An Osteological Analysis of 18th Century Dog Burials at the Williamsburg Public Amoury

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An Osteological Analysis of 18th Century Dog Burials at the Williamsburg Public Amoury

A thesis submitted in partial fulfillment of the requirement for the degree of Bachelor of Arts in Anthropology from the College of William and Mary

by

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ABSTRACT

Excavations at Anderson’s Armoury in Colonial Williamsburg revealed six dog burials dating to the last quarter of the 18th century. The position of the dogs near a large sawpit, containing the articulated remains of roosters, a duck, and a cat, suggest that these dogs may have been used in dog fighting. An alternative hypothesis proposes that these dogs may have instead been used for the purposes of working and guarding the armoury. To investigate these claims, a detailed osteological analysis was performed on each of the dogs, essentially creating a biological profile. Additionally, documentary research provided contextual information on the histories of dog fighting and guarding, attitudes towards dogs, and the biological history of the dog.
Introduction

During excavations at Anderson’s armory in Colonial Williamsburg, archaeologists discovered six dogs in at least four burial sites, all of which dated to the last quarter of the 18th century. This finding was most unusual as non-prehistoric dog burials before the 19th century are scarce to nonexistent in the archaeological record. The burials were found near the fence line separating Anderson’s lot and the adjacent one. Although sometimes used for a smithy, Anderson’s shop is best remembered for serving as the public armory during the Revolutionary War, which begs the question: what were these dogs doing here? In at least three of the burials, the dogs seem to have been interred, suggesting an emotional bond between the owner and his or her animal. Although one may think that this treatment implies that they were beloved pets, there were in fact many social categories and occupational designations for dogs in 18th century Colonial America. Due to the position of the burials near a large sawpit, along with other biological and documentary evidence, these dogs likely fall into the category of working dogs. More specifically, this paper discusses the possibility that the dogs were kept for use in dog fighting or guarding the armory.

The first section of this thesis addresses the biological, cultural, and historical background necessary to understanding the dog burials. Dogs were not merely objects that were owned and discarded after they were no longer of use. Dogs are living creatures that have willingly entered into relationships with humans, and in order to explore the dynamism in such relationship, it is necessary to explore each actor in turn. The animal side of the equation is discussed first with notes on the initial domestication of the dog and biological background of its ancestor, the wolf. In this thesis, Budiansky
(1999) and Clutton-Brock (1981) form the basis for the domestication theories. I find particularly helpful their focus not on cultural mastery, but rather a more biological approach that gives the animal agency in its own domestication. Wolf behavior is also addressed because it forms the basis for all dog behaviors. Although dogs were domesticated, this does not imply that the dog completely changed its behavior, but rather modified it from wild forms. For example, modern dog trainers take advantage of the wolves’ and dogs’ hierarchical social structure to train their pets by inserting themselves at the top of the hierarchy. Next, theories on human-animals relationships are discussed with a focus on the 18th century dog owners, dog fighting, and animal burials.

Attitudes towards animals are constantly in flux and vary culturally; therefore, it is important to look at the period, location, and social setting in which an animal lived. In this thesis, burial trends are examined to discover the cultural practices behind them. Nonetheless, the analysis takes into account the variation inherent within and between sites. The history and methods of both dog fighting and guard dogs are discussed in the following sections to explore whether it was possible or even likely to have fighting or guard dogs at an 18th century armoury. The analysis takes into account which dogs were used for specific tasks with the ultimate goal of confirming whether the osteological and archaeological evidence correspond to historical trends.

The presence of dogs in Williamsburg and Virginia are addressed in the next section. In particular, it explores who owned what types of dogs as well as, what their roles were, and what regulations were present in terms of owning them. The last section in the background chapter focuses on the history and archaeology of Anderson’s armoury. Although there is a dearth of information about James Anderson’s personal
life, a more general description of smithing and its mariality are presented to provide an indication about what was happening at the site during the armoury period. This section also details the initial archaeological findings at the armoury site.

The osteological examination that I performed on each of the skeletons is discussed in the second chapter. After reconstruction and measurement of each of the bones, I determined basic facts about each dog, including their size, age, and sex. Analysis of cranial shape was performed because resulting metrics are diagnostic as to breeds and types (excluding size). Historical accounts of dogs often mention several characteristics of breeds, such as size, fur color and length, temperament, cranial shape, and skills (e.g. hunting, fighting, etc.). Of these factors, size and cranial shape are most important to this study, as they are best preserved in the archaeological record. In this way, the anatomy of the skeletons can be compared to ideal modern breeds of dogs used for fighting and guarding to see if there are any similarities. A pathological assessment was also performed on the bones to attempt to identify any illness or trauma, especially as they relate to cause of death. With guard dogs and particularly fighting dogs, there are risks of injury involved inherent in their tasks, some of which may be severe enough to leave their mark on the bones.

The discussion section links the background materials to the osteological and archaeological finds and explores their connection. Through a synthesis of documentary and biological evidence, the possibility of fighting and guarding dogs at the armoury is assessed. I first look at the burials themselves because they are in themselves an unusual find. Many prehistoric dog burials have been found in America, yet outside of European examples, few historical-period burials have been discussed in scholarly treatments of the
British Atlantic (see Morey 2006). The discussion that follows attempts to answer the main question of this thesis: What were these dogs doing at the armoury during the late 18th century? The interpretation focuses on two different sources of information: historical and osteological. The historical evidence demonstrates the likelihood that Anderson owned fighting or guarding dogs. The osteological evidence resolves whether these dogs would have been good candidates to use in fighting or guarding, and if there is any faunal evidence of associated trauma.

**Background**

*a. Domestication Theories*

Theorists note that issues of agency are central to interpretations of the initial domestication of the wolf, with some attributing humans all of the agency and others dividing it between humans and the wolf. Earlier theories would attribute much more agency to the person as the initiator of domestication. In these theories, humans are characterized as taking in pups from the wild and “taming” them. In turn, their progeny would have eventually become the domesticated dog. Budiansky (1999) finds much fault in this argument, however. He points out the failure of peoples to domesticate certain animals that may have still been kept as tame pets and the presence of wild behaviors, such as aggressiveness or a fear of humans, which remain in these animals despite their relatively tame state. Animals that were domesticated had behavioral predispositions (listed below), which allowed them to enter into a mutualistic relationship easier than other animals. Such characteristics were not evolved with the evolutionary goal of eventual domestication, but rather provided humans an entrance into the lives of these animals.
In more modern interpretations of domestication, the dog has equal agency in developing a relationship with humans. Humans did not simply assert their will and dominance to domesticate the dog. According to Coppinger & Coppinger (2001), dogs formed a commensal relationship with humans at first, scavenging at the edges of a camp for food. Eventually, the tamer animals would have bonded with humans. As the dog became more accustomed to living with humans, it could be used as a hunting companion, helping to bring down dangerous or swift prey. People entered into the dogs’ social sphere as the alpha, granting them a measure of control over the dogs, while still maintaining a relationship between the two species. As dogs drew their social networks closer to human ones, the relationship would have shifted from commensalism to mutualism, with the dogs receiving food and additional care for their young in return for their hunting effort, and as the relationship developed, guarding and herding. These theories suggest that as society became more complex, new niches for the dog emerged, such as fighting and companionship (Budiansky, 1999).

Clutton-Brock (1981) redefines six behavioral characteristics that domesticated animals displayed while still wild from Francis Galton’s 1865 essay on animal domestication. Animals that were domesticated displayed an ability to survive removal from its mother and life in a different environment. Domesticated animals are social (with the exception of the cat) and accustomed to living within hierarchical social structures, which allows humans to enter at the top of the dominance hierarchy. Additionally, animals vary in their flight distance, or how close a predator can get before the prey flees, and animals with a shorter flight distance would have been chosen because hunters would have been able to observe and learn their behavior more easily and
eventually handle the animals. One of the primary reasons for domesticating animals was that they had a use to humans, whether that was food, fibers, milk, draft, or hunting companions. Domesticated animals should additionally be able to breed easily, so as to maintain a stable population in captivity. The last characteristic of domesticated animals is that they are “easy to tend.” In essence, the animal should be social to be kept in herds, have a generalized diet, and have a rather submissive demeanor. The wolf exhibited all of these features, and therefore, was a prime candidate to enter into a relationship with humans (Clutton-Brock 1981).

b. Canine Ancestors and Their Behavior

Anthropologists are correct to study the animal side of the relationship in addition to human behaviors. Because dogs played a role in their own domestication, it is important to look at the wild wolf behavior to identify those behavioral elements that are preadaptive to life with humans. Humans and wolves were able to form a relationship because they exhibited these qualities. Indeed, when looking at behaviors of fighting and guard dogs, especially territoriality and dominance, one can see how they were coadapted from wild behaviors.

The main social units of wolves are called packs, which consists of a reproductive pair and their offspring. In terms of social organization, wolf packs are hierarchical, with the reproductive pair at the top and younger members falling thereafter. The pack can be comprised of two to forty members with an average of seven wolves. Pack size fluctuates due to dispersal of wolves when they are one to four years old. Lone wolves without a territory often have just recently dispersed, but this is primarily a transitional stage. When a member of the alpha pair dies, one of these outside wolves or a member of
the pack may take its place (Mech and Boitani, 2003). Pack size can also fluctuate with prey density and size and the seasons. Dominance is mostly based on age and breeding status, but is not a fixed position except with the alpha pair. During encounters between two wolves, dominance is evidenced by their body positions. (Lopez, 1978; Mech, 1999). Aggressive animals have high, raised, hackles and tails; their legs are rigid; and they move very slowly and purposefully. Submissive animals, on the other hand, try to look less intimidating by trying to reduce their apparent size and hiding their teeth. Their tail will remain low, but they may wag it in an attempt to appear friendly. Fights to the death within packs would reduce the fitness of the pack, so there are low instances of death and serious injury. When a growl from a dominant member does not deter a submissive one, they may enter into a somewhat “ritualized” fight pattern. The two wolves circle each other at first, with the dominant trying to displace the submissive. The dominant wolf will usually end the fight by unbalancing its opponent or biting it at the hindquarters (Harrington and Asa, 2003). This style of fighting is in contrast to dog fighting, in which the dogs attack the face and forelimbs of their opponent, intending to cause injury instead of just exhibiting dominance.

Wolf packs maintain a rather large territory, of which they can be highly defensive against conspecifics. Territories can be evolutionarily advantageous because wolves only need to fight a competitor once to have a territory containing prey, instead of conflicting with other wolves every hunt. Territory size varies with population size, prey availability, and location, and may range from 13 square miles up to 1,700 square miles. In order to prevent trespassing by other packs, wolves will scent mark their territory at boundaries and trail intersection, and howl, which can be heard up to six miles away.
Usually, this will be enough to keep other wolves well away. Incursions on other wolves’ territories are thought to be either a result of desperation (i.e. food scarcity) or a deliberate invasion because inter-pack encounters, in contrast to intra-pack conflict, usually result in physical trauma and sometimes death. Even if the losing wolf begins to exhibit submissive behavior, it may not be enough to stop the attack of the other wolf. Wolves that do not have a territory yet may either challenge an alpha or establish his or her own in an unoccupied area or in between other territories. Deliberate attacks tend to occur around the time of the breeding season, which may be an attempt by wolves to disrupt the reproductive success of rival wolf packs (Mech and Boitani, 2003; Lopez, 1978). After the alpha female gives birth, the pack will localize around the den (chosen by the mother while still pregnant). The den along with the area around it is known as the home site and is guarded by the pack while the mother nurses her pups (Packard, 2003).

Wolves are opportunistic hunters, going through periods of feast and famine. They tend to eat wild ungulates (e.g. deer and elk), especially species that are weaker, smaller, and more abundant. Oftentimes the prey animals are deer due to their abundance, although in some areas, wild boar and moose are also hunted. Because of their opportunistic eating behavior, however, it is difficult to formulate a pattern of qualities attributes that a wolf looks for in its prey. Wolves can hunt at a maximum of 38 miles per hour and thirteen miles in distance, but the average is a much smaller range (Wagner et al., 2012; Peterson and Ciucci, 2003). The process of hunting usually follows a similar pattern. Wolves approach and observe the prey, attack the herd, and either pursue or harass the prey, depending on whether they flee or fight (MacNulty et al.,
Wolves eat in order of the hierarchy, and then rest for several hours afterwards to aid digestion. Wolves will devour most of the carcass, eating an average of five to ten pounds, but disregard the stomach and intestines as these usually contain vegetal matter (Peterson and Ciucci, 2003; Lopez, 1978).

Communication among wolves is achieved via several different mediums. Auditory cues include howling, indicating position or a command to assemble; growling, in both aggressive and playful situations; and whining. Wolves can use olfactory cues, in the form of scent marking, to interpret territory boundaries and information about the urinater via hormones. Communication using posture can be based on a dominant-submissive dyad, but is usually more complex and is emphasized through markings on the fur. Tactile communication can strengthen social bonds and reduce stress during play, but it can also reveal information about a rival wolf during confrontations (Lopez, 1978; Harrington and Asa, 2003).

Many if not all of these behaviors served either in the initial domestication of the species or in working dogs today. Because the wolf is such a social creature, it would have been easier for it to enter into the humans’ social sphere. In these models of early domestication, humans are seen as assuming top position within the hierarchy, giving them a measure of control over early dogs’ actions. Wolves ate a varied diet and exhibited gregarious behavior (which evolved to be more similar to juvenile behavior), and thus necessitated little human intervention. Although pup survival rate in the wild is rather low, reproduction in captivity would probably have increased survival rates with both human and maternal care and protection. Observation of wolves would have led hunters to understand the basics of how wolves interacted. The process of coevolution
between humans and dogs is longstanding as is the ever expanding repertoire of communication between the two species, so that they now have a unique understanding of one another. Dogs can sense human emotions and follow commands, while owners can often distinguish between different types of barking (e.g. playful versus on guard). Territoriality instincts would have been useful to protect homes and work places, and would have required the dog either to bark, a trait that is much more commonly found in domestic and feral dogs, or to attack the trespasser. Territoriality may also relate to dog fights, as disputes between wolves of different territories often involve physical aggression, while fights between members of the same pack usually end with one wolf expressing its dominance.

c. Theoretical and Ethnohistorical Background

Dogs exhibit a special place in human history and the evolution of human culture. They were the first animals domesticated, but have rarely been used for food. Leach (1964) argues that this is because dogs occupy an ambiguous position within people’s cultural classification of “animals.” Because they often live inside the house and are given names, they are classified—and anthropomorphized—as people. Dogs transcend the category of animal, often achieving human emotion and intelligence as perceived in literature and the media. The dog is furthermore unique in its capacity to fill many roles. Throughout their history, dogs have served as hunter, herders, guardians, companions, laborers, fighters, pariahs, and in some places food sources. Dogs have successfully coevolved with humans to become an almost essential part of life.

In modern Western society, it seems only natural for people to be campaigning for animal rights and denouncing activities that do them harm. As history shows, however,
animal baiting used to be one of the most popular forms of entertainment in England. Philosophical and religious beliefs of historic Britain gave people a paradigm that allowed them to harm animals without creating moral qualms. Beginning in medieval thought, Christians interpreted Genesis as God giving man dominion over animals. They believed that every animal was made to suit some human purpose. If the animal did not suit some practical purpose like a horse, then it was used to teach a moral lesson or existed simply to please the eye. Therefore, animals, such as cocks, dogs, bears, and bulls, were meant to entertain humans. One 18th century man was quoted as saying, “If not for combat, why was the fighting-cock created?” (Powell 1988). Another belief (this one philosophical) allowed people to discount any pain that they might inflict on animals. Descartes proposed the idea that the body was like a machine, or an “automata,” and only a human’s soul separated them from the animals. Many of his followers took this to mean that animals could not feel pain, as a machine cannot feel pain. Any cries let out by animals were simply reflexes, not an indication of suffering. This argument was also used as a justification for vivisection (surgery performed on living animals to study their internal structure) (Thomas 1983).

According to Hoage (1989), humans hold nine different attitudes towards animals. Owners of fighting dogs likely express the dominionistic attitude, both in historic and modern contexts. He defines this outlook as follows:

“This attitude is oriented toward satisfactions derived from the mastery and control of animals, typically in a sporting context. Animals are valued largely as challenging opponents, providing opportunities for the display of prowess, skill, strength, and often masculinity. The conquest of the animal demonstrates superiority and dominance—the human ability to confront wildness and render it submissive and orderly. The most valued animals are those viewed as fierce or cunning competitors. The major interest lies in challenge, confrontations, and competition (p. 9).”
Although in dog fighting, people are not confronting animals themselves, the ideas of superiority and dominance remain. In modern dog fighting as well as historical dog fighting, the dog symbolized its owner in the ring. Dogs were bred for “gameness,” a trait which involves aggression towards other animals, tolerance to pain, strength, endurance, and persistence. Dogs had to be bred and trained to behave this way because normal fights between dogs will end quickly with one submitting to the other (Sinclair, Merck, and Lockwood 2006). Through dogs exemplifying these characteristics, owners (most often men in both historical and modern contexts) could have admirable traits reflected onto themselves. Fighting dogs were considered to exemplify masculinity and bravery when they won, but cowardice when they lost. Dogs that lost reflected poorly on their owners and may have subsequently been culled (Evans, Kalich, & Forsyth 2007). People that participated in cock fighting also showed the same tendencies to glorify their animals when they won. It was said that “men were led to virtue by the martial courage which game cocks exemplify,” showing that men could learn a lesson from their animals (Powell 1988). This quote also shows the standards to which men were held, namely that they were strong-willed, brave, and unyielding.

Englishmen greatly identified with their dogs, in particular the mastiff, a breed that was used both in fighting and guarding property. The mastiff often represented the essence of England, showing exemplary courage and valor in the ring. Foreign ambassadors were usually taken to baiting events, in which the mastiff would conquer a larger, exotic animal, representing England’s prowess over its enemies. As the mastiff was a native breed of England, it was well suited to represent the country as a national icon. Descriptions of the mastiff’s appearance and temperament also matched those
descriptions that are associated with Englishmen, further reinforcing the bond. Much of the similarity also has to do with being in the north of Europe, which was thought to be more masculine than the southern parts, due to the harsher climate (MacInnes 2003). Not all attributes, however, were due to the environment; character had to be instilled into the animals through training and baiting. Because trainers could control a fight between two animals by exhibiting mastery over their dog, it also seemed to give them a feeling of mastery over nature. Although beginning as a working dog of the common folk, the mastiff’s exemplary performance in the arena made it a favorite among the aristocracy, eventually being equated with the lion. Being a mastiff of the gentry, however, did not mean that it escaped the ring; dogs raised by noblemen were equally as likely to enter the arena as a mastiff of questionable provenance (MacInnes 2003).

Attitudes towards companion and working animals are also reflected in the manner that they were treated after death. Although pet cemeteries did not become popular until well into the 19th century, burial of dogs was not uncommon on homesites. In America, the oldest burials from Native American sites date back 8,500 years. Indeed, the majority of dog burials are prehistoric and are found worldwide. After surveying the literature on dog burials, trends emerge in terms of how and why people buried their dogs. Most dogs were buried alone with no other human or dog burials near them, although there have been mass graves of up to 1,000 dogs uncovered in Israel (Morey 2006). In the burial of dogs, people were anthropomorphizing them or attributing them human characteristics, such as continuing on to the afterlife. Placing the dog in a careful, arranged position may have indicated that someone was particularly fond of the dog. The inclusion of grave goods also indicated that they wanted the dog’s journey to the afterlife
to be pleasant. Dogs with healed pathologies from disease and injury, although their quality of life in general may not have been good, showed that they received care from an individual, as they likely would not have been able to survive on their own accord (Morey 2006). Eighteenth century colonists, though, may have had other ways of disposing of their animals. Bedell (2000) reports that while dogs and cats were not eaten, their remains are often found within trash pits. This disposal, however, does not mean that the owners did not care for their dog in life, but simply that, as was common for humans in the late 17th and early 18th centuries, after the “soul” departed the body, it was considered somewhat of an empty vessel. He also notes that dogs, even those used for hunting, are not included in probate inventories in the 18th century despite their prevalence and value. Evidence from Britain does indicate that for some pets there were burial rites. Elegies and epitaphs were created for pets throughout the 18th century. These poems indicate a belief that domesticated animals continued into an afterlife, but also often focused more on the owners than the pets themselves (Tague 2008). It is unclear whether these elegies would have been just for pets or if working dogs would have substantiated them as well.

Morris (2011) completed a survey of animal burials in Great Britain from the Iron Age through the medieval period. He analyzed associated bone groups (where partial or complete skeletons were buried instead of individual bones) and their trends over time and space. He separated burials into two categories: functional, in which the animal was buried because it had died (e.g. culling, disease, and natural waste) and ritual, in which the animal was buried had a spiritual role (e.g. sacrifice, offerings, and feasts). He also suggests that burials can represent a combination of the two categories, such as when an
animal dies of a natural cause, but the burial itself has a spiritual significance. Archaeologists tended to explain earlier burials with a ritual interpretation, while functional interpretations increased with more recent sites. Old animals were often buried as a result of being culled because they were no longer useful or death from old age or disease. Young animals, on the other hand, died during birth, from disease, or as a result of culling for population control purposes. Several groups of dogs were found from the medieval time period, which were interpreted as the result of a culling. The more complete the skeleton, the closer to the time of death someone buried the animal. The most common pathology found on buried skeletons was degenerative joint diseases, which includes osteoarthritis, antolysis, and exostoses. There are problems, however, with forming general trends in animal burials. The functional and ritual categories may not be as dichotomous as one thinks because ritual is not always related to religion. Furthermore, Morris concluded that there is no standard animal burial or interpretation because behind each burial is a wealth of possible situations and motivations.

When looking at the dog burials it is important to keep these theories and paradigms in mind. Philosophical and religious thought, nationalism, and personal attitudes all contributed to the culture of dog fighting in England and colonial America. These theories tell us not only why dog fighting may have become popular in the first place, but also what kinds of people were attracted to dog fighting. Furthermore, the burial information informs us under what circumstances would people, the British in particular, bury their animals. Because it is so unusual to find dog burials from colonial America, it is pertinent to amass information related to which types of animals were buried and also why and how they were buried.
d. History of Dog Fighting

Although dog fighting may extend back into Roman times, one of the first recorded dog fights was a bull baiting (an event in which dogs attempt to pin down a bull that is loosely tethered to a stake) in 1209 in Lincolnshire. Earl William Warren was so delighted by the sight of a butcher’s dogs chasing a bull through town that he specified an area for dogs to bait bulls (Fleig 1996). In fact, many of the early popular dog fighting sports involved baiting other animals—bulls, bears, lions, apes, cats, mice, and many other species (Taplin 1803). Animal baiting continued to be a popular sport throughout the next few centuries, especially among the nobility. Queen Elizabeth I loved the sport so much, in fact, that she prohibited plays on Thursdays as that was the day on which most fighting occurred. King James I set several mastiffs against a lion in 1618, and then retired the dogs who survived the fight, as any other opponent would be beneath them. Animal baiting became such an integrated part of English daily life, in fact, that in the 17th century a law was established to require bull baiting before killing the bull for meat, as it was believed to tenderize its flesh. Mastiffs, bulldogs, and later bull terriers were the dogs of choice in the fight. The Royal Official of Bull and Bear Baiting had the authority to take any mastiff to be used in fights, which usually led to an agreement in which the town would send a certain number of mastiffs a year to be used in fights in exchange for the official leaving the rest of the dogs alone. Animal baiting began to decline in popularity with the gentry during the 18th century, yet increased in popularity with the working class during the Industrial Revolution. Also increasing in popularity was dog-on-dog fighting, which required a less elaborate setup than baiting larger animals (Evans & Forsyth 1997, Ritchie 1981).
Fighting between dogs, rather than between different species, likely started in the mid-17th century. Although probably beginning with the gentry, like some other gambling sports, dog fighting became a sport of the commoner, reaching its peak popularity in the late 19th century. Specialized breeds developed as a result of these fights, including the Staffordshire bull terrier, the American Staffordshire terrier, and the pit bull terrier. Dogs no longer required the massive jaw strength necessary to grip larger animals, but instead bulldogs and similar breeds were crossed with terriers to give them more speed (Fleig 1996). Professions that took part in breeding dogs included publicans, livery stable keepers, sporting butchers, and others who had the money and premises to raise dogs. Other dogs not specifically bred for fighting could also take part in the fighting. Known as “canine amateurs,” such dogs as the Newfoundland dog and Irish spaniel were recorded as fighting in the arena. Notably, when dogfighting events were announced in newspapers or magazines, they were rarely mentioned alone. Other baiting events, such as rat-catching, badger-, and bull-baiting often occurred at the same time (Homan, 1999).

Opposition to dog fighting has been prevalent for several centuries. Puritans opposed dog fighting for the reason that it was corrupt for the people involved. Because it brought pleasure to those watching, dog fighting was condemned as sinful (Carson 1972). Others, such as the church and playhouses, repudiated animal baiting as they took away from their own attendance (Evans & Forsyth 1997). The first attempt to make bull and bear baiting a punishable offense was in 1777 in England, but this and similar laws were not enacted until years later (Fleig 1996). The Royal Society for the Prevention of Cruelty to Animals (RSPCA) was formed in the early 19th century, and laws preventing
animal fighting followed not too long after, including the banning of dog fighting in 1835 (Ritchie 1981). America eventually followed suit when New York prohibited dogfighting in 1856 (Evans & Forsyth 1997).

Banning of dog fighting made it into the illegal underground sport that is reviled by many people today. Modern dog fighting caters to a quite different demographic, yet many of the rules (which are more complicated than one might think) are applicable to 18th century fighting. Fights usually take place in a twelve-foot square pit that is around two feet deep, according to Cajun rules (Gibson 2005). Dogs are usually matched up according to weight and gender in the name of parity. Bets are taken on which dog will win, as well as which will strike first, how long it could hold a grip, etc. Between betting and raising dogs to fight or sell, dog fighting could potentially be a profitable business venture (Fleig 1996). In the fight, the dogs take turns attacking each other and only win if they are the last to attack, even if its opponent has given up. In fact, it is possible for a dog that has died to win as long as it made the last move (Fitz-Barnard 1975). Due to these rules, most dogs do not die during the dog fight. About half the time in modern cases, however, they perish as a result of their injuries, which include blood loss, dehydration, puncture wounds, infection, crushing injuries, and broken bones. Oftentimes, this is because the owner does not dare to take their animal to the veterinarian for fear of prosecution (Sinclair, Merck, & Lockwood 2006). Although not illegal in the 18th century, the same issue with injuries may have still occurred due to the lack of veterinarians in this time. Veterinarians during this period believed that—in terms of the animal world—only the horse was worth treating; nevertheless, there were several folk remedies around for simpler injuries and diseases for other domestic animals.
It was not until the decline of the horse as a mode of transportation that vets began to specialize in treatment of pets. Because horses were focused within rural areas, veterinarians had to turn to the next most prevalent source of animals, pets, for their income (Swabe 1999).

Training dogs for the fight was no easy task, for either the dog or its owner. Dogs were trained to attack their competition from an early age. Some equipment, like the catmill, flirtpole, and springpole, was designed to keep the dog slightly out of reach of the bait animal, using leather straps, encouraging the dog to continuously attack the bait animal, which may have been mutts, cats, rats, or other small animals, but did not let the dog actually harm the animal. This practice encouraged aggression and gameness and increased a dog’s lunging power and speed. Often owners made their dog wear heavy chains or weights as to increase muscle mass and endurance (Gibson 2005). The animals used for bait were usually given to the dog to eat after its training was over.

Additionally, it was a golden rule of dog fighting to let one’s dog incite fights with stray dogs and then allow them to kill and eat it. Around a month before a fight, the owner would begin to condition their dog. They would take their dog for long walks of up to ten miles on hard surfaces to improve their stamina and muscle endurance. Their diet would be specialized to make them leaner because a dog that was over the specified weight for the match would be disqualified. The training, however, presented problems with other animals. Dogs would have had to be kept separate to prevent fighting between them, which would have hurt both the animals and the owner’s profits. Owners also had to be careful when breeding because the gameness instilled within the dog interfered with the mother’s maternal instinct. Fighting dogs were specifically trained, though, not to be
aggressive towards people because their trainers needed to be able to handle them. Most
dogs that showed aggression towards humans were culled immediately, but if a dog did
happen to get into a fight with a person, it would fight to the death. Although fighting
dogs and guard dogs were garnered from the same breeds, in this manner, dogs that were
trained for fighting would not make good guard dogs as well (Fleig 1996; Fitz-Barnard
1976).

e. Guard Dogs

An alternative theory to interpreting the dogs under investigation as fighting dogs
is that the dogs may have served as guards for the armory. Guarding may be one of the
oldest jobs of the dog. By the time of the Romans, a “breed” of guard dogs existed,
although it is highly likely that the form of the dog was somewhat variable. Canes
villatici, as watchdogs were called, tended to have a stocky body with a large chest and a
large head (Zedda et al. 2006). Guard dogs can be divided into several categories. In
general, guard dogs are used to defend a certain property from intruders. This definition
of guard dogs is what will be discussed in this thesis. Livestock guardian dogs protect
other animals (generally sheep) from predators, such as wolves. They live with the
livestock, having very little contact with humans, and therefore, are required to have very
neotenous, or juvenile, behavior patterns, as to not appear threatening to their charges.
Because the guardian dogs choose to bark, rather than go into an attack sequence, the
predator often becomes confused and will leave (Coppinger and Coppinger 2007).
Sentry dogs are similar to guard dogs in that they are used for protection, but instead of
guarding a particular area, they work with a handler to defend a variety of locations.
These dogs were in use in the military when troops would have to travel every day
The last type of guard dog was the carriage dog, which is believed to be the origin of the modern Dalmatian breed. These dogs had to be swift to keep up with the carriage, yet large and strong to defend the carriage at night. The dog and the horse also had to share in a relationship, so that the dog did not frighten or get in the way of the horse, and the horse did not trample the dog in return (New York Times 1900).

It was commonplace for a dog, usually a mastiff, to be chained up during the day and let loose at night to guard the premises (Taplin 1803). In the 19th century, dogs were used to protect British army magazines, factories, and storage areas. There are several characteristics found in dogs that make them useful at guarding. Barking serves as a warning to both the trespassing individual to stay away and to the owner to prepare to defend his or her property. A guard dog, however, must not bark at every stray movement that catches its eye, but save its barking until there is a threat to it or the property. Guard dogs could be of any size, although generally, large dogs were more useful as their size and deeper barks appeared more menacing to intruders. There have been several breeds that were utilized as guard dogs, including Newfoundland, St. Bernard, Great Dane, mastiffs, bull terriers, retrievers, bulldogs, and mixed breeds.

Guard dogs can work alone, in a group, or with a human sentry to patrol a property. In order to learn their area of defense, dogs were discouraged to leave the boundaries of the property. After sleeping in the daylight hours, guard dogs would work from dusk until dawn by roaming along the edges of the area (Butler 1860; Richardson 1920). This practice may indeed have taken place at the armory as well.

Blacksmiths in general usually kept at least a dog or two around for work and guarding purposes (Washington Post 1894). A blacksmith would not want others to steal
his wares, especially if he was making guns for the army. Guard dogs could have been useful, however, not only for keeping people out, but also for keeping people in.

Anderson employed several prisoners of war in his armory, who would have needed to be prevented from escaping, especially with weapons. This is, however, not to say that Anderson’s dog would have only been active at night. One benefit to having multiple dogs is that they could have been used for multiple purposes, which would have been made more feasible by dogs taking different shifts. Blacksmiths sometimes kept dogs to operate the bellows by running on a treadmill. Dogs of this type could have had a history in Williamsburg, as seen by an 1894 article, which mentions three blacksmith shops utilizing this power source. The article describes one such shop, stating:

“Six dogs are in use there, only one or two working at a time. The dogs go about their work with cheerfulness and alacrity. They are big, heavy fellows of mongrel breed, with a remarkable development of muscle, caused by the vigorous exercise they get (Washington Post 1894).”

The dogs in employment at this shop demonstrate remarkable endurance and loyalty, never leaving the treadmill unless it is time for another to take its place, despite the fact that they are not tied to the treadmill or looked after in any way. Shift lengths vary with the number of dogs available to work, but in this instance were around an hour of the dog walking at a relatively fast walk. The dogs could have performed this type of work at the armory, although it is also possible that enslaved or free children in Anderson’s employment could have performed the same job. Dogs in general liked to hang about blacksmith’s shops because they are attracted to the odor of the hooves that are burnt for oil. Blacksmiths would sometimes give dogs hooves to chew on, which they did voraciously (The Washington Post 1908).
f. Dogs in Williamsburg

Although these burials were some of the first dogs found in Colonial Williamsburg, this does not mean that they were absent. From the Native Americans’ own dogs, which were used for hunting, guarding, as well as ritual purposes, to the spaniel and mastiff that were brought over on the first voyage to Jamestown, dogs were an essential part of any settlement (Derr 2004; Fitzgerald 2009). It is evident that the population of dogs in colonial America quickly grew from the few English brought over and Native American dogs. As for England, by the late 18th century there were one million dogs, so it is likely that almost everyone had a dog in the colonies as well (Derr 2004). Dogs were kept by the elite, who often used them for companionship or hunting, but also by lower class individuals and slaves, who primarily raised their dogs to help with hunting and protection. It is no wonder that people kept dogs in this time, as they were useful for multiple purposes, as noted above. In fact, there may have been even too many dogs in Williamsburg in the 18th century. Slaves were limited by law the number of dogs they could own, partially because of the fear of their masters that dogs would kill their livestock. Even students at the College of William and Mary were threatened not to take their dogs to school (Meacham 2011).

g. Anderson’s Armory

James Anderson owned a house and the public armoury on Lot 18 in Williamsburg from 1770 until his death in 1798. He bought the lot from William Holt for 600 pounds, and had previously bought part of Lot 19 in 1767. In 1776, he was declared the Public Armourer for Virginia, although he had been working as a blacksmith and public armourer for some time before this appointment. Unfortunately, little is
known about his life before his rise to prominence as a blacksmith in Williamsburg in the 1760s. When the capital was moved from Williamsburg to Richmond, Anderson also moved for a short period to work there until the war was over. The war took its toll on the finances of the government, and after two years without pay, Anderson quit his job as public armorer and moved back to Williamsburg, where he continued to work as a blacksmith. Anderson put many men to work, including apprentices, prisoners of war, enslaved individuals, free blacks, and indentured servants, totaling up to 50 people by the late 1770s. Historical evidence indicates that Anderson was responsible for these men in terms of food and housing, although it is unclear where they were living (Stephenson 1961).

It is possible that they stayed at the Anderson house on Lot 18 or elsewhere in Williamsburg, as records show for at least one year, Anderson paid rent for his workers at another property. Documentary and archaeological evidence place his forges along the western boundary of Lot 18, but added additional forges in 1779 and again in 1788 (Stephenson 1961). Some of the work he did as a blacksmith included shoeing horses, repairing wagons, repairing utensils, and making tools and irons for the gaol. Additionally, he was in charge of repairing all of the guns in the magazine during the Revolutionary War. Little is said about his services and products during the war, perhaps because he was being paid a standard fee by the government and had no need to write out each item individually. After his death, Anderson’s possessions were divided among his children, as he left no will, with his daughter Nancy Camp receiving the property in 1805. She renovated the smithy from a workspace into a more domestic space (Schupp 2002). Dogs are never mentioned in association with James Anderson. An inventory of his
belongings was compiled upon his death, with an enslaved man, but no dogs, listed among his possessions.

The 2011 excavations mark the third time that the area around the James Anderson house and armoury was the focus of an archaeological study. The first excavation was in 1932 with the intention of discovering building foundations. Excavations were completed in 1976 in order to verify the reconstruction and gain information about Anderson’s occupation of the site. A notable discovery was a dog skeleton, complete except for the cranium and mandible. It had evidence of osteoarthritis along the vertebral column and joints. Unfortunately, nothing is said about the location or any other features of this find, nor was it sent off with the rest of the faunal material for analysis (Foss 1977). Excavations in the year 2000 were Phase III data recovery and focused mainly in the south yard of the blacksmith shop. Archaeologists were attempting to discover the use of one of the workspaces. Archaeologists uncovered industrial remains, including large ceramic storage vessels, iron, tin, coal, clinker, and slag. The proportion of lead objects, such as waste, solder, and shot, were also high in armoury contexts (Schupp 2002).

In the most recent excavation, there were four dog burials containing six dogs found behind the armory along the border of Anderson’s lot and the lot that he later purchased (Figure 1). (Note: Dogs are referred to by context number for the specimen 10AR***, where 10AR is the site designation). The first grave contained dogs 10AR193, 10AR194, and 10AR195 (Figure 2). Unfortunately, a 20th century drain had disturbed this grave. The second burial, containing dog 10AR236 (Figure 3), was over a meter long and around a half meter deep and wide. The third grave holds 10AR622 and several
unusual artifacts, including a piece of coral, a cow femur with signs of carnivorous chewing, and a shaped stone (Figure 4). The cow femur was placed near the dog’s front limbs, suggesting a deliberate inclusion of grave goods. Additionally, coral was sometimes used as a medicine to treat worms, weak hearts, and coughs, indicating that the dog may have been sick at the time of its death (Lev 2006). On the other hand, it could simply be a decorative item that the owner felt could help memorialize the dog’s death. Dog 10AR644 is in the final grave (Figure 5) (A. Edwards 2/13, Personal Communication). The separate burials of most of the animals indicate that these were separate events instead of a mass culling of dogs.

In addition to the burials, there is another feature found on the site that may have relevance to this population of dogs. A large pit, presumed to be a sawpit, was found around 2.5 meters north of the last burial. This feature was estimated to be around 6 by 3.6 meters large and was partially excavated in the summer of 2012. In May 2013, three-quarters of the sawpit were excavated, which revealed some interesting zooarchaeological finds. Archaeologists uncovered three roosters, a duck, and a cat, all still articulated (Figure 6). The intact nature of these skeletons implies that these animals were not eaten. One cock spur appeared to be blunted and may have been sawn off for the purposes of attaching a cock spur. This evidence may point to cock fighting. An alternate hypothesis for the presence of these animals is that they were used for baiting the dogs to allow them to practice fighting without harming another fighting dog. Although this pit was probably not dug for the express purpose of fighting, it could have been co-opted for this reason.
Methods and Results

Measurements were taken from each dog after excavation according to Von Den Driesch (1976). Measurements from specimens 10AR622 and 10AR644 were taken, while the rest of the measurements were done by a volunteer at the Colonial Williamsburg Archaeology Lab. Measurements were only taken from one side of the skeleton. When choosing between right and left, the side was chosen based on the completeness of the bone. When possible I tried to keep within the chosen side of the mandible and feet. If I could not be sure that a measurement of a bone was accurate (e.g. due to a broken process), the measurement was not taken. Other measurements relating to cranial indexes come from Onar et al. (2012). (Note: Because 10AR644 was a juvenile with unfused bones, the epiphyses were glued onto the diaphysis for measuring purposes.)

a. Age

Age determination for all dogs was surmised from patterns of epiphyseal fusion, teeth eruption, and teeth wear. Only one dog (10AR644) had unfused epiphyseal plates, marking it at least under 18 months. The eruption of permanent dentition was complete, marking it at least five months old. All long bones had unfused epiphyses, yet the scapula was completely fused. Due to the aforementioned characteristics, the age of 10AR644 was estimated at around six months (Silver 1970). Because 10AR644 had not fully developed, however, some measurements may not be completely accurate. Although the form of the bone stays similar throughout growth, many proportions within the bones change through maturity. The skull, for example, becomes less brachycephalic as it reaches maturity in the dog as well as in other animals. Furthermore, many of the
equations used to derive characteristics, such as weight and height, were calculated with
adult bones. This is not to say that these measurements are completely inaccurate, but
rather only to caution the reader that there may be error introduced into the data set based
on incomplete development.

All other specimens’ epiphyses were completely fused, marking them as adults of
at least 18 months of age. In addition, because of their adult status, dental eruption
formulas could not be used to determine age (Silver 1970). Although teeth wear varies
between dogs and their diets, rough age estimates were attempted for each dog. Wear on
the incisors and canines was evaluated using illustration from Piérard (1967), while molar
wear was assessed from Horard-Herbin (2000). It must be noted, however, that the diet
of the dog varies more than that of herbivores and can cause different wear patterns.
Butler (1860) remarks that “a hard bone is very wearing to the teeth of a hungry animal.”
Incisor wear on 10AR193 showed the dog to be greater than 5.5 years, and the molar
wear indicated an age of four years or older. Specimen 10AR194 was missing a cranium,
and therefore could only be described as a mature adult, greater than 18 months.
Although 10AR195 was missing several teeth, wear on the incisors only indicated that it
was at least 2.5 years old, while molar wear estimated age as at least 15 months. Both
10AR236 and 10AR622 showed signs of extreme wear on the incisors and molars,
indicating that they were at least 4-5 years old if not older.

b. Sex

Sex was determined by two different tests. The first was the presence of a
bacculum, found only in the male. Specimens were judged to be male if this bone was
present. The absence of a bacculum, nevertheless, does not imply that the dog female.
The bone could simply be missing. Due to the intactness of the burials, however, absence of a bacculum is unlikely if it were a male dog. The other test used to determine sex was the Table Test done with the dog’s humerus (Ruscillo 2002). When the humerus is placed on its anteroventral plane, it will either rest or tip over onto its medial side. If the bone falls over, it is very likely a male, but if it stays at rest, the test is inconclusive (although less likely to be a male than if it falls over). When both of these factors are taken into consideration, a determination of sex can be made. Dogs 10AR194, 10AR236, and 10AR622 were judged to be male, while 10AR193, 10AR195, and 10AR644 were ascertained as females.

c. Shoulder Height

Shoulder height was calculated through measurement of the greatest length of the long bones and metapodials. Through formulas obtained from Harcourt 1974, it was possible to convert these measurements into a total height for the dogs. All dogs except 10AR195 fall into the “large” category according to Lupo and Janetski (in Bartelle et al. 2010). Table 1 shows the average lengths and standard deviations for shoulder height for each specimen.

<table>
<thead>
<tr>
<th></th>
<th>10AR236 (&gt;4.5 years)</th>
<th>10AR193 (&gt;5.5 years)</th>
<th>10AR194 (&gt;18 mo.)</th>
<th>10AR195 (&gt;2.5 years)</th>
<th>10AR622 (&gt;5.5 years)</th>
<th>10AR644 (6 mo.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Metapodials (cm)</td>
<td>62.643</td>
<td>63.249</td>
<td>48.602</td>
<td>33.268</td>
<td>54.092</td>
<td>51.408</td>
</tr>
<tr>
<td>Average Long Bones (cm)</td>
<td>66.325</td>
<td>63.275</td>
<td>53.410</td>
<td>32.287</td>
<td>56.447</td>
<td>49.306</td>
</tr>
<tr>
<td>Average Total (cm)</td>
<td>64.484</td>
<td>63.262</td>
<td>51.006</td>
<td>32.778</td>
<td>55.270</td>
<td>50.357</td>
</tr>
<tr>
<td>Standard Deviation (cm)</td>
<td>2.1963</td>
<td>0.8158</td>
<td>2.512</td>
<td>0.5815</td>
<td>1.3823</td>
<td>1.2241</td>
</tr>
</tbody>
</table>

Table 1 – Shoulder height as a function of metapodials and long bone length

d. Body Length

Body length was calculated with a formula from Yohe and Pavesic (2000). Dogs were classified as having a shorter, longer, or approximately equal body length when
compared with their shoulder height. Body lengths for 10AR193, 10AR194, and 10AR195 were not able to be calculated due to a missing innominate bone. 10AR236 had a calculated body length of 65.88 cm, which was slightly greater than its height. 10AR622 had a greater body length with a measurement of 57.44 cm. Finally, 10AR644 measured an estimated 42.24 cm in body length, less than its shoulder height.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Body Length (cm)</th>
<th>Comparison to Shoulder Height (SH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10AR236  (&gt;4.5 years)</td>
<td>65.8826</td>
<td>≥SH</td>
</tr>
<tr>
<td>10AR622  (&gt;5.5 years)</td>
<td>57.4414</td>
<td>&gt;SH</td>
</tr>
<tr>
<td>10AR644  (6 mo.)</td>
<td>42.2416</td>
<td>&lt;SH</td>
</tr>
</tbody>
</table>

Table 2 – Body Length as derived from innominate length

\(e. \text{ Mass}\)

The approximate mass for each dog was calculated from the circumference of the femur and the humerus (Onar 2005). When possible both the right and left bones were measured to reduce errors. The smallest dog was 10AR195, weighing 9.1 kg. 10AR236 and 10AR193 were the largest dogs, weighing 37.86 and 36.35 kg respectively. The other three dogs weighed almost in the middle of the range between these three. Specimen 10AR194 weighed 22.9 kg, 10AR622 was calculated to be 26.73 kg, and 10AR644 was measured at 21.39 kg.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Femur (right)</th>
<th>Femur (left)</th>
<th>Humerus (right)</th>
<th>Humerus (left)</th>
<th>Average (kg)</th>
<th>Average (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10AR236  (&gt;4.5 years)</td>
<td>41.099</td>
<td>38.469</td>
<td>35.713</td>
<td>36.175</td>
<td>37.864</td>
<td>83.477</td>
</tr>
<tr>
<td>10AR193  (&gt;5.5 years)</td>
<td>--</td>
<td>--</td>
<td>35.174</td>
<td>37.531</td>
<td>36.352</td>
<td>80.144</td>
</tr>
<tr>
<td>10AR194  (&gt;18 mo.)</td>
<td>20.128</td>
<td>--</td>
<td>--</td>
<td>25.668</td>
<td>22.898</td>
<td>50.482</td>
</tr>
<tr>
<td>10AR195  (&gt;2.5 years)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>9.102</td>
<td>9.102</td>
<td>20.067</td>
</tr>
<tr>
<td>10AR622  (&gt;5.5 years)</td>
<td>23.508</td>
<td>25.485</td>
<td>28.252</td>
<td>29.658</td>
<td>26.726</td>
<td>58.921</td>
</tr>
<tr>
<td>10AR644  (6 mo.)</td>
<td>18.095</td>
<td>17.944</td>
<td>24.641</td>
<td>24.879</td>
<td>21.390</td>
<td>47.157</td>
</tr>
</tbody>
</table>

Table 3 – Weight as a function of femur and humerus circumference

When the height and mass are compared against each other, the dogs fall into at least three distinct size groupings.
f. Cranium

Dog can be classified into three groups based on their skull types: brachycephalic, mesaticephalic, and dolichocephalic. Brachycephalic dogs have a larger skull width in proportion to their skull length, while dolichocephalic dogs’ skulls are much longer than they are wide. Mesaticephalic dogs’ skull fall in between the ranges of the other two types. Evans and Christensen (1979) note the average cranial indices for each type of canine:

<table>
<thead>
<tr>
<th></th>
<th>Brachycephalic</th>
<th>Mesaticephalic</th>
<th>Dolichocephalic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull Index</td>
<td>81</td>
<td>52</td>
<td>39</td>
</tr>
<tr>
<td>Cranial Index</td>
<td>57</td>
<td>56</td>
<td>48</td>
</tr>
<tr>
<td>Facial Index</td>
<td>215</td>
<td>111</td>
<td>81</td>
</tr>
</tbody>
</table>

Table 4 – Average values for indices indicating skull shapes

When comparing these values with the armory dogs, it is apparent that none of the dogs fall into the brachycephalic subtype, save perhaps 10AR194. Its skull, however, is fragmented, and only one index out of the above three was able to be calculated. The rest of the dogs vary between mesaticephalic and dolichocephalic, depending on which index is used.
g. Dating

Burial 1 contained the remains of dogs 10AR193, 194, and 195. Although very few artifacts were found in the grave, the presence of pearlware was able to date the grave at some time after 1775. Burial 2 contained dog 10AR236 and pearlware, dating it to the same time period. Additionally, it contained a clinker that likely originated from the armory period, which began in 1778. Burial 3 contained dog 10AR622, and while it contained several artifacts, none were temporally diagnostic. The last burial contained dog 10AR644, but no artifacts. It was, however, sealed by a context dating to the late 18th century, indicating the date before then.

h. Bite Strength

Fitz Barnard states that the measure of a fighting dog lay not in its sharpness of teeth, but in its strength of jaw. Although I was unable to directly measure the jaw strength by calculating the surface area of the muscle attachments, I was able to make comparisons between the individual dogs and other dog breeds. As stated earlier, all dogs except 10AR194 were classified as either mesaticephalic or dolichocephalic. 10AR194 was tentatively labeled brachiocephalic. Ellis et al. (2009) did a study on numerous dog breeds, comparing both size and cranial shape. They found that while body size is the greatest determining factor, in larger dogs, shorter faces produce higher bite forces. Smaller dogs’ bite forces are not as affected by cranial shape as the larger dogs are. In general medium to large brachycephalic dogs have almost twice the force at the molar than mesaticephalic and dolichocephalic dogs. Additionally, large brachicephalic dogs can have up to 5 times the jaw strength of their smaller counterparts. The larger sagittal crests in 10AR193 and 10AR236 could indicate larger facial muscles
and therefore a larger bite force than dogs 10AR194, 622, and 644, which are lacking a sagittal crest.

\textit{i. Pathology}

Although cause of death could not be determined, several pathologies were analyzed in the bones. 10AR193 was a very elderly dog, who had several pathologies associated with her (Figure 7). Extra-osseous growth on the right fifth metacarpal indicates that the bone had likely been fractured, but remodeling was interrupted by an infection in the bone. It is possible that this injury could have occurred from a fight, as fighting dogs tend to attack the face and legs, as opposed to normal dogs, which attack the shoulder and haunches (Sinclair, Merck, and Lockwood 2006). It may be equally as likely, though, that heavy smithing equipment might have fallen on the dog’s foot, fracturing it. In either situation, the bone shows signs of healing, which implies that the owner cared for, perhaps even after it was no longer able to care for itself. Small bony growths on the frontal and maxillary bones indicate repeated trauma to this area of the face. Additionally, complete fusion of several cranial sutures indicates the old age of this canine. The malar and frontal bones also show porotic hyperostosis, which indicates anemia, usually caused by malnutrition. Malnutrition, in turn, could be caused either by a poor diet or by parasites (often worms) that leech nutrients from their host. Records from a Williamsburg apothecary show that the Anderson family was prescribed vermifuge, indicating that they were suffering from parasites. Indeed, parasites were common in the 18\textsuperscript{th} century, especially intestinal roundworms, whipworm, hookworm, and tapeworm. Worms were spread through fecal material, which was often used as fertilizer for plants (Schupp 2012). Unusual growth on the postorbital process of the malar bones indicates
that this dog may have been victim to an ear infection at some time (L. Freeman, Personal Communication).

Both dogs 10AR622 and 236, which were both at least 4.5 years old, display growth on the distal end of the femur, the patella, and the proximal end of the tibia. Although the bones are missing the hallmark eburnation found on the articular surfaces of bones with osteoarthritis, the bones are likely in an early stage of arthritis, because of which the dogs may have had some discomfort while walking. The type of arthritis most closely resembles degenerative arthritis, which is formed through stress on the joints (Ortner 1985). Dog 10AR622 (Figure 8) has a bony growth on his malar bone below the eye socket that is likely the result of a small fracture that has healed. Additionally, it was found with a piece of shot measuring 5mm in diameter and weighing 0.7 grams embedded in the scapula. The bone showed signs of healing, indicating that this injury was not the cause of death and may have been the result of an accident. Another piece of shot the same size was also found with the skeleton; however, it was not associated with any of the bones. It is unclear in what situation the dog would have received this injury. Lead shot was manufactured at the armoury, so the injury could be the result of a misfire. Other circumstances that could have possibly led to this outcome could be a trespasser or a hunting accident. Lead buck shot was frequently used during the Revolutionary War by American troops (Sprouse 1988). The shot found on this dog, however, may be slightly smaller than the shot the military used, and instead fall into the categories of “goose drops” or “duck shot,” which were used in hunting the fowl of the respective name (George 1947). This may imply that the dog was occasionally taken on hunts with its owner. 10AR622 also showed unusual remodeling at the attachment points of the
interosseous ligament between the radius and ulna on both forelimbs. The interosseous ligament is designed to absorb impact and stabilize the forelimb. Long periods of stress on the forelimbs were the likely cause of this pathology.

j. 10AR113

Although only six complete burials were found and are included in this study, a seventh dog was also uncovered. This dog is very fragmentary and partial and therefore is not included as part of the population. I felt, however, that this skeleton and my findings from its analysis are worth a brief mention. The primary observation that I was able to make was about the age of the individual. P₁, P₂, and M₂ of the right mandible were all fully erupted permanent teeth, which usually happens around 5-7 months. The distal end of the femur and the proximal end of the ulna did not have fused epiphyses, which puts the final estimation of age as between five and eighteen months. Sex was unable to be determined. Measurements indicate that it was larger than 10AR195, yet around the same size or smaller than 10AR644.

Discussion

The intact nature of the skeletons indicates that they were buried fairly rapidly after death, since they were an intact unit before being sealed by the soil. There are no indications that these dogs were purposefully killed, as there are no knife or gunshot wounds apparent to the analyst. Additionally, the separate nature of the burials suggests that an interpretation of culling could not be accepted, as those animals are usually found in mass graves because it costs less energy for the owner. Because dogs were not readily sacrificed in 18th century America, the interpretation tends towards a more functional viewpoint. Inclusion of burial goods in 10AR622’s grave, however, may indicate that
there was some measure of a ritual component. The position of the skeletons (somewhat curled up and on their side) suggests that they were carefully place in the graves instead of haphazardly thrown in. Furthermore, the position of the graves along the fence line may imply a designated, special space in which these animals were buried.

According to documentary evidence, it is highly likely that the colonists continued the practice of dog fighting from their English roots. Virginia in particular tried to follow England in their views towards gaming (Findlay 1986). Evidence from the Virginia Gazette shows that cock fighting was publicly practiced in Williamsburg at least as late as 1773 (Ballendine 1773). Accounts of dogs in the Virginia Gazette, however, are limited to lost or stolen dogs and dogs for sale. If cock fighting was occurring in Williamsburg, then it is likely that other forms of animal baiting, including dog fighting were happening as well. There still remains, however, the fact that mentions of dog fighting before the 19th century in America are practically unheard of. Moreover, cockfights are only mentioned to happen at courthouses, inns, and taverns, not at blacksmith shops. This is not to say that they did not happen elsewhere; perhaps only formal fights were advertised or recorded in the newspaper. Later newspaper evidence does indicate that there was dog fighting in Williamsburg as early as the 19th century. In one account, there was reported an established area near Richmond Road for dog and cock fighting, as well as a racetrack. As the gentry were the main patrons of this establishment, it likely would have been utilized before the law against dog fighting was established in 1856. The article further reports that the racetrack was established as early as 1736. Although it is not explicitly stated that dog fighting occurred at this time,
evidence marshaled in this thesis suggests that there would be other gambling activities there, which may have included dog fighting (VA Gazette 1904).

The physical evidence is as inconclusive as the documentary evidence, providing incomplete findings as to dog fighting. On one hand, dogs are matched by weight and gender, so it would not matter how small or large they were as long as they had a similar opponent to fight. Writings on dog fighting, however, usually place a dog’s maximum weight as around 40 pounds (Homan 1999). The skull shape points away from several types of dogs used in large animal baiting, such as the bull dog and mastiff, which are brachycephalic, yet the pit bull terrier has a mesaticephalic head. Although several of the dogs’ teeth are worn, Fitz-Barnard (1976) states that only a strong jaw is necessary for a fighting dog, not necessarily razor sharp teeth or even teeth at all. 10AR193 has what appears to be a broken or fractured metacarpal that may have been infected, as evidenced by the large amount of bony growth. 10AR622 may have had a small fracture on its malar bone that was healed over. These injuries suggest some trauma to the animal, but not necessarily to the extent that one might expect in fighting dogs. Besides wounds to soft tissue, crushing injuries and broken bones are common wounds in fighting dogs (Sinclair, Merck, and Lockwood 2006). The age of the individual may not prove to be a deciding factor either. While a fighting dog is considered to be in its prime by four years, bull dog puppies as young as six months old will attack a bull to the death (Ritchie 1981). On the other hand, Sheridan noted that “the farmer [would bring] his aged bull-bitch, many years the faithful sentinel of his house and farm-yard… to prove at the bull-ring the staunchness of her breed” (Taplin 1803).
Another possibility for these animals is that they were involved in animal baiting instead of dog-on-dog fighting. In animal baiting, a dog is put into a pit with an animal of a different species, from as small an animal as a rat up to bears and lions. Obviously, there were no lions in Williamsburg at this time, but workers could have set small animals, such as rats, cats, roosters, or ducks, against dogs in the sawpit. These animals would not have had the strength to leave the crushing injuries often associated with dogs fighting, so the injuries may not present themselves on the bones. Animal baiting could occur as entertainment in itself, as the onlookers watched the animals chase and fight each other, or it could serve as a venue for training dogs for bigger fights. Dogs in training were often tied to a stake to prevent harming the bait animal, while still encouraging aggression, or to prevent the animal from hurting them, especially when training with other dogs. Additionally, although the size of the sawpit is acceptable for dog fighting (modern rules use square pits), it would probably have been too deep for the owners and dogs to get easily in and out of the pit. Unfortunately, this interpretation is confounded by the ways in which dog fighting owners dispose of their bait animals. It was considered beneficial to the dog to consume the bait animal after practice or a match. None of the animal remains from the sawpit showed marks of gnawing, meaning that the roosters and cat were not disposed of in this method (Fleig 1996).

The alternative hypothesis to dog fighting is that this dog population was used for guarding the armoury. Guard dogs have been ubiquitous in Western society from early times until today. Although certain breeds are suggested for guard dogs, mutts have certainly been utilized for the same tasks. The most common features mentioned in relation to guard dogs is that they are trained well and are large enough to ward off
intruders (Butler 1860). All dogs except 10AR195 fall into the weight category of large
dogs, suggesting that they would be suitable for this task. Undesirably, the occupation of
guard dogs leaves little to no evidence on the bone, so paleopathology would not provide
a reliable indicator. It is possible, however, that guard dogs could sustain injury from
their work (e.g. if an intruder were to attack them), which could have a similar
manifestation as dog fighting injuries. Furthermore, guard dogs come from a much
broader spectrum of breeds than do dogs for fighting, so one cannot tell simply by
looking at a guard dog what its use might be. It is possible that the guard dogs were also
used during the day to pump the bellows of the forge by running on a treadmill. If so,
these long periods of running could explain the remodeling found on the radius of
10AR622 and the degenerative arthritis found on the knee joints of 10AR236 and
10AR622 from continuing stress on the legs.

Therefore, this thesis supports the hypothesis that the population of dogs found at
the armory was used for guarding and blacksmithing operations rather than dog fighting
although it is possible that some middle ground between these two hypotheses is also
possible. The probability of dog fighting taking place at the armoury combined with the
lack of physical trauma provides very little support for this hypothesis. While there is not
overwhelming evidence in favor of guard dogs, the likelihood of guard dogs at the
armory is much higher than fighting dogs. Additionally, the idea that the dogs could
have had both duties is highly unlikely. Although the dogs may have indeed been used
for multiple purposes, these two tasks require specific behaviors that are almost mutually
exclusive. Moreover, the owner would likely not be willing to put his guard dogs at risk
in the fighting ring or vice versa.
Conclusions

This study set out to determine the purpose of the six dogs that were buried at Anderson’s armoury. The background in ethological and domestic theories provided a basis for the behavior of the dog, while the historical and social theories grounded the dogs in a cultural setting. The osteological analysis confirmed that the population of dogs buried was a diverse one, comprising of both males and females, large and small, and old and young dogs. Although documentary evidence indicates that dog fighting was occurring in Williamsburg by the early 19th century, evidence that it happened at the armory is scant. Additionally, the osteological examination provides inconsistent evidence as to whether these dogs were likely to be used in dog fighting. Small animal baiting seems to be a more likely interpretation than simple dog fighting. The most consistent interpretation with the remains is that these dogs were used in guarding and working the blacksmith’s shop.

The osteological analysis performed for each of the dogs essentially created a biological profile for each of them. A summary of relevant findings is listed below:

<table>
<thead>
<tr>
<th>Sex</th>
<th>10AR193</th>
<th>10AR194</th>
<th>10AR195</th>
<th>10AR236</th>
<th>10AR622</th>
<th>10AR644</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&gt;5.5 years</td>
<td>&gt;18 months</td>
<td>&gt;2.5 years</td>
<td>&gt;4.5 years</td>
<td>&gt;5.5 years</td>
<td>~6 months</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>63.26</td>
<td>51.00</td>
<td>32.78</td>
<td>64.48</td>
<td>55.27</td>
<td>50.36</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>36.35</td>
<td>22.90</td>
<td>9.10</td>
<td>37.86</td>
<td>26.73</td>
<td>21.39</td>
</tr>
<tr>
<td>Body Length (cm)</td>
<td>--</td>
<td>--</td>
<td>9.10</td>
<td>65.88</td>
<td>57.44</td>
<td>42.24</td>
</tr>
<tr>
<td>Skull Shape</td>
<td>Dolicho- /Mesati- cephalic</td>
<td>--</td>
<td>Brachy- /Mesati- cephalic</td>
<td>Dolicho- /Mesati- cephalic</td>
<td>Dolicho- /Mesati- cephalic</td>
<td>Dolicho- /Mesati- cephalic</td>
</tr>
</tbody>
</table>

Table 5: Summary of findings

When looking at the dogs as individuals, it is possible to assess the probability that any one of them could have been used in dog fighting or guarding. 10AR193 was quite large and would likely have been imposing to intruders. The sagittal crest for increased muscle
attachment for bite strength and the fractured metacarpal may indicate dog fighting, but her old age, teeth worn to the dentin, and elongated face speak against it. 10AR194 is missing his skull, so it is difficult to tell whether his skull shape would be suited for dog fighting, but his larger size would have been useful in guarding. 10AR195 may be the most likely candidate for fighting, as she was the only one below the suggested 40 pounds. She also exhibits the most brachycephalic head shape, which is essential for a strong biting force. 10AR236 is of similar size and shape to 10AR193, with a sagittal crest perhaps providing extra biting force. The lack of trauma to the skeleton, however, points away from a dog fighting hypothesis. 10AR622 would have had too dolichocephalic of a face to have a strong bite force, especially when combined with the lack of a sagittal crest. While not the largest of the dogs, he still could have been big enough to deter intruders. The last dog 10AR644 would have probably been too young to fight other dogs, as the peak age is around two years old. Combined with the elongated face shape without a sagittal crest and the lack of trauma, she does not fit the profile of a fighting dog.

Although this study endeavored to be a comprehensive exploration of dog fighting, guard dogs, and the archaeological materials, there were several limitations on this research. Much of the literature on dogs was not written until the 19th century, when dog breeding became popular. Thus, notes on breeds and training may not be contemporaneous to 18th century thought and practice. Additionally, there were no private records for James Anderson, and archaeological studies in the past focused more on the business side of Lot 18 than the domestic one. Therefore, it is difficult to know what Anderson personally would have done with his dogs. Furthermore, the original
proposal for this thesis included a DNA analysis of the dogs, but due to constraints in time and money, samples were unable to be sent for testing. For pathology assessments, I accorded diagnoses based on comparisons from human and animal paleopathology documents, but unclear pictures or descriptions from the books, similar symptoms for different diseases, and general observer error may have confounded the accuracy of the findings.

There are several options for future research on these burials that fell outside of the research focus or time constraints of this project. A DNA analysis could be completed for each individual, which could reveal relatedness between the individuals, similarity to breed types, and genetic diseases. Radiographs of each of the bones may reveal hidden pathology that was inside the bone or not obvious to the observer. Isotopic analysis may reveal the diet of the dogs or their origin (i.e. were they raised on the Anderson property or were they brought there from another location?). Additional cranial measurements and further statistical analysis may provide a more reliable means of categorizing the dogs into a breed-type or functional group. Furthermore, future excavations may uncover more burials that will provide additional data.

Despite the limitations of this research, I believe this study has provided a sound basis for the interpretation of these dog burials. I hope that others will be able to build off my research either in further interpretation of these dog burials or in future research of colonial dogfighting and dog burials.
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APPENDIX

Figure 1: Location of Burials and Sawpit at Anderson’s Armoury

Figure 1a: Locations of Burials 1 and 2

Figure 1b: Location of Burials 3 & 4 along with the saw pit
Figure 2: Burial 1, containing dogs 10AR193 (female, >5.5 years), 194 (male, >18 months), and 195 (female, >2.5 years), truncated by a 20th century storm drain.

Figure 3: Burial 2, containing dog 10AR236 (male, >4.5 years)
Figure 4: Burial 3, containing dog 10AR622 (male, >5.5 years), plus a piece of coral, a cow femur, and a shaped stone.

Figure 5: Burial 4, containing dog 10AR644 (female, 6 months)
Figure 6: Animal remains from sawpit

Figure 6a: Articulated rooster skeleton found in saw pit

Figure 6b: Articulate cat skeleton found in saw pit
Figure 6c: Blunted (possibly sawn?) cock spur on tarsometatarsus

Figure 7: Pathology of 10AR193

Figure 7a: Fractured and infected metacarpal 5 on 10AR193
Figure 7b: Porotic hyperostosis on zygomatic of 10AR193

Figure 8: Pathology of 10AR622

Figure 8a: Lead shot embedded in scapula of 10AR622
Figure 8b: Fractured and healed zygomatic of 10AR622

Figure 8c: Degenerative arthritis of the knee joint of 10AR622
Figure 8d: Remodeling of the interosseous ligament attachment of 10AR622