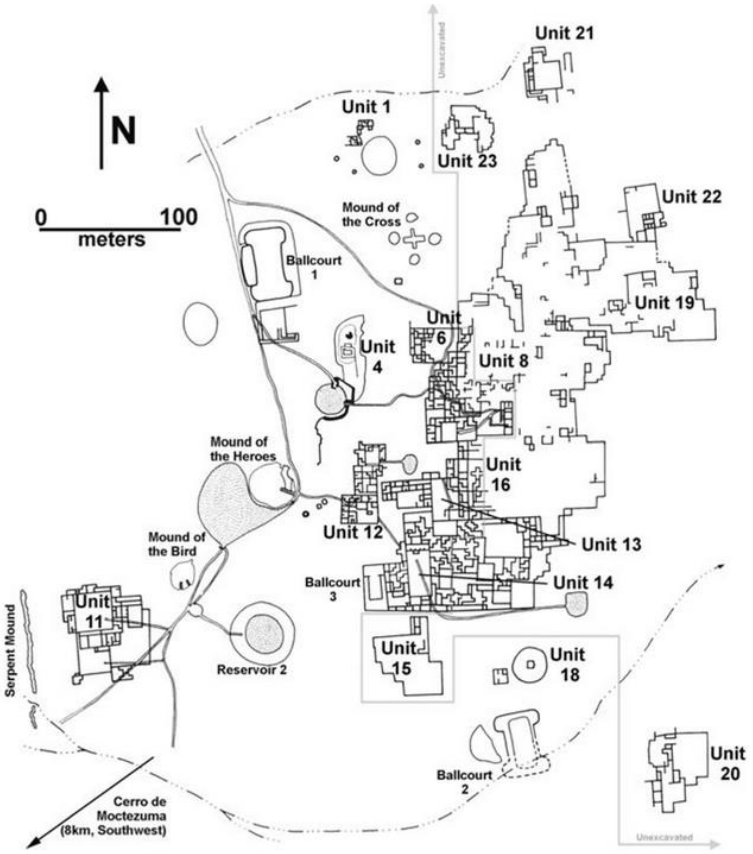

Figure 4. The site of Paquimé (Rakita 2009:Figure1.4)

More recent analyses of the tree-ring samples and calibration of the radiocarbon dates have shown that Di Peso's original site dates were inaccurate (Bradley 2000; Dean and Ravesloot 1993). The dates have been "corrected"/recalibrated (Table 1), but the new dates are still approximate dates (Dean & Ravesloot 1993). In addition, the Buena Fé phase overlaps the Paquimé phase, so Dean and Ravesloot (1993) suggest that the Medio period as a whole be used instead of the individual phases. Other researchers (e.g. Rakita 2009; Whalen and Minnis 2009) recognize large cultural changes between the beginning of the Medio period and the end of the Medio period, and thus separate their data into "Early Medio" and "Late Medio." While these changes clearly occurred, for the purpose of this research, it is more useful to examine the Medio period as a whole given the relatively consistent sexual differentiation of various polychrome effigy vessels that were made during the Medio period.

Table 1. Dating of the Casas Grandes Region (adapted from Rakita 2009: Table 1.1), including the Revised Ceramic Period Dating used in this study.

Period	Phase	Di Peso's Original Dates (AD)	Revised Ceramic Period Dating (AD)
Viejo	Convento	700–900	600–800
	Pilon	900–950	800–975
	Perros Bravos	950–1060	975–1200
Medio	Buena Fé	1060–1205	1200–1275
	Paquimé	1205–1261	1275–1350
	Diablo	1261–1340	1350–1475
Tardio	Robles	1340–1519	1475–1550
	Periodic Spanish contact	1519–1660	1550–1660
Expañoles	San Antonio do Padia	1660–1686	1660–1686
	Apache	1686–1821	1686–1821

Although Di Peso's original dates are incorrect, his hypothesis of Paquimé's formation by traders may not have been far from the truth; evidence from Paquimé suggests heavy trade and contact with Mesoamerican peoples (Bradley 2000; Kelley 1995; T. VanPool et al. 2008). The

Mesoamerican trade network is also known to spread as far north as southern New Mexico (VanPool et al. 2008). There is unanimous consensus among researchers that this site was one of the most important in the region at this time, and certainly one of the largest (Rakita 2009).

The Burial Population

In this study I consider the Medio period burials reported in Di Peso et al. (1974:8). This includes those from Paquimé, as well as burials from Reyes Site No. 1, which is a site near Paquimé that Di Peso and the Joint Casas Grandes Expedition also excavated (Di Peso et al. 1974:8). Most of the Reyes materials date to the preceding Viejo period, but Medio period remains were discovered in one room. At Paquimé, a total of 576 Medio period individuals were exhumed. Di Peso assumed 129 of these individuals did not receive intentional burials: 127 of these individuals appeared to have died during the course of the city's destruction, and two appeared to have had accidental deaths (one in a roof collapse and one in a wall collapse; see Di Peso et al. 1974:8:337). These 129 individuals were therefore not included in Di Peso's analysis of Medio period burials. Thus, the total burial population count of the Medio period population at Paquimé is 447. Using burials associated with dated architecture, Di Peso calculated an average death rate for the Medio period, which was 2.3 persons per 100 (Di Peso et al. 1974:8:355). However, only 366 individuals (within specific dated architectural features) were found (Di Peso et al. 1974:8). From this average death rate, he had estimated that 1,452 Medio period individuals would have been buried at Paquimé (Di Peso et al. 1974:8). From this, Di Peso proposes that other mortuary practices, in addition to burial, were being employed.[1]

[1] It should be noted that, much like Di Peso's suppositions about "unintentional" burials, Di Peso's calculations of death rates are also currently contested. Therefore, conclusions drawn about burial practices from this data should be taken with a grain of salt. For more information on both of these debates, see: Casserino 2009; Rakita 2009:108–109; Walker 2002.

Of the buried individuals excavated, most were buried in pits (rounded holes with a “U”-shaped cross-section). The large majority of these individuals were interred in living spaces (Rakita 2009). Burials beneath domestic space, as well as other burial practices, were new to the Medio period:

> During the Viejo Period, the dead were always buried in public spaces in plazas or abandoned structures and placed in simple primary internment pits. By contrast, Medio period burials involved greater diversity of facility, location, and corpse processing. While primary inhumation continued to predominate, new corpse-handling techniques were introduced in the Medio period, including secondary burials, burials with extra elements or elements missing, sacrifice of individuals, and removal of corpses from pit features (Rakita 2009:50).

Although not new to the Medio period, multiple burials also drastically increased upon the arrival of the Medio period. Of the 447 Medio period individuals recovered at Paquimé, 253 were found in multiple burial pits (Di Peso et al. 1974:8). A total of 83 pits contained multiple burials (Di Peso et al. 1974:8).

Sex Ratios

The Medio period adult intentional burial population sex ratios at Paquimé are as follows: young adult (18–35 years), 31 percent male and 69 percent female; mid-adult (36–50 years), 48 percent male and 52 percent female; and old adult (50+ years), 48 percent male and 52 percent female (Di Peso et al. 1974:8 Figures 333-8 and 354-8). Temporally, the distribution of sex is fairly even across most phases except for the late Medio period (Rakita 2009). In the late Medio period, females outnumber males almost 2:1. However, this odd ratio is not as striking if one considers the unintentional burials (Casserino 2009; Rakita 2009). Overall, according to Di Peso,

the Medio period adult intentional burial sex ratio is 38.6 percent male and 61.4 percent female (calculated from Di Peso et al. 1974:8 Figure 354-8). (Waller n.d. suggests the sex ratio is closer to 1:1, and that male and female mortality is not significantly different.)

Rakita (2009) proposes a few explanations for higher percentages of female burials. It could be that males were buried off-site or buried in a manner that didn't allow survival in the archaeological record, or that a larger percentage of males died at places away from the city and were buried there. Rakita also suggests that it could be an issue of female overrepresentation, not male underrepresentation. If females of a certain age group have a higher mortality rate, it could skew the overall sex ratio of the sample. The Medio period sex ratios quoted above show that the young adult age group is skewed heavily towards females. It could then be speculated that death during childbirth plays a factor in Paquimé's skewed sex ratios (Rakita 2009).

Burial Position

Medio period individuals were buried in various positions. The body positions are: legs flexed or semiflexed, which include laying on back (supine), on front (prone), on left side, on right side, and sitting; legs extended, which also includes laying on back, on front, on left side, on right side, and sitting; legs drawn up to the rear, which includes laying on front, on right side, and sitting; and laying on back with legs frogged out (Di Peso et al. 1974:8, taken from unit descriptions). A flexed position is one in which the legs are drawn up to the body such that the angle formed between the legs and body is less than 45 degrees (Di Peso et al. 1974:8). Semiflexed positions are those in which the angle is greater than 45 degrees (Di Peso et al. 1974:8). According to Di Peso et al. (1974:8:361), "the popular flexed side, supine, and sitting postures were used indiscriminately for all ages and both sexes, although the last apparently

was more commonly used to accommodate mid- and old-adult males". The extended postures were not introduced until the Paquimé or Diablo phases of the Medio period, and were used extremely infrequently (Di Peso et al. 1974:8).

The flexed side position, though less popular in the Medio period than in previous phases, still represents a large portion of the Medio period burials: 42.7 percent (Di Peso et al. 1974:8). The flexed sitting position, which increased in popularity from the previous phases, represents 23.5 percent of the burials (Di Peso et al. 1974:8). The flexed supine position makes up 29.3 percent of burials.

Grave Goods

Many individuals were interred with grave goods at Paquimé. One-hundred nineteen of the grave pits (43.0 percent) within the city of Paquimé contained one or more non-perishable items (Di Peso et al. 1974:8). Although male burials had a higher frequency of grave goods, the difference is not statistically significant. This suggests that both males and females received similar treatment in regards to the placement of grave goods (Di Peso et al. 1974:8). Age also does not appear to have been a factor (Di Peso et al. 1974:8).

Of the surviving artifacts, ceramic vessels were the most common grave good (textiles and other organic materials had deteriorated by the time Di Peso et al. excavated the site). Of the previously mentioned 119 grave pits, 91 of them (75.8 percent) had at least one bowl or jar, and 49 (41.2 percent) burials were only associated with ceramics (Di Peso et al. 1974:8). A total of 199 vessels were recovered; within this assemblage 13 of the 25 local pottery types and two trade wares were present (Di Peso et al. 1974:8). The three most popular ceramic types were

Ramos Polychrome (58 vessels), Casas Grandes Plainware (52 vessels), and Ramos Black (38 vessels). Ramos Black was the most popular ceramic type for grave goods (Di Peso et al. 1974:8). Most of the Ramos Black assemblage (63 percent) at Paquimé was found in burials (Rakita 2009; Rakita 2001). Thus, Ramos Black is "decidedly associated with mortuary contexts" (Rakita 2009:151; Rakita 2008). Human effigy jars were also uncovered in burials (e.g., Di Peso 1974:2:Figure 450-2).

Casas Grandes Ceramics

Besides being grave goods, ceramic vessels were likely made in in large quantities (Di Peso et al. 1974:6; Rakita and Cruz 2015). From Di Peso's excavation of Paquimé, 771,271 sherds and 915 restorable vessels were recovered (Di Peso et al. 1974:6:77). Over a quarter of these sherds and vessels were polychromes. Of the polychrome types, Ramos Polychrome was the most represented (11.6 percent) (Di Peso et. al 1974:6). Ramos Polychrome was the finest made of the ceramics, and Di Peso thought it was the archetype that all of the other Medio period polychromes were trying to emulate. Ramos Polychrome was well-made with fine clay and crushed white rocks, coiled and scraped, polished to a nice finish, and painted with fine red and black line work. Because of the thin walls, fine materials, and fine line work, Di Peso et al. (1974) thought that they were made by specialists. Sprehn (2003) confirmed Di Peso's hypothesis regarding Ramos Polychromes, and also found that the other polychromes (e.g., Babicora and Villa Ahumada) with slips and broader line work were not made by specialists. Rakita and Cruz (2015) suggest that Paquimé had specialized ceramic producers that made their own wares for use and trade.

The Casas Grandes polychrome ceramic tradition flourished in the Medio period. Whereas the preceding Viejo period only utilized one minor polychrome type (Mata Polychrome) towards the end of the period, Medio period ceramists produced 7 major types of polychromes: Babicora, Carretas, Corralitos, Escondida, Huerigos, Ramos, and Villa Ahumada. Babicora, Carretas, Escondida, Huerigos, Ramos and Villa Ahumada Polychromes all following basic layouts and designs such as interlocking designs (e.g., interlocking steps). Corralitios Polychrome with its incising around banded designs does not follow the layouts and designs of the other Medio period polychromes. There are no definitive dates for these ceramics; however, general temporal ranges are known for some polychrome types (Rakita and Raymond 2003). As previously stated, Whalen and Minnis (2009) found that Mata Polychrome is the earliest, arriving in the Viejo period and dating well before AD 1300. Villa Ahumada and Dublan Polychromes were introduced early in the Medio period before or around AD 1300. VanPool (2003b) argues that Mata Polychrome (Late Viejo) is followed by Dublan Polychrome; she believes it is a transitional piece between the Viejo and the Medio period. Whalen and Minnis (2009) have also found that there is an early Ramos and Babicora that dates from the AD 1200's to 1300's, and a late Ramos and Babicora that dates after the 1300's. The design style "Classic Ramos" appears around AD 1350 (VanPool 2011). Some of the polychrome types listed above had multiple variants based on whether or not they had the Paquimé style (red designs outlined in black). There was also an increase in variation of vessel form in the Medio period. Ceramists started producing bottles, lobed jars, "two-story" jars, cruciform, and effigies (Di Peso et al. 1974:6).

Effigy Vessels

Effigy vessels took multiple forms: hooded globular vessels with human heads molded onto the rim, and vessels that had human features molded as part of the jar. The more realistic vessels are sometimes referred to as “true effigies” (Sayles 1936). The true effigies are used in this study (and will be hereafter referred to as simply “effigies”); they have heads, arms, legs, and detailed primary and secondary sexual characteristics, which are often enlarged or accentuated, so there is little doubt whether an individual is male or female (VanPool and VanPool 2006). This display of sexual characteristics is rarely seen in other prehistoric ceramic traditions in the American Southwest and northern Mexico.

Most effigy vessels were classified into three polychrome types: Ramos, Babicora, and Villa Ahumada. Ramos Polychrome vessels have a light tan paste and very fine temper. They do not have a slip, but were polished to create a self-slip. They have red and black painted lines that are very well executed (Di Peso et al. 1974; VanPool et al. 2008). Babicora Polychrome vessels also have red and black painted line work, but are considered a crude copy of Ramos Polychrome with sloppier lines (Di Peso et al. 1974). Villa Ahumada Polychromes have a dark paste and a white slip. The slip can sometimes flake off, taking the painted design with it (VanPool et al. 2008). All three of the polychrome types have similar iconographic systems (VanPool 2003b). Following Whalen and Minnis (2009), it appears that aspects of the iconographic system spanned the early and late Medio period. These researchers believe that the complex designs, macaws, and serpents appear during the Late Medio period.

The painted designs on the vessels are thought to be clothing, body painting, tattoos, and/or markings from self-mutilation (Di Peso 1974:2; Di Peso et al. 1975:8; Sprehn 2001; VanPool

2003a; VanPool and VanPool 2006; VanPool et al. n.d.). The designs on the body of the vessels represent blankets or textiles that were wrapped around the body in various manners (Di Peso et al. 1974:8). In some instances they represent ponchos. The images painted on the waists and legs of the vessels are belts, breechcloths, and penis sheaths. Leggings and footwear were painted on the lower limbs and feet (Di Peso et al. 1974:8).

There are two design elements that are only present on male effigies: isolated circles with a central dot on the legs and pound signs with or without a central dot (VanPool 2003a). These could represent marks from self-flogging, which shamans have been ethnographically documented to do in order to induce altered states of consciousness (VanPool 2003a). Alternating red and black zig-zag line designs and more elaborate depictions of clothing are also significantly associated with males, whereas stepped designs on faces are associated with females (VanPool et al. n.d.). This could represent gender-specific clothing, or iconographic motifs that are traditionally associated with each gender (VanPool et al. n.d.).

As previously mentioned, male and female effigy vessels also differ in body position. Males sit with both of their knees drawn up to their chest (e.g., Figure 2) or with just one leg drawn up and the other leg tucked underneath their body. Females typically sit with their legs straight out in front of them (e.g., Figure 3) (VanPool and VanPool 2006). If the portrayed males who are sitting are interpreted to represent past squatting behaviors, facets would have formed on males' tibiae and tali if men frequently held this position in life. An analysis of these squatting facets from the contemporaneous burial population can be used to evaluate if the human effigies truly portrayed Paquiméans' daily life.

Squatting Facets

The squatting position (Figure 5) is a relatively common resting posture cross-culturally. It has been documented ethnographically in living populations as well as osteologically in skeletal samples, including in Neandertals (Trinkaus 1975). Squatting involves hyperflexion of the hip and knee joints, and hyperdorsiflexion of the ankle and subtalar joints. This posture provides a large base of support and can be maintained for long periods of time with minimal muscular activity (Trinkaus 1975). While evidence of habitual squatting can be found at each of the lower limb articulations, facets on the distal tibia and talus are the most popular indicators of squatting.

Figure 5. Lower limb in squatting position (Trinkaus 1975, adapted from Huard and Montagne 1950)

Functional Anatomy of Squatting Facets

Human bone is adaptable, meaning that it changes its morphology based on the loading regimes under which it is put (Ruff et al. 2006). Ankle bone morphology is especially helpful in determining if squatting was a habitual posture of past peoples. There are three main bones that form the ankle: the tibia and the fibula (both in the lower leg), and the talus (in the foot) (Figure 6). The talus is sometimes referred to as or the "ankle bone," and has been historically (in humans) called the "astragalus." The top of the talus (superior surface) is wider toward the front of the body (anteriorly) and narrows toward the back (posteriorly). When the ankle joints are weight-

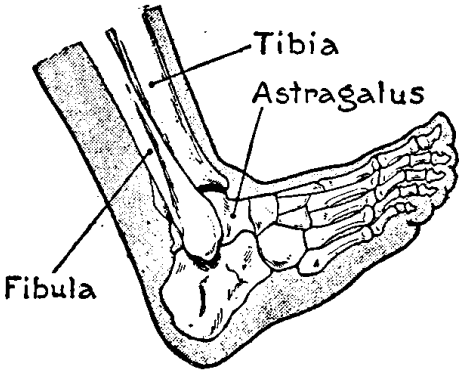

Figure 6. The tibia, fibulia, and astragalus (a.k.a. "talus") (Lutz 1918)

bearing and undergoing dorsiflexion, meaning hyper-flexion of the foot such as seen when squatting, the tibia rotates over the talus. The talus then becomes wedged such that it separates the tibia and the fibula which increases the ankle's stability in this position (Levangie and Norkin 2011). Prolonged hyper-flexion of the foot is rarely achieved during normal locomotion (Ari et al. 2003; Trinkaus 1975).

In cases of habitual hyper-flexion of the foot, the tibia and talus come into frequent contact with one another, forming smooth areas on both the tibia and the talus. These are referred to as squatting facets. The squatting facet on the talus is complimentary to the tibial squatting facet, but is frequently less well-marked (Thomson 1889). The neck of the talus is rough, so unless the facet is well-developed, it is often difficult to identify (Thomson 1889).

When the data that are used in this study were being collected, squatting facets were simply recorded as either "present" or "absent". However, squatting facets can take multiple forms.

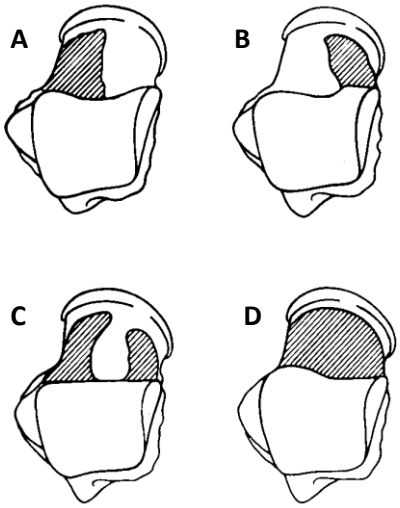

Figure 7. Superior view (plan view) of the left talus showing the squatting facet variations: A. lateral, B. medial, C. combined, and D. continuous (adapted from Pandey and Singh 1990).

There are four different kinds of talar squatting facets: lateral, medial, combined, and continuous (Pandey and Singh 1990). Lateral squatting facets occur on the lateral (outside) surface of the neck of the talus (Figure 7.A), and conversely, medial squatting facets occur on the medial (inside) surface of the talar neck (Figure 7.B). Combined squatting facets are lateral and medial facets that have not joined together (Figure 7.C). Continuous squatting facets are made up of both medial and lateral facets that have joined together to form a "gutter-like

structure" (Figure 7.D) (Pandey and Singh 1990). There has been little discussion about how long any or all of these take to form, and about what processes lead the each of their formation (Libby Cowgill personal communication 2015). However, it is known that lateral squatting facets are far more common than medial squatting facets, which are relatively rare in all populations (Capasso et al. 1999; Rao 1966).

The tibial squatting facet can also present itself in multiple ways. Thomson, who first identified and defined squatting facets (1889; 1890), described the variants of the tibial squatting facet:

> In some cases the presence of such a facet is only indicated by an eversion or slipping of the anterior margin of the inferior articular surface; in other instances, this eversion of the margin is associated with a hollowing of the bone around it, the surface of which is smooth, but can hardly be regarded as articular [Thomson 1889:624].

He notes that in cases of extreme dorsiflexion, the latter form of the tibial squatting facet is more frequent; there is a smooth ridge on the neck of the talus which fits into the hollow space created on the tibial surface (1889). Again, however, these squatting facet variants were not noted in the data used in this study; they are merely "present" or "absent".

Gender Bias of Squatting Facets?

Pandey and Singh (1990) suggest that females are more susceptible to stress-induced bone remodeling. In their sample from Northern India, they found that females had a significantly greater frequency of all types of talar squatting facets. Pandey and Singh attribute this to hormonal differences between females and males, as well as to nutritional differences in their studied communities. Boulle (2001) examined a collection of French skeletons dating from the 1st to 18th century and also found that squatting facets are more frequent in females. However,

unlike Pandey and Singh (1990), Boulle attributed the higher frequency of female squatting facets to differing activities (e.g., the squatting required for domestic activates that females undertook), and not to differing hormones between females and males.

Not all studies that separated out squatting facets by gender found that squatting facets are more frequent for females. Two such studies found that there is no significant difference between males and females in their study samples. Dlamini and Morris (2005), who looked at both Late Stone Age foragers and Iron Age farmers from various sites throughout South Africa, found no significant difference in squatting facet frequency between sexes. Rao (1966) presents both tibia and talus squatting facet data for male and female Australian Aborigines. When I ran Chi-square tests using these data (presented in Rao 1966:Table 3; all types of facets, e.g. medial and lateral, combined into a single category, and "doubtful" combined into "absent"), I found that Australian Aborigines also do not exhibit significant sexual dimorphism in regards to squatting facets of either the tibia or talus. However, Rao (1966) does not provide a behavioral context for Australian Aborigine sample studied, so meaningful conclusions regarding gender and facet formation cannot be drawn.

Although female bones are typically described as less robust than male bones, there does not appear to be any current studies supporting the idea that females are more likely to remodel (Libby Cowgill personal communication 2015). While having a larger skeleton would mean being able to tolerate larger absolute loads, men's and women's bones undergo the same levels of stress (load per unit area) when not acted upon by an outside force (Seeman 2008). There are differences in material composition and bone structure between men and women, but the relationship between these factors and bone fragility is still poorly understood (Seeman 2008).

Alternative Causes of Squatting Facets

While squatting is the most universally accepted behavior associated with the formation of squatting facets, there are alternative means by which the tibia and talus can come into contact that cause modification of the distal surface of the tibia and the neck of the talus. Standing or walking on hard surfaces for extended periods of time can push the heel of the foot outwards at the subtalar joint, which is the joint that is formed by the heel bone (calcaneus) and ankle bone (talus) (Ari et al. 2003). This position allows contact between lateral portions of both the tibia and talus (Ari et al. 2003). Squatting facets observed in a 13th century Byzantine population may be attributed to the pes valgus deformity, which is caused by the above described eversion of the calcaneus, and has been previously noted in the population (Ari et al. 2003).

More recently, tibial squatting facets have been found on a migrant citrus worker; however, these squatting facets were caused by weight placed on dorsiflexed feet while climbing and standing on ladders (Wienker and Wood 1988). This dorsiflexion becomes even more pronounced when carrying a load of fruit (Wienker and Wood 1988). Although this is only one individual, it is suggestive that steep terrain could also be the cause of bone modification, especially if heavy loads are being carried. Frequent travel over variable terrain causes weight to be placed on a dorsiflexed foot, possibly leading to talar squatting facets (Capasso et al. 1999).

Habitual kneeling may also form squatting facets. A study conducted on a known kneeling population (Byzantine monks from the AD 5th–7th centuries) found that squatting facets of both the tibia and talus were indeed present (Ullinger et al. 2004). This is interesting considering that most of the body weight during kneeling is placed on the knees, whereas during squatting, most of the body weight is placed on the ankles. Although there have been no population level

studies of squatting facets in geographic regions surrounding the Casas Grandes area, there is an individual case history that suggests southwestern inhabitants could have also formed squatting facets from habitual kneeling. Squatting facets found on an Ancestral Pueblo woman from Bright Angel Ruin (AD 1050– AD 1150), Grand Canyon National Park have been attributed to kneeling (Merbs and Euler 1985). The authors suspected the woman gained squatting facets due to the many hours of kneeling she would have spent while grinding corn with a mano and metate. This conclusion is supported by degeneration of her elbows which would also have occurred during repeated grinding activities (Merbs and Euler 1985). All of these cases show that squatting facets are created by means other than true "squatting."

Even though there are variable causes for squatting facets, they are generally attributed to stress from habitual activities and postures (Thomson 1889, 1890; Trinkaus 1975). This is important because even if Paquiméans were not truly squatting, an analysis of squatting facets provides useful insights into differential behaviors between the sexes.

Previous Research on Squatting Facets at Paquimé

If the Casas Grandes effigy vessels are reflecting habitual activities, males should have a greater frequency of squatting facets. However, a past study of Medio period Paquiméan human remains conducted by Benfer (1968) shows that this is not the case. He found that it is the *female* remains, not the males, who have a greater frequency of squatting facets. Benfer states the following in regards to posture (although a discussion of the axis of tuberosity of the calcaneum—the angle of the heel bone relative to the rest of the foot—is beyond the scope of this study, the evidence it provides regarding differences in habitual activity based on sex is nonetheless valuable):

> Postural differences between the sexes are noticeable in the significantly more frequent occurrence of 'squatting facets' in females (tibia and talus) than in males. The axis of tuberosity of the calcaneum varies in a bizarre manner: in males, the right calcaneum more often has a tuberosity inclined from the vertical than the left calcaneum. The opposite trend is found in females. Perhaps, differing cultural practices in sitting may have affected the tuberosity; sitting on one leg could conceivably in time change the insertion of the achilles tendon. Sexual division of labor may have also affected this relationship [Benfer 1968:31].

It is clear from Benfer's conclusions that there are real-life differences in habitual activity between sexes.

As can be inferred from the above passage, Benfer (1968) examined tibia and talus squatting facets based on sex, but he also examined squatting facets based on Di Peso's temporal phases. Table 2 provides the summary data Benfer presented in Appendix A. It is important to note that Benfer's Medio I phase refers to Di Peso's original Medio period designation, and his Medio II phase refers to Di Peso's original Tardio period designation (Benfer 1968:5). Benfer had to go back and rename these phases because Di Peso later reclassified certain Tardio sites as Medio period sites (e.g. Reyes Sites 1 and 2, Units 6 and 11, and the Central Plaza area). However, Benfer believed that these reclassified sites were biologically, and possibly culturally, distinct from the sites originally classified as Medio period sites based on morphological differences. Therefore, Benfer classified these sites as "Medio II" to separate them out from the "Medio I" sites (the sites that were originally classified as Medio period sites). For my study, I use Benfer's squatting facet data from both phases (which I combine) and analyze the data using more

recent sex assignments (discussed in the next chapter). I then use these results to interpret the ceramic depictions of the posture.

Table 2. Summary data presented in Benfer (1968: adapted from Appendix A, Table VIII)

		Squatting Facets of Tibia					Squatting Facets of Talus				
		Present		Absent			Present		Absent		
		No.	%	No.	%	**Total**	No.	%	No.	%	**Total**
Right											
Males	Medio II	5	41.7	7	58.3	**12**	17	50.0	17	50.0	**34**
	Medio I	1	50.0	1	50.0	**2**	0	0	0	0	**0**
	Viejo	1	100.0	0	0	**1**	2	100.0	0	0	**2**
Females	Medio II	10	76.9	3	23.1	**13**	14	48.3	15	51.7	**29**
	Medio I	0	0	2	100.0	**2**	1	50.0	1	50.0	**2**
	Viejo	1	50.0	1	50.0	**2**	4	80.0	1	20.0	**5**
Left											
Males	Medio II	4	40.0	6	60.0	**10**	24	66.7	12	33.3	**36**
	Medio I	2	66.7	1	33.3	**3**	3	50.0	3	50.0	**6**
	Viejo	0	0	0	0	**0**	4	80.0	1	20.0	**5**
Females	Medio II	9	75.0	3	25.0	**12**	20	58.8	14	41.2	**34**
	Medio I	0	0	1	100.0	**1**	3	60.0	2	40.0	**5**
	Viejo	5	100.0	0	0	**5**	6	85.7	1	14.3	**7**

While an understanding Benfer's internal Medio period phases is important for interpreting his data, for the purpose of this study, these designations are ignored. Meaningful conclusions can still be drawn by combining these two internal phases and simply referring to the Medio period as a whole. I only use the designation "Medio period" when conducting my analysis later in this study.

Benfer used a Chi-square analysis to test the null hypothesis that males and females have the same frequency of squatting facets. He concluded that squatting facets of the tibia and talus occurred significantly more often on females than on males: χ^2=5.68 with 1 degree of freedom (df), p<.02 for the tibia; χ^2 =7.96 with 1 df, p<.01 for the talus (Benfer 1968:10). Unfortunately,

he did not provide detail on the specifications of the dataset he used, nor the calculations he used to arrive at this conclusion. Thus, I am unable replicate them with the summary data provided in his dissertation. Given that he cites one degree of freedom, it can be assumed that he worked with a two-by-two matrix, most likely with one axis being males/females, and the opposite axis being presence/absence of squatting facets. It can also be assumed that he collapsed his “right” and “left” categories into his larger squatting facet presence/absence category because he does not report differences based on sides of the body or predominant leg usage in regards to squatting facets. He clearly states that he combined his Viejo, Medio I, and Medio II period samples due to small sample size. In this study I also use Chi-square analyses to analyze the frequency of squatting facets, but given that I classified the remains differently (because I am only interested in Medio period remains) and am using more recent sex assignments, there was a possibility that I would reach different conclusions.

Chapter 3. Materials and Methods

To examine the skeletal remains from Paquimé and compare those data to human ceramic representations, Benfer's (1968) postcranial recordation sheets and VanPool and VanPools's (2006) database of Medio period human effigies were used.

Postcranial Skeletal Remains

The total number of individuals recovered from Paquimé (from all periods) is 654 (Benfer 1968). Di Peso assumed this number to represent about a fourth of the remains present at the site (Benfer 1968); however, this estimation was derived from flawed death rate calculations as noted in the previous chapter. Benfer examined the remains of individuals over the age of 19, and only those individuals whose remains were intact such that a detailed analysis was possible. Thus Benfer examined 372 adults from the entire timespan of the site.

Benfer's original observations and measurements are on file at the Amerind Foundation, Inc. in Dragoon, Arizona. My colleague, Kyle Waller, was able to scan Benfer's recording sheets, which contained postcranial data for 164 individuals, aged 18-60+. Unlike the summary data presented in the appendix of Benfer's dissertation, his individual observations do not include Di Peso's associated chronological divisions (Viejo, Medio I, and Medio II).

To compare Medio period human effigies to their human counterparts, only individuals that lived during the Medio period are examined. In order to determine Medio period individuals in Benfer's analysis, I compared each individual's catalog number to the catalog numbers in Di Peso et al.'s *Casas Grandes: A Fallen Trading Center of the Gran Chichimeca Vol. 8 –Bones—*

Economy—Burials (1974). Individuals were cataloged based on unit number. For example, individual 9–1 is the ninth individual in Unit 1. Because Di Peso uses Viejo, Medio, and Tardio period designations, I also use these designations. However, I used Dean and Ravesloot's (1993) corrected temporal associations for Di Peso's periods. Once the individuals were classified by time period, I removed individuals not belonging to the Medio period from the dataset.

Once the database of Medio period individuals' post-cranial information was compiled, the sex of each individual was evaluated. Waller (n.d.) has recently examined Paquimé's skeletal collection and re-sexed each individual based on more current practices: discriminant function analysis based on five cranial traits (Walker 2008), greater sciatic notch morphology (Walker 2005), and non-metric traits of the pubis (Phenice 1969). The first method involved scoring the prominence of the nuchal crest, mastoid process, supra-orbital margin, supra-orbital ridge/glabella, and mental eminence against a standard scoring system originally devised by Buikstra and Ubelaker (1994)(Figure 8). These scores were then placed into a series of logistic regression equations (available for download from http://math.mercyhurst.edu/~sousley/Software/) that output a series of probabilities that the individual is either male or female. The second method involved scoring the shape of the greater sciatic notch (on the pubic bone) against a standard scoring system, also originally from Buikstra and Ubelaker (1994)(Figure 8). Both the cranial trait scoring and the greater sciatic notch scoring are on a 1 to 5 scale. A score of 1 represents extreme female conditions, and a score of 5 represents extreme male conditions. The third method involved examining three nonmetric traits of the pubis: the ventral arc, the subpubic concavity/contour, and the medial aspect of the ischio-pubic ramus (Klales et al. 2012; Phenice 1969). Presence of certain traits in these three areas indicates that the individual is female, whereas absence of certain traits indicates that the

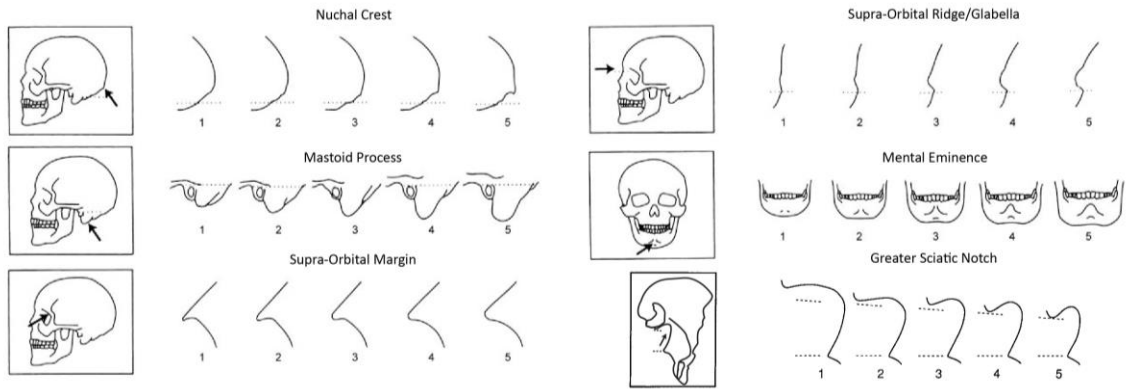

Figure 8. Standard for scoring sex differences in cranial traits (nuchal crest, mastoid process, supra-orbital margin, supra-orbital ridge/glabella, mental eminence) and greater sciatic notch (adapted from Walker 2005, 2008).

individual is male (see Klales et al. 2012 and Phenice 1969 for greater discussion). Waller then took the results of the above three methods and assigned each individual to the following scale: male, likely male, indeterminate, likely female, and female (following Buikstra and Ubelaker 1994).

The types of analysis described above attempts to remove some of the subjectivity that has been usually present when assigning sex (Walker 2008). Historically, sex has been visually assessed by researchers that are (hopefully) knowledgeable about the population being examined. However, because of the subjectivity of visual methods, there is often variation between researchers when assigning sex to the same individual (Walker 2005).

As stated before, I used Waller's most recent estimations to assign sex of Medio period individuals. This is not only because his sex estimates are based on more current practices, but because the recorded sex of any given Medio period individual has been sometimes inconsistently assigned during previous studies (Benfer 1968, Butler 1971, Waller n.d.). As seen in Table 3, the sexes assigned to the 134 individuals examined in this study shifted slightly with

each analyst. It is also difficult to compare the sex assignments of each researcher because each one assigned sex based on a different methods. When assuming Waller's "likely female" individuals were female and Waller's "likely male" individuals were male, all three authors agreed on the sex of 89 individuals (66.4 percent). Benfer and Butler disagreed on the sex of 14 individuals, Butler and Waller disagree on the sex of 25 individuals, and Benfer and Waller disagree on the sex of 29 individuals. While there are disagreements among the researchers, no Medio period individual was classified as male by one analyst, female by another analyst, and indeterminate by the third analyst.

Table 3. Summary of sex estimations of the 134 Medio period individuals examined in this study

	Sex Estimation						
Publication	F	F?*	?	M?	M	No Data	Total
Waller (n.d.)	55	9	8	9	43	10	134
Butler (1971)	75		7		52		134
Benfer (1968)	74				57	3	134

* "F?" and "M?" refer to the designations of "likely female" and "likely male" respectively; "?" refers to the designation of "indeterminate"

The technique Benfer used to estimate sex was not reported in his dissertation. Butler's sex assignments (1971:18), reported in Di Peso et al. Volume 8 (1974), were made by looking at multiple cranial characteristics outlined in Brothwell (1963), Krogman (1962), and Sublett (1966). The characteristics used were browridges, bossing, mastoids, and markings (Butler 1971: Figure 4). In males, these characteristics are typically more robust. In females, they are typically less robust (Butler 1971). If Butler's sex assignment (using only cranial characteristics) for any given individual matched Benfer's previously assigned sex, Butler kept this sex assignment. However, if Butler's sex assignment did not match Benfer's previously assigned sex, Butler then looked at postcranial material and used "common skeletal characteristics" to determine sex

(Butler 1971:18). Because Benfer and Butler relied on different methodologies that focused on cranial measurements, their sex assignments sometimes did not match. Because of these discrepancies, and the fact that measurements of the pelvis are vastly superior to cranial measurements when determining sex (Walker 2005:385), I use Waller's most recent sex assignments.

When Waller did not have data for a particular individual, as was the case for 14 individuals from Paquimé, or Waller assigned the sex as "indeterminate," I used Butler's sex estimation. The latter was most certainly the case for a few individuals who were missing their skull. Butler's estimations were used because her methodology is well-known and is more recent than Benfer's, and her sex estimations are readily available through the Di Peso volumes (unlike Benfer's dissertation, which is on file at the Amerind Foundation, Inc. and therefore difficult to access).

In addition to discrepancies in sex assignments between past studies and current studies on Paquimé's skeletal remains, there was also a minor issue relating to catalog numbers. When multiple individuals were present in a single burial, Benfer usually grouped these individual together under one catalog number. Several multiple burials, however, were later assigned sub-catalog numbers to differentiate between individuals (e.g. burial 17-1 was sexed as female by Benfer, but this burial was later divided into 17A-1, a female old adult, and 17B-1, an adolescent of indeterminate sex). I resolved this issue by comparing Benfer's cranial descriptions with Waller's cranial data. If a match could be made between Benfer's individuals and Waller's individuals, those individuals were included in the dataset. If a match could not be confidently made, I excluded that individual from my dataset.

I also excluded an additional five individuals from my dataset because Benfer's and Butler's observations of these individuals regarding age, sex, and skeletal condition were an obvious mismatch. Three individuals (5-8, 26-13, and 27-13) were recorded by Butler as being under the age of 13 with unknown sexes; Benfer recorded these three individuals as young adults with varying sexes. One individual, 1-20, was recorded by Butler as missing both legs, but Benfer recorded lower limb data for this individual. Another individual, 44B-13, was recorded by Butler as being only a skull; Benfer recorded multiple individuals on his postcranial data forms for 44B-13, so it is unclear which body belongs with the skull.

Ultimately, with the exclusion of non-Medio period individuals, the resolution of catalog numbering for multiple individuals in a burial, and the elimination of the five individuals whose data was an obvious mismatch between Benfer and Butler's records resulted in my sample size smaller than the originally reported 164 individuals. Postcranial data of 134 individuals from 14 units (Table 4, see also Appendix Table 15) are used in this study.

Table 4. Units Included in this Study [All are CHIH:D:9:1 (Paquimé) with the exception of the Reyes Site]

Unit 1 (The House of Ovens)	Unit 14 (The House of the Pillars)
Unit 4 (The Mound of the Offerings)	Unit 15 (House Cluster, single story)
Unit 6 (House-Cluster)	Unit 16 (The House of the Skulls)
Unit 8 (The House of the Well)	Unit 19 (House-Cluster, multiple story)
Unit 11 (The House of the Serpent)	Unit 20 (House-Cluster)
Unit 12 (The House of the Macaws)	Central Plaza, The Marketplace
Unit 13 (The House of the Dead)	Reyes Site No. 1 (CHIH:D:9:13)

Of these 134 individuals, 73 (54.5 percent) are female or likely female, and 58 (43.3 percent) are male or likely male (Table 5). Three individuals (2.2 percent) are indeterminate.

Table 5. Sex Frequencies for Medio period Individuals with Postcranial Data.

Sex Estimation	Count
Female (F)	64
Likely Female (F?)	9
Male (M)	49
Likely Male (M?)	9
Indeterminate	3
Total	134

Ceramic Representation

To examine the relationship between real-life posture and the artistic representations of human postures, the postcranial data of the individuals in Table 5 were compared to the human effigy vessel sample presented in VanPool and VanPool (2006) and VanPool et al. (n.d.). Recently I helped the VanPools create a new database while specifically looking at clothing depictions. Our database is a collection of 98 vessels from a variety of locations (e.g. museums) and publications (see Tables 1, 2, and 3 in VanPool and VanPool 2006 and VanPool et al. n.d.). As previously discussed, these effigy vessels are of four different polychrome traditions. VanPool n.d., collapsed the four polychrome types (Ramos, Villa Ahumada, Babicora, and Huerigos) together and analyzed the sample as a whole because the iconographic system cross-cut these types. Our new database is comparable to the original database in regards to posture, so I will use the currently published data in VanPool and VanPool 2006. Of these 81 vessels, 46 are male and 35 are female (VanPool and VanPool 2006). Again, as previously mentioned, the males and females are depicted in different postures: females are found sitting with their legs straight out more often than expected by chance, and males are usually found with one or both legs to their chest or one leg under their bodies (Table 6).

Table 6. Medio period (AD 1200–1450) Casas Grandes effigy vessel body position frequencies based on sex (VanPool and VanPool 2006: Table 5).

Sex	Leg Position	Observed Frequency	Expected Frequency	Chi-Square Value	Adjusted Residual
Males	Legs out straight	1	20	18.5	-8.72
	Both legs to the chest	21	14	5.8	4.41
	One leg to chest, one leg under	24	15	7.4	5.04
Females	Legs out straight	34	15	25.9	8.71
	Both legs to the chest	1	10	8.1	-4.41
	One leg to chest, one leg under	0	10	10.4	-5.04
	Chi-square Value =	76.1			
	p-value <	.0001			

If the male vessels with both legs to their chest are interpreted to be squatting, comparing the tibia and talus squatting facet frequency of males and females in the Casas Grandes mortuary remains will provide a means of comparison of past postures and their portrayal of "gendered" postures.

Again, the tibia and talus squatting facet data I used are from Benfer's notes that are on file at the Amerind. Because of the lack of detailed information about his data collection and analysis within his 1968 dissertation, his original measurements were necessary in order to examine the individual burials. I reevaluated Benfer's data while utilizing Waller's and Butler's sex assignments as previously discussed. Chi-square tests were run to determine if there were any statistically significant differences between male and female squatting facet frequency. Following Di Peso et al. (1974:8), I also briefly examined trends in burial postures in order to see if there were specific burial postures that might be predominately associated with either sex. Burial position data for each individual was obtained from Di Peso et al. (1974:8).

Chapter 4. Results

Post-cranial data for 134 Medio period individuals were available. Of these 134 individuals, squatting facet data were available for 94 individuals of known sex. To better show general trends and increase the "male" and "female" sample size, the categories of "female" and "likely female" were combined into a single category of "female". Likewise was been done for "male" and "likely male". Individuals of indeterminate sex were excluded in analyses of sexual dimorphism. Tibia squatting facet data were available on 40 individuals (21 females and 19 males); talus squatting facet data were available on 87 individuals (49 females and 38 males). A summary of the squatting facet data collected by Benfer with the more recently assessed sex estimations is presented in Table 7.

Table 7. Summary of Squatting Facets by Sex on Medio period Individuals.

	Squatting Facets of Tibia					Squatting Facets of Talus				
	Present		Absent		**Total**	Present		Absent		**Total**
	No.	%	No.	%		No.	%	No.	%	
Female										
Right	12	63.2	7	36.8	**19**	29	69.0	13	31.0	**42**
Left	12	85.7	2	14.3	**14**	25	65.8	13	34.2	**38**
Male										
Right	6	46.2	7	53.8	**13**	17	51.5	16	48.5	**33**
Left	4	33.3	8	66.7	**12**	14	46.7	16	53.3	**30**

When the data were reanalyzed with Chi-square tests (two-by-two matrices, collapsing of right and left facet categories), a significant difference was seen between male and female squatting facets of the tibia (Table 8). Females are associated with tibia squatting facets more often than expected by chance, and conversely, males are associated with tibia squatting facets less often than expected by chance.

Table 8. Chi-Square Analysis of Tibia Squatting Facets.

Sex	Tibia Squatting Facet	Observed	Expected	Chi-Square Value	Adj. Residual
Female	Present	24	19.34	1.12	2.51
	Absent	9	13.66	1.59	-2.51
Male	Present	10	14.66	1.48	-2.51
	Absent	15	10.34	2.09	2.51
			Chi-Square Value=	6.28	
			p-value=	0.01	

The same is true for squatting facets of the talus. A Chi-square test was done to assess the relative frequency of talus squatting facets between females and males, and a significant difference was found (Table 9).

Table 9. Chi-Square Analysis of Talus Squatting Facets.

Sex	Talus Squatting Facet	Observed	Expected	Chi-Square Value	Adj. Residual
Female	Present	54	47.55	0.87	2.21
	Absent	26	32.45	1.28	-2.21
Male	Present	31	37.45	1.11	-2.21
	Absent	32	25.55	1.63	2.21
			Chi-Square Value=	4.89	
			p-value=	0.03	

Although there is a difference in counts between my compiled data and Benfer's original data, and many of Waller's sex estimations are different than Benfer's original sex estimations (see Table 3 in previous section), the results from my Chi-squares are actually consistent with the squatting facet results that Benfer presented in his dissertation. It shows that females indeed have more squatting facets of both the tibia and talus than males.

Bilateral Asymmetry of Squatting Facets

Bilateral asymmetry of stress markers is useful for assessing whether past people favored one side of their body over the other. As previously discussed, Benfer suggested that males and females may be sitting on different sides of their bodies (Benfer 1968:31). To examine this, individuals with both right and left tibial squatting facet data and/or both right and left talar squatting facet data were identified. A summary of paired tibial and paired talar data is presented in Table 10. Paired tibiae and tali were used (versus using all data, both paired and unpaired, as presented in Table 7) because that is the precedent set in past studies of asymmetry (e.g., Ari et al. 2003), and also because it provides certainty that asymmetric individuals are being examined. Of the 18 individuals who have both right and left tibia squatting facet information, two individuals (11.1 percent) have asymmetry of squatting facets between their right and left tibia. Of the 56 individuals who have both right and left talus squatting facet data, six individuals (10.7 percent) express asymmetry of squatting facets between their right and left talus.

Table 10. Summary of Squatting Facet Presence (+) and Absence (-) of Individuals with Paired Tibiae and Paired Tali.

Squatting Facet	Number of Paired Tibiae	Number of Paired Tali
Right + Left +	9	29
Right + Left -	1	3
Right - Left +	1	3
Right - Left -	7	21
Total	18	56

A total of seven individuals expressed squatting facet asymmetry between their right and left ankles; four are female and three are male (see Table 11 below). Individuals of unknown sex were included in tests of squatting facet asymmetry in order to get a better picture of the

overall level of bilateral asymmetry in the complete sample (94 Medio period individuals). However, all individuals identified as being asymmetrical are of known sex. Only one of the seven individuals (B18-13) had asymmetry in both her tibia and talus squatting facets (Table 11). The two other individuals with both paired tibia and talus data (B6-6 and B10-16) had asymmetry in one measurement (either tibia or talus), but did not exhibit asymmetry in the other. Individual B6-6 had a squatting facet on his left talus but not his right talus, which at first suggests that he probably favored putting his weight on his left side. However, he did not have squatting facets on either of this right or left tibia. Individual B10-16 had a squatting facet on his right tibia but not his left tibia. He had squatting facets on both of his tali. This could mean that he favored putting his weight on his right side, but because he had squatting facets on both of his tali, it is unclear.

Table 11. Individuals who Exhibit Squatting Facet Asymmetry between Right and Left Ankles.

Catalog #	Sex Estimate	Age group	Tibia Squatting Facets		Talus Squatting Facets		Side Preference
			Right	Left	Right	Left	
16-1	F	Young adult			present	absent	R
28-11	F	Young adult			absent	present	L
18-13	F	Young adult	absent	present	absent	present	L
62C-13	F	Old adult			present	absent	R
6-6	M	Young adult	absent	absent	absent	present	R
31-13	M	Mid-adult			present	absent	L
10-16	M	Young adult	present	absent	present	present	L

When looking at the overall sample of paired tibiae and paired tali regardless of gender (Table 10), there is no side preference of squatting facets. This means that within the group of individuals who have bilateral asymmetry, body weight was not preferentially placed on one ankle versus the other when squatting. When looking at side preference in relation to sex, the

sample size is too small to comfortably conduct a Chi-square analysis. A larger sample size would be preferable to interpret bilateral asymmetry's relation to sex.

Burial Position by Sex

Although not directly related to squatting facets, burial body positions could provide insight into postures that are meaningful to Medio period Paquiméans. Body position data are available on 110 sexed individuals in my sample of 134 Medio period individuals. These body positions are presented in Table 12, and reflect body position regardless of side (e.g. laying on the right or left side) in order to get an overall picture of leg positions relative to the body. Body positions were obtained from the "Remarks" sections of each unit's burial notes in Di Peso (1974:8).

Table 12. Body Position of Burials by Sex

Body Position	Females	Males
Flexed	53	41
Semiflexed	3	3
Extended	2	3
Flexed to rear	2	1
Frogged out		1
Nonintentional burial		1
Total	60	50

Flexed position include: laying on left side flexed, laying on right side flexed, sitting flexed, and supine flexed. Semiflexed positions include: laying on left side semiflexed, sitting slightly flexed, and laying supine semiflexed. Extended positions include: laying on right side extended and supine extended. Flexed to rear positions include: laying on right side with legs drawn up behind, sitting with legs flexed to rear, and supine with legs flexed to back. One individual was buried laying supine with his legs frogged out. The body position of the individual in this sample whose burial was "unintentional" was not included in this analysis of body position.

A Chi-square test was conducted for the various burial positions presented in Table 12. The results concur with Di Peso's previously stated conclusion regarding body position: No singular body position was significantly associated with either sex (p-value= .74 when $\alpha<.05$).

Table 13 presents body position side regardless of leg position. The category of "no side" includes sitting or supine positions in which the body was not interred on the right or left side.

Table 13. Side Preference of Intentional Burials

Side	Females	Males
Left	16	12
Right	17	13
No side	27	24
Total	60	49

Again, excluding the "unintentional" burial, a Chi-square test was conducted to see if there was any relationship between internment side and sex. No relationship was found (p= .63 when $\alpha<.05$).

Chapter 5. Discussion and Interpretation

Based on the above results, the Casas Grandes effigy vessels are not reflecting habitual postures. If they were reflecting habitual postures, the skeletal data should have indicated a greater frequency of squatting facets in males than in females. This is not the case. Females have a statistically significant greater frequency of both tibia and talus squatting facets.

According to ethnographic data, Pueblo women ideally sit with their legs straight out (VanPool and VanPool 2006). This fact supports the idea that real-life postures are reflected in the effigy vessels. Perhaps females sit with legs out during social events and/or ritual activities, and this is what is being depicted by Medio period effigy vessels. Perhaps Paquiméan females received their squatting facets from activities such as maize processing, which tended to be done in small rooms that had two to three women working at a time (Parsons 1936). Women knelt on the floor and leaned their upper bodies over the metate as they rubbed a mano back and forth over the maize on the grinding stone. A stabilized ankle joint, as experienced in the kneeling position, helped with both the overall stabilization of the body as well as with pushing the mano. Given that dynamic and unusual loads are osteogenic (meaning that these types of loads build bone), and that both frequency *and* magnitude are important to these loads (Ruff et al. 2006), it may be that more stressful activities such as corn grinding caused these squatting facets, even if these loads were not applied as often as lesser social or ritual loads (whatever those may be).

Musculoskeletal markers from various other Southwest groups support the interpretation that females received their squatting facets from food grinding. Harrod (2003) examined humeral robusticity, femoral robusticity, and enthuses (enthuses are “sites of stress concentration at the region where tendons and ligaments attach to bone,” Benjamin et al. 2006:471). Broadly, these

measurements indicate varying levels of activity, including those related to walking great distances, navigating rugged terrain, carrying heavy loads, and squatting (Harrod 2003; Ruff 2008). When examining skeletal remains from Chaco Canyon (Pueblo Bonito, Kin Bineola, Wingate sites; AD 860–1150), La Plata sites (late Basketmaker III–Pueblo I), and Aztec Ruins (early to mid Pueblo III), Harrod (2003) concluded that there were significant differences between males and females in terms of activity patterns at most of these sites. Perry (2004) examined musculoskeletal markers of the upper limb of Pueblo IV (AD 1275–1600) remains at Grasshopper Pueblo, a large Mogollon settlement in east-central Arizona. Similar to Harrod (2003), she found that the gender roles were very rigid, with "little fluidity between the habitual activities of men and women" (Perry 2004:361). Further, the female upper arms exhibited markers that are characteristic of symmetrical use of the upper body. This contrasts with male upper arms, which were utilized asymmetrically. From this upper arm evidence she concludes that females participated in grinding activities, whereas males most liked participated in hunting and agricultural labor. Whitley (2009) examined remains from Pot Creek Pueblo in the Taos Valley in northern New Mexico, which was occupied from AD 1260–1320. As with Harrod (2003) and Perry (2004), she also posits a sexual division of labor at Pot Creek Pueblo based on musculoskeletal markers. Whitley was also able to divide female labor into two female labor groups: corn-grinders and non-corn-grinders.

Ethnographic evidence and the specialized production of groundstone in the Casas Grandes region also support the idea that females spent large amounts of their time participating in food processing activities. Historically, Hopi women ground corn or other seeds for three to five hours a day (VanPool and Leonard 2002). It is likely that women in the Casas Grandes region also spent this amount of time grinding food; specialized Medio period two-handed manos and

square trough metates are a good indicator of a conscious effort to increase the efficiency of this tedious and time-consuming task (VanPool and Leonard 2002).

One way to test the hypothesis that Paquiméan female squatting facets are from grinding activities would be to look at the foot morphology of the study sample. During kneeling, not only is the foot hyperdorsiflexed, but the toes are also hyperflexed. Skeletal markers known as "kneeling facets" form on the distal end of the superior metatarsal surface (the long bones in the middle of the feet) and on the proximal ends of the proximal foot phalanges (Larsen 2015; Ullinger et al. 2005). If we want to better understand whether these women where habitually squatting or kneeling, future studies could include an examination of pedal markers (similar to Ullinger et al. 2005 and Ubelaker 1979).

It is also possible that the effigy vessels are not reflecting actual behaviors or the most frequent behaviors of males and females, but instead represent gender-specific behavioral expectations in specific types of social settings. Poststructural approaches to iconographic study identify what is known as "false iconography", meaning that iconography has the ability to misrepresent reality (Giddens 1984; VanPool 2003b). According to Giddens, "iconography tends to illustrate what society considers being the norm even when it is not exactly true" (VanPool 2003b:26). From the effigy vessels we may be seeing what Paquiméans are doing, but not what they're doing all of the time. From ethnographic, archaeological, and skeletal evidence we know that women spent large amounts of time grinding corn, so we can assume from a lack of corn-grinding effigy vessels that the effigy vessels are not portraying the mundane day-to-day activities. Iconography is a picture into the past, but a very limited picture.

Checking Assumptions: Are the Male Effigies Actually Squatting?

One major assumption of this study is that the male effigy vessels are depicting a squatting posture. What if their body weight is being placed on their buttocks instead of on their ankles: Are the male effigy vessels "squatting" in the true sense of the word, or are they just sitting with their legs up? Many of the male vessels with only one of their legs pulled to their chest have the other legs placed beneath them, with one foot turned sideways under their buttocks. Perhaps this position was more popular than the squatting position. Or, assuming that many males sit with both of their knees up: do squatting facets still develop if the legs are merely pulled up to the chest and the ankles are not actually supporting any body weight? This could all simply be a matter of artistic limitations (it's difficult to balance a vessel if it is only supported by two little ceramic feet), but it could also mean that males aren't sitting in positions that would produce squatting facets. This could be one explanation why males have significantly less squatting facets than females. Perhaps neither their work nor habitual sitting postures place them in positions that form squatting facets. Another possible explanation is that that men are doing more walking and not spending time squatting or sitting (Perry 2004; VanPool and VanPool 2006). As previously discussed, musculoskeletal markers from other Southwestern groups indicate that men participated in activities such as hunting and agricultural labor (Perry 2004). These types of activities require high mobility and wouldn't often place the angle in the hyperflexed position required for the creation of squatting facets.

Some males, however, do have squatting facets (they're not completely absent in the male sample), so maybe only specific males habitually sat in squatting positions. It has been hypothesized that because of particular designs that are only found on male effigies (small circles with a central dot and pound signs with or without a central dot) that these males are all

members of the same group (VanPool 2003a). Perhaps it is only a subset of the male population, such as shamans, that habitually squat. If the division of labor and/or the assignment of a social role correspond with both gender *and* social status, it may be that within the male population only a particular class of males habitually squat. If the skeletal data were able to be separated based on social status, perhaps there would be clearer trends in squatting facets. Regardless, it may be that only specific males squat, whereas squatting is more universal for females.

Along that line of reasoning, the effigy vessels may not only be representing specific groups of people but perhaps representing particular individuals. As previously mentioned, mortuary practices at Paquimé indicate a focus on the individual rather than a sexual division of gender-based status (VanPool and VanPool 2006). In our recent analysis of clothing and body markings on male and female effigies, we find that facial designs and the designs found on clothing are highly variable, suggesting to us that actual individuals were depicted (VanPool et al. n.d.).

Squatting Facets of both the Tibia and Talus: a Redundant Measure?

Researchers are often faced with a lack of data, especially when examining fragmentary archaeological remains. Because tibia and talus squatting facets are complimentary, I was curious to see whether I would hypothetically reach the same conclusions with partial data as I would with complete data. Of the 25 individuals with both right tibia and right talus squatting facet data present, two individuals (8.0 percent) had one facet present and the other facet absent (one had tibia present and talus absent; the other was reversed)(Table 14). All others with both right tibia and right talus squatting facet data available (92.0 percent) were consistent. Either their right tibia and right talus both had squatting facets, or neither of the right tibia or talus had squatting facets. Of the 18 individuals with both left tibia and left talus

squatting facet data present, four individuals (22.2 percent) have mismatched tibia and talus presence/absence of squatting facets. All others (77.8 percent) are consistent. Overall, 86.5 percent of the paired tibia and taluses (regardless of side) matched. The small sample I looked at is suggestive that tibia squatting facets and talus squatting facets are redundant measures, but a larger sample size is needed to be more confident about the validity of this assertion.

Table 14. Frequency of Matched and Unmatched Tibia and Talus Squatting Facets

	Right Tibia and Talus	Left Tibia and Talus	Total	Percent of Total
Matched	23	14	37	86.05
Unmatched	2	4	6	13.95
Total	25	18	43	100.00

As previously discussed, Thomson (1889) observed that squatting facets are recorded more frequently on the tibia due to the increased difficulty of identifying squatting facets on the talus. Although tibial data may be a good means of checking talar data, they also present the possibility of skewed data collection. However, Benfer's data are not skewed in this way. The percent of left tibia squatting facets marked "present" for females (see above, Table 7) is greater than those marked "present" for the left talus. However, this trend does not hold when comparing the "present" percentages of right female tibia squatting facets to right female talus squatting facets, or of both right and left male tibia and talus squatting facets. Because of this trend, the data then demonstrate the skewness of the sample more than the relationship between tibial and talar squatting facets.

Suggestions for Future Research

One noticeable aspect of the male effigies, besides their overall postural differences from female effigies, is their asymmetric posture. One means of examining postural asymmetry is

femoral torsion. Femoral torsion is the measure of the twist in the shaft of the femur. A study of asymmetry of femoral torsion would not only be helpful for determining side preference of Paquiméan postures (which is tangential to this study because the effigy vessels are sitting squarely on their buttocks with the legs in front of them, not with the legs placed to either side), but it would be useful in testing if males, like the effigy vessels, are using different leg positions. Femoral torsion is not a weight-bearing issue (in that it's not affected by the magnitude of weight), it's affected by distribution of weight during habitual activities such as assuming specific postures. Angles of femoral torsion, also referred to as femoral anteversion or retroversion, change throughout growth. In utero, there is hyperflexion of the femur on the hip: the femur is locked into the acetabulum (the socket on the pelvis in which the femoral head articulates). This force causes the femur to twist, resulting in a high degree of torsion (Wescott et al. 2014). After birth, changes in the musculature of the hip, capsular restriction, and the changing weight distribution of the body during gait development cause de-rotation of the femur (Tardieu 2010).

At birth, the long portion of the femur (the diaphysis) is ossified; however, the round portions at the extremities of the femur (the epiphyses) are cartilaginous. Different postures create differential loadings across the developing epiphyses, causing variations in angles of femoral torsion because of the malleability of the skeleton at this stage in development (Tardieu 2010). For example, postures that involve medial or lateral rotation of the thighs (such as seen in the "W" sitting position, or when sitting on one laterally rotated thigh with both legs placed to the opposite side) would prevent de-rotation of the femur, and cause both higher degrees of femoral torsion and asymmetry of femoral torsion (Wescott et al. 2014). In summation, different postures assumed during childhood affect the angle of femoral torsion; after the

epiphyses fuse to the metaphyses (the portion of bone between the epiphyses and the diaphysis) around puberty, there is little further change with advancing age.

Over half of the male effigy vessels (52.2 percent) are sitting with each of their legs in different positions, whereas there are no female vessels who have each of their legs placed in different positions (see Table 6). There is only one female with her legs pulled up to her chest; all others have both of their legs extended out in front of them. If the vessels are reflecting real life habitual postures, and these postures are assumed by children as well as adults, the male skeletal remains should exhibit femoral torsion asymmetry between their two legs and the female skeletal remains should not.

Benfer recorded femoral torsion, however, he did not provide the information needed (i.e., angular measurements) to address femoral torsion asymmetry by sex. He classified femoral torsion into one of the four following categories: 1. Absent, Negative; 2. Submedium; 3. Medium; and 4. Pronounced. Femoral torsion, being a measure of the twist between the proximal and distal end of the femoral shaft, should be an angular measurement. No corresponding ranges of angles can be found to accompany Benfer's categories. Of equal importance, Benfer did not report the methods by which he measured femoral torsion. There are multiple methods by which he could have obtained this measurement, and these methods inform the interpretation of the data.

If trying to get a sense of habitual postures regardless of ceramic depiction, questions of side preference may be informed by squatting facets. However, there has been some debate as to whether non-metric postcranial traits, such as squatting facets, exhibit bilateral asymmetry.

Squatting facets are qualitative and are recorded as either present or absent. There is no quantifiable determination of presence or absence, it is a judgement call of the recorder. Penteado et al. (1986), in a study of the left and right incidence of 30 non-metric post-cranial traits, found that all but two of the traits were nonsignificant in terms of bilateral asymmetry. One of these two traits was the lateral tibial squatting facet. Finnegan (1978), also in a study of 30 non-metric traits, found no significant difference in side comparisons of females (either as a whole or in his racially differentiated subsamples). One significant difference was found in the side comparison of white males, as well as one significant difference in the side comparison of black males, but neither traits were related to squatting facets. Ari et al. (2003) conclude that the findings of these two studies indicate that post-cranial non-metric traits do not show side dimorphism (their study of tibial squatting facets also showed no evidence of side dimorphism). However, this may not necessarily be the case. Trinkaus (1978) found that side dimorphism of non-metric traits is common.

In my study of the Paquiméan data, roughly 11 percent of individuals who had data for both right and left ankles exhibited side dimorphism. However, as previously mentioned, the sample size here is relatively small. If side-dimorphism is to be analyzed in the future, perhaps a comparison of squatting facets against metric traits could be conducted. These would include the calcaneal axis of tuberosity (previously studied by Benfer, 1968), the angle of femoral torsion (which is known to be sensitive to habitual postures from Arkin and Katz, 1956), and the angle of tibial torsion (although torsion of the tibia is hard to attribute just to squatting; Trinkaus 1975). The presence or absence of Poirier's facet, although non-metric and unrelated to squatting as previously thought, may possibly be related to femoral torsion and therefore useful as well (Stephanie Child personal communication 2015).

Another benefit to this study would be comparisons to similar populations. If other Southwestern populations' sitting patterns are documented and data on squatting facets were to become available, more concrete conclusions may be drawn regarding the habitual postures of Paquimé's inhabitants. Examination of other skeletal measures of activity such as musculoskeletal markers, cross-sectional geometry, and robusticity indices could also be conducted on this sample and then compared to similar analyses in other Southwestern populations (e.g., Brock 2005; Harrod 2003; Perry 2004; Whitley 2009).

Chapter 6. Conclusion

While squatting facets may not be the perfect skeletal marker to gain insight into habitual postures of the Paquiméan people, they provided a unique way to test our assumption about male and female body positions that were observed in Medio period iconography. From squatting facets we know that Medio period males and females were habitually assuming different postures. We also now know that Medio period effigy vessels do not portray the habitual activities of the contemporaneous people, or at least those activities that would cause the formation of squatting facets. The higher frequency of squatting facets in females suggests females spent long hours in a squatting or kneeling position. As shown through ethnographic and archaeological data, women in the American Southwest and Northern Mexico spent large periods of time grinding food (Crown 2000; Perry 2004; VanPool and Leonard 2002; Whitley 2009). Further, ethnographic and archaeological comparison with other Southwestern groups suggests that men are more likely to have walked longer distances, whereas women were more likely to be involved in activities requiring/allowing sitting positions (Perry 2004; VanPool and VanPool 2006). Perhaps this gendered division of activities and labor caused the significant difference in squatting facet frequency between males and females.

VanPool and VanPool (2007) analysis of Medio period iconography, which included painted jars and other types of effigies (e.g., birds and snakes), found that the iconography depicted Casas Grandes cosmology as it related to humans, the Under World, and the Upper World. They also suggest that cosmos was split into two dual ritual aspects based on gender with both males and females working together to keep the cosmos animated (i.e., gender complementary). They found that females were associated with birds and hence the Upper World, whereas males were

associated with serpents and the Lower World (VanPool and VanPool 2006, 2007). Three female effigies had tutelary bird painted on their chest suggesting that these women were also involved with shamanic rituals. Thus it suggests that women depicted in Medio period iconography are involved with social behaviors related to cosmology.

The activities depicted by the female effigies also support the ideas that the vessels are portraying Paquiméans in non-mundane activities and that the vessels are depicting a particular subset of the population. Five female effigies are holding bowls, and it has been proposed that the women holding bowls represent women who serve food during feasts (VanPool and VanPool 2006). It is likely that specific women, such as married women, performed specific ritual duties such as serving food during communal meals (Schlegel 1977; VanPool and VanPool 2006). Given that habitual squatting positions are supported for females from mortuary context, and that squatting is not portrayed in the effigy vessels, it is likely that human effigies are again reflecting something other than the daily practice of the typical Medio period woman. Again it appears that social status and religious notions were more important to Casas Grandes people to depict in their iconography than mundane activities.

To reiterate, the effigy vessels are not depicting everyday work activities. It is then likely that they were modeled after “proper” postures for particular social situations, or perhaps depicting a certain subset of the population that are expected to sit in certain positions. This subset may be a certain social class of people, or could be certain roles that people served within the society. From the particular motifs on some of the male effigies it has been proposed that some of the male effigies are shaman (VanPool 2003a). Thus it is not a great leap to speculate that the other effigy vessels may be depicting particular roles, occupations, or even individuals.

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Appendix

Table 15. Master Catalog

Unit	Catalog # (Benfer)	**Burial** (Butler 1971, presented in Di Peso et al. 1974:8)	Sex Estimate	**Age** (Butler 1971, presented in Di Peso et al. 1974:8)	**Age group** (Butler 1971, presented in Di Peso et al. 1974:8)	**Position** (Butler 1971, presented in Di Peso et al. 1974:8)	**Squatting Facets**			
							R Tibia	**L Tibia**	**R Talus**	**L Talus**
1	1-1	1A-1	F	36-50	Mid-adult				absent	absent
	1-1	1B-1	F?	18+	?-adult				present	present
	2-1	2-1	F	18-35	Young Adult	L side flexed				
	3-1	3A-1	F	50+	Old Adult	sitting				
	4-1	4-1	M?	36-50	Mid-adult	L side flexed				
	8-1	8A-1	F	36-50	Mid-adult	sitting flexed	present	present	present	present
	9-1	9-1	F	50+	Old Adult	R side flexed				
	11-1	11A-1	M?	18+	?-adult	sitting flexed				
	12-1	12A-1	M	36-50	Mid-adult	sitting flexed		present		present
	15-1	15-1	M	36-50	Mid-adult		present		present	
	16-1	16-1	F	18-35	Young Adult	R side flexed			present	absent
	17-1	17A-1	F	50+	Old Adult	R side flexed			present	
	22-1	22-1	F	36-50	Mid-adult	R side flexed				
	23-1	23A-1	M	18-35	Young Adult	L side flexed				
	24-1	24-1	F	18-35	Young Adult	R side flexed			present	
	28-1	28-1	M	36-50	Mid-adult	L side flexed				absent
4	1-4	1-4	M	18-35	Young Adult		present			
	2-4	2-4	M?	50+	Old Adult				present	
	3-4	3-4	F?	36-50	Mid-adult					
	4-4	4-4	M	36-50	Mid-adult					
	5-4	5-4	F	18-35	Young Adult	R side legs drawn up behind		present	present	
6	6-6	6-6	M	18-20	Young Adult	supine flexed	absent	absent	absent	present
	8-6	8-6	M	18-35	Young Adult					absent
	17-6	17-6	M	18-35	Young Adult	L side flexed				

	20-6	20-6	F	18-35	Young Adult	L side flexed	present	present	present	present
	27-6	27-6	M	36-50	Mid-adult	R side flexed			absent	
	28-6	28A-6	F	6-12	Juvenile	sitting flexed				
	32-6	32A-6	M?	50+	Old Adult	R side flexed			absent	
	33-6	33-6	?	18+	?-adult	R side flexed				
	34-6	34-6	F	18+	?-adult	L side semiflexed				
	35-6	35-6	F	18-35	Young Adult	R side flexed				
	37-6	37-6	F	36-50	Mid-adult	L side semiflexed				
	41-6	41-6	M	18-35	Young Adult	sitting flexed				
	42-6	42-6	M	50+	Old Adult	supine semiflexed	present			
	43-6	43-6	M	18-35	Young Adult	supine legs flexed behind	absent	absent		
	47-6	47-6	F	18-35	Young Adult	sitting flexed	present	present	present	present
8	1-8	1-8	M	36-50	Mid-adult	R side flexed			present	present
	13-8	13A-8	F	36-50	Mid-adult		present		present	present
	14-8	14-8	M	36-50	Mid-adult	L side flexed			present	
	17-8	17-8	F	18-35	Young Adult	R side flexed			absent	
	20-8	20-8	M	50+	Old Adult	supine flexed				
	21-8	21-8	M	18+	?-adult	L side flexed			absent	absent
	31-8	31-8	M	36-50	Mid-adult	R side extended			absent	absent
	33-8	33-8	F?	36-50	Mid-adult	supine flexed			absent	absent
	35-8	35-8	M	36-50	Mid-adult	supine flexed		present		
	36-8	36-8	M	18-35	Young Adult	R side flexed				
	44-8	44-8	M	36-50	Mid-adult	L side flexed			present	present
11	10-11	10-11	F	18-35	Young Adult					
	25-11	25-11	M	50+	Old Adult	sitting slightly flexed		present		present
	28-11	28-11	F	18-35	Young Adult	L side flexed			absent	present
	32-11	32-11	F?	18-35	Young Adult	supine flexed			present	present
	33-11	33-11	M?	18-35	Young Adult	supine flexed	absent	absent	absent	absent

	35-11	35-11	F?	18-35	Young Adult	supine flexed			absent	absent
	36-11	36A-11	F	36-50	Mid-adult	L side flexed			present	
	37-11	37-11	M	36-50	Mid-adult	sitting			present	present
	40-11	40-11	M	36-50	Mid-adult	R side flexed				
	41-11	41A-11	F?	18-35	Young Adult	L side semiflexed	absent		absent	absent
12	4-12	4-12	M	36-50	Mid-adult	R side flexed			present	present
	15-12	15B-12	F	36-50	Mid-adult	L side flexed	absent	absent	absent	absent
	19-12	19-12	F	18-25	Young Adult	supine flexed				absent
	24-12	24-12	M	18-35	Young Adult	R side flexed			absent	absent
	25-12	25-12	M?	18-35	Young Adult	L side flexed				
	34-12	34-12	M	36-50	Mid-adult	sitting flexed	present		present	present
	35-12	35-12	M	36-50	Mid-adult	sitting flexed			present	present
	36-12	36-12	M	18-35	Young Adult	supine extended			absent	absent
	40-12	40-12	M	50+	Old Adult				present	present
	41-12	41-12	M	18-35	Young Adult	R side flexed			absent	absent
13	44e-13	44E-13	M	36-50	Mid-adult	supine legs frogged out				
	13-13	13-13	F	18-35	Young Adult	R side flexed			present	present
	14-13	14-13	M?	18-35	Young Adult				absent	absent
	18-13	18-13	F	18-35	Young Adult		absent	present	absent	present
	19-13	19-13	F	18-35	Young Adult	supine flexed				present
	20-13	20-13	M?	18-35	Young Adult	L side flexed				absent
	31-13	31-13	M	36-50	Mid-adult	L side flexed			present	absent
	34-13	34-13	M	18+	?-adult		absent		absent	absent
	35-13	35-13	F	18-35	Young Adult	supine flexed	present	present	absent	absent
	38-13	38-13	M	36+	?-adult	supine extended			absent	absent
	44a-13	44A-13	M	50+	Old Adult	supine flexed			present	
	46-13	46-13	?	18+	?-adult	sitting flexed				absent
	52-13	52-13	F	18+	?-adult	supine flexed			absent	

	54-13	54A-13	M	36-50	Mid-adult	sitting flexed		absent	absent	
	55-13	55-13	M	18-35	Young Adult	supine semiflexed				
	62a-13	62A-13	M	18-35	Young Adult	R side flexed			present	present
	62c-13	62C-13	F	50+	Old Adult	R side flexed			present	absent
	65a-13	65A-13	M	18-35	Young Adult	R side flexed				
	66a-13	66A-13	F	50+	Old Adult	supine flexed	present	present		present
	66b-13	66B-13	F	18-35	Young Adult		absent		present	
	69-13	69-13	F	50+	Old Adult	sitting flexed				
	72-13	72-13	F	36-50	Mid-adult	L side flexed			present	present
	76-13	76-13	F	36-50	Mid-adult	sitting flexed	absent			
	77-13	77-13	F	36-50	Mid-adult	sitting flexed				
	78-13	78-13	F	18+	?-adult	supine flexed			present	present
	80-13	80-13	M?	18-35	Young Adult	sitting flexed			present	present
	81-13	81-13	F?	18-35	Young Adult	L side flexed	present		present	present
	85-13	85-13	F	36-50	Mid-adult	supine flexed	present	present	present	
	86-13	86-13	F	36-50	Mid-adult	R side flexed				present
14	2-14	2-14	M	18-35	Young Adult	L side flexed	present		present	present
	3-14	3A-14	F	30-32	Young Adult	R side flexed	present		present	present
	4-14	4-14	F	18-35	Young Adult					
	6-14	6-14	F	50+	Old Adult	L side flexed				
	7-14	7-14	F	18-35	Young Adult	sitting legs flexed to rear			present	present
	11-14	11-14	F	18-35	Young Adult	supine flexed				
	14-14	14-14	F	18+	?-adult	sitting flexed			present	present
	18-14	18-14	M	18-35	Young Adult	sitting flexed	absent	absent	absent	absent
	20-14	20-14	F	18+	?-adult				present	present
	30-14	30-14	M	36-50	Mid-adult	R side flexed		absent	absent	absent
	31-14	31-14	F	18-35	Young Adult	L side flexed			present	
	32-14	32-14	F	50+	Old Adult					

	34-14	34-14	F	36-50	Mid-adult	R side flexed				present
	35-14	35-14	F	18-35	Young Adult					
	36-14	36-14	F?	18-35	Young Adult	supine extended				present
	38-14	38-14	F	36-50	Mid-adult	supine flexed	absent		absent	absent
	39-14	39-14	F	18-35	Young Adult	L side flexed			present	present
	43-14	43-14	F	36-50	Mid-adult	R side flexed	present	present	present	present
	44-14	44-14	F	18-35	Young Adult	R side flexed	present	present	present	present
	45-14	45-14	F	18-35	Young Adult	supine flexed				absent
	55-14	55-14	F	18-35	Young Adult	sitting flexed	absent	absent	absent	absent
	56-14	56-14	F	18-35	Young Adult	L side flexed			present	
	59-14	59-14	?	13-14	Adolescent	supine flexed				
15	9-15	9A-15	F	18-35	Young Adult					
16	1-16	1-16	F	18-35	Young Adult	supine extended				
	2-16	2-16	M	50+	Old Adult	sitting flexed	absent	absent		
	3-16	3-16	M	36-50	Mid-adult	sitting flexed		present	present	
	8-16	8-16	M	18-35	Young Adult	nonintentional burial (type 9)				
	9-16	9-16	F	18-35	Young Adult		present	present		
	10-16	10-16	M	18-35	Young Adult	L side flexed	present	absent	present	present
19	6-19	6-19	F?	18-35	Young Adult	L side flexed			present	
Central Plaza	10-CP	10-CP	F	36-50	Mid-adult	supine flexed			present	present
	11-CP	11-CP	F	18-35	Young Adult	L side flexed				
	12-CP	12-CP	M	50+	Old Adult	R side flexed	absent		absent	absent
	4-CP	4-CP	F	18-35	Young Adult	R side flexed		present	absent	absent
	5-CP	5A-CP	F	18+	?-adult	supine flexed				
Reyes Site No. 1	3	3	F	18-35	Young Adult	R side flexed				
	5	5	M	18-50	Young to Mid-Adult	supine flexed				