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Pleistocene Peccaries from Guy Wilson Cave, Sullivan County, Tennessee

A thesis

presented to

the faculty of the Department of Physics, Astronomy, and Geology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Masters of Science in Technology

by

April Season Nye

August 2007

Dr. Steven C. Wallace

Dr. Blaine W. Schubert

Dr. Martha Copp

Keywords: Pleistocene, Peccaries, *Platygonus compressus*, *Mylohyus*, Guy Wilson Cave

ABSTRACT

Pleistocene Peccaries from Guy Wilson Cave, Sullivan County, Tennessee

by

April Season Nye

Descriptive and taphonomic analyses of undescribed Pleistocene Tayassuidae from Guy Wilson Cave within the East Tennessee State University and McClung Museum collections revealed a MNI of 16 *Platygonus compressus* and 2 *Mylohyus* from left femora and isolated teeth, respectively. Linkage between upper dentition and species identification is suggested by comparing *Mylohyus fossilis* to *M. nasutus* from other Pleistocene-aged sites. Long-bone NISP and age profiles show a predominance of *Platygonus* adults. Tayassuidae upper canines, likely *Platygonus*, suggest sexual dimorphism. Long bones were analyzed for carnivore damage and utilization revealing light utilization similar to that caused by modern wolves. Long bone weathering is predominantly light and suggests limited exposure prior to burial. Results indicate the cave was likely used as a carnivore den, possibly from dire wolf, for a period of time. No stratigraphical excavation data were available for either collection; therefore, additional excavations are needed to confirm these findings.

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I would like to thank the Blumberg family and friend Kay Zuber for the Guy Wilson Cave donation to East Tennessee State University and providing this research opportunity; S.D. Dean and Sammy Taylor for taking the personal time to provide important historical accounts; the Frank H. McClung museum for allowing research of their Guy Wilson Cave collection; and especially to Dr. Paul Parmalee for elaborating on additional history of the cave and for lunch.

I would also like to thank ETSU for the Graduate Research Grant providing financial support for a radiocarbon date. Thanks to my advisors for their insight and patience. Lastly, thanks to my family for their support and sacrifices.

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CHAPTER 1

INTRODUCTION

The Pleistocene, more commonly known as the “Ice Age”, ranged from roughly 1.8 million to 10,000 years ago and was a period of climatic change that influenced the distribution of both fauna and flora. For example, large mammals typically associated with the Pleistocene such as mammoths, mastodons, saber-toothed cats, and a long list of other taxa went extinct near the end of the Pleistocene (Kurtén & Anderson, 1980; Martin & Wright, 1967). *Platygonus* and *Mylohyus*, members of the Family Tayassuidae or peccary family, were among the list of taxa affected by extinction during this time. While most of the large mammals of the Pleistocene do not have living relatives, three species of peccary currently exist in the Americas (Sowls, 1997) allowing for comparative studies to their fossil relatives.

A sample of the Pleistocene peccaries *Platygonus compressus* and *Mylohyus* sp. from Guy Wilson Cave provides an opportunity to take a closer look at these two genera in relation to the cave. Descriptive and taphonomic analyses coupled with post-cranial identification, MNI (minimal number of individuals), NISP (number of identified specimens), age profiles, carnivore damage and utilization, and weathering may provide answers of abundance and how the peccaries entered the cave, such as through herding behaviors or carnivore activities. In addition, the Tayassuidae canines allow for the examination of potential sexual dimorphism within the sample. Lastly, with the presence of *Mylohyus*, species identification through comparisons of upper dentition

may validate the presence of the debated *Mylohyus fossilis* or *M. nasutus* at Guy Wilson Cave if it is possible to separate the two species.

Differences Between Peccaries and Pigs

Simpson (1980) summarizes the similarity of peccaries to pigs by stating, “Peccaries resemble pigs and are often erroneously given that name, but they have been distinct from pigs for tens of millions of years; the true pigs have never lived in the Western Hemisphere except as introduced by European humans” (p. 230).

At first glance, it is easy to confuse a peccary with a pig or wild boar. All share similar snouts and tusks (canines). However, there are many differences between the families that are typically overlooked. For example, Peccaries have vertical upper canines, simple molars, a fused radius and ulna, reduced lateral digits, a dorsal musk (scent) gland, 38 teeth, and only 7 caudal vertebrae (Kurtén & Anderson, 1980; Sowls, 1997). Pigs, on the other hand, have upper canines that curve upward and out; 34 or 44 teeth; the ulna, radius, metacarpals, and metatarsals are not fused; no musk gland; and have between 20 and 30 caudal vertebrae (Sowls). Even the sound produced by a peccary is different from a pig’s squeal or snort. Finally, peccary (Tayassuidae) fossils have been discovered from as far back as the Lower Oligocene in North America, whereas, pigs (Suidae) are strictly Old World or European.

Peccaries

Living species

In order to gain a better picture of the past, fossils are typically compared to their nearest modern relative for insights on behavior. In this case, although limited, the

Pleistocene peccaries *Platygonus* and *Mylohyus* can be compared to the three modern peccaries' distribution and herding behavior. The collared peccary (*Tayassu tajacu*), also known as the javelina (Figure 1), is distributed from the southwestern United States through Central America into Gran Chaco of Argentina (Figure 2) and is adapted to a variety of climates and habitats (Sowls, 1997). In the United States, herds typically ranging from 2 to 50 individuals with an average from 7 to 8.5 in Arizona (Mayer & Brandt, 1982), prefer mesquite habitats where they can obtain prickly pear cacti, and have become common in residential areas (Ingmarsson, 1999). The white-lipped peccary (*Tayassu pecari*; Figure 3) is found thriving in hot humid jungles from southern Mexico to the Gran Chaco of Argentina (Figure 4) (Mayer & Wetzel, 1987) with one of the largest herd sizes of the modern species ranging from 5 to over 100 individuals with no average size estimated due to the large range of variation (Mayer & Brandt). The Chacoan peccary (*Catagonus wagneri*; Figure 5) originally described as a fossil specimen by Rusconi (1930), is geographically restricted to the Gran Chaco of Argentina, Paraguay, and Bolivia and resides in the semiarid thorn forest and steppe of that region (Figure 6) (Mayer & Wetzel, 1986). Due to its isolation, it was thought to be extinct until 1972 when Wetzel and his colleagues discovered a living population in the Chaco Boreal of Paraguay (Sowls). Unique in that it shares skull morphology and dentition with the extinct genus *Platygonus* (Figure 7), the Chacoan peccary has only two hind toes, meaning it lacks dew claws (also similar to *Platygonus* but unlike the other two living species – Guilday, Hamilton, & McCrady, 1971; Kurtén & Anderson, 1980; Mayer & Wetzel; Wetzel, 1977;). Herd size averaged 4.6 during observation in the

years of 1975-1977 (Mayer & Brandt). Further research on this isolated species may reveal a closer kinship to *Platygonus* than the other modern forms.



Figure 1. An Adult Collared Peccary. Photograph of an adult collared peccary taken by Wendi Shaver in 2005 at Big Bend National Park, Rio Grande Village Campground.



Figure 2. Distribution of the Collared Peccary. An illustration of the distribution of the in North, Central, and South America (adapted from Bodmer & Sowls, 1993).



Figure 3. An Adult White-lipped Peccary. Photograph of an adult female white-lipped peccary used with permission from Brent Huffman photographed in 2003 at the Parc Zoologique de Paris Paris, France.



Figure 4. Distribution of the White-lipped Peccary. An illustration of the distribution in Central and South America (adapted from March, 1993).



Figure 5. An Adult Chacoan Peccary. Photograph of an adult male Chacoan peccary used with permission from Brent Huffman, photographed in 2005 at the Saint Louis Zoo, Missouri, USA.



Figure 6. Distribution of the Chacoan Peccary. An illustration of the distribution in South America (adapted from Taber, 1993).

Platygonus Species

In all, there are four recognized *Platygonus* species ranging in land mammal ages from the Blancan and early Irvingtonian (*Platygonus pearcei* and *P. bicalcaratus*), to late Irvingtonian and early Rancholabrean (*P. vetus*), to middle and late Rancholabrean. *P. compressus*, the flat-headed peccary (Figure 7), was the last of its genus to go extinct near the end of the Pleistocene in North America (Kurtén & Anderson, 1980). The first *P. compressus* skull was discovered around 1804 in a Kentucky cave and was identified as peccary by Caspar Wistar in 1806 (Kurtén & Anderson). Peccary material found in Galena, IL was named by Le Conte (1848) as *Platygonus compressus* and formally described by Leidy (1853). *P. compressus* commonly occurs in North American Pleistocene faunas (encompasses up to 90% of some Appalachian faunas) and is interpreted as having a wide environmental climate tolerance based on its extensive range: New York to California, from the Wisconsin ice sheet to Mexico, to the tropical forest of South America (Figure 8; Guilday et al., 1971; Kurtén & Anderson; FAUNMAP Working Group, 1994). Pleistocene peccary (*Platygonus* and *Mylohyus*, Figure 7) remains are also common from caves in Tennessee with many sites lacking radiocarbon dating (Figure 9; Corgan & Breitburg, 1996). A wide environmental climate tolerance from the boreal forest of North America to the tropical forest of South America is interpreted for *Platygonus* from various Pleistocene-aged deposits (Figure 8; Guilday et al., 1971; Kurtén & Anderson; FAUNMAP Working Group), similar in distribution to modern peccaries (Sowls, 1997). Although *Tayassu* has not been found at sites with *Platygonus*, it has occupied some former *Platygonus* ranges. Environmental changes during the Pleistocene are thought

to have been more favorable for *Tayassu*. Guilday et al. suggest that these environmental changes affected the environmental niche of *Platygonus* and, when mixed with slow breeding, the overwhelming strain could have led to extinction.

Similar in overall size to a European wild boar, *P. compressus* has also been interpreted as having characteristics representative of a browser, including a small I² and missing I₃ with specialized hypsodont cheek teeth adapted for coarser vegetation (Guilday et al., 1971; Kurtén & Anderson, 1980). Being an open forest browser is also supported by the overall build of *Platygonus*. With a combination of elongated distal limb elements, short humerus, broad and erect thoracic vertebrae, and a large scapula, it is suggested that *Platygonus* was fleet of foot than the modern species (Guilday et al.).

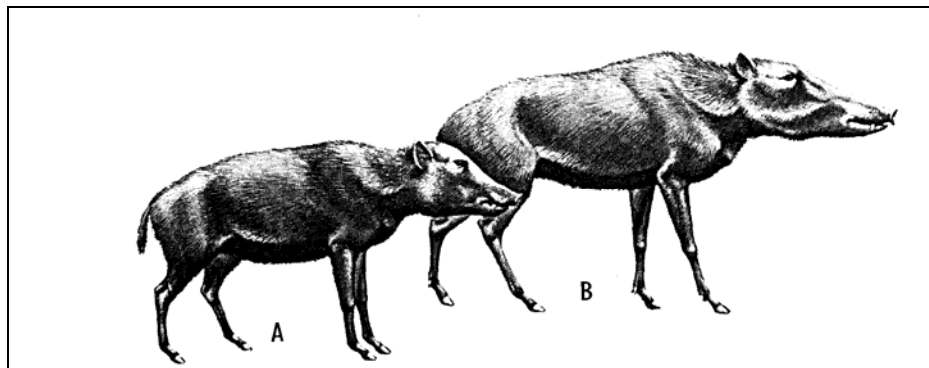


Figure 7. An Artistic Interpretation of Two Pleistocene Peccaries. (A) *Platygonus* and (B) *Mylohyus* adapted from SOWLS (1997) by Charles L. Ripper.

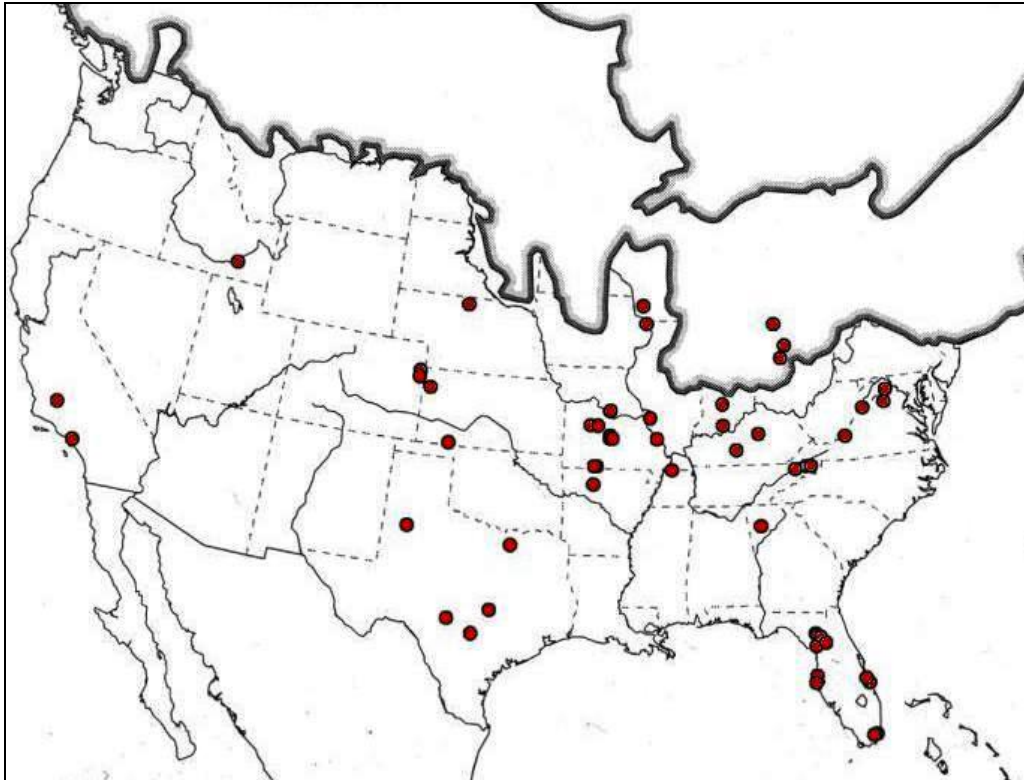
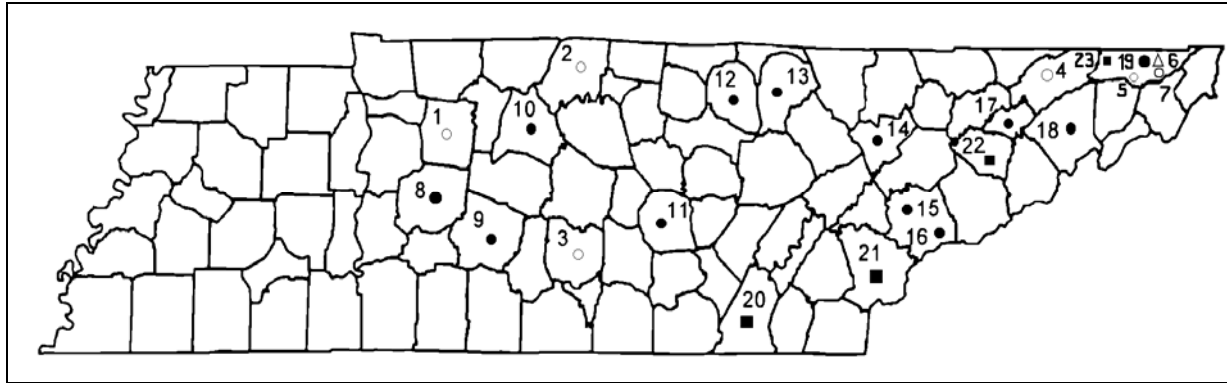


Figure 8. The Presumed Distribution of *Platygonus compressus*. Selected North American Pleistocene-aged sites representing *Platygonus compressus* during the Late Wisconsin (35,000 to 10,000 yr B.P. [radiocarbon years before present] adapted from FAUNMAP Working Group, 1994).



<i>Platygonus compressus</i> (○)	<i>Mylohyus nasutus</i> (●)	Peccaries not identified to genus (■)
1. Jewel Cave, Dickson County	8. Town Cave No. 2, Hickman County	20. Lookout Cave, Hamilton County
2. Cave of the Skulls, Sumner County	9. Cheek Bend Cave, Maury County	21. Kyles Quarry, Monroe County
3. Bishop Cave, Bedford County	10. First American, Davidson County	22. Zirkel's Cave, Jefferson County
4. Rogersville, Hawkins County	11. Cumberland Caverns, Warren County	23. Eastman Cave No. 2, Sullivan County
5. Baker Bluff Cave, Sullivan County	12. Peck Cave, Overton County	
6. (Δ) Guy Wilson Cave, Sullivan County	13. Wolf River Cave, Fentress County	
7. Morrell (Worley) Cave, Sullivan County	14. Vess Cave, Anderson County	
	15. Craig Quarry, Blount County	
	16. Finger Quarry, Blount County	
	17. Whitesburg, Hamblen County	
	18. Cedar Creek Cave, Greene County	
	19. Riverside Cave, Sullivan County	

Figure 9. Pleistocene-aged Peccary Sites in Tennessee Counties. Guy Wilson Cave is the only site that has both peccary species represented (map adapted from Corgan & Breitburg, 1996).

P. compressus is often found in various sized groups from cave deposits (Table 1) reflecting its potential herding and the use of caves as protection, although this could be representative of carnivore dens in some cases (Kurtén & Anderson, 1980).

Depending on the size and formation, a cave can retain a consistent temperature day

and night, while providing protection from the elements; an ideal shelter, particularly during extreme weather. In order to gain a better understanding of the behavioral patterns, including potential herding, of *Platygonus*, interpretations are made through observations of the modern species (Guilday et al., 1971). While modern peccary species vary in herd size from as little as 2 to 100 individuals (Sowls, 1997), it is likely that *Platygonus* may have also had varying herd numbers supported through fossil finds (Table 1).

Table 1.

*Pleistocene Cave Sites with Potential *Platygonus compressus* Herding Scenarios*

Site	Number Reported	Resource
Megenity Peccary Cave, IN	500	Indiana State Museum (2007)
Bat Cave, MO	98+	Hawksley et al. (1973)
Sheriden Pit, OH	36	Gobetz (1998)
Welsh Cave, KY	31	Guilday et al. (1971)
Guy Wilson Cave, TN	16	Guilday et al. (1978)
Columbus OH	12	Klippart (1873)
Goodland, KS	9	Williston (1894)
Hickman, KY	5	Finch et al. (1972)
Denver, CO	5	Lewis (1970)
Belding, MI	5	Wagner (1903)
Sandusky County, OH	4	Hoare et al. (1964)
Gaineville, NY	2	Clarke (1916)
Near Pittsford/, NY	2	Leidy (1889)

The last dated occurrence for *P. compressus* is debatable. Conventional ¹⁴C radiocarbon dating indicated that *P. compressus* lived to at least 11,900 +/- 750 yr B.P.

at a Wisconsinan-age site in northern Pennsylvania (Ray, Denny, & Rubin, 1970), 12,950 +/- 550 yr B.P. from Welsh Cave, Kentucky (Guilday et al., 1971), and 10,790 +/- 150 yr B.P. from a late Wisconsinan-aged find east of Ann Arbor, Michigan (Eshelman, Evenson, & Hibbard, 1972). Even with more advanced methods of radiocarbon dating like accelerator mass spectrometry (AMS; Stafford, Jull, Duhamel, & Donahue, 1987), a more precise terminal date for the species may not occur until a sufficient sample can be taken using this method, which may take years.

Mylohyus Species

Little is known about *Mylohyus* other than time ranges and physical characteristics. Descended from the Pliocene genus *Prosthenops*, *Mylohyus* (long-nosed peccary; Figure 7) first appears during the late Blancan (*Mylohyus floridanus*; Kinsey, 1974; known from Haile 8A, Santa Fe River IB, FL, is thought to be ancestral to *M. nasutus*; Kurtén & Anderson, 1980) and becomes extinct at the end of the Rancholabrean (*M. nasutus*). *Mylohyus* is a slightly less common Pleistocene species of peccary that is thought to have used caves differently than *P. compressus*. Though this species was just as widespread, it is considered to be a more solitary animal (Figure 7, 7) (Kurtén & Anderson).

There are many physical characteristics that distinguish *Mylohyus* from *Platygonus*, such as an elongated facial region, long slender legs, dew claws, and the morphology of its cheek teeth. Dentitions from both genera are easily distinguishable. In *Platygonus*, the premolars have a single pair of high cusps, while the molars have high transversely paired principal cones with the presence of deep transverse valleys. In

Mylohyus, the premolars and molars have low and rounded principal cones and intermediate subsidiary cones separating them (Brown, 1908). The build of *Mylohyus* is similar in size to a white-tailed deer (Kurtén & Anderson, 1980), but it is larger than *Platygonus* (Figure 7).

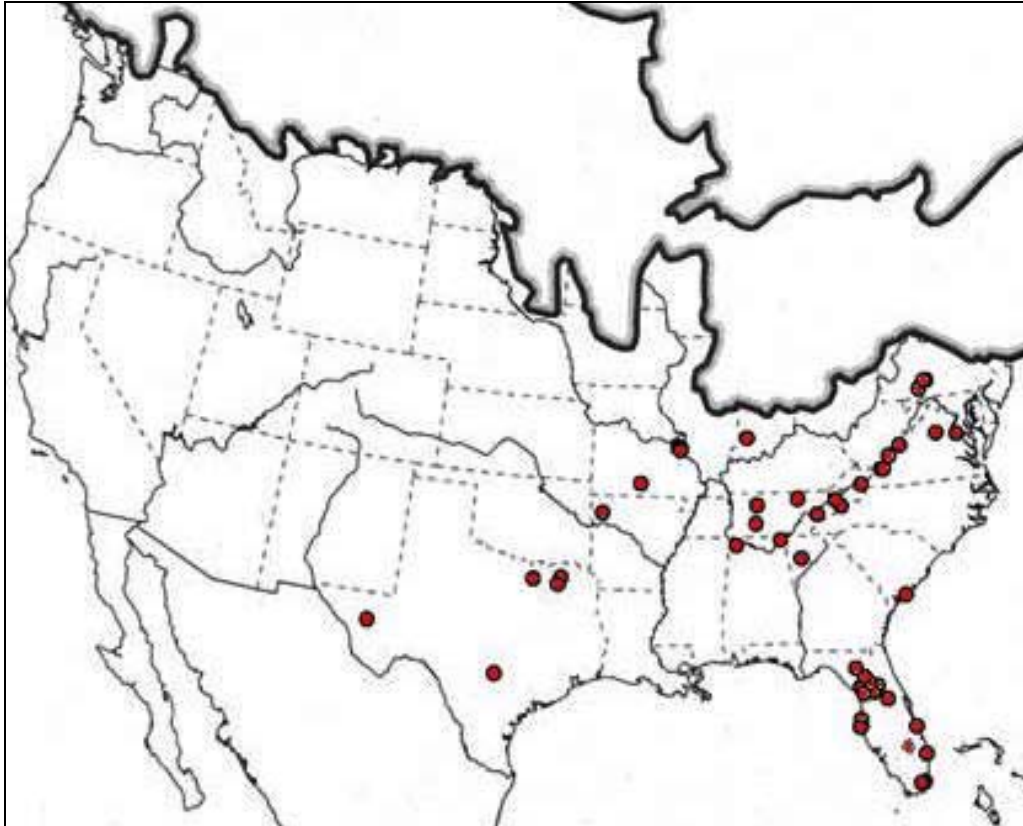


Figure 10. The Presumed Distribution of *Mylohyus*. Selected North American Pleistocene-aged sites representing *Mylohyus* during the Late Wisconsinan (35,000 to 10,000 yr B.P.; adapted from FAUNMAP, 1994).

Lundelius (1960) analyzed *Mylohyus* samples found in Texas and provided a detailed description of individual elements identified as *M. nasutus* Leidy (1869)

separating the species from *M. fossilis* Leidy (1859). Lundelius's views are in agreement with Leidy (1869) based primarily on the size of M^3 , m_3 , and lower canine, as well as locality, with the smaller *M. fossilis* found in the eastern United States and the larger *M. nasutus* found in the western half. Ray (1967) was the first to suggest that observed variations within *Mylohyus* could be a result of sexual, individual, geographic, and chronological variation. Due to the lack of evidence supporting the existence of an eastern *Mylohyus fossilis* Leidy (1859) and a western *M. nasutus* Leidy (1869), Ray grouped *Mylohyus* into one species (*M. nasutus*). Later, Westgate and Messick (1985) reanalyzed the genus when describing the Plummer Cave, MO sample and concluded that their sample contained a mixture of traits from both species with *M. fossilis* predominating. Westgate and Messick suggested that the combination could be an offset population of *M. fossilis* to that western area, or, that it could represent a single highly variable species. Wright (1995) analyzed the Leisey Shell Pit fauna of Hillsborough County, Florida and agrees with Ray in placing *Mylohyus* into a single species but uses *M. fossilis* Leidy (1859), noting the precedence over *M. nasutus* Leidy (1869). With the continuing debate, this analysis will refer to any Guy Wilson Cave material as *Mylohyus* sp.

Guy Wilson Cave

Importance of the Site

A recent donation of fossil material to ETSU from Guy Wilson Cave, Sullivan Co., TN has warranted a further study of the Pleistocene fossil assemblage. The donation consists of an unpublished fauna comprised almost entirely of *Platygonus compressus* cranial and post-cranial material and some *Mylohyus*. With the opportunity to closely

examine the Tayassuidae from the cave, questions of NISP, MNI, age, and potential carnivore damage and utilization may reveal answers of abundance and sexual dimorphism within this common, yet understudied Pleistocene species. Comparative analysis of the upper dentition of *Mylohyus fossilis* and *M. nasutus* may also provide insights on the status of the taxa and identification for the Guy Wilson Cave *Mylohyus* sp. Currently, the site has one conventional C¹⁴ radiocarbon date from Tayassuidae material and a recent accelerator mass spectrometry (AMS) radiocarbon date for the site's *Mylohyus* sp. within the ETMNH collection. Dating of the *Mylohyus* sp. has provided an important record of the taxon in eastern Tennessee. In addition, the presence of *Canis dirus*, *Ursus* sp., and other fauna (also found within the sample) may provide insights about interaction between the species.

History

During the late 1960s, S.D. Dean, a local vocational archeologist, discovered Pleistocene bones in Guy Wilson Cave and many other Pleistocene cave deposits in Sullivan County, TN. Dean sent photographs of peccary bones to the Carnegie Museum (Figures 11-13), which then conveyed to John Guilday for interpretation. Guilday sent his colleagues Harold Hamilton and Alan McCrady to sample the cave deposit with the assistance of Dean in 1969 (Figure 14) (S. D. Dean, personal communications, March 9, 2005; Schubert, 2005). The excavated material is currently curated at the Carnegie Museum of Natural History (CMNH). Then, in December 1972, Charles Coney further sampled the cave and added to the faunal list. Later, in March 1979 and sometime in 1981, Dean returned to Guy Wilson Cave collecting a small sample. In May and August

of 1988, two University of Tennessee students, Chris Hays and Rob Hoffman, took samples for water-screening, of which most of the material was returned to them. The remaining material is now curated at the Frank C. McClung Museum at the University of Tennessee, Knoxville, TN (Corgan & Breitburg, 1996; Guilday, Parmalee, & Hamilton, 1975; P. Parmalee, personal communications, December 29, 2005, January 3, 2006; Schubert, 2005) (Appendix A).



Figure 11. An Example of Peccary Material From Guy Wilson Cave. Photograph (provided by S. D. Dean) of an excavator holding a broken peccary canine during the initial excavation of Guy Wilson Cave's bone deposit from the 1960s.

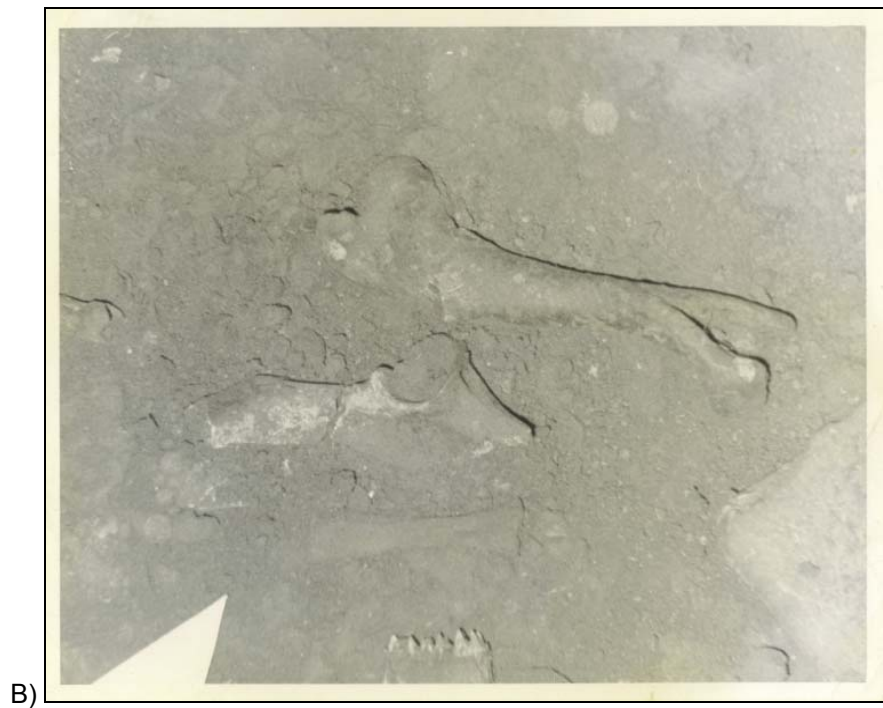
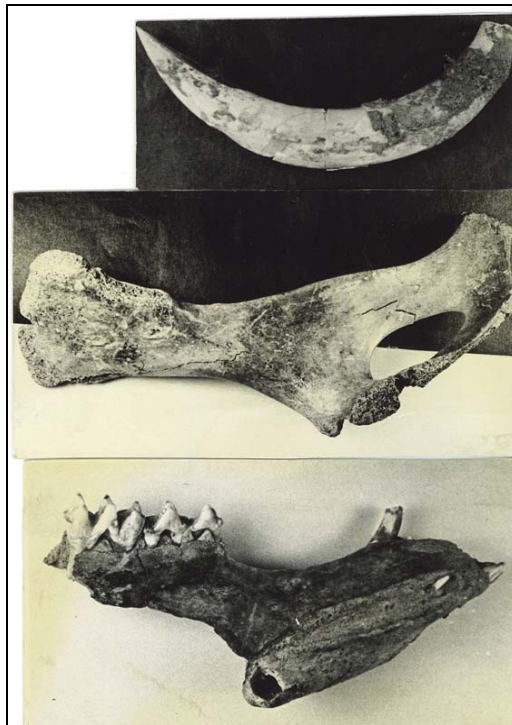


Figure 12. An Example of In Situ Peccary Bones From Guy Wilson Cave. Photographs (provided by S. D. Dean) of peccary bones during the discovery of Guy Wilson Cave's bone deposit from the 1960s; A) Colored photograph of various peccary elements; B) A black and white photograph of the same elements from a different angle.



A)



B)

Figure 13. Examples of Peccary Bones From Guy Wilson Cave. Photographs (provided by S. D. Dean) of peccary bones during the discovery of Guy Wilson Cave's bone deposit from the 1960s; A) Peccary postcranial elements *in situ*; B) A close-up photograph of recovered material.

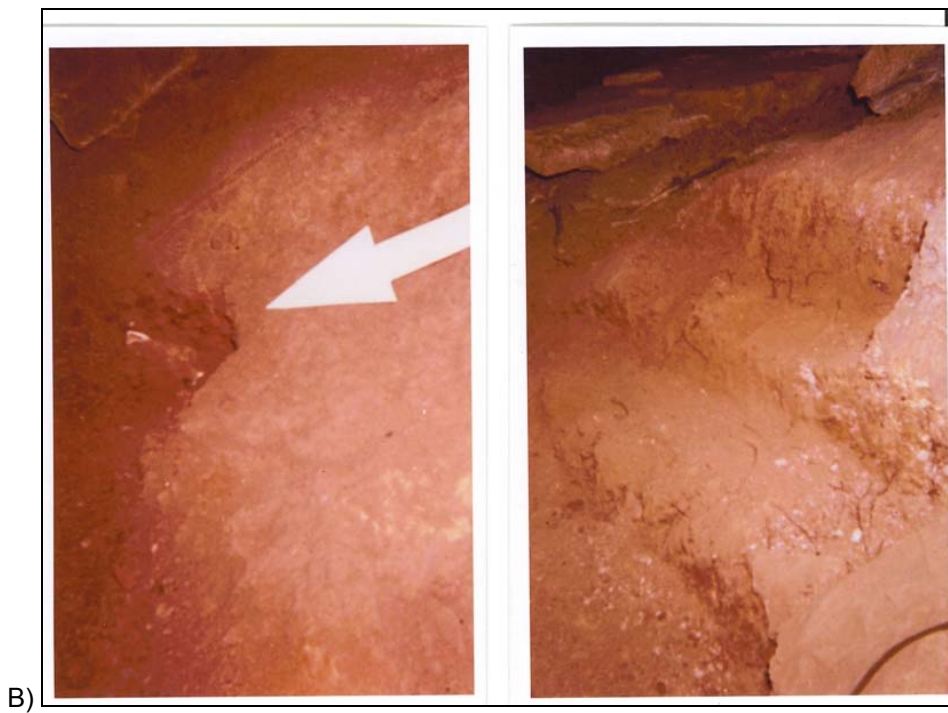
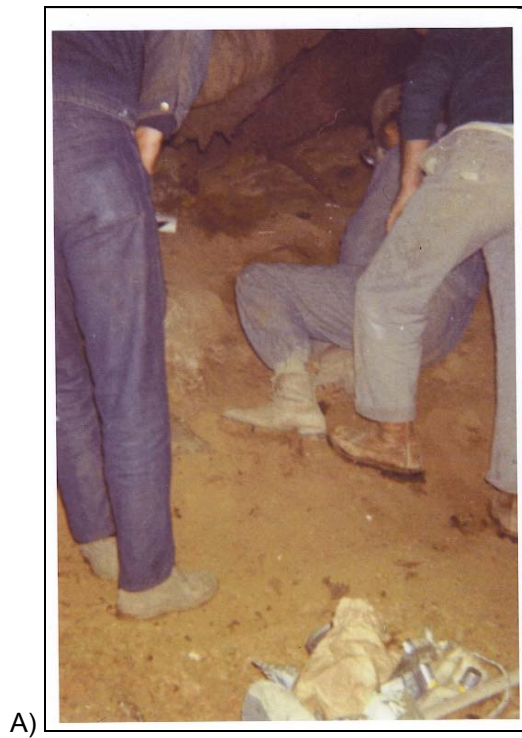


Figure 14. Photographs From Inside Guy Wilson Cave. Photographs of the Carnegie Museum's visit to Guy Wilson in 1969 provided by S. D. Dean; A) From left to right Larry Gardner, Alan McCrady, and Howard Hamilton excavating near the rear of the cave; B) Shows two areas inside Guy Wilson Cave in which samples were taken during the Carnegie Museum excavations.

The extensive fauna recovered during the initial excavations facilitated an interpretation of Guy Wilson Cave by the CMNH. The presence of three living species, northern bog lemming (*Synaptomys borealis*), heather vole (*Phenacomys*), and caribou (*Rangifer tarandus*) at Guy Wilson Cave has assisted in determination of the climatic conditions of the time. These extralimital species indicate a cooler climate than present, similar to Baker Bluff Cave of Sullivan Co., TN dated at 19,100 ± 850 yr B.P. and having similar represented faunal remains for this time frame (Guilday, Hamilton, Anderson, & Parmalee, 1978; Guilday, Parmalee, & Hamilton, 1975; Guilday, Parmalee, & Hamilton, 1977). During 1969-1970 with conventional ¹⁴C dating conducted from peccary bone collagen, a date of 19,700 ± 600 yr B.P. for Guy Wilson Cave was produced for the CMNH (Buckley & Willis, 1972). All known information about the cave has been based upon the CMNH sample until recently.

In November 2004, fossil material was donated by the Blumberg family to East Tennessee State University (ETSU). After being kept in numerous boxes and placed in a storage building for many years, the fossil material was found only after a property transaction. Following a hunch, the origin of the fossils was revealed as being from Guy Wilson Cave and excavated by Sammy Taylor and Ronnie Jones in the early 1970s (Schubert, 2005; B. Schubert, personal communications, December 2004; S. Taylor, personal communications, December 8, 2004). The material consists of various species of extinct fauna, though the collection is dominated by flat-headed peccaries.

CHAPTER 2

METHODS

Abbreviations

AMS: Accelerator Mass Spectrometry; cm: centimeters; Co.: County; ETMNH: East Tennessee Museum of Natural History; ETSU: East Tennessee State University; CMNH: Carnegie Museum of Natural History; GB: Greatest Breadth; GL: Greatest Length; GWC: Guy Wilson Cave; MM: Frank H. McClung Museum; mm: millimeters; N/A: Not Applicable; UND: Undetermined; yr B.P: radiocarbon years before present; *Numbers in superscript and subscript are reflective of upper and lower dentition. The symbol ~ indicates estimated values.

Analysis

This study focuses on the Tayassuidae excavated from Guy Wilson Cave currently housed at ETSU in the ETMNH collection and the MM. Both collections will be combined for all analyses. An additional sample is housed at the CMNH from early excavations, which could provide additional information in a future analysis; however, it is not included here. Currently, Guy Wilson Cave is not accessible for additional research or excavations.

Location

Located near Bluff City, Guy Wilson Cave (Figure 15) is nestled within a limestone outcrop and the entrance overlooks a floodplain of the Holston River. As is typical of this

part of eastern Tennessee, the cave is surrounded by eastern deciduous forest and karst topography (Hudson & Espenshade, 2000; TopoZone, 2006). It seems likely that the current entrance is at the “rear” of the cave based on the formation of speleothems near the entrance. Stratigraphy within the cave indicates transport from a narrow passage (currently impassable) that may connect to a sinkhole located near the top of the overlying ridge (S. D. Dean, personal communication, March 9, 2005), which allowed sediment and skeletal remains to flow inside over time.



Figure 15. The Current Entrance to Guy Wilson Cave. Picture taken in January of 2005.

Sample Preparation

The material donated to ETSU was originally preserved with hairspray (S. Taylor, personal communication, December 8, 2004). Despite using this unorthodox technique,

most of the remains are surprisingly stable and still preserve taphonomic information. However, further stabilization was required for long-term curation. Consequently, the hairspray was removed by placing individual specimens in an alcohol bath for a limited time until the thin coating became a slimy residue that could be easily removed. Specimens were then carefully brushed off, removing the residue and any remaining matrix. A current preservation techniques consisting of a limited bath in Butvar as then applied. [Butvar is a powdered resin (Polyvinyl butyral) that is dissolved in 91% isopropyl alcohol or acetone that is applied to fossil material. When allowed to dry, the alcohol or acetone evaporates, leaving the resin behind to preserve the specimen.] Once stable, the fossil elements were separated, identified to genera and element, and then cataloged (Figures 16, 17). Because the McClung Museum specimens were not individually cataloged at the time of this analysis, an arbitrary numbering system with the prefix MM (McClung Museum) was given to each element for measuring and taphonomic analysis. Also, with limited elements of *Mylohyus* to test within the sample for an AMS date, each tooth was carefully examined for a test area that would cause minimal damage. The root of ETMNH 1583 M¹ was chosen in order to preserve the occlusal surface (Figure 18).



Figure 16. Donated ETMNH Tayassuidae Post-cranial Material Photographed During Initial Processing.



B)

Figure 17. ETMNH Tayassuidae Post-cranial Material After Being Cataloged in the Collection.



Figure 18. ETMNH 1583 *Mylohyus* M¹ Showing Testing Area for AMS dating.

Descriptive Analysis

Identification. The Guy Wilson Cave Tayassuidae was first identified to genus by comparing dentition and selected post-cranial measurements to other known Pleistocene sites (Appendix C-F). Identification of *Mylohyus* dentition was based on descriptions from Brown (1908) and from the morphologic differences present in both *Platygonus* and *Mylohyus*. Ray (1967) made comparisons of *Mylohyus* from various Pleistocene-aged sites, but he did not conduct any statistical analyses. Westgate and Messick (1985) conducted statistical “t”- tests of the lower canine (antero-posterior length and lateral width), length of the left and right lower molar series, and M³ length applying the Mann-Whitney U-test to check the values. The analysis resulted in a mixture of characteristics of both *M. fossilis* and *M. nasutus* leading to an identification of the predominant *M. fossilis* within their analyses. With the species *M. fossilis* and *M. nasutus* in debate (Ray; Westgate & Messick; Wright, 1995) identification for *Mylohyus* is attempted by comparing length, anterior width, and posterior width of identified *M. fossilis* and *M. nasutus* dentition from various Pleistocene-aged sites (Table 2; Appendix D) in 3-D scatter-plots. Measurements of the teeth may indicate an actual separation of the two species (*M. fossilis* and *M. nasutus*), which may not have been previously noticed based on tooth measurements in this manner.

Table 2.

Key to Site Identification in Dentition Figures of Mylohyus

Site	Species	Shape	Citation	Collection Numbers
HFL: Haile 8A, FL	<i>Mylohyus fossilis</i>	●	Ray (1967)	UF 3279
IRFL: Itchtucknee River, FL	<i>Mylohyus fossilis</i>	○	Ray (1967)	UF 3567
PCMO: Plummer Cave, Douglas Co., MO	<i>Mylohyus fossilis</i>	+	Westgate & Messick (1985)	PC 183
FCTX: Friesenhahn Cave, Bexar Co., TX	<i>Mylohyus nasutus</i>	▲	Lundelius (1960)	TMM 933-3232
LGA: Ladds, Bartow Co., GA	<i>Mylohyus nasutus</i>	*	Ray (1967)	USNM 22326
SGP: Sandahl Gravel Pit, KS	<i>Mylohyus nasutus</i>	◆	Semken & Griggs (1965)	UMMP 44763
GWCTN: Guy Wilson Cave, Sullivan Co., TN	<i>Mylohyus</i> sp.	X	* Appendix C	ETMNH 1581, 1582, 1583

The post-cranial identification of elements is accomplished through comparisons of an unknown element to a known element (Klein & Cruz-Urbe, 1984) and by following Lundelius's (1960) descriptions of *Mylohyus nasutus*. An initial element size comparison of the Welsh Cave, KY *Platygonus compressus* (Guilday, Hamilton, & McCrady, 1971) and Friesenhahn Cave, TX *Mylohyus nasutus* (Lundelius) has resulted in the selection of humerus, femur, and tibia greatest length and greatest breadth (width) as differential base measurements for the genera. All measurements follow those for suids in von den Driesch (1976) with post-cranial measurements of both species being compared to

measurements taken from deposits of various Pleistocene ages (Table 3; Appendix E & F) in the United States to determine size ranges. All elements, including ribs and vertebrae, which cannot be clearly identified as Tayassuidae, are excluded from this analysis.

Table 3.

*Key to Site Identification in Post-cranial Figures of *Platygonus compressus*, *Mylohyus fossilis*, and *M. nasutus**

Site	Species	Shape	Citation	Collection Numbers
AAMI: Ann Arbor, Washenaw Co., MI	<i>Platygonus compressus</i>	◆	Eshelman, Everson, & Hibbard (1972)	Ann Arbor University of Michigan V60533, V60534, V60535
BMI: Belding, Ionia Co., MI	<i>Platygonus compressus</i>	■	Wagner (1903)	Belding MI, University of Michigan V7325
FCTX: Friesenhahn Cave, Bexar Co., TX	<i>Mylohyus nasutus</i>	▲	Lundelius (1960)	TMM 933-3232
GWCTN: Guy Wilson Cave, Sullivan Co., TN	<i>Platygonus compressus</i>	X	* See Appendix C	* See Appendix B
LGA: Ladds, Bartow Co., GA	<i>Mylohyus nasutus</i>	*	Ray (1967)	USNM 2326
LSPCKY: Lone Star Peccary Cave, Hart Co., KY	<i>Platygonus compressus</i>	○	Wilson, Guilday, & Branstetter (1975)	CM 24589
MPA: Mosherville, Bradford Co., PA	<i>Platygonus compressus</i>	△	Ray, et al. (1970)	Millerton/Moserville, Bradford Co, PA USNM 23706
PCMO: Plummer Cave, Douglas Co., MO	<i>Mylohyus fossilis</i>	+	Westgate & Messick (1985)	PC 183
SPOH: Sheriden Pit, Wyandot Co., OH	<i>Platygonus compressus</i>	◇	Gobetz (1998)	*See reference
WCKY: Welsh Cave, Woodford Co., KY	<i>Platygonus compressus</i>	□	Guilday, et al. (1971)	*Not available, see reference
WTOH: Washington Township, Sandusky Co., OH	<i>Platygonus compressus</i>	○	Hoare, Coash, Innis, & Thornton (1964)	Sandusky Bowling Green State University BGSU 2353

NISP. Once all elements were identified, the NISP (Number of Identified Specimens) (Grayson, 1979; Klein & Cruz-Urbe, 1984; Payne, 1975), which is considered to be the overall element count for a sample, was calculated. Because identifiable fragments are present in each separate collection (ETMNH and MM), they were included in the NISP. With the radius and ulna fused in Tayassuidae, these elements were considered as one unless the elements were isolated. In the case of isolation, such as an infant or juvenile, each element was considered as an individual element and indicated.

MNI. The MNI (Minimum Number of Individuals - White, 1953), or “the number of individuals necessary to account for all the identified bones” (Klein & Cruz-Urbe, 1984, p. 26), is usually smaller than or equal to the NISP with the two being used in combination for analysis. One technique used to calculate a MNI is to separate elements into lefts and rights and use the larger number as the MNI. Another way is to not separate sides, but to divide the total number of elements by two. Because fragmentary elements can affect the outcome of an MNI with overlapping of pieces, fragments are critical to address within an analysis. There are three customary ways to handle fragments: 1) ignore them; 2) consider them as whole bones; or 3) record them as fragments of whole bones. Each will either inflate or deflate the NISP count. Therefore, using both the NISP and MNI together provides a more accurate representation of the number of individuals (or total sample size) represented in a sample (Klein & Cruz-Urbe).

Two collections (ETMNH and MM) from non-repeating whole element sides (lefts and rights) and aided by age classes were combined for the MNI of the Tayassuidae. Moreover, fragments are labeled, but not included in MNI, similar to the NISP calculation. In the MNI calculation, the radius and ulna were considered as one element unless the elements were isolated. In the case of isolation, as in the NISP calculation, each element was considered as an individual element and indicated.

Age. Age estimates for fossils are typically determined through examining the teeth and epiphyses and can provide detailed information about a sample. For example, they may reveal possible collection biases present within a sample. In particular, teeth can be used to determine narrowly bounded age classes through eruption sequences and wear (Klein & Cruz-Uribe, 1984). In mammals, younger individuals do not have entirely fused epiphyses; consequently, age ranges may be established because proximal and distal epiphyses tend to fuse at different times (Grossman, 1938; Klein & Cruz-Uribe). Because juvenile bones are not entirely ossified, though, the proximal and distal ends are easily consumed by carnivores and removed by transportation agents (Lyman, 1994). Another bias to consider is one created by the excavator in which smaller bones are simply overlooked. Sample collection biases could have an important influence within age profiles for a sample. According to Klein and Cruz-Uribe, two theoretical models have resulted from the work of many others in age profiling and can be respectfully followed within a fossil sample age interpretation. The first model is when an older age class contains fewer individuals, typical in a modern mammal population. When applied to a fossil assemblage, this could be representative of a

catastrophic age profile from a sudden natural disaster or epidemic of the population. The second model is when reproductive (prime age) adults are underrepresented with the young and older age classes overrepresented. This could represent an attritional profile influenced by factors such as starvation, accidents, predation, and endemic disease to the ages more at risk. However, the two models may only provide a basis for interpretation depending on site context, associations, and size of the fossil sample. Here, a post-cranial age structure of adult, sub-adult, and juvenile for Tayassuidae will be based on the degree of ossification of epiphysis of post-cranial elements (Grossman; Klein & Cruz-Uribe; Lyman). Because the proximal and distal epiphyses fuse at different rates (Klein & Cruz-Uribe) that are currently unknown for peccaries, the age structures were categorized as: adult, having both epiphyses fused; sub-adult, having at least one epiphysis fused; and, juvenile, having no fused epiphyses. If the age could not be determined, then it was indicated as undetermined.

Sex. Sexual dimorphism is common among animals. Charles Darwin's theory of sexual selection is used to explain secondary sexual characters, like horns and or colors.

The sexual struggle is of two kinds: in the one it is between the individuals of the same sex, generally the males, in order to drive away or kill their rivals, the females remaining passive; while in the other, the struggle is likewise between the individuals of the same sex, in order to excite or charm those of the opposite sex, generally the females, which no longer remain passive, but select the more agreeable partners (Darwin, 1871).

Peccaries, like most animals, both past and present, developed dimorphic characters. With modern peccaries having limited sexually dimorphic canines, the assumption is that fossil Tayassuidae would also exhibit a similar degree of dimorphism (Wright, 1993). Guilday et al. (1971) state that because the primary defense and weapon in modern peccaries are the lower canines, then it is likely the same for *Platygonus*. Within the Welsh Cave Tayassuidae canine sample of 12 individuals, sex is unknown. One older specimen does have a much higher canine buttress than others. If this specimen is indeed male, than the rest of the sample could be female; unless reexamined with a larger sample, the conclusion reflects individual variation. Hawksley, Reynolds, and Foley (1973) analyzed the width and crown length of 66 upper and 65 lower canines within the Bat Cave, MO Tayassuidae that did not result in a bimodal distribution. Although the function of the zygomatic processes is only assumed in extinct tayassuids, there is a resemblance to African suids like the warthog in which the processes are to protect an individual's eyes while in combat with another (Wright; Darwin). When Wright examined various species of Tayassuidae (both extant and extinct), he encountered four situations in the degree of canine and zygomata dimorphism: 1) canines are strongly dimorphic with the zygomata narrow in both sexes; 2) canines are strongly dimorphic with zygomata having broad, winglike processes in both sexes; 3) canines and zygomata are strongly dimorphic; 4) canines are only weakly dimorphic with narrow zygomata in both sexes. *Platygonus compressus* fell between situation 3 and 4 having weakly dimorphic canines and narrow zygomata with some specimens having small processes (Wright), though, it appears that only the lower canines were

analyzed. Species such as *Mylohyus fossilis*, *Platygonus compressus*, *Pecari tajacu*, *Catagonus wagneri*, and *Tayassu pecari* tend to exhibit overlapping sex size modes with slightly dimorphic canines. Wright concludes that there is a correlation with the reduction in the degree of canine dimorphism and zygomatic process reduction (Wright) though dimorphism is present in some Tayassuidae (1995).

The upper and lower canines for Guy Wilson Cave Tayassuidae were measured to examine possible sexual dimorphism following Wright's (1993) correlations. The anteroposterior length and transverse breadth of each canine was taken at the gumline. Where required (due to concretion or damage), measurements were estimated to increase the sample. Both lefts and rights from the ETMNH and MM collections were combined to enhance the sample quantity. The transverse and anteroposterior measurements of all upper and lower canines were collected using a digital caliber in millimeters at the gumline. Estimations were only attempted if within .05mm to 1mm.

Taphonomic Analysis

Carnivore Damage and Utilization. An initial examination of the post-cranial material and the presence of a large carnivore coprolite (within the ETMNH collection) from Guy Wilson Cave indicated carnivore activity in the cave. A taphonomic study (the science of the laws of embedding or burial; Efremov, 1940) was conducted on the Tayassuidae post-cranial elements to determine the relationship of these taxa with carnivore species. Haynes has done intensive taphonomic research of carnivore damage and utilization patterns among modern wolf, hyena, and bear on deer, bison, caribou, and moose, providing detailed descriptions and utilization stages of various

elements (Haynes, 1980, 1982, 1983). Through his research, and that of others, comes the revealing factor of carnivores utilizing prey in predictable patterns with distinguishable markings (Haynes 1980, 1983).

In order to determine carnivore damage, careful comparative examination must take place. Wolves, for example, will leave gnaw damage like furrows, grooves produced by cheek teeth ranging from 2-4 cm long and 4mm wide, and transverse to the long axis, splintered ends, short nicks, single grooves, and damage resembling a chopping action (Figure 19, Haynes, 1980). Bears, on the other hand, will tend to grind down, crush, plane, or shear cancellous bone with their broad cheek teeth leaving a mashed look in some cases. Additionally, bear teeth may also leave short parallel score lines resembling that of rodent gnaw damage (Haynes, 1983).



Figure 19. An Example of Modern Wolf Teeth Imprints on the Larger Trochlear Rim of a Bison's Femur. Image adapted from Haynes (1983).

In general, tooth impressions and grooves are made when bone lamellae are broken and deformed under pressure. Sharp carnivore teeth, typically from young individuals, can produce multiple cut-like markings on bone. Adult teeth markings differ by producing uneven edges and incomplete bone slicing due to their blunt or larger cusps. Gnaw damage on bone is more obvious at the ends near epiphyses where cheek teeth can grind or shear off cancellous or thin compact bone (Figures 20, 21) (Haynes, 1983). Haynes (1980) cautions that the overall modification of the element may need to be analyzed when identifiable tooth marks are not produced. With the ability to link modern carnivore damage on bone to the source, some taphonomists suggest, this may also be applied to fossils (Buskirk & Gibson 1978; Haynes 1980, 1981, 1982; Magoun, 1976). “The existence of certain carnivores in the past might be concretely reflected by gnaw damage to prey bones, even in fossil assemblages that lack remains of predators and scavengers” (Figure 22) (Haynes, 1983, p.164).

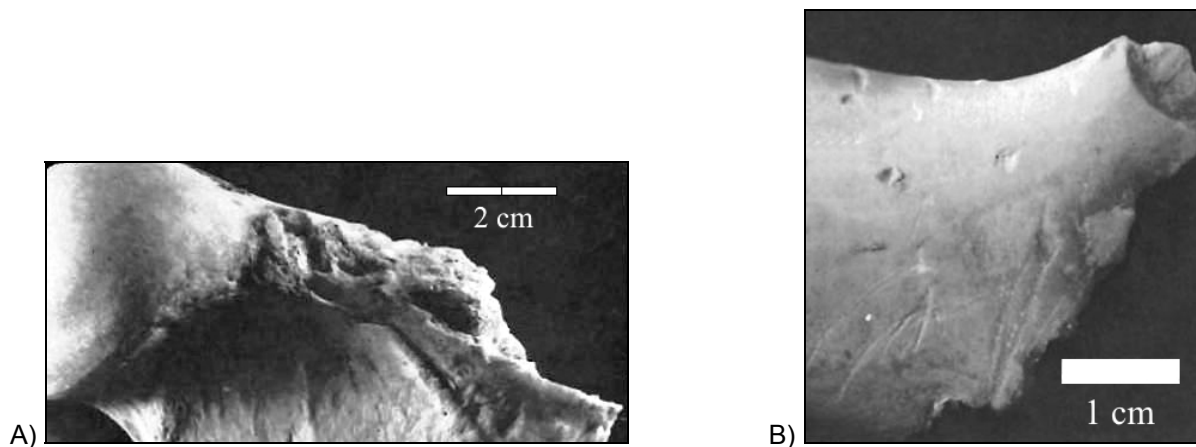


Figure 20. Examples of Modern Wolf Damage to Bison Elements. A), the proximal end of a bison femur having the greater trochanter removed. B), scratches and pits on a humerus shaft adapted from Haynes (1983).

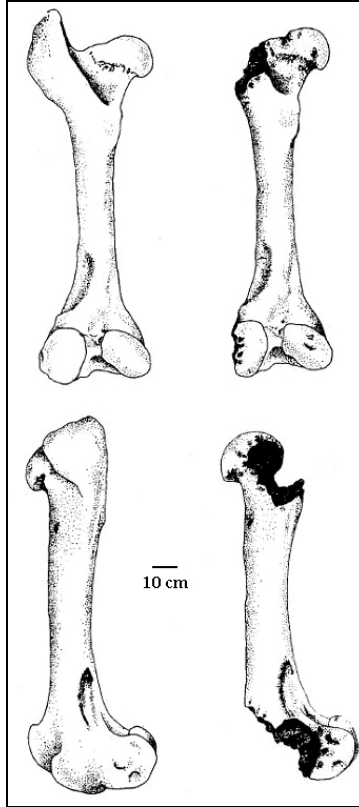


Figure 21. An Example of Typical Modern Wolf and Bear Damage to a Bison Femur in Comparison to One Undamaged in Posterior and Lateral Views. Image adapted from Haynes (1982).

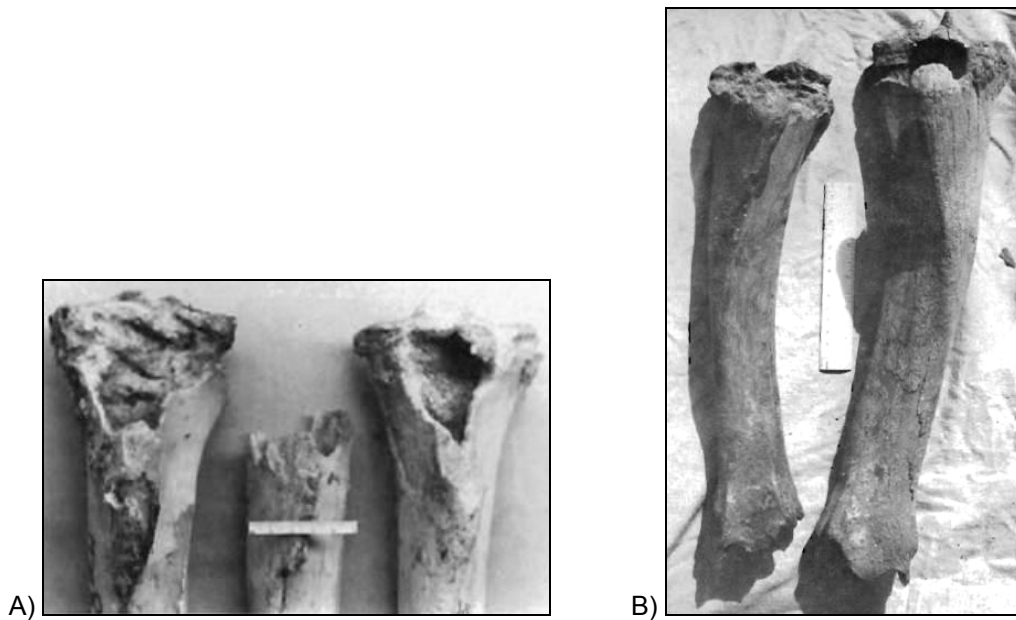


Figure 22. Examples of Carnivore Damage to Tibiae. A) modern wolf damage to moose tibia (scale 5.2 cm); B) similar damage visible on a Pleistocene bison (scale 15.2 cm) adapted from Haynes (1980).

According to Emslie and Morgan (1995), if Guy Wilson Cave is a carnivore den, then it should fall within the following specific characteristics and reflect the carnivores' role: 1) the number of bone splinters will be inversely correlated with the number of articular ends as most of these ends are destroyed by gnawing; 2) bones will be marked by pitting, furrowing, channeling, and other damage caused by gnawing that does not occur at kill sites (see also Haynes, 1980); 3) only large splinters, > 4cm long, will show characteristics of gnawing while small splinters may show evidence of acid etching from stomach acids; 4) many breaks will occur at protrusions of thin ridges on bone resulting in long splinters with triangular cross-sections such as the tibial crest; gnaw patterns may vary with specific skeletal elements (Binford, 1981). An extreme example of a site with these characteristics is that of Cutler Hammock, Dade Co. FL, interpreted as a carnivore den (Emslie & Morgan). The fauna has an extensive list (Hulbert, 1992) representing the largest number of dire wolf, Florida cave bear, and the long-nosed peccary (75 adults and 24 juveniles) in North America from one location (Emslie & Morgan).

In order to assess potential carnivore modification and utilization with a higher durability and predominate appearance, the long bones (humeri, radii, ulnae, femora, and tibiae) were examined. Classification followed and is adapted to that of Haynes (1980,1982,1983), which provide descriptions of damage (Table 4) and utilization stages (Table 5) by modern wolf and bear to bison, deer, and additional bovids. Utilization stages are set as: none (not visible), light, light to moderate, moderate to full, full, and heavy. The light stage contains elements with damage, though less than

Haynes's light to moderate stage. With Haynes's utilization descriptions for ulnae and radii being limited, carnivore and utilization characteristics were noted on a conservative basis using the other long bones as a guide. When applicable, evidence of predation was noted for each element with its possible source and a percentage was calculated for the overall element count. If the element had damage from sources that could not be determined, then it was indicated as undetermined. If the element does not have visible damage, then it was indicated as none.

Table 4.

Descriptions of Bone Damage by Modern Wolf and Bear

Carnivore	Species	Element	Damage
Wolf	Deer	Skull / Mandible	The anterior of the premaxilla may be removed. The nasal may have tooth scratches present. The mandibular rami may have shallow tooth furrows on the medial surfaces.
		Scapula	Typical damage consists of splintering or fracturing of blades near distal end with possible round tooth marks with associated concentric ring cracks. The coracoid process may be splintered.
		Humerus	When the proximal epiphysis is removed, the shaft may have broken edges that are toothed, crenellated, or smooth in outline.
		Radius	Heavy damage would indicate scavenging with epiphyses removed, low luster gnawed edges with indication of an outline. Tooth furrowing and scoring near edges.
Bear	Bison, Moose	Femur	Unusual for heavy gnawing to take place after tissue is removed. The broad cheek teeth grind down and crush off cancellous bone. Furrows or score marks may be present across cancellous bone.
	Other Bovids		(Light damage): Cheek teeth grind off most of the greater trochanter and larger trochlear rim. (Moderate to Heavy damage): The stump of the greater trochanter is flattened with the exposed cancellous bone possibly gouged out. The trochlear rims appear to have been crushed or ground off between teeth. Tooth marks may not be present on shaft. If present on compact bone, appear as short, wide sets of parallel scrapes or as shallow, roughly circular pits.
		Tibia	Only inflict full range of damage when food is in short supply. Typical gnaw damage has rounded edges and grinding with crushed compact bone with the exposed cancellous bone looking mashed. A tooth cusp impression, a single flat-bottomed hole, may be present on the distal end. Short scratches may be present on the shaft from cheek teeth.

Note. Bone damage results from modern wolf to deer and bear to modern bovid adapted from Haynes (1980, 1982, 1983).

Table 5.

Descriptions of Bone Utilization by Modern Wolf

Element	Utilization		
	Light to moderate	Full	Heavy
Skull	No damage to bones.	Nasal bones tooth-scratched.	Nasal bones are ragged at ends. Anterior premaxillaries may be broken.
Mandible	Remain articulated.	One hyoid remains.	Medial surfaces of mandibular rami may have shallow furrows from teeth. Disarticulation may occur.
Humerus	Greater tuberosities are removed or furrowed.	All tuberosities are gone with tooth scoring on shaft.	Proximal end and about 1/3 of proximal shaft is gone. The condyles are gnawed in scavenging.
Radius	Damage is variable on degree of carcass utilization.	Damage is variable on degree of carcass utilization.	If present, heavy damage would indicate scavenging with epiphyses removed, low luster gnawed edges with indication of an outline. Tooth furrowing and scoring near edges.
Scapula	Vertebral end may be ragged.	Bone edges splintered and jagged.	Splintering or fracturing of blades near distal end with possible round tooth marks with associated concentric ring cracks. Coracoid process may be splintered.
Femur	The greater trochanter destroyed by gnawing with grooving of the trochlear rims.	Similar damage as previous with gouging of distal condyles, and increased overall damage.	Femoral head may be removed with trochlear area gouged out. Distal end removed.
Tibia	Lateral proximal end grooved removed with some furrowing or gouging.	Porous bone of the crest exposed or bone removed. Medial edges furrowed.	Proximal end removed. Most edges have sharp fractures with some rounding. Shaft may be broken.
Innominate	Edges of illium and ischum gnawed.	Edges of illium and ischum heavily gnawed leaving ragged edges with possible tooth-punch marks visible.	Only the acetabulum and surrounding denser bone may survive.

Note. The bone utilization table is based on wolf predation of kill and non-kill adult bison adapted from Haynes (1980; 1981; 1982).

Weathering. The weathering stage of a bone may reveal important taphonomic information such as surface exposure prior to burial and bone accumulation time, when distinguished from transport abrasion and diagenetic effects. A single weathering stage present throughout an assemblage could represent catastrophic death or localized conditions impeding weathering during accumulation. An assemblage with all weathering stages represented could indicate a long-term accumulation over time or a variable micro-environment (Behrensmeyer, 1978). An extensive weathering stage categorization based on observations of modern bones in Amboseli Park Kenya has been created to provide a basis for descriptive comparison with modern and fossil bones (Behrensmeyer).

Behrensmeyer's (1978) guidelines that are used for each fossil examined are, 1) the most advanced stage covers a surface area more than 1cm²; 2) preferably, the use of limb bone shafts and flat surfaces are used, not bone edges where physical damage is more likely; 3) the stage must have unanimous decision among all observers. To determine the degree of weathering on the Guy Wilson Cave Tayassuidae, all post-cranial elements are classified following Behrensmeyer's weathering stage categorization (Table 6 and Figure 23) with intermediate stages added and guidelines from her work in Amboseli Park, Kenya. Intermediate weathering categories were applied between the Behrensmeyer stages to provide a more detailed analysis of condition.

Table 6.

Descriptions of Bone Weathering Stages

Stage	Description
0	Bone surface shows no sign of cracking or flaking.
1	Bone is cracked parallel to fiber structure (longitudinal in long bones). Articular surface has mosaic cracking.
2	Outermost thin bone layers have flaking with cracks having angular edges. An initial sign of this stage is long thin flakes with one or more sides attached to the bone with more extensive flaking to follow.
3	Bone has a fibrous texture from patches of rough, homogeneously weathered compact bone where all the external concentrically layered bone is removed. Evidence is at the surface, no deeper than 1.0-1.5mm with bone fibers still attached. Visible cracked edging is rounded in cross-section.
4	Bone surface has coarsely fibrous and rough texture with large and small splinters that may detach when moved. Weathering is present on inner cavities. Open cracks have splintered or rounded edges.
5	Bone is unstable, disintegrating <i>in situ</i> with large fragments lying along the exterior surface. Bone shape is may not be easily recognizable with cancellous bone exposed, which may endure more than harder compact bone.

Note. Weathering descriptions adapted from Behrensmeyer (1978).

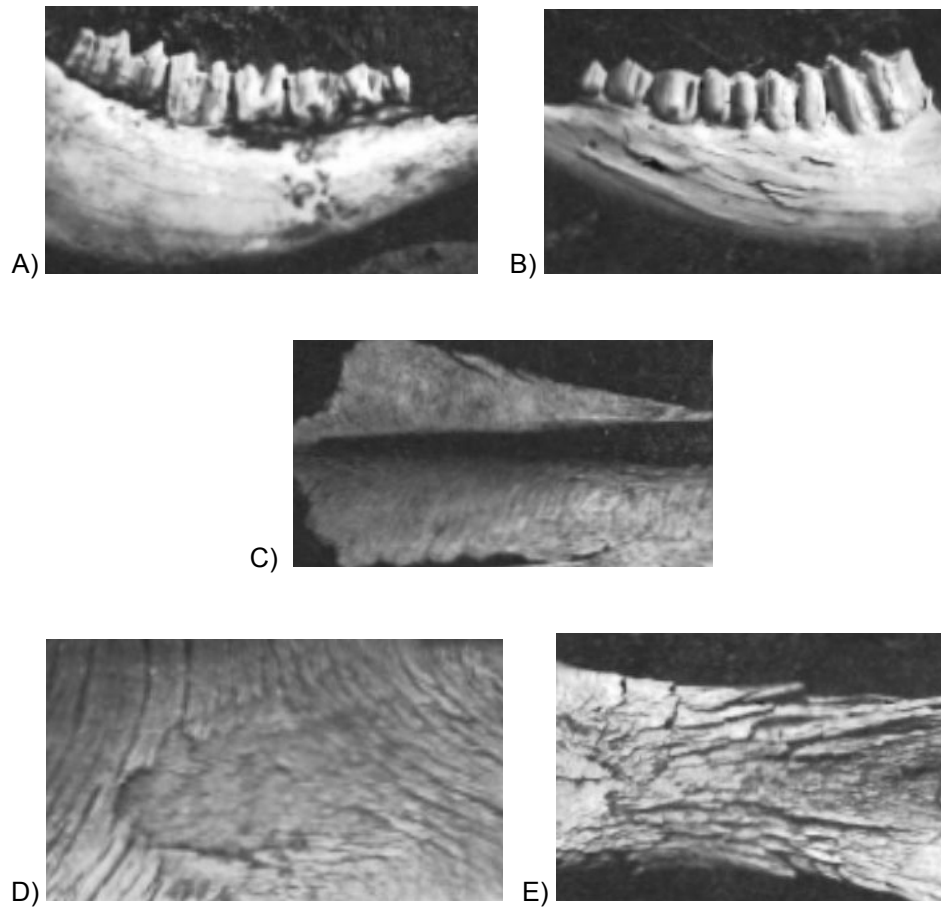


Figure 23. Examples of Each Stage of Bone Weathering. Images adapted from Behrensmeyer (1978); A) Stage 1: visible parallel cracking to bone fiber structure of a mandible. B) Stage 2: visible flaking of outer bone layers of same mandible, opposite side. C) Stage 3: visible fibrous, rough texture, and remnants of surface bone of a scapula. D) Stage 4: visible deep cracking, coarse texture, and layered fiber structure of a scapula. E) Stage 5: visible deep cracking and splitting in final stage to a scapula.

CHAPTER 3

RESULTS

Descriptive Analysis

Identification

Platygonus compressus is represented by three mostly complete skulls (two in the ETMNH collection [e.g., Figure 24] and one in the MM collection), many associated and isolated teeth and an extensive collection of post-cranial remains. *Mylohyus* sp. is represented by a left P²-M² series (ETMNH 1581), an isolated left P⁴ (ETMNH 1582), and an isolated right M¹ (ETMNH 1583; Figure 25). The *Mylohyus* teeth measurements were plotted against *M. fossilis* and *M. nasutus* from various Pleistocene-aged sites (Figures 26-29). Long bone (humeri, femora, and tibiae) measurements from the cave sample are used in post-cranial identification to separate the genera (Figures 30-32).



Figure 24. ETMNH 1561 *Platygonus compressus* Skull. Scale bar = 10 cm.

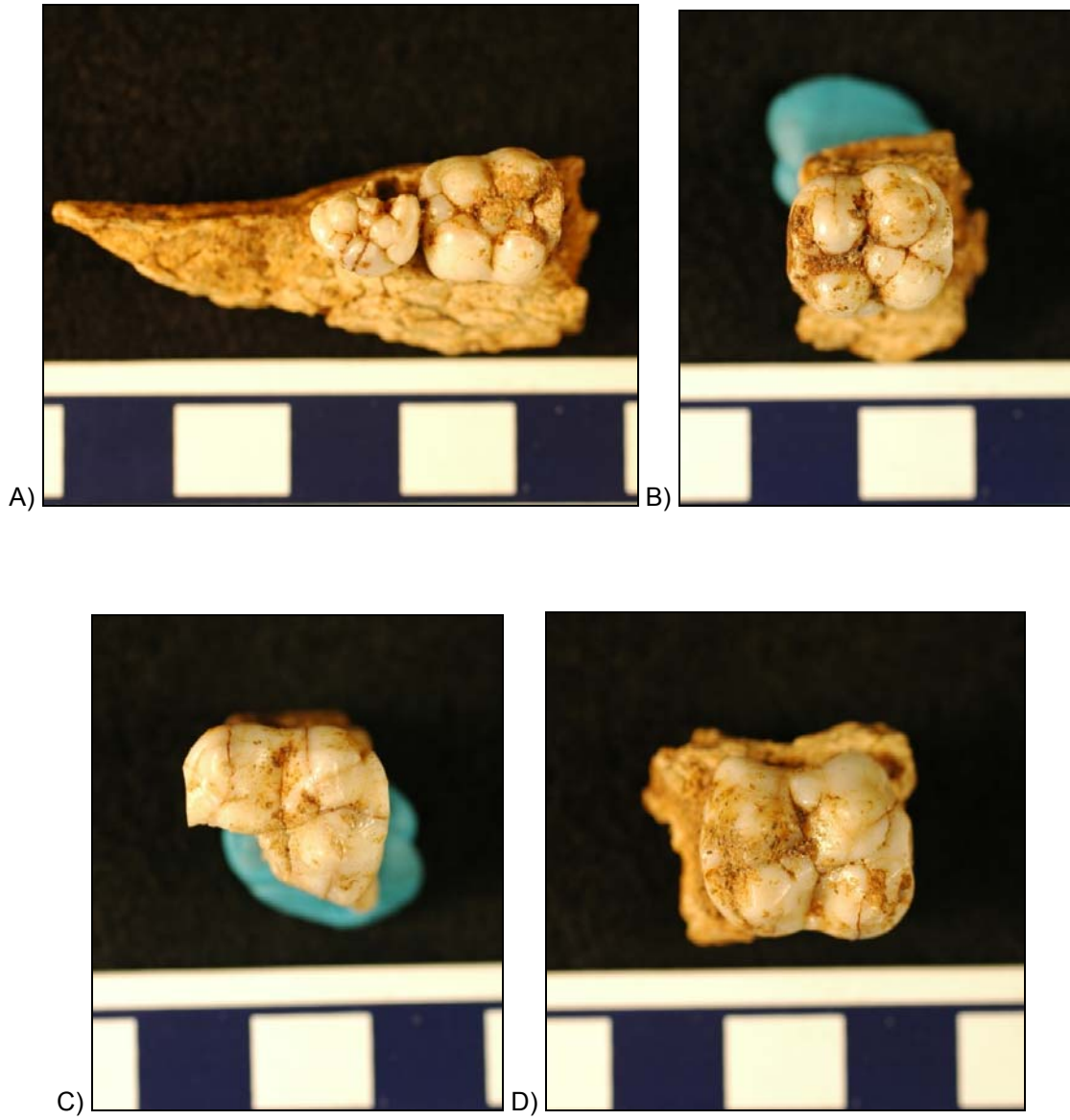


Figure 25. Guy Wilson Cave *Mylohyus* Teeth Within the ETMNH Collection. ETMNH 1581; A) left P²-P³; B) left P⁴; C) left M¹; D) left M² (each square of scale bar = 1 cm).



Figure 25. Guy Wilson Cave *Mylohyus* Teeth Within the ETMNH Collection. ETMNH 1582; E) left P⁴; and ETMNH 1583; F) right M¹ (each square of scale bar = 1 cm).

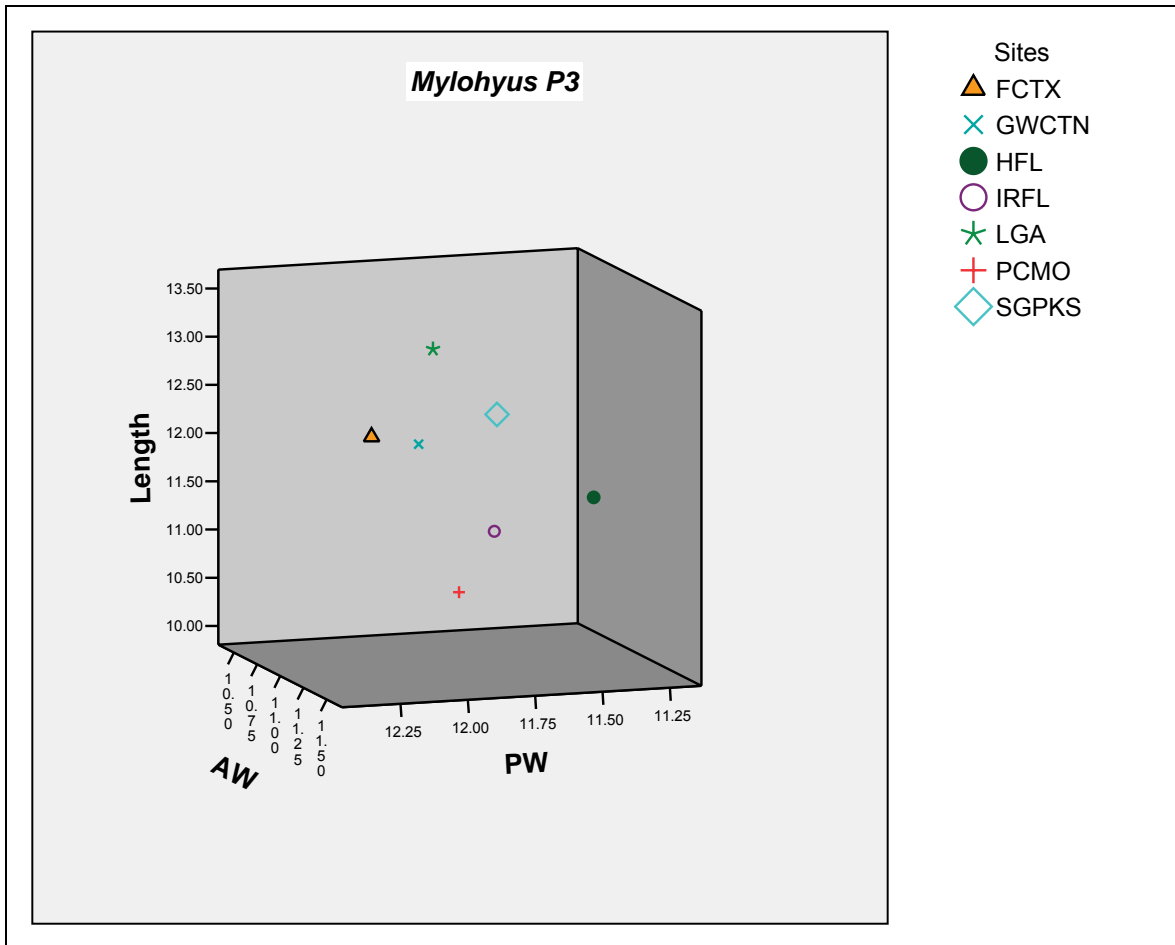


Figure 26. Plotted Measurement of *Mylohyus* Left P³s. Measurements of length, anterior width, and posterior width in millimeters of from Guy Wilson Cave and various Pleistocene-aged sites (refer to Table 2 for site and species identification; Appendix C & D for measurements).

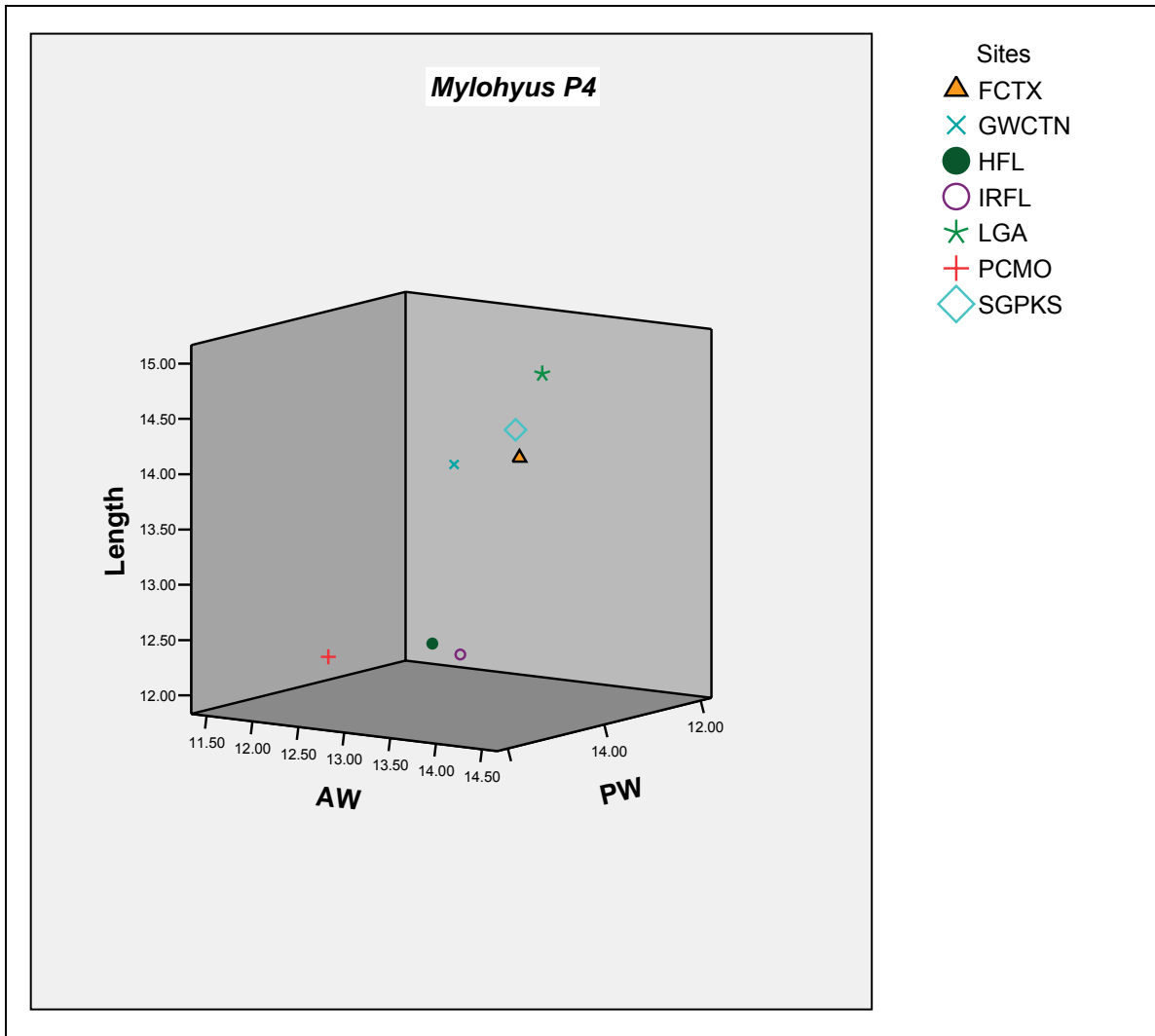


Figure 27. Plotted Measurement of *Mylohyus* left P⁴'s. Measurements of length, anterior width, and posterior width in millimeters of from Guy Wilson Cave and various Pleistocene-aged sites (refer to Table 2 for site and species identification; Appendix C & D for measurements).

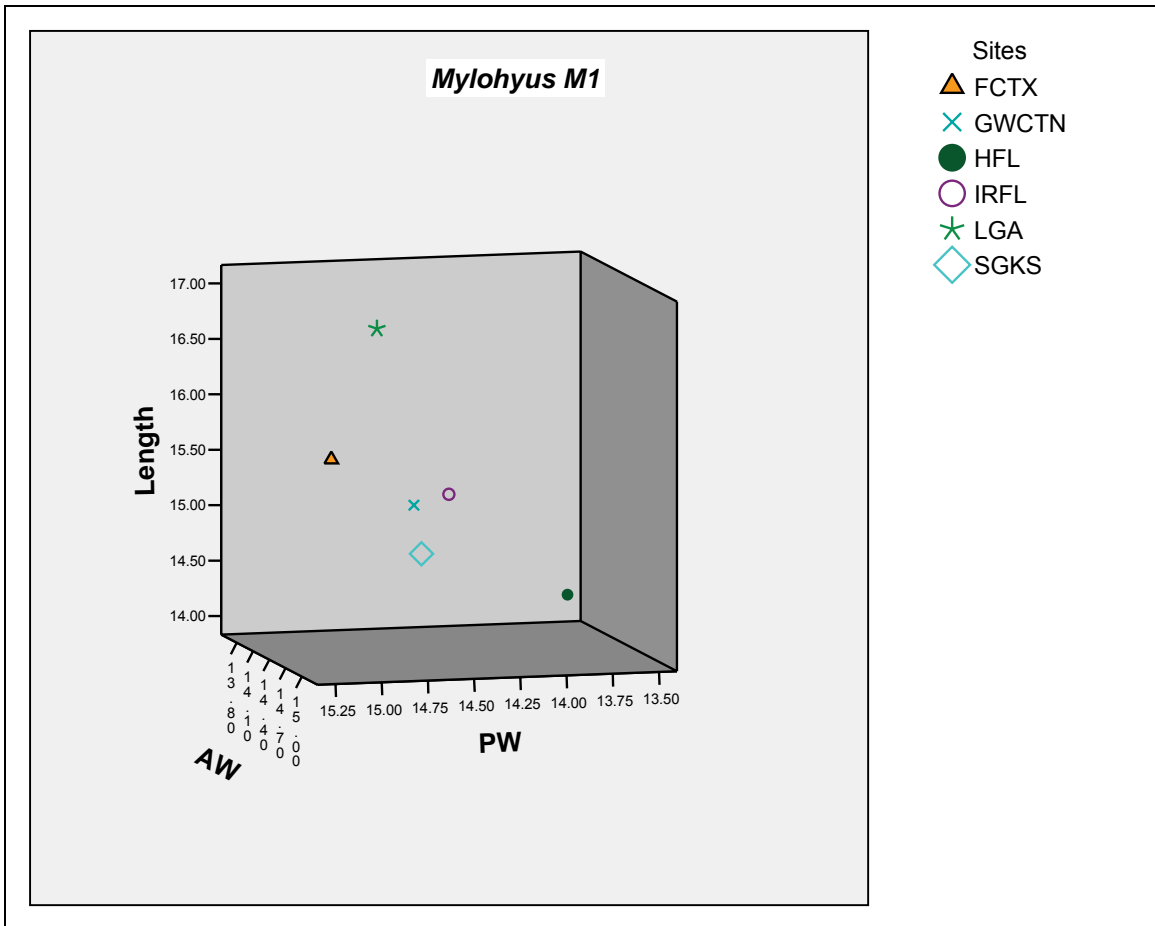


Figure 28. Plotted Measurements of *Mylohyus* Left M¹s. Measurements of length, anterior width, and posterior width in millimeters of and GWCTN right M¹ from Guy Wilson Cave and various Pleistocene-aged sites (refer to Table 2 for site and species identification; Appendix C & D for measurements).

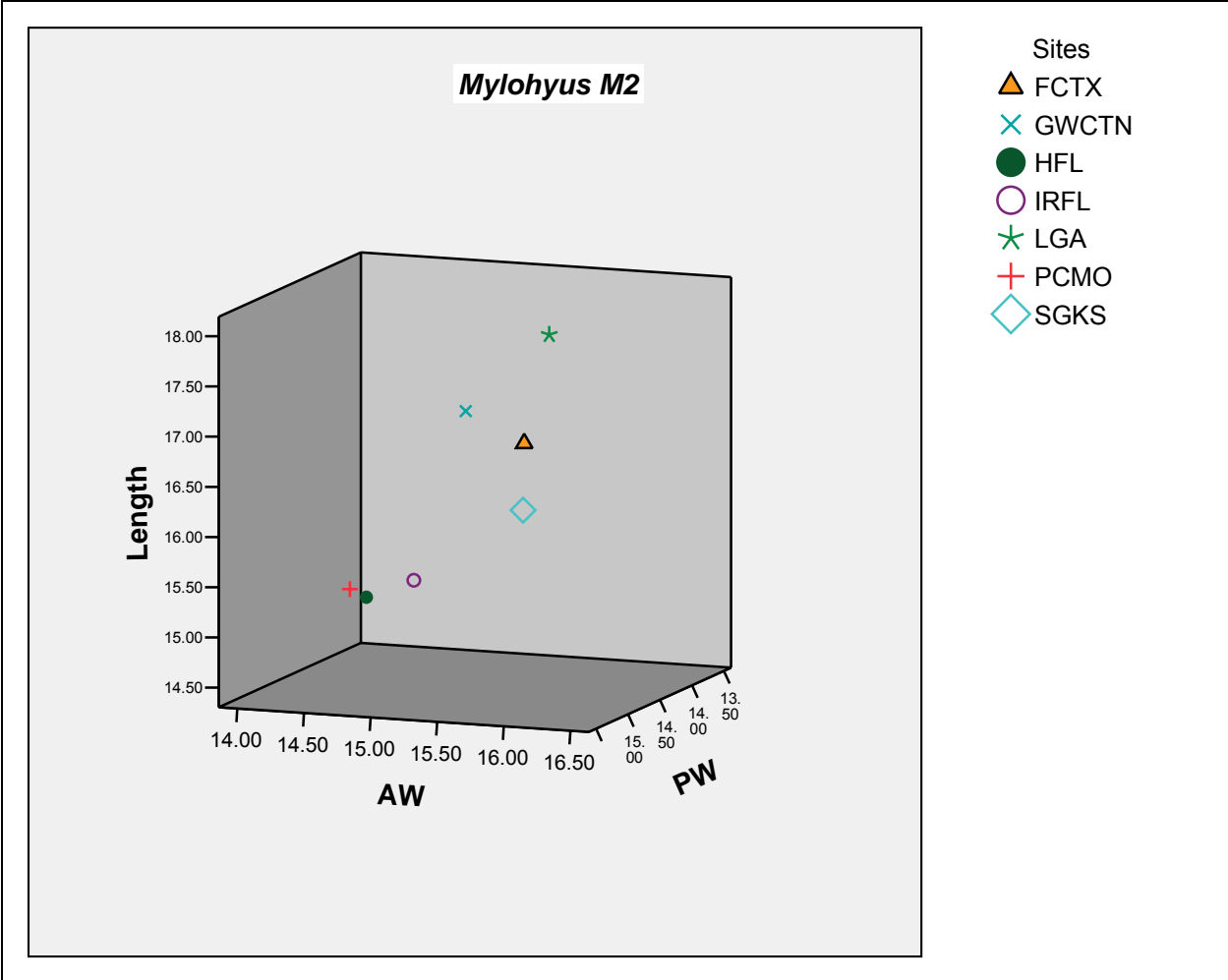


Figure 29. Plotted Measurements of *Mylohyus* Left M^2 's. Measurements of length, anterior width, and posterior width in millimeters of from Guy Wilson Cave and various Pleistocene-aged sites (refer to Table 2 for site and species identification; Appendix C & D for measurements).

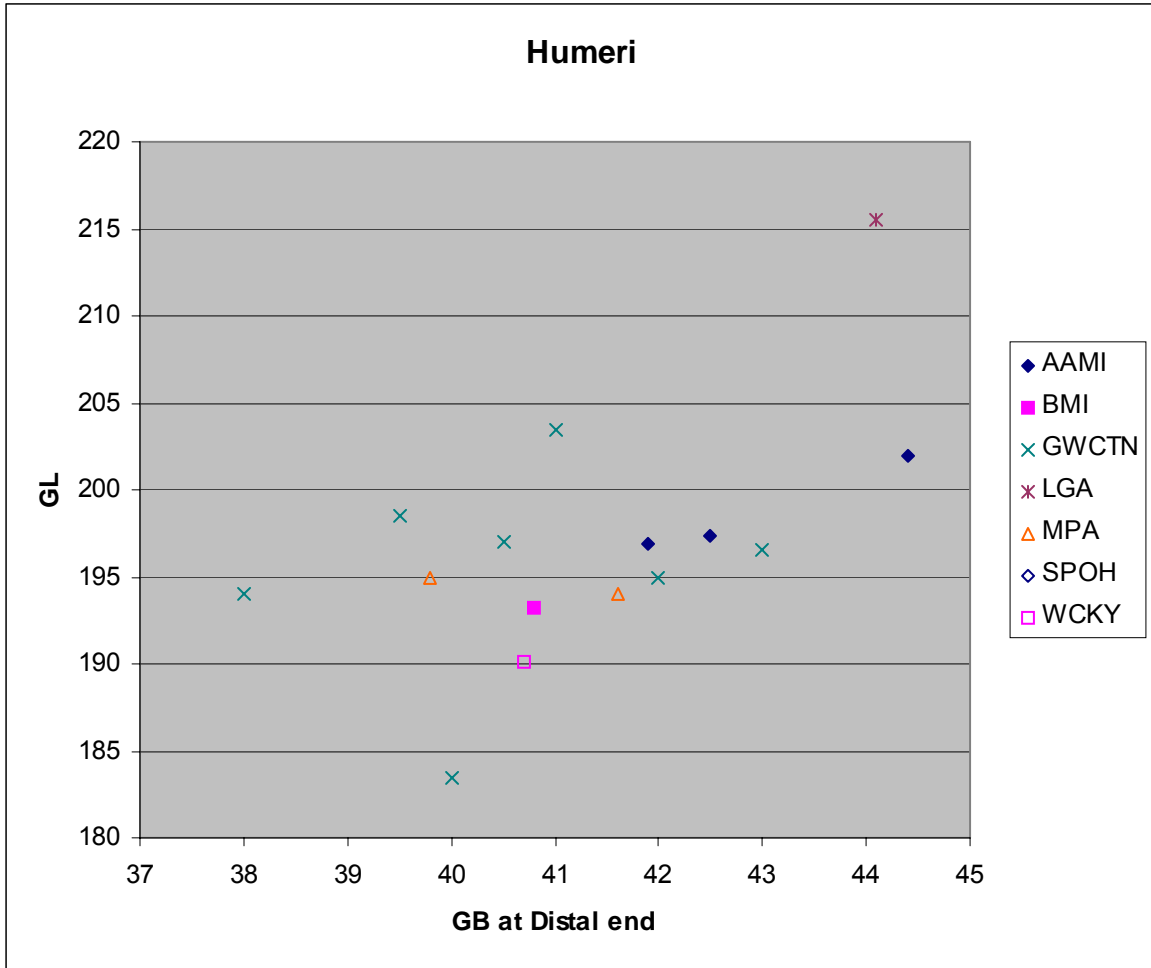


Figure 30. Plotted *Platygonus compressus*, *Mylohyus nasutus*, and *M. fossilis* Humeri Measurements. Measurements of GL and GB in millimeters from various Pleistocene-aged sites and Guy Wilson cave (refer to Table 3 for site and species identification; Appendix C, E, & F for measurements).

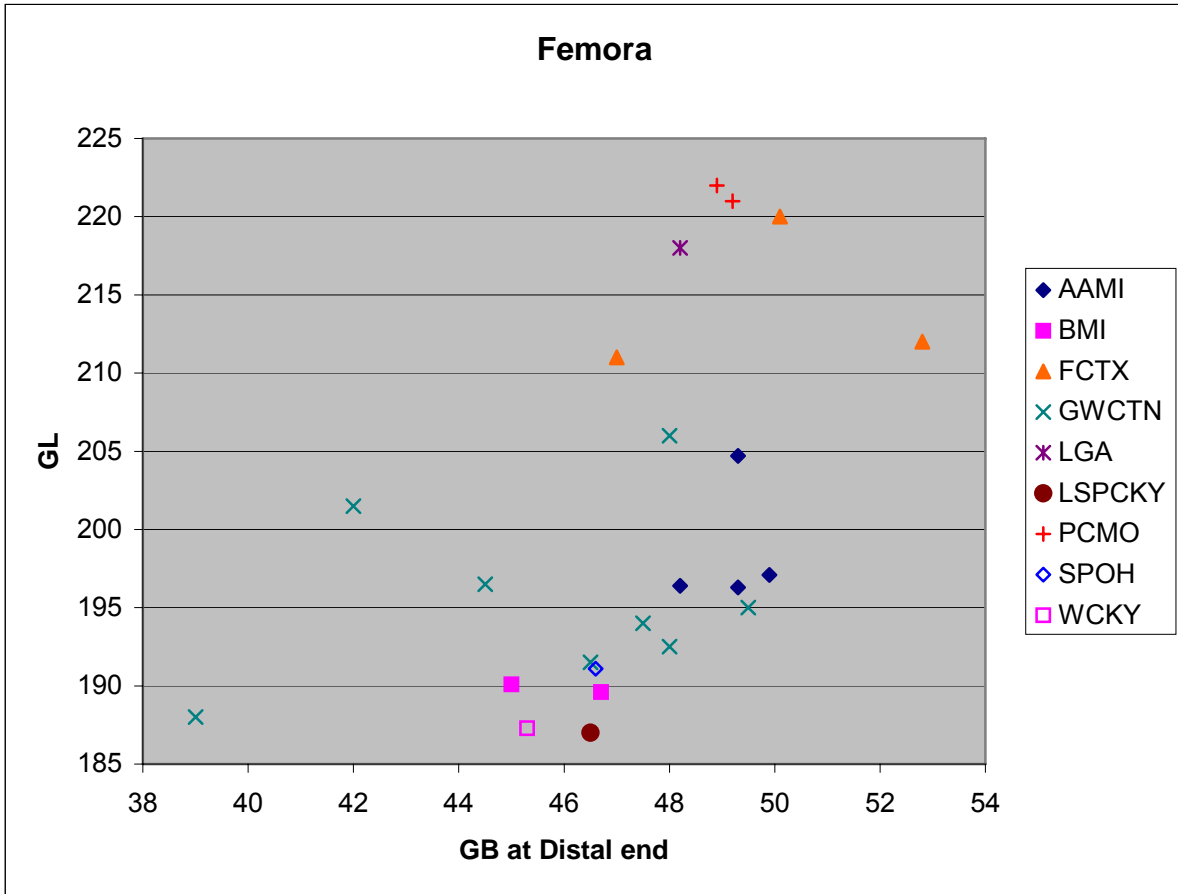


Figure 31. Plotted *Platygonus compressus*, *Mylohyus nasutus*, and *M. fossilis* Femora Measurements. Measurements of GL and GB in millimeters from various Pleistocene-aged sites and Guy Wilson cave (refer to Table 3 for site and species identification; Appendix C, E, & F for measurements).

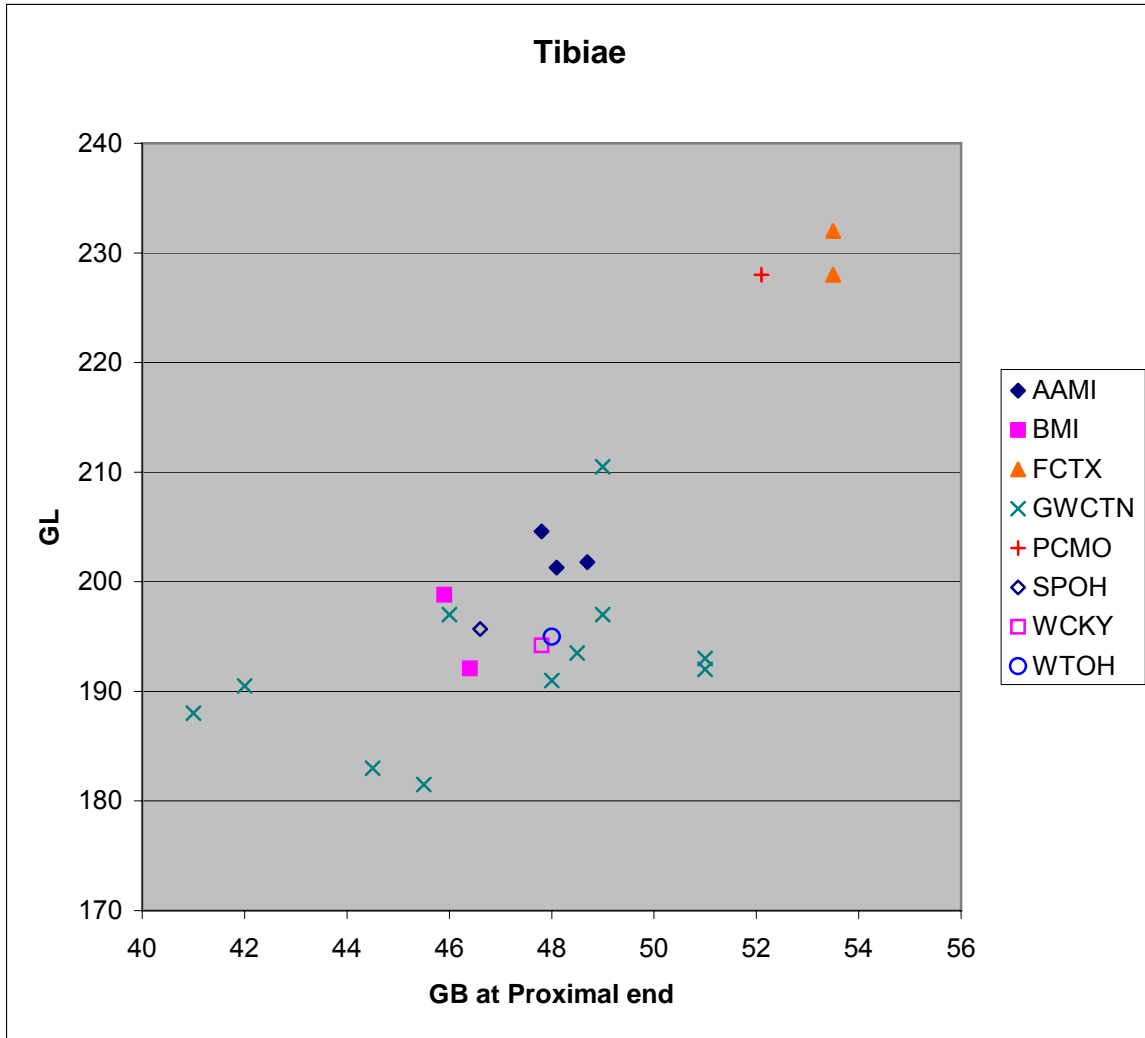


Figure 32. Plotted *Platygonus compressus*, *Mylohyus nasutus*, and *M. fossilis* Tibiae Measurements. Measurements of GL and GB in millimeters from various Pleistocene-aged sites and Guy Wilson cave (refer to Table 3 for site and species identification; Appendix C, E, & F for measurements).

NISP

The Guy Wilson Cave peccary sample from the ETMNH and MM collections have a post-cranial element count of 868 (Table 7). The fused radius and ulna is counted as a single element with the exception of two ulnae, which are isolated and were counted as individual elements. The post-cranial NISP count includes identifiable element fragments such as proximal and distal epiphyses.

MNI

The *Platygonus* long-bones (humeri, radii and ulnae, femora, and tibiae) reveal a MNI of 16 based on left femora aided by individual age classes, excluding fragmentary pieces (Table 8). *Mylohyus* is represented by a left P²-M² (ETMNH 1581), a left P⁴ (ETMNH 1582), and right M¹ (ETMNH 1583) for an MNI of 2. The cranial and post-cranial material within the sample yield a MNI of 25, based on both left and right, calcanei for Tayassuidae (Table 7).

Age

The long bones (humeri, radii and ulnae, femora, and tibiae; Table 8) are classified as adult, sub-adult, or juvenile. Using this basic categorization of age classes and element side aided in the calculation of the MNI. Within the 133 long bones from the ETMNH and MM collections, 90 adult, 21 sub-adult, 20 juvenile and 2 undetermined elements represent 67.7%, 15.8%, 15%, and 1.5% of the sample respectively (Table 9).

Table 7.

Guy Wilson Cave Tayassuidae Post-cranial Element Counts

Element	McClung Museum sample									ETMNH sample												
	Lt. Fragment	Total	Rt. Fragment	Total	Unk. Side / Fragments	NISP	MNI	Lt. Fragment	Total	Rt. Fragment	Total	Unk. Side / Fragments	NISP	MNI								
humerus	3	3	5	5		8	5	11	8	19	10	2	12	32	10							
ulno-radius	4	4	3	3		7	4	5	3	8	5		5	13	5							
ulna								1	1	2				2	1							
scapula	5	5	7	1	8	13	7	3	1	4	4	1	5	9	4							
innominate	3	3	2	2		5	3	2		2	5		5	1	7	5						
sacrum						6	6	6						5, 3F	8	8						
femur	3	1	4	5	2	7		11	13	12	25	4	6	10	35	12						
tibia	3	1	4	4	1	5		9	5	9	3	12	10	1	11	23	10					
fibula									4	4		6	6		10	6						
patella	2		2	3		3		5	5	6		6	10		16	10						
calcaneum	5		5	10		10		15	10	20		20	16		36	20						
astragulus	6		6	4		4		10	6	14		14	7		21	14						
fused MC								3	3	1					1	1						
unfused MC																						
MC III	5		5	4		4		9	5	14		14	7	1	8	22	*					
MC IV	7		7	6		6		13	7	19		19	11		11	30	*					
unknown MC						4, 7F		11	*						10, 1F	11	*					
fused MT	5		5	10		1		16	10	13		13	14		14	27	14					
unfused MT															2	2	*					
phalange																						
proximal						2Unk./ 37		39	*						97	97	*					
medial						35		35	*						84	84	*					
distal						17		17	*						43	43	*					
vertebrae																						
atlas															5	5	*					
axis															8	8	*					
cervical															32	32	*					
thoracic															50	50	*					
lumbar															12	12	*					
caudal															4	4	*					
Total element count																			232		636	

Note. * Indicates elements that have not been identified to the proper side and cannot be applied to the MNI count.

Table 8.

Age Class Summary from Guy Wilson Cave Long Bones

Element	Side	Age	NISP	Fragments
Humerus	Left	Adult	14	7
		Sub-adult	3	
		Juvenile	1	
		UND.	1	1
		Total	19	8
		MNI	11	
	Right	Adult	14	2
		Sub-adult	2	
		Juvenile		
		UND.	1	
		Total	17	2
MNI		15		

Element	Side	Age	NISP	Fragments
Femur	Left	Adult	15	3
		Sub-adult	6	5
		Juvenile	8	5
		UND.		
		Total	29	13
		MNI	16	
	Right	Adult	9	4
		Sub-adult	2	2
		Juvenile	6	2
		UND.		
		Total	17	8
MNI		9		

Element	Side	Age	NISP	Fragments
Radius-ulna	Left	Adult	8	1
		Sub-adult	3	1
		Juvenile	1	
		UND.		
		Total	12	2
		MNI	10	
	Right	Adult	8	
		Sub-adult		
		Juvenile		
		UND.		
		Total	8	
MNI		8		

Element	Side	Age	NISP	Fragments
Tibia	Left	Adult	12	3
		Sub-adult	2	1
		Juvenile	1	
		UND.		
		Total	15	4
		MNI	11	
	Right	Adult	10	1
		Sub-adult	3	1
		Juvenile	3	
		UND.		
		Total	16	2
MNI		14		

Note. The elements analyzed are a mixture of left and right sides for an overall total for the sample.

Fragments are not included in the MNI calculation.

Sex

Within the lower canine sample (Figure 33), there is no clear pattern or clustering; however, the upper canines (Figure 34) appear to exhibit a bimodal distribution.

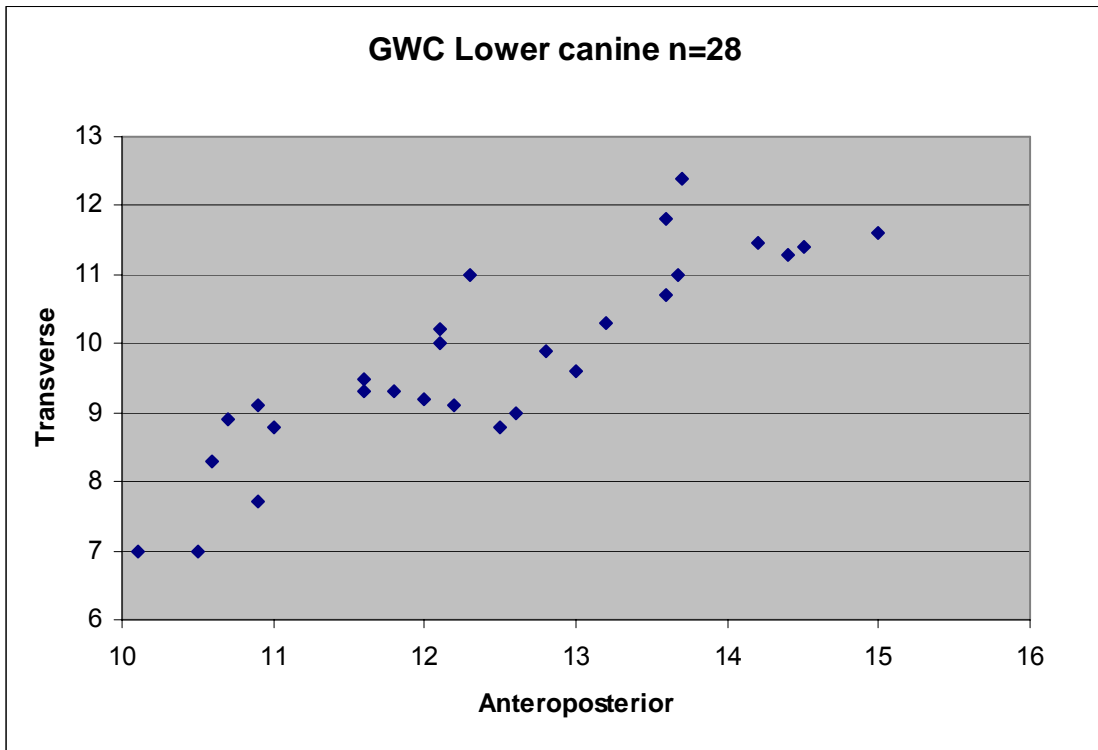


Figure 33. Guy Wilson Cave Tayassuidae Lower Canine Measurements. Anteroposterior and transverse measurements in millimeters (Appendix C).

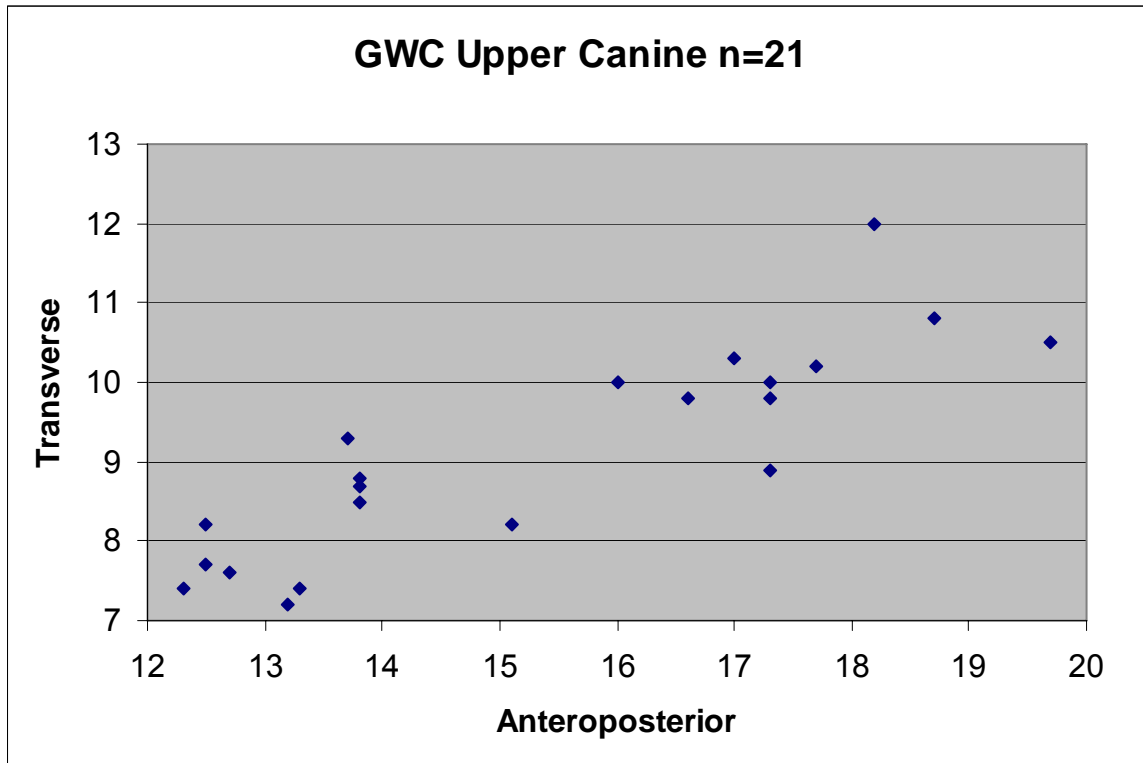


Figure 34. Guy Wilson Cave Tayassuidae Upper Canine Measurements. Anteroposterior and transverse measurements in millimeters (Appendix C).

Taphonomic Analysis

Carnivore Damage and Utilization

The analysis of the 133 Tayassuidae long bones (humeri, radii and ulnae, femora, and tibiae) revealed evidence of carnivore damage within the sample (Figure 35). The sides of the long bones analyzed were combined for ease of calculating the percentiles of each potential carnivore source and degree of utilization (Table 9; Figure 36). Within the analyzed long bones, wolf and rodent damage represent 49.6% and 22.6% of the sample, respectively. Elements with an undetermined (Und) source of damage and no damage (none) represent 40.6% and 4.5% of the sample, respectively (Figure 37). The

data suggest the absence of any visible bear gnawing characteristics to bone from the analyzed sample at this time; however, bear could be a source of heavily damaged elements categorized as undetermined. The degree of bone utilization on the long bones ranging from none, light, light to moderate, moderate to full, full, and heavy represent 9%, 27.8%, 18.8%, 1.5%, 11.3%, and 31.6% respectively (Figure 38).



Figure 35. Humerus (MM 1) Showing Punctures and Gnaw Damage Attributed to Wolf. A) proximal end; B) distal end.



Figure 36. Examples of the Carnivore Utilization on Left Femora. Left to right, light, ETMNH 826; light to moderate, ETMNH 829; full, ETMNH 833; and heavy; ETMNH 849.

Table 9.

Carnivore Damage and Utilization Percentiles of Guy Wilson Cave Long Bones

Element	Age	NISP	Carnivore Damage									Utilization												
			Wolf	%	Rodent	%	Bear	UND.	%	N/A	%	None	%	Light	%	Light-Moderate	%	Moderate - Full	%	Full	%	Heavy	%	
Humerus	Adult	28	17	60.7	10	35.7		10	35.7	1	3.6	4	14.3	6	21.4	6	21.4			3	10.7	10	35.7	
	Sub-adult	5	3	80	1	20		1	20					3	60	1	20			1	20			
	Juvenile	1	1	100												1	100							
	UND.	2						1	100											1	50	1	50	
	Total	36	21	61.1	11	30.6		12	33.3	1	2.8	4	11.1	9	25	8	22.2			0	5	13.9	11	30.6
Radius-ulna	Adult	16	5	31.3	3	18.8		11	68.8	1	6.3	1	6.3	9	56.3	2	12.5			4	18.2	1	6.3	
	Sub-adult	3	2	66.7	2	66.7		1	33.3						1	33.3				1	33.3	1	33.3	
	Juvenile	1						1	100					1	100									
	UND.																							
	Total	20	7	35	7	35		13	65	1	5	1	5	11	55	3	15				5	25	2	10
Femur	Adult	24	15	62.5	4	16.7		7	29.2	1	4.2	4	16.7	9	37.5	2	8.3	1	4.2	2	8.3	6	25	
	Sub-adult	8	1	12.5				5	62.5	2	25											8	100	
	Juvenile	14	4	28.6	1	7.1		9	64.3						6	42.3						8	57.1	
	UND.																							
	Total	46	20	43.5	5	10.9		21	45.7	3	6.5	4	8.7	9	19.6	8	17.4	1	2.2	2	4.3	22	47.8	
Tibia	Adult	22	13	59	7	31.8		5	22.7	1		3	13.6	10	45.5	4	18			1	4.5	4	18	
	Sub-adult	5	3	60				2	40					1	20	1	20	1	20	1	20	2	40	
	Juvenile	4	2	50				1	25						2	50					1	25	1	25
	UND.																							
	Total	31	18	58.1	7	22.6		8	25.8	1	3.2	3	9.7	8	25.8	6	19.4	1	3.2	3	9.7	7	22.6	
Inclusive Total		133	66	49.6	30	22.6		54	40.6	6	4.5	12	9	37	27.8	25	18.8	2	1.5	15	11.3	42	31.6	

Note. Element sides are combined into a single count within the age classes. Percentiles are given for likely carnivore damage sources and degree of bone utilization for an overall view of the sample.

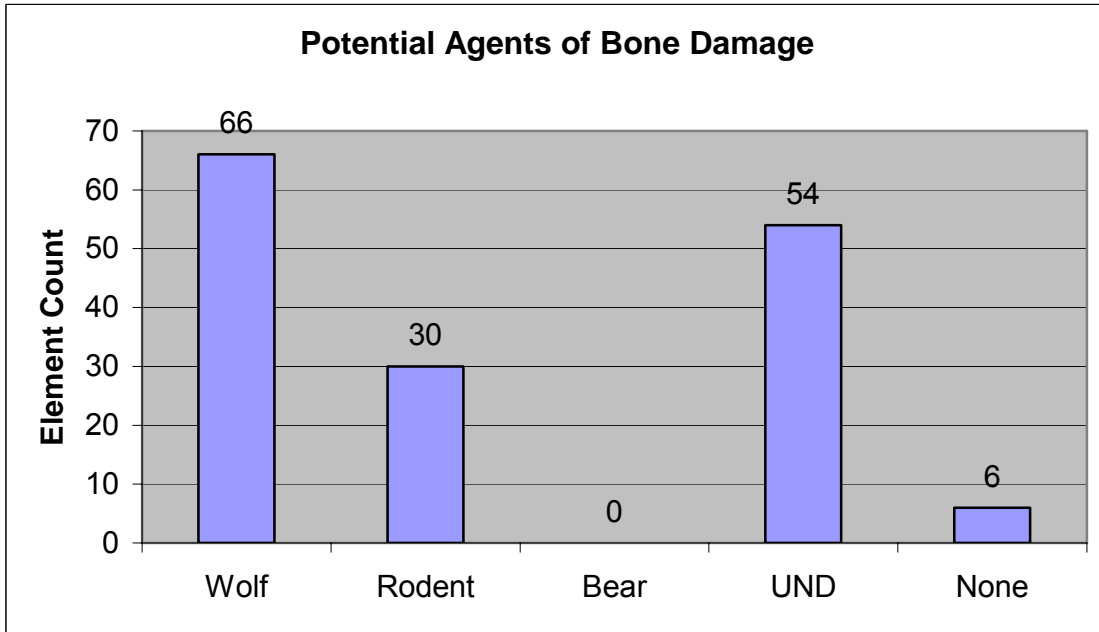


Figure 37. Element Count Representative of Bone Damage Categories Within 133 Analyzed Long Bones from Guy Wilson Cave. The abbreviation 'UND' (Undetermined) represents elements having damage with an undetermined source.

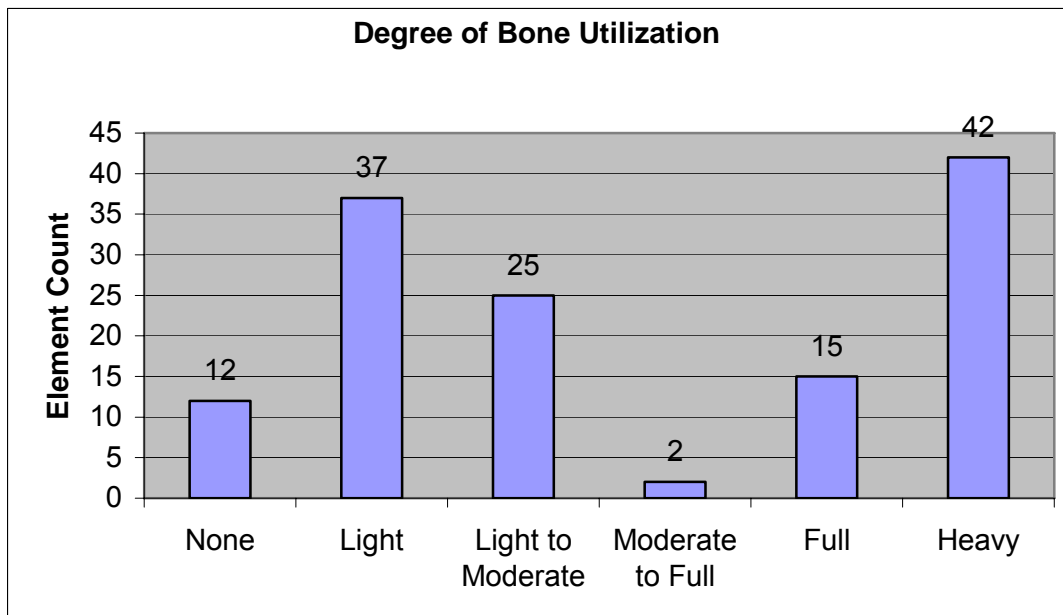


Figure 38. Element Counts Representative of Bone Utilization Within 133 Analyzed Long Bones from Guy Wilson Cave.

Weathering

The sides of the long bones analyzed were combined for ease of calculating the percentiles of each weathering stage (Table 10). Of the 133 elements analyzed for weathering stage, Stage 0, Stage 0 to 1, Stage 1, Stage 1 to 2, Stage 2, and Stage 3 represent 29%, 50%, 17%, 2%, 1%, and 1% of the sample, respectively (Figure 39). 96% of the sample is at stage 1 or less.

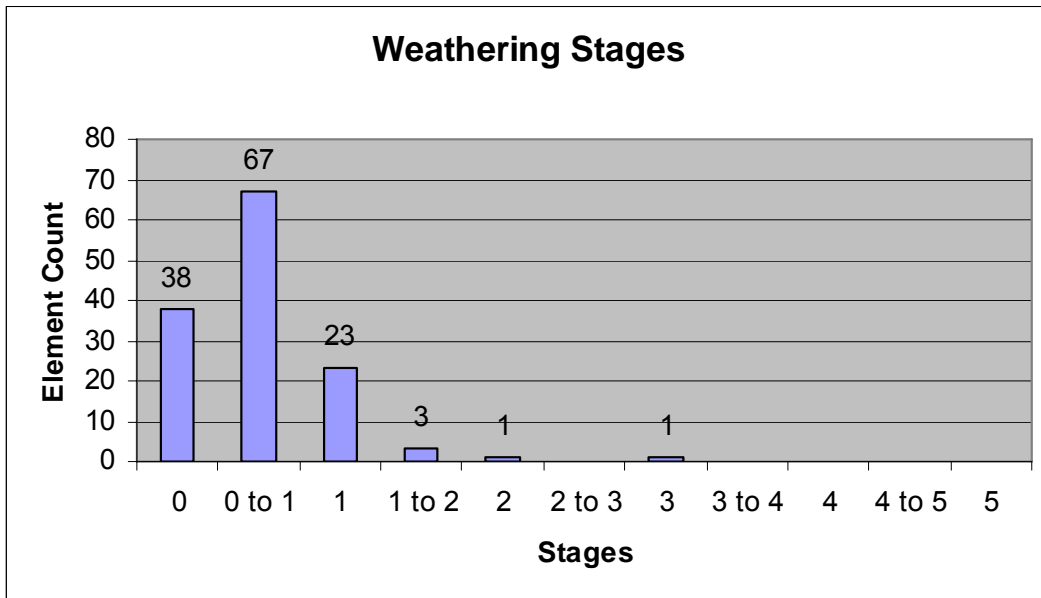


Figure 39. Element Counts Representative of Weathering Stages Within 133 Analyzed Long Bones from Guy Wilson Cave.

Table 10.

Weathering Stages and Percentiles of Guy Wilson Cave Long Bones

Element	Age	NISP	Weathering Stage																	
			0	%	0 to 1	%	1	%	1 to 2	%	2	%	2 to 3	%	3	%	3 to 4	4	4 to 5	5
Humerus	Adult	28	8	28.5	13	46.4	3	10.7	2	7.1	1	3.6			1	3.6				
	Sub-adult	5			4	80	1	20												
	Juvenile	1					1													
	UND.	2	1		1															
	Total	36	9	25	18	50	5	13.9	2	5.6	1	2.8			1	2.8				
Radius-ulna	Adult	16	5	31.3	8	50	3	18.8												
	Sub-adult	3	2	66.7	1	33.3														
	Juvenile	1			1															
	UND.																			
	Total	20	7	35	10	50	3	15												
Femur	Adult	24	7	29.2	12	50	4	16.6	1	4.1										
	Sub-adult	8	3	37.5	3	37.5	2	25												
	Juvenile	14	7	50	5	35.7	2	14.3												
	UND.																			
	Total	46	17	37	20	43.5	8		1	2.2										
Tibia	Adult	22	4	18.1	12	54.5	6	27.2												
	Sub-adult	5			5	100														
	Juvenile	4	1	25	2	50	1	25												
	UND.																			
	Total	31	5	16.1	19	61.3	7	22.6												
Inclusive Total		133	38	28.6	67	50.4	23	17.3	3	2.3	1	0.8			1	0.8				

Note. Element sides are combined into a single count within an age class. Percentiles of each element and observed weathering stages are calculated for an overall view of the sample.

CHAPTER 4

DISCUSSION

Identification

Fossil material collected from Guy Wilson Cave, Sullivan Co., TN donated to the ETMNH collection at ETSU has presented an opportunity to reexamine the Tayassuidae from this unique fauna. Initial identification of *Platygonus compressus* was made by Guilday et al. (1971) based on the discovery made by S.D. Dean in the late 1960s. A conventional ^{14}C date of $19,700 \pm 600$ yr B.P. from peccary bone collagen has been reported (Buckley & Willis, 1972). With the possibility of contamination in the previously dated sample (Stafford et al., 1987) an AMS date from the ETMNH 1583 *Mylohyus* right M^1 has provided a more reliable date; however, its value is limited to the species sampled.

In comparing each of the upper *Mylohyus* teeth represented from Guy Wilson Cave to those from other Pleistocene-aged sites, two clusters seem to appear that may represent the two species, *M. fossilis* and *M. nasutus*, with all the Guy Wilson Cave specimens clustering with *M. nasutus* (Figures 26-29). Clustering is most clear in P^3 , P^4 , and M^2 (Figures 26, 27, & 29). Slight clustering exists in the M^1 , though not as clearly defined (Figure 28). With limited comparative and radiocarbon-dated samples of *Mylohyus*, sexual, individual, and chronological variation within a single species cannot be excluded as explanations for the clustering. Also, within the examined samples of *Mylohyus fossilis* and *M. nasutus*, geographic distribution of an eastern and western

species (Lundelius, 1960) appears to overlap. A larger sample size and accurate radiocarbon dates of *Mylohyus* may provide an answer to the species debate.

Due to the large amount of non-cranial material in the donation, identification of *Platygonus* and *Mylohyus* postcranial remains is an important aspect to this study. In order to separate the post-cranial material of the two genera, a close examination through comparisons from known Pleistocene-aged sites was required. Although there are limited postcranial *Mylohyus* measurements available for comparisons, it is assumed that if an individual element from the sample falls within the range of a particular genus (*Platygonus* or *Mylohyus*), the element would be apparent through the plotting of the measurements. Humeri measurements from Guy Wilson Cave are within the observed range of the compared *P. compressus* sites with the *M. nasutus* specimen isolated to the upper right of the chart (Figure 30). A few femora appear to be slightly larger than the compared *P. compressus* sites, though not to the same degree as the *Mylohyus* specimens (Figure 31). One measurement stands out from the group as being very close in size to *Mylohyus*; however, based on morphology descriptions, it appears that it is a large individual of *P. compressus*. Therefore, it seems likely that all analyzed femora samples are probably *P. compressus*. Tibiae cluster with the *P. compressus* samples rather than *M. nasutus* (Figure 32). Although *M. fossilis* is not included in this comparative sample, there appears to be significant separation between *M. nasutus* and the other samples of *Platygonus*. If a Guy Wilson Cave measurement fell between the two genera, that element could possibly be *M. fossilis*. Two Guy Wilson Cave measurements do plot out lower than the rest due to MM 16 being a juvenile and

MM 17 being a sub-adult. Including the younger individuals, all of the Guy Wilson Cave samples fall within the *P. compressus* grouping. With each analyzed Guy Wilson Cave post-cranial element fitting within the *Platygonus compressus* measurements of the compared sites versus the *Mylohyus* measurements, the specimens are assumed to be that of *Platygonus compressus*.

NISP

Element abundance of the Guy Wilson Cave sample is provided through the NISP count. By looking at the collection summary (Table 7), it is apparent that the ETMNH collection contains more overall postcranial material; 636 elements (including 53 fragments) than the MM collection which has 232 postcranial elements (including 13 fragments). Payne (1975) states that the lack of unfused epiphyses to diaphyses can be a sign of a biased sample. A lack of fragments in general and unfused epiphyses within the MM collection suggests the likelihood of a biased sample when compared to the ETMNH collection. The NISP count within each collection seems to support a complete large bone versus fragmented bone preference (or collection bias) from the excavators in the McClung collection versus other influences, like carnivore activity or fluvial transportation within the whole sample.

MNI

A MNI of 12 *Platygonus compressus* individuals was the first MNI calculated for a Guy Wilson Cave sample located at the CMNH (Guilday et al., 1975). A second MNI is mentioned as being representative of 16 *Platygonus compressus* individuals (Guilday et

al., 1978). For both accounts, the calculation process of genus element identification, element used, or the status of fragments within the sample is not stated and, therefore, the second count cannot be combined with the CMNH count. In Guilday et al. (1975), the potential for *Mylohyus* being present in the sample was unknown. If genus identification, the element used, and status of fragments could be determined within the CMNH sample, the current analysis may or may not contribute to the MNI of 16 *Platygonus compressus* individuals (Guilday et al., 1978).

A MNI of *Platygonus compressus* from the ETMNH and McClung collections is 16 based on left femora. Age classes and secondary numbers from the other long bones analyzed (Table 8) also support this MNI. Secondary elements include 15 right humeri and 14 right tibiae. For Tayassuidae, a MNI of 25 has resulted from left and right calcanei (Table 7). With limited *Mylohyus* post-cranial measurements to compare the calcanei for generic identification, the MNI of 25 cannot be proven as only *Platygonus compressus* though it seems likely that this number is close. Although there are large numbers of metacarpals, metatarsals, and phalanges in both collections, these elements are difficult to identify to the appropriate side with confidence and, therefore, were not used within the MNI.

Based on dentition (Figure 25), the *Mylohyus* MNI is 2 with no potentially associated long bones. Similar wear present on the left P⁴ (ETMNH 1582), and right M¹ (ETMNH 1583) is visually different from the dentition series in ETMNH 1581 supporting this count. Herding behavior is inconclusive and is limited in comparison to previous

fossil finds of *Platygonus compressus* with the lack of carnivores to influence MNI counts (Table1) or to modern peccary behavior. The MNI may suggest a large number (or herd) to be present in the area of the cave for carnivores to utilize versus a limited number (or individuals) of *Mylohyus* in the area.

Age

Long bone age profiles have assisted with the MNI and NISP count of the sample's Tayassuidae population. Adults dominate every long-bone element analyzed (Tables 8, 9). With the resulting age profiles, it appears as though the sample does not fall within the two theoretical age profile models (Klein & Cruz-Urbe, 1984). Instead, the NISP count within the MM collection suggests the presence of collection bias (from the excavator) of whole bones versus the inclusion of fragmented elements and may also reflect on the lack of juvenile material. The NISP count is likely to also be influenced from carnivore activity within the cave.

Although there is more juvenile material within the ETMNH collection, only two juvenile post-cranial elements (humerus, ETMNH 818 and ulna, ETMNH 885) are possibly associated due to similar preservation (including coloration, side, and size). There is a possibility that there is also a correlation between these elements and a partial juvenile skull (ETMNH 1564). An additional excavation in which all material is collected, the juvenile NISP count could increase, revealing an overrepresentation of the young and old age classes. With the lack of spatial data from both collections, the current age profiles may or may not be a respectful representation of the sample.

Sex

According to Wright (1993), sexual dimorphism is of weakly discrete bimodality in the canines of *Platygonus compressus* and *Mylohyus fossilis*, and tends to overlap in modes for Rancholabrean samples. In analyzing the ETMNH sample of lower canines (Figure 33) the result is a lack of clustering or bimodality. The upper canine measurements (Figure 34) do, however, appear more defined and discrete in clusters. It is possible that the visible breaks in the anteroposterior measurements represent a sexual dimorphism with the females being smaller and the males being larger. Although the canine sample may contain some *Mylohyus*, due to its rarity here and in other fossil localities, the general trends suggest dimorphism within *Platygonus* rather than representing a mixture of both genera. Lundelius (1960) states that the only difference between the canines of the two species is that *Mylohyus nasutus* is smaller than *Platygonus* with the lower canines being more curved and he does not mention sexual dimorphism for any element.

Carnivore Damage and Utilization

With the known presence of *Canis dirus* (dire wolf) (Guilday et al., 1975) and *Ursus* sp. (bear sp.) at Guy Wilson Cave, one may assume that the accumulation of various herbivore elements (including Tayassuidae) could have resulted from the cave being used as a den by both carnivores and herbivores over an undetermined amount of time. Analysis of carnivore damage and utilization from both the ETMNH and MM collections indicates that a majority of the sample is heavily influenced by a wolf-like

carnivore. However, the percentage represented within the undetermined category may have had evidence of carnivore damage removed from rodent gnawing.

With Guy Wilson Cave having two known large carnivores present, dire wolf (Guilday et al., 1975) and bear, any carnivore damage on the Tayassuidae should have similar characteristics or attributes to modern carnivore damage. Of the 133 long bones analyzed, 66 elements representing 49.6% show characteristics of potential wolf damage (Table 9). By analyzing carnivore damage and utilization percentages (Table 9), the percentages suggest that most of the sample was likely influenced by dire wolf with light utilization. A utilization percentage of 9% for no utilization may suggest that natural deaths occurred to a small portion of the sample inside the cave, supported by elements with no applicable carnivore damage. With light and light to moderate utilization at high percentiles, this could be interpreted as there being a sufficient food source for the carnivores (dire wolf) for at least some time intervals, while full and heavy utilization may reflect periods of a scarce food source for carnivores taking advantage of the current meal or influencing fragment counts. The carnivore coprolite also seems to support this activity due to its wolf-like size and composition of bone fragments.

Although bear is present within the ETMNH Guy Wilson Cave sample, there appears to be no identified Tayassuidae specimens with gnawing characteristics similar to bear unless elements are present in the undetermined category. With the lack of visible bear damage, the results suggest that the bear was probably not present during the same time period as the Tayassuidae with varying cave usage or not feeding on

them. Lacking a stratigraphic excavation record from the cave, it is unknown whether the bear was found at the same strata level. If a close stratigraphical level was known, it could suggest a similar depositional time period although there would still be a chance of the fauna mixing if post-depositional transportation occurred.

Many elements analyzed show characteristics from more than one likely source, like wolf and rodent marks. In some cases, the element is too damaged to be assigned to a single potential source and is referred to as undetermined. Based on the characteristics of a carnivore den presented by Emslie and Morgan (1995), Guy Wilson Cave does fall into this category in reference to the long bones with damage appearing at articular surfaces; pitting, furrowing, and channeling present on most bones and breaks at protrusions of thin ridges. Acid etching was not analyzed, though may be present in smaller elements such as phalanges.

Weathering

Of the 133 elements analyzed for weathering stages, 96.2% of the sample is at or below Stage 1 weathering with 3.8% of the sample falling in a category above Stage 1 (Table 10). The weathering percentiles suggest that a majority of the sample had limited weathering exposure prior to a likely dry burial. This result is expected given that the sample is from a stable cave environment. The few elements at higher weathering stages could represent the small percentage exposed to a variable micro-environment such as deposition near the opening of the cave susceptible to external weather conditions for a period of time or that the bones entered from outside after weathering.

CHAPTER 5

CONCLUSION

Descriptive and taphonomic analyses of unpublished Pleistocene Tayassuidae material from Guy Wilson Cave within the ETMNH and McClung Museum collections has revealed a MNI of 16 *Platygonus compressus* from left femora and 2 *Mylohyus* individuals from isolated teeth. A comparative study of *Mylohyus fossilis* and *M. nasutus* upper P³, P⁴, and M² from other Pleistocene sites suggest a possible linkage between morphology and species identification through scatter-plot clustering. A previous CMNH MNI of 16 *P. compressus* (Guilday et al., 1978) cannot be combined with the existing count due to lack of known procedure. With conventional ¹⁴C radiocarbon dating, Guy Wilson Cave has been dated as 19,700 ± 600 yr B.P. from peccary bone collagen by the CMNH (Buckley & Willis, 1972). Recently, an AMS radiocarbon date for the *Mylohyus* sp. of 11,727± 60 yr B.P. (NZA 27736) was obtained from Rafter Radiocarbon Lab in New Zealand. With few dates existing for the genus, this date provides an important record of the taxon in eastern Tennessee.

Long-bone NISP counts and age profiles of the ETMNH and McClung collection show a predominance of *Platygonus compressus* adults, which suggests a collection bias in the McClung collection with juveniles and fragments likely underrepresented. Tayassuidae upper canines, likely *Platygonus*, in the ETMNH collection suggest sexual dimorphism. Of the 133 long bones analyzed for carnivore damage and utilization due to the presence of dire wolf and bear, 49.6% show gnaw damage similar to modern wolf with mainly light utilization with no visible evidence from bear. A possibility exists that elements utilized by bear could have been altered by rodents or through lack of

preservation placing the elements with the undetermined category. Evidence of weathering on the long bones is predominantly light and suggests limited weathering exposure outside of the cave. All of the above suggest that the cave was used as a carnivore den by dire wolves for a period of time. With no stratigraphical excavation data available from either of the collections, additional excavations in the cave are needed with a reexamination of the CMNH Guy Wilson Cave sample to confirm these findings and enlarge the sample.

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APPENDICES

APPENDIX A

Fauna List for GWC

Scientific name	Common Name	Published
Order Rodentia		
Family Cricetidae		
<i>Synaptomys borealis</i>	northern bog lemming	Guilday et al. (1975)
<i>Phenacomys sp.</i>	heather vole or tree mice	Guilday et al. (1975)
Order Carnivora		
Family Canidae		
* <i>Canis dirus</i>	dire wolf	Guilday et al. (1975)
Family Ursidae		
<i>Ursus sp.</i>	bear	Current analysis (2007)
Order Artiodactyla		
Family Tayassuidae		
* <i>Platygonus compressus</i>	flat-headed peccary	Guilday et al. (1975)
* <i>Mylohyus sp.</i>	long-nosed peccary	Schubert (2005)
Family Cervidae		
<i>Rangifer tarandus</i>	caribou	Guilday et al. (1975)
Order Perissodactyla		
Family Tapiridae		
* <i>Tapirus sp.</i>	tapir	Guilday et al. (1975)
* <i>Equus sp.</i>	horse	Schubert (2005)
Order Xenarthra		
Family Megalonychidae		
* <i>Megalonyx jeffersonii</i>	Jefferson's ground sloth	Guilday et al. (1975)
Order Proboscidea		
Family Mammutidae		
* <i>Mammuthus</i>	mammoth	Guilday et al. (1975)

Note. The symbol (*) represents extinct taxa from Guy Wilson Cave, Sullivan County, TN. The other fauna do not currently live in the geographical area (FAUNMAP, 1994).

APPENDIX B

GWC Referred Specimen List and Measurements

*The listed material is from the ETMNH and MM collections of *Platygonus compressus*, *Mylohyus*, and Tayassuidae material.

Platygonus compressus

ETMNH	Element
1373	Lt. Dentary p ₃ -m ₃
1374	Lt. Dentary dp ₃ -dm ₁
1375	Lt. Dentary m ₂ -unerupted m ₃
1376	Lt. Dentary m ₂ -m ₃
1377	Lt. Dentary m ₁ -m ₂
1378	Rt. Dentary i ₂ , c, m ₁ -m ₂
1379	Rt. Dentary m ₃
1380	Rt. Dentary p ₄ -m ₃
1381	Rt. Dentary dp ₂ -dp ₄ , m ₁ -m ₃
1382	Lt. Dentary p ₃ -m ₃
1383	Mandible anterior half with Lt. / Rt. Canines
1384	Mandible anterior half with Lt. Canine
1385, 1386, 1390	Premaxilla
1387-1389	Premaxilla with I ¹
1391	Premaxilla/maxilla anterior half with I ¹ , C
1392	Premaxilla/maxilla anterior half with C
1393	Maxilla DP ² -DM ¹
1394	Palatine with Lt. P ⁴ -M ¹ , Rt. M ¹ -M ²
1395-1405	Lt. Lower canine
1406-1428	Rt. Lower canine
1429-1442	Lt. Upper Canine
1443-1454	Rt. Upper Canine

1455-1458, 1545	Deciduous Upper Canine
1459	Upper Canine root
1460-1465	Upper Canine fragment
1466-1469	Lower canine fragment
1470-1473	Lt. I ¹
1474	Lt DI ¹
1475-1480, 1665	Rt. I ¹
1481-1489	Lower incisor
1490	I ¹
1491	Upper incisor
1492	I ²
1493-1496	p ₂
1497-1500, 1502-1504	P ²
1501, 1509-1509	P ³
1510, 1512	Rt. P ⁴
1511, 1547	Lt. P ⁴
1513, 1514	Lt. m ₂
1515-1517	Rt. m ₂
1518, 1523, 1525	Lt. M ²
1519-1522, 1546, 1555, 1583	Rt. M ²
1524, 1526	Lt. M ² with fragment of maxilla
1527, 1548	Unerrupted M ²
1528	M ² fragment
1529, 1532, 1533	Rt. m ₃
1530, 1531, 1551, 1652	Lt. m ₃
1534, 1536-1538	Lt. M ³
1535, 1539	Rt. M ³
1540	Lt. Maxilla M ¹ -M ³

1541, 1542	Rt. Maxilla p ₃ -p ₄
1543	Dentary fragment m ₁
1544	Dentary fragment p ₄ -m ₁
1549	Rt. P ²
1550	p ₃
1552, 1553, 1557	M ¹
1554	m ₃
1555	m ₂
1558	P ⁴
1559	m ₂
1560	Maxilla anterior half with Canine
1561, 1564	Partial skull
1562	Premaxilla/maxilla; Rt. P ⁴ -M ² ; Lt. P ² -P ⁴ , M ² , M ³
1563	Premaxilla/maxilla; Rt. P ⁴ -M ² ; Lt. P ² -M ²
1565	Occipital condyle, temporal condyle, partial zygomatic process
1566	Occipital condylemastoid process
1567	Rt. Frontal
1568	Lt. Frontal
1569, 1570	Lt. Zygomatic process of malar
1571, 1580	Lt. partial maxilla with canine cavity
1573	Rt. partial maxilla with canine cavity
1574, 1650	Rt. Premaxilla
1575	Auditory bulla
1576	Premolar fragment
1577-1579	Deciduous lower molar
1581	Lt. Maxilla P ² -M ²
1582	m ₁
1637	Pterygoidus lateralis of the dentary

1638	Zygomatic process
1651	Temporal condyle
1653	Premaxilla/maxilla anterior

ETMNH collection

Platygonus compressus postcranial material

802, 805, 808	Rt. humerus
811-813, 1243	Lt. humerus
825-829, 831, 833, 834	Lt. Femur
847	Rt. Femur
854-856, 860, 861, 863	Lt. Tibia
866-869, 871	Rt. Tibia

Mylohyus sp.

ETMNH

1581	Lt. P ² -M ²
1582	Lt. P ⁴
1583	Rt. M ¹

ETMNH Collection

Tayassuidae

ETMNH	Element
800, 801, 803, 804, 806, 807,	Rt. humerus
809, 810, 817	

814-816, 818-824, 891, 1244,	Lt. humerus
1245	
830, 832, 835-846, 1584, 1632,	Lt. Femur
1654	
848-853, 1586, 1655-1657	Rt. Femur
857-859, 862, 864, 865	Lt. Tibia
870, 872-875, 1643, 1658-1660	Rt. Tibia
892-896, 898-904, 1241	Lt. Patella
897, 1242, 1587	Rt. Patella
905, 907, 909-912, 916, 922-	Lt. fused metatarsal
924, 927-929	
906, 908, 913-915, 917-921,	Rt. fused metatarsal
925, 926, 930, 1621	
931	Fused metatarsal
932	Rt. 4?
933	Lt. fused metacarpal
934-943, 970, 971, 1646	Lt. MC 3
944-947, 960, 972-975, 1596-	Rt. MC 3
1598, 1622	
948-959, 968, 969, 976, 977,	Lt. MC 4
1623, 1644, 1645	
961-967	Rt. MC 4
968-984, 1599, 1600, 1624,	unidentifiable MC/MT
1647-1649	
985-998	Lt. Astragalus
999-1005	Rt. Astragalus

1006-1025	Lt. Calcaneum
1026-1040, 1595	Rt. Calcaneum
1041-1120, 1156-1158, 1194, 1603-1607, 1620, 1625-1628, 1661	Proximal phalange
1121-1155, 1159-1193, 1572, 1610-1616, 1629-1631, 1662- 1664	Medial phalange
1195-1234, 1609, 1617-1619	Distal phalange
1235-1240, 1589, 1633, 1639	Fibula
1247-1251	Atlas
1252-1259	Axis
1260-1287, 1590, 1635, 1640- 1642	Cervical vertebrae
1288-1333, 1591, 1592, 1634, 1636	Thoracic vertebrae
1334-1345	Lumbar vertebrae
1346-1353	Sacrum
1354-1356, 1593	Caudal vertebrae
1357-1360	Lt. Scapula
1361-1365	Rt. Scapula
1366	Lt. Ischium
1367	Lt. Acetabulum
1368, 1369	Rt. Ischium
1370, 1372	Rt. Ilium/acetabulum

1371	Rt. Acetabulum
1594	Acetabulum
1601	Fused Metatarsal
1601	Metatarsal
1632	Femur head

McClung (MM) Collection

Platygonus compressus cranial material

60	Lt. partial dentary p ₄ -m ₃ to mandibular condyle
61	Lt. partial dentary p ₂ -m ₃
62	Lt. partial dentary p ₂ -m ₃ to partial mandibular condyle
63	Lt. angle of the mandible to partial mandibular condyle
64	Lt. angle of the mandible to partial mandibular condyle
65	Rt. angle of the mandible to partial mandibular condyle
66	Rt. dentary p ₃
67	Rt. dentary dp ₃ , dp ₄ -m ₁ , partial erupted m ₂ with synthesis Lt./Rt. deciduous canines and partially erupted canines
68	dentary Lt i ₁ -i ₃ , p ₂ -m ₃ ; Rt. i ₁ -i ₃ , p ₂ -m ₃
69	Lt I ¹
70	Lt I ¹
71	Rt. I 1
72	Rt. I 1
73	deciduous incisor
74	incisor
75	deciduous C
76	deciduous c
77	deciduous c
78	P ²

79	P ³
80	M ¹
81	Lt. M ²
82	Lt. M ³
83	Lt. M ³
84	Rt. M ³
85	upper molar fragment
86	deciduous p ₄
87	deciduous lower molar
88	deciduous lower molar
89	Lt. deciduous p ₃
90	partial Lt p ₃
91	Rt. p ₃
92	Rt. m ₁ with dentary fragment
93	Lt. m ₃
94	Lt. m ₃
95	Lt. m ₂ , m ₃ in dentary fragment
96	Rt. m ₃ fragment
97	Rt. I ¹
98	p ₃
99	Rt. M ¹
100	Rt. M ²
101	Lt. M ²
102	p ₂
103	Lt. m ₁ in dentary
104	Lt. m ₃
105	Rt. Canine
106	Upper Canine

107	Lt. Canine
108	Rt. Canine
109	Lower canine tip
110	Premaxilla with Lt. / Rt. Canines
111	Zygomatic process
112	Partial cranium with Lt. zygomatic process
113	Partial cranium with partial Lt. zygomatic process and nasal
114	Lower canine
115	Partial tip of lower canine
116	Partial tip to root of canine
117	Partial palate Lt. P ² -M ³ , broken Rt. P ⁴ -M ²
118	lower m ₂

McClung Museum

Platygonus compressus postcranial material

3	Lt. Humerus
3	Rt. Humerus
1	Lt. Femur
3	Rt. Femur
1	Lt. Tibia
4	Rt. Tibia

McClung Museum

Tayassuidae postcranial material

2	Rt. Humerus
4	Lt. Radius/ulna
3	Rt. Radius/ulna

5	Lt. Scapula
8	Rt. Scapula
6	Sacrum
3	Lt. Innominate
2	Rt. Innominate
3	Lt. Femur
4	Rt. Femur
2	Lt. Patella
3	Rt. Patella
2	Lt. Tibia
1	Rt. Tibia
5	Lt. Calcaneus
10	Rt. Calcaneus
6	Lt. Astragalus
4	Rt. Astragalus
5	Lt. MC III
4	Rt. MC III
7	Lt. MC IV
6	Rt. MC IV
11	unknown MC
5	Lt. fused MT
39	Proximal phalange
35	Medial phalange
17	Distal phalange

APPENDIX C
Guy Wilson Cave Tayassuidae Measurements and Taphonomic Information.

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age	Whole/ Fragment	Carnivore Damage					Utilization				Weathering Stage		
								Wolf	Rodent	Bear	UND.	None	None	Light	Light-moderate	Moderate - full	Full	Heavy	Stage
800	humerus	right				Adult	Whole	*	*						*				0
801	humerus	right			39	Adult	Whole	*	*						*				0
802	humerus	right	197		40.5	Adult	Whole	*							*				1 to 2
803	humerus	right				Adult	Whole	*	*								*		2
804	humerus	right			39	Adult	Whole	*							*				1
805	humerus	right	194		38	Adult	Whole				*	*	*						1
806	humerus	right	192			Adult	Whole				*		*						1 to 2
807	humerus	right				Adult	Whole	*	*								*		0 to 1
808	humerus	right	195		42	Adult	Whole				*		*						0 to 1
809	humerus	right			39.5	Adult	Fragment	*	*									*	0 to 1
810	humerus	right				Adult	Fragment	*										*	0 to 1
811	humerus	left	196.5		43	Adult	Whole	*					*						0 to 1
812	humerus	left	203.5		41	Adult	Whole	*				*							0
813	humerus	left	183.5		40	Adult	Whole	*	*									*	0
814	humerus	left			40.5	Sub-adult	Whole	*	*									*	0 to 1
815	humerus	left				Adult	Fragment	*										*	0
816	humerus	left				?Damage	Fragment		*									*	0
817	humerus	right			40	?Damage	Whole	*			*							*	0 to 1
818	humerus	left				Juvenile	Whole	*							*				1
819	humerus	left				Sub-adult	Whole	*							*				0 to 1
820	humerus	left	192			Adult	Whole				*				*				0
821	humerus	left				Adult	Fragment				*							*	0 to 1
822	humerus	left				Adult	Fragment	*										*	0 to 1
823	humerus	left			39	Adult	Fragment				*							*	0
824	humerus	left			42	Adult	Fragment		*		*							*	0 to 1
891	humerus	left				Adult	Fragment	*										*	3
1243	humerus	left	198.5		39.5	Adult	Whole		*				*						0 to 1
1244	humerus	left			39	Adult	Fragment				*							*	0 to 1
825	femur	left	195		49.5	Adult	Whole				*		*						0 to 1
826	femur	left	192.5		48	Adult	Whole	*					*						1
827	femur	left	206		48	Adult	Whole	*					*						0 to 1
828	femur	left	194		47.5	Adult	Whole		*				*						0 to 1
829	femur	left	191.5		46.5	Adult	Whole	*						*					1
830	femur	left				Adult	Fragment	*	*									*	0
831	femur	left	201.5		42	Adult	Whole				*		*						0 to 1

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage	
								Wolf	Rodent	Bear	Und.	None	None	Light	Light-moderate	Moderate - full	Full	Heavy	Stage
832	femur	left			44.5	Adult	Whole	*						*					0 to 1
833	femur	left	188		39	Adult	Whole	*	*								*		1 to 2
834	femur	left	196.5		44.5	Adult	Whole	*							*				0 to 1
835	femur	left				Adult	Whole				*		*						0 to 1
836	femur	left			46.5	Adult	Fragment	*									*		0
837	femur	left				Juvenile	Whole	*										*	0 to 1
838	femur	left				Sub-adult	Fragment				*							*	0 to 1
839	femur	left				Sub-adult	Fragment				*							*	1
840	femur	left				Sub-adult	Fragment				*							*	1
841	femur	left				Sub-adult	Fragment				*		*					*	0
842	femur	left				Juvenile	Fragment				*			*					0
843	femur	left				Juvenile	Fragment				*			*					0
844	femur	left				Juvenile	Fragment				*			*					0
845	femur	left				Juvenile	Fragment				*			*					0
846	femur	left				Juvenile	Fragment				*			*					0 to 1
1584	femur	left				Juvenile	Whole	*										*	1
1632	femur	left				Adult	Fragment	*										*	0
1654	femur	left				Juvenile	Whole	*										*	1
847	femur	right	185		43	Adult	Whole				*		*						0 to 1
848	femur	right				Adult	Whole	*						*					0
849	femur	right				Adult	Fragment	*										*	0
850	femur	right				Adult	Fragment	*										*	1
851	femur	right				Juvenile	Fragment				*							*	0 to 1
852	femur	right				Adult	Fragment	*										*	1
853	femur	right				Juvenile	Fragment				*			*					0 to 1
1586	femur	right				Adult	Fragment	*										*	0
1656	femur	right				Juvenile		*	*									*	0 to 1
1657	femur	right				Juvenile		*										*	0 to 1
854	tibia	left	183	44.5		Adult					*		*						0 to 1
855	tibia	left	193	51		Adult		*					*						0 to 1
856	tibia	left	190.5	~41		Adult			*					*					0
857	tibia	left		38.5		juvenile		*						*					0 to 1
858	tibia	left		49		Adult	Fragment	*					*						0

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage	
								Wolf	Rodent	Bear	Und.	None	None	Light	Light-moderate	Moderate - full	Full	Heavy	Stage
859	tibia	left		48		Adult	Fragment	*	*						*				0 to 1
860	tibia	left	191	48		Adult			*					*					0 to 1
861	tibia	left	197	46		adult			*					*					0
862	tibia	left	197.5			adult		*	*						*				0 to 1
863	tibia	left	188	41		adult		*	*						*				1
864	tibia	left	199			adult		*									*		1
865	tibia	left				adult	Fragment	*										*	0
866	tibia	right	192	51		adult		*						*					0 to 1
867	tibia	right	197	49		adult					*		*						1
868	tibia	right	181.5	~45.4		adult		*						*					0 to 1
869	tibia	right	193.5	48.5		adult		*						*					1
870	tibia	right				Adult		*										*	1
871	tibia	right	~210.5	49		adult						*		*					1
872	tibia	right				subadult		*							*				0 to 1
873	tibia	right				Juvenile		*									*		0
874	tibia	right	197			adult		*							*				0 to 1
875	tibia	right				Adult	Fragment	*										*	0 to 1
1643	tibia	right				Juvenile		*							*				1
876	radius-ulna	left				Adult			*		*			*					0 to 1
	radius		162.5		30														
	ulna																		
877	radius-ulna	left				Adult					*			*					0 to 1
	radius		152.5		30														
	ulna																		
878	radius-ulna	left				Adult		*						*					1 to 2
	radius		157		29														
	ulna		214.5																
879	radius-ulna	left				Adult						*	*						0
	radius		165.1		30														
	ulna		225.5																
880	radius-ulna	left				Adult		*	*									*	0 to 1
	radius		161																
	ulna																		

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage	
								Wolf	Rodent	Bear	Und.	None	None	Light	Light-moderate	Moderate - full	Full	Heavy	Stage
881	radius-ulna radius	left				sub-adult		*	*									*	0
	ulna																		
882	radius-ulna radius	left			33	~ Adult	Fragment	*										*	~0 to 1
	ulna																		
883	radius-ulna ulna	left				sub-adult	Fragment	*										*	0
884	ulna	left				Adult	Fragment				*							*	0 to 1
885	ulna	left				Juvenile		*					*						0 to 1
886	radius-ulna radius	right	162		31	Adult					*		*						0 to 1
	ulna																		
887	radius-ulna radius	right	157			Adult			*		*		*						1
	ulna		212.1																
888	radius-ulna radius	right	162.5		~34	Adult					*		*						0 to 1
	ulna		223.5																
889	radius-ulna radius	right	161.5		31	Adult		*					*						1
	ulna		222																
1246	radius-ulna radius	right			31	Adult					*							*	0 to 1
	ulna																		
933	MC IV fused	right																	
948	MC IV	left	91.1			adult													
949	MC IV	left	91.1			adult													
950	MC IV	left	88.3			adult													
951	MC IV	left	~95.6			adult													
953	MC IV	left	93.6			adult													
954	MC IV	left	~88			adult													
955	MC IV	left	90.8			adult													

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age
956	MC IV	left	~90.4			adult
957	MC IV	left	~94			adult
958	MC IV	left	92.3			adult
959	MC IV	left	~92			adult
961	MC IV	right	~94			adult
962	MC IV	right	92			adult
963	MC IV	right	92.7			adult
964	MC IV	right	86.7			adult
966	MC IV	right	89.8			adult
967	MC IV	right	~91.5			adult
985	astragalus	left	42.3			
986	astragalus	left	40			
987	astragalus	left	42			
988	astragalus	left	45.2			
989	astragalus	left	40			
990	astragalus	left	41			
991	astragalus	left	39			
992	astragalus	left	38.2			
993	astragalus	left	39.3			
994	astragalus	left	43			
995	astragalus	left	39.4			
996	astragalus	left	33			
997	astragalus	left	29			
999	astragalus	right	44.8			
1000	astragalus	right	40			
1001	astragalus	right	42.4			
1002	astragalus	right	39.1			
1003	astragalus	right	41.1			
1004	astragalus	right	37.5			
1006	calcaneus	left	64.8		23	subadult
1007	calcaneus	left	64		25.5	subadult
1008	calcaneus	left	69.1		22.2	adult
1009	calcaneus	left	72.5		24	adult
1010	calcaneus	left	71.2		23	adult

ETMNH	Element	Side	GL (mm)	GB Proximal end (mm)	GB Distal end (mm)	Age
1011	calcaneus	left	74.1		24.5	adult
1012	calcaneus	left	73.3		25	adult
1013	calcaneus	left	70		23	adult
1014	calcaneus	left	70		23.5	adult
1015	calcaneus	left	72.5		24	adult
1016	calcaneus	left	71.1		25.5	
1017	calcaneus	left	73		24.3	adult
1018	calcaneus	left	70.4		24	adult
1019	calcaneus	left	71		23.4	adult
1020	calcaneus	left	73.2		24	adult
1021	calcaneus	left	72.4		23	adult
1022	calcaneus	left	73		23.5	adult
1023	calcaneus	left	71		24	adult
1024	calcaneus	left	70		23	adult
1025	calcaneus	left	60		18.2	subadult
1026	calcaneus	right	66		22	subadult
1027	calcaneus	right	77.1		24.5	adult
1028	calcaneus	right	66.5		21.4	subadult
1029	calcaneus	right	74.2		22	adult
1030	calcaneus	right	74		21.5	adult
1031	calcaneus	right	71.2		20	adult
1032	calcaneus	right	72		24	adult
1033	calcaneus	right	70.2		21	adult
1034	calcaneus	right	62.3		21	subadult
1035	calcaneus	right	63		19.5	subadult
1036	calcaneus	right	75		23.2	adult
1037	calcaneus	right	71.4		24	adult
1038	calcaneus	right	72.5		22.5	adult
1039	calcaneus	right	74		21	adult
1040	calcaneus	right	73.1		21	adult

ETMNH	Element	Side	AP (mm)	T (mm)	Age	Whole/ Fragment
1378	lower canine in jaw	right	10.9	7.7	adult	Whole
1383	mandibular syph.	left	10.1	7	adult	Whole
1383	mandibular syph.	right	10.5	7	adult	Whole
1384	lower canine in jaw	left	13.6	11.8	adult	Whole
1395	lower canine	left	14.4	11.3	adult	Whole
1396	lower canine	left	~12.1	~10	adult	Whole
1397	lower canine	left	12.8	9.9	adult	Whole
1398	lower canine	left	12.5	~8.8	adult	Whole
1399	lower canine	left	~12.2	~9.1	adult	Whole
1400	lower canine	left	~12	~9.2	adult	Whole
1401	lower canine	left	13	9.6	adult	Whole
1402	lower canine	left	11.6	9.3	adult	Whole
1403	lower canine	left	10.7	8.9	adult	Whole
1404	lower canine	left	11.6	9.5	adult	Whole
1405	lower canine	left	13.2	10.3	adult	Whole
1406	lower canine	right	15	11.6	adult	Whole
1407	lower canine	right	~13.7	12.4	adult	Whole
1408	lower canine	right	~12.6	~9	adult	Whole
1409	lower canine	right	13.68	11	adult	Whole
1410	lower canine	right	11	8.8	adult	Whole
1411	lower canine	right	13.6	10.7	adult	Whole
1412	lower canine	right	14.5	11.4	adult	Whole
1415	lower canine	right	~10.9	9.1	adult	Whole
1418	lower canine	right	12.3	11	adult	Whole
1420	lower canine	right	~10.6	~8.3	adult	Whole
1421	lower canine	right	~11.8	9.3	adult	Whole
1391	Upper Canine in jaw	right	15.1	8.2	adult	Whole
1392	Upper Canine in jaw	left	12.5	7.7	adult	Whole
1429	Upper Canine	left	~18.2	~12	adult	Whole
1430	Upper Canine	left	~17.3	10	adult	Whole
1431	Upper Canine	left	~13.7	9.3	adult	Whole
1432	Upper Canine	left	17.7	10.2	adult	Whole
1433	Upper Canine	left	13.8	8.7	adult	Whole
1435	Upper Canine	left	19.7	10.5	adult	Whole
1436	Upper Canine	left	13.2	~7.2	adult	Whole

ETMNH	Element	Side	AP (mm)	T (mm)	Age	Whole/ Fragment
1437	Upper Canine	left	~13.3	~7.4	adult	Whole
1438	Upper Canine	left			adult	Whole
1439	Upper Canine	left			adult	Whole
1440	Upper Canine	left			adult	Whole
1441	Upper Canine	left			adult	Fragment
1442	Upper Canine	left			adult	Fragment
1443	Upper Canine	right	12.3	7.4	adult	Whole
1444	Upper Canine	right	~13.8	~8.7	adult	Whole
1445	Upper Canine	right	13.8	8.5	adult	Whole
1446	Upper Canine	right			adult	Whole
1447	Upper Canine	right	~12.7	7.6	adult	Whole
1448	Upper Canine	right	~16.6	~9.8	adult	Whole
1449	Upper Canine	right			adult	Whole
1450	Upper Canine	right	~18.7	~10.8	adult	Whole
1451	Upper Canine	right			adult	Whole
1452	Upper Canine	right	~16	10	adult	Whole
1453	Upper Canine	right			adult	Fragment
1454	Upper Canine	right			adult	Fragment

<i>Mylohyus</i> sp.					
ETMNH	Element	Side	length	AW (mm)	PW (mm)
1581	P ²	left	9.36	~6.89	
1581	P ³	left	11.96	10.7	11.85
1581	P ⁴	left	13.89	12.61	13.2
1581	M ¹	left	16.58		14.75
1581	M ²	left	17.16	~15.34	14.83
1582	P ⁴	right	14.61	12.95	13.63
1583	M ¹	right	15.21	14.52	14.6

MM#	Element	Side	GL (mm)	GB (mm)	age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage	
							Wolf	Rodent	Bear	UN D	N/A	N/A	Light	Light to Moderate	Moderate to Full	Full		Heavy
1	humerus	left	189	45	adult	Whole	*						*					0 to 1
2	humerus	left	193	~45	adult	Whole		*			*		*					0 to 1
3	humerus	left	175	41	subadult	Whole					*		*					0 to 1
4	humerus	right			subadult	Whole	*						*					0 to 1
5	humerus	right	189	42	adult	Whole	*						*					0 to 1
6	humerus	right	~180.5	~46	subadult	Whole	*						*					1
7	humerus	right	~196	~42.5	adult	Whole					*	*						0
8	humerus	right		~44.5	adult	Whole	*	*					*					~1
9	radius-ulna	left		32	juvenile	Whole					*					*		1
10	radius-ulna	left	213.5	28.5	adult	Whole					*		*					0 to 1
	radius		153.5	28.5														
	ulna		~207	28														
11	radius-ulna	left		30.5	subadult	Whole		*					*					0 to 1
	radius		~144.5	30.5														
	ulna			28.5														
12	radius-ulna	left		41	adult	Whole					*		~*					0
	radius		162	37.5														
	ulna																	
13	radius-ulna	right	~204.5	38.5	adult	Whole	*						*					0
	radius		154.4	31.5														
	ulna																	
14	radius-ulna	right	221.5	34	adult	Whole					*		*					0
	radius		160	31.5														
	ulna		214	25.5														
15	radius-ulna	right		38	adult	Whole					*		*					0
	radius		152.5	33.5														
	ulna			28														

MM#	Element	Side	GL (mm)	GB (mm)	age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage
							Wolf	Rodent	Bear	UND	N/A	N/A	Light to Moderate	Moderate to Full	Full	Heavy	
16	tibia	right	~155	~37.5	juvenile	Whole				*						*	0 to 1
17	tibia	right	~161.5	38	subadult	Whole	*									*	0 to 1
18	tibia	right	186.5	45	adult	Whole				*		*					0 to 1
19	tibia	right	203	50	adult	Whole				*		*					0 to 1
20	tibia	right	~185	43	subadult	Whole	*							*			0 to 1
21	tibia	right		48.5	adult	Whole		*		*						*	0 to 1
22	tibia /prox	left		44	subadult	fragment					*					*	0
23	tibia /prox	right		44	subadult	fragment					*					*	0 to 1
24	femur	left	200.5	55	adult	Whole				*		*					0 to 1
25	femur	left		~46.5	subadult	Whole					*					*	0 to 1
26	femur	left		44	adult	Whole				*		~*					0 to 1
27	femur	right			juvenile	Whole				*						*	~0
28	femur	right			juvenile	Whole				*						*	~0
29	femur	right	186.5	54	adult	Whole	*	*				*					0 to 1
30	femur	right	176	51	adult	Whole				*		*					0 to 1
31	femur	right	195.5	52.5	adult	Whole					*	*					0
32	femur /dist	left		44.5	subadult	fragment	*									*	N/A
33	femur /dist	right		41	subadult	fragment					*					*	N/A
34	femur /dist	right		44.8	subadult	fragment				*						*	N/A
35	calcaneus	left	~62.4	21.9	subadult	Whole					*						
36	calcaneus	left	63.16	21.48	subadult	Whole					*						
37	calcaneus	left	70.1	23.46	adult	Whole					*						
38	calcaneus	left	76.51	25.78	adult	Whole					*						
39	calcaneus	left	75.89	25.6	adult	Whole				*							
40	calcaneus	right	60.87	23.2	juvenile?	Whole					*						
41	calcaneus	right	71.67	22.4	subadult	Whole					*						
42	calcaneus	right			adult	Whole	*	*									
43	calcaneus	right	70.56	23.6	adult	Whole					*						
44	calcaneus	right	74.19	24.86	adult	Whole				*							

MM#	Element	Side	GL (mm)	GB (mm)	age	Whole/ Fragment	Carnivore Damage					Utilization					Weathering Stage	
							Wolf	Rodent	Bear	UND	N/A	N/A	Light	Light to Moderate	Moderate to Full	Full	Heavy	Stage
45	calcaneus	right	72.78	24.28	adult	Whole												
46	calcaneus	right			adult	Whole		*			*							
47	calcaneus	right	67.75	23.08	adult	Whole						*						
48	calcaneus	right	70.33	22.91	adult	Whole						*						
49	calcaneus	right	59.74	23.12	subadult	Whole						*						
50	astragalus	left	42.68	26.56	adult	Whole						*						
51	astragalus	left	38.63	22	adult	Whole						*						
52	astragalus	left	40.5	21.97	adult	Whole						*						
54	astragalus	left	40.84	23.44	adult	Whole					*							
55	astragalus	left	42.39	25.6	adult	Whole						*						
56	astragalus	right	39.64	23.45	subadult	Whole						*						
57	astragalus	right	42.74	26	adult	Whole						*						
58	astragalus	right	41.13	22.88	adult	Whole		*										
59	astragalus	right	44.22	25.65	adult	Whole						*						

MM	Element	Side	AP (mm)	T (mm)	Age	Whole/ Fragment
105	Upper Canine	right	17	10.25	adult	Whole
106	Upper Canine		~12.47	8.24	adult	Whole
107	lower canine	left	14.17	11.46	adult	Whole
108	lower canine	right	12.06	10.21	adult	Whole
110	Upper Canine	left	17.32	8.94	adult	Whole
110	Upper Canine	right	17.3	9.08	adult	Whole

APPENDIX D

Mylohyus Tooth Measurements From Various Pleistocene-aged Sites

Friesenhahn Cave, Bexar Co., TX <i>M. nasutus</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	9.6	8.1	8.7
	right	9.5	8	8.7
P ³	left	12.5	11.5	12.3
	right	11.3	10	10.7
P ⁴	left	14.2	13.9	14.3
	right	13.5	11.7	13
M ¹	left	15.7	14.7	15.1
	right	14.9	13.6	13.7
M ²	left	17.1	16.1	15.5
	right	16.2	14.1	14.2
M ³	left	18.8	14.4	11.7
	right	17.7	13	10.1

(Lundelius, 1960)

Ladds, Bartow Co., GA <i>M. nasutus</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	11.1	8.6	8.9
	right	11.2	8.8	9
P ³	left	13.1	11	11.9
	right	13.4	11.1	12.3
P ⁴	left	15	14.2	14.4
	right	15.2	14.3	14.4
M ¹	left	17	15.2	15
	right	16.6	15.4	14.9
M ²	left	18	16	14.9
	right	17.8	16.2	15.4
M ³	left	19.3	15.1	11.8
	right	19.3	14.7	11.9

(Ray, 1967)

Haile VIII, FL <i>M. fossilis</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	9.2		8.7
	right	8.9		8.9
P ³	left	11.3	10.7	11.2
	right	10.9	10.6	10.9
P ⁴	left	12.1	11.9	12.3
	right	11.8	11.6	12.5
M ¹	left	14.1	13.6	13.5
	right	14.1	13.9	13.6
M ²	left	14.9	14.1	13.8
	right			
M ³	left	16.3	12.5	10.4
	right			

(Ray, 1967)

Plummer Cave, Douglas Co., MO <i>M. fossilis</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	7.8	8.2	10.5
	right	7.3	8.2	10.7
P ³	left	10.4	10.7	11.7
	right	10.5	10.7	11.4
P ⁴	left	12.4	12.5	15.6
	right	12.5	12.6	15.1
M ¹	left	14.9	15	14.7
	right	14.8	14.7	14.6
M ²	left	15.4	14.6	15.1
	right	15.5	14.9	14.4
M ³	left	13.2	12	
	right	10.9	11	

(Westgate & Messick, 1985)

Itchtucknee River, FL <i>M. fossilis</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	8.6		8.2
	right			
P ³	left	10.9	10.5	11.5
	right			
P ⁴	left	12	12.1	12.1
	right	12	12.2	12.6
M ¹	left	15.1	13.8	14.2
	right	14.8	13.9	14.3
M ²	left	15.2	14.6	14.1
	right	15	14.8	14.2
M ³	left	17.5	12.8	10.7
	right	17.3	12.7	10.7

(Ray, 1967)

Sandahl Grave Pit, KA <i>M. nasutus</i>				
Element	Side	length (mm)	AW (mm)	PW (mm)
P ²	left	10.3	8.4	8.5
	right	10.5	8.6	8.9
P ³	left	12.6	11.4	11.8
	right	12.8	11.6	12
P ⁴	left	14.4	13.7	14
	right	14.7	13.1	14.1
M ¹	left			
	right			
M ²	left	16.3	15.9	15.1
	right	16.4	16	15
M ³	left	17.4	14.2	11.4
	right	17.7	13.9	11.3

(Semken & Griggs, 1965)

APPENDIX E

Mylohyus Postcranial Measurements From Various Pleistocene-aged Sites

Element	Friesenhahn Cave, Bexar Co., TX <i>Mylohyus nasutus</i>			Ladds, Bartow Co., GA <i>Mylohyus nasutus</i>			Plummer Cave, Douglas Co., MO <i>Mylohyus fossilis</i>		
	GL (mm)	GB (mm)	N	GL (mm)	GB (mm)	N	GL (mm)	GB (mm)	N
humerus	217.5		4	215.5		1	221		2
proximal									
distal					44.1	1			
radius	179.4		5				186.5		2
ulna	239.25		4				240.5		2
metacarpal IV	102.7		2	100.75		2	101		1
femur	214.3		4	218		1	221.5		2
proximal		52.9	4		54.8	1			
distal		41.7	4		48.2	1		49.5	2
tibia	230		2				227.5		2
proximal		53.5	2						
distal		32.4	2					32.4	2
astragalus				~ 41.1		1	41.9		1
proximal					~ 23.3	1		23.4	1
distal					~ 22.8	1			
calcaneum									

(Lundelius,
1960)

(Ray,
1967)

(Westgate
&
Messick,
1985)

APPENDIX F

Platygonus compressus Postcranial Measurements From Various Pleistocene-aged Sites

Element	Ann Arbor, MI			Belding, MI			Lone Star Peccary Cave, KY			Mosherville, Bradford Co, PA			*Sheriden Pit, OH			
	GL mm	GB mm proximal	GB mm distal	GL mm	GB mm proximal	GB mm distal	GL mm	GB mm proximal	GB mm distal	GL	GB proximal	GB distal	GL	GB proximal	GB distal	No.
humerus	196.9		41.9	193.2		40.8			41.9	194	46.8	41.6	195.6			8
	197.4		42.5							195	47.5	39.8			41.2	31
	202		44.4													
radius length	165.3	32.1		154.7	30.3		160	32.4		160			161.6			9
	165.1	32.3		157.9	29.5									31		29
	171.4	32.8														
	171.6	32.3														
femur length	196.3		49.3	190.1		45	187		46.5	190			191.2			6
	196.4		48.2	189.6		46.7				~189					46.5	10
	204.7		49.3													
	197.1		49.9													
tibia length	201.3	48.1	32.1	198.8	45.9	30.5					46.1		195.7			10
	201.8	48.7	28.1	192.1	46.4									42.9		13
	204.6	47.8														
	(Eshelman et al., 1972)			(Wagner, 1903)			(Wilson et al., 1975)			(Ray et al., 1970)			(Gobetz, 1998)			

* Measurements in millimeters are averages due to large sample.

Platygonus compressus Postcranial Measurements From Various Pleistocene-aged Sites

Element	Washington Township, Sandusky Co., OH			*Welsh Cave, KY			
	GL (mm)	GB (mm) proximal	GB (mm) distal	GL (mm)	GB (mm) prox	GB (mm) distal	No.
humerus	200			190.1			22
						40.7	32
radius length	167			157			15
					30.3		28
femur length	200			187.3			19
						45.3	31
tibia length	195	48	33	194.2			15
					47.8		15
						29.9	17
	(Hoare, etal 1964)			(Guilday et al. 1971)			

* Measurements in millimeters are averages due to large sample.

VITA

APRIL SEASON NYE

Personal Data: Place of Birth: Greeneville, TN

Education: Public Schools, Greene County, Tennessee
B.S. Geography, Geology minor, East Tennessee
State University, Johnson City, Tennessee 2002
M.S. Technology, Geoscience concentration, East
Tennessee State University, Johnson City, Tennessee 2007

Professional Experience: Graduate Assistant, East Tennessee State University
Geology Department and Gray Fossil Site 2003-2004

Assistant Curator for the East Tennessee Museum of
Natural History, Gray, TN through East Tennessee State
University and Lab Supervisor, Lab and Field Technician
2005-2006

Research Assistant for the East Tennessee State University
Gray Fossil Site, Johnson City, TN 2006-2007

Publications: Nye, A., Stout, G., and Wallace, S. (2004). A customized attribute information database for museum collection storage and analysis: Gray Fossil Site. *Journal of Vertebrate Paleontology* 24(3), Abstracts, p.98A.

Current research: East Tennessee State University Graduate Studies Research Grant for an accelerator mass spectrometry (AMS) ¹⁴C radiocarbon date for Guy Wilson Cave, Sullivan County, TN *Mylohyus* sp. (January 2007).

Professional Memberships:

Society of Vertebrate Paleontology (SVP)

National Speleological Society, INC. (NSS)

Mountain Empire Grotto, Virginia Region of the NSS

The Graduate and Professional Student Association (GPSA) of East

Tennessee State University