**Mia Carey**
**"The Untold Story of Nicodemus: Reconstructing Environment and Health"**
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While more archaeologists are becoming interested in African American sites from the Reconstruction period, many have had the tendency to focus their research on slavery and the pre-Civil War era. Archaeologists have made significant contributions to the understanding of enslaved peoples; however, they have overlooked areas that may lead to a more holistic perspective of the African American past. More research is starting to investigate how the daily lives of African Americans changed after Emancipation, during the Exoduster Movement, and into the Reconstruction period. Among others, Charles Orser and Paul Mullins were some of the first to highlight the importance of these sites. Archaeological investigations of post-Emancipation African American sites have provided significant insights about this time period. These studies inform the public that African Americans had a history that was characterized by perseverance and the ability to prosper even when faced with the harshest conditions.

Nicodemus was an exclusively African American town established in 1877 in the northwestern region of Graham County, Kansas. Waves of Exodusters migrated from the lush, bountiful fields of Kentucky and Tennessee, escaping oppression and prejudice to settle in Kansas where they were unaccustomed to the harshness of life on the plains. The Exodusters were former slaves who fled the southern United States to settle in Kansas during the late 19$^{th}$ century. Advertisements boasted about the lush conditions and opportunity to own land for five dollars a plot. Although initially the residents struggled for survival, they were able to blossom. At its height the community boasted a population of almost 700, included a bank, two hotels, several churches, two newspapers, a drug store, three general stores, a literary society, a law office, an ice cream parlor, a baseball team, a band, and a benefit society.

Despite a steady decline after the Union Pacific Railroad decided to bypass the township, Nicodemus remains the oldest surviving black town west of the Mississippi. In 1996 Nicodemus was designated as a National Historic Site.

To learn about the daily lives of African Americans, specifically the residents of Nicodemus, it is important to reconstruct the environmental changes and health conditions through the past behavioral practices of the community. Through an analysis of the archaeological data, we can gain a general understanding of how the residents managed their natural and social surroundings and how they regulated their health practices in order to survive in an unfamiliar territory. This study combined faunal analysis, soil studies, and a look at material culture to understand conditions of sanitation, health, and ecological relationships. The main objective of this research was to detect and better understand survival strategies, processes of adaptation, and the quality of health for African American pioneers in the Midwest.

Considering many aspects of Exoduster life, this research provided a general view of how the Nicodemus Exodusters adjusted to life in Kansas. This research investigated many facets of the conditions surrounding the Nicodemus Exodusters by combining an in-depth look at faunal collection and soil samples. To better answer questions related to the daily lives of the residents, health, and sanitation, questions focused on different adaptive mechanisms. This study turned to two locations with high concentrations of faunal remains. Soil samples collected from these areas presented the opportunity to discover parasites or rodent droppings that could pose potential health risks to the settlers. Through this research, we uncovered the impacts of environment on cultural behavior as well as the impact of culture on environment. Research studies such as this one are significant because they provide an avenue for descendants of Black towns to learn about a history, which has been overlooked in many textbook pages.

There is much to be learned from the study of archaeological sites where African Americans settled during the Reconstruction period and later years. Many exclusively African-American towns were established during this period, which highlights the ability of these communities to remain tenacious in light of unpleasant circumstances. Driven by economic opportunities and the ability to own land, which symbolized freedom, African Americans fled the south and settled in not only urban environments such as Chicago and Detroit, but rural environments as well. The founders of Nicodemus were attracted to Kansas by the promise of fertile lands that offered the perfect conditions for planting; unfortunately, upon arrival some families were so disillusioned by the starkness of the land that they returned to the South.

Nicodemus is located in the Northwestern region of Kansas, which is characterized by rolling terrain and gently sloping farmland. The natural landscape of the region lacks a large number of trees but offers the perfect conditions for tough short grass plants. "Prior to the establishment of Nicodemus and other regional settlements by pioneers of European descent, northwestern Kansas was dominated by short grass and mixed-grass prairie communities" (BVHA 2003:122). Unpredictable farming conditions are often exacerbated by little rainfall, often only an average of twenty-two inches of rain per year (Woods 2007). The Nicodemus Exodusters were also faced with long, cold winters, hot summers, violent hail storms, high winds, occasional tornados, and swarms of locus. Although the residents transformed the environment with buildings and farming, most of the indigenous plant life has survived (Woods 2007). The prairie is "cut by narrow, discontinuous ribbon of riverine forest" (BVHA 2003:122).

The 2011 research conducted under the support of the McNair program is a continuation of a previous study that focused on reconstructing environment and health through solely looking at faunal remains. A preliminary faunal analysis on the sample excavated from the Thomas Johnson and Henry Williams farm (14GH102) resulted in the conclusion that the sample was not a representative diet.

Considering the low percentage of domesticated animals and the prevalence of small mammals of a variety of species, it was highly likely that the animals were commensal. Within the collection there were remains of two pigs, a cow, several small bird species, amphibians, rodents, rabbit and/or hare, and small carnivores. A minimum number of individuals (MIN) count was conducted for the pig, cow, and rodent remains, of which there were thirteen craniums and/or mandibles. Bone modification was also taken into consideration during analysis; despite there being little to no modification on the bones, there were a few which had been gnawed, butchered (e.g. cow scapula), or sawed (e.g. pig mandible.) The most interesting results from the analysis were the presence of very few large mammal species that are commonly expected from a farming community. We also found no presence of fish remains, despite common references to fishing in the oral traditions and the close proximity of the site to water resources. The community was located near the south fork of the Solomon River and was close to the Saline River, Bow Creek and Spring Creek. There was a weak branch of Spring Creek, which flowed through the center of the Johnson and Williams' farm, which residents recall having an abundance of fish at one time (Woods 2007). Table 1.1 displays the results of the results of the preliminary faunal analysis.

Since zooarchaeological perspectives can help shed light on the relationship between humans and animals and the impact of that relationship on their environment (Reitz and Wing 1999), this project questioned the processes in which animals entered the archaeological record. The significance of preliminary analyses indicated that the animals did not become a part of the archaeological record through human intervention. Since the results demonstrated that these animals were commensal, our recent work turned to commensal rodents for insight about the environment and health of the Nicodemus residents. Commensal rodents depend heavily upon human habitats for basic essentials and as a result they may contaminate the small amounts of stored foodstuffs they consume as well as pose potential health risks to humans (Sullivan 1997). Contamination of supplies can occur through animal urine, droppings, and hair (Sullivan 1997).

Of the thirty-six rodents found in Kansas, only three rodents are non-native (Potts et al. 2000). These three species of rodents, the house mouse, Norway rat, and black rat, were introduced to the United States during the 17th and 18th centuries (Sullivan 1997). Rodents are hosts to parasites who also pose potential health risk to humans. "Parasite remains from archaeological sites can address a remarkably broad range of questions regarding past behavior and environment" (Reinhard 1992:231); specific questions about the health and environment of the Nicodemus settlers can be answered through the presence of parasites in the soil.

Several variables were taken into consideration in the design of a research plan. Faunal analysis can tell several things about diet and environment; however, when coupled with a parasitic analysis of soil it can give more precise information. As an extension of previous research, we revisited the fauna. This time the provenance and type of bone was taken into consideration. To further narrow down the sample, close attention was given to rodent remains. Data analysis compared geographic provenance, exact feature locations, and species of previously identified faunal elements. The features that were examined for this study were the root cellar (Feature 1), the dugout/soddie structure (Feature 2), and the trash midden, or trash pit, (Feature 1077), all located on the Thomas Johnson and Henry Williams farm (14GH102). We also collected samples from the schoolyard on District 1 Schoolhouse (14GH103) site. Remains located in the landscape were discovered through 1 x 1 shovel test pit units, and the information obtained was graphed to show distribution of the fauna across the landscape. Simultaneously, the fauna was compared to a rodent identification key (RIK) in order to determine species with in specific families. The key, Figure 1.3, gives the common and Latin name of the two non-native rodent species from the family Muridae. The figure displays a lateral, ventral, and dorsal view of the cranium. Rodent remains that could not be identified based on this key, were placed into general rodentia families to determine if a dental pattern could be matched.

A species account was constructed for the house mouse (*Mus musculus*) and Norway rat (*Rattus norvegicus).* While there are three Old World mice and rats in rodents, the third species the black rat (*Rattus rattus*) only has a known locality in Wichita (UGA 2011). These three species are Old World mice and rats that were introduced to the United States during the 17$^{th}$ and 18$^{th}$ centuries through various methods. The species account included the Latin name, the common name, habitat, description, distribution, adult weight, length (head to tail), and general impacts. These two species were examined specifically since they were non-native to Kansas, and they arrived in the United States a century prior to the Nicodemus settlers migrating to Kansas. Their presence in Kansas indicates of how far their geographic distribution had spread, and also suggests that the Exodusters could have introduced them to Kansas.

Once all of the faunal information was graphed and compared to the RIK, soil samples from the root cellar (Feature 1) and dugout (Feature 2) were examined for parasite eggs. In order to examine the soils for parasitic remains, samples need to be rehydrated. The final stage in the research portion of the project entailed the rehydration of soil samples. Following the methodology of Reinhard (1994), a drop of glycerol was added to the samples on a microscopic slide. Once a cover slide was placed over the sample, the slides were examined under a Sharper Image 130X USB microscopic camera. Several still images were taken of each sample, blown up, and then examined further for the presence of parasite eggs. If present within the sample, parasite eggs can be distinguished by their cell membranes.

The house mouse (*Mus musculus*) has had a relationship with humans that spans over 8,000 years, and it is the most geographically distributed mammal other than humans (UGA 2011). Since their geographic distribution is worldwide, they inhabit almost all types of habitats included agricultural areas, coastlands, natural forests, planted forests, and urban areas. A wild house mouse has fur that is commonly light brown to black, with belly fur that can either be white, brown, or grey. This species has a relatively long tail (60-105 mm) that is approximately equal to its head and body length that ranges from 65-95 mm (UGA 2011). It has large, prominent black eyes, round ears, and a pointed muzzle with long whiskers. As commensal animals, they are mainly economic pests; they consume and spoil crops and human foodstuffs, as well as host a range of infectious diseases and parasites that are transmittable to humans (UGA 2011). They are best known for transmitting the bubonic plague and salmonella.

The Norway rat (*Rattus norvegicus*) is a member of the Muridae family that has brown fur on its back with pale grey fur on its belly (UGA 2011). *Rattus norvegicus* has relatively small ears and females have twelve teats. This species is also globally widespread and inhabits a variety of different habitats including agricultural areas, coastland, natural forests, planted forests, range and grasslands, riparian zones, ruderal/disturbed areas, urban areas, and wetlands. Adults normally weigh between 150 and 300 grams, however, some adults may reach 500 grams. The average adult length ranges up to 390 millimeters and the tail is shorter than the heady-body length. The general impacts of the Norway rat include the restriction of the regeneration of many plant species through consumption of seeds and seedlings (UGA 2011). Norway rats are carnivorous and usually prey upon smaller animal species such as reptiles, small birds, and bird eggs. Like other rodent species, the Norway rat will urinate and defecate in human foodstuffs and will eat crops. Additional impacts caused by the Norway rat may include chewing of power cables and the spread of diseases (UGA 2011).

Figure 1.2 shows the distribution of the fauna. It illustrates that the highest concentration of all species was in the root cellar (Feature 1). Percentages of the fauna concentrations were calculated by counting the number of bags that contained faunal remains; there were approximately 153 bags that were spread over Feature 1, Feature 2, and Feature 1077 of site 14GH102, and from the schoolyard of site 14GH103. The coordinates for the root cellar range (Feature 1) from N510, E505 to N510, E515 and N510, E505 to N515, E505. The coordinates for the dugout/soddie range from N510, E528 to N510, E328 and N510, E528 to N525, E528. The trash midden (Feature 1077) was concentrated within the coordinates of N540, E525 and N560, E530. Approximately 49 percent (75 bags) of the faunal remains were concentrated within the root cellar compared with approximately 31 percent (48 bags) of the remains that were concentrated within the dugout/soddie. The trash midden contained only 8.5 (13 bags) percent of the remains, shovel test pits uncovered 2.6 percent (4 bags) of the remains, and 14GH103 contained 4.6 percent (7 bags) of remains. The distribution of the fauna over the landscape supports the assumption that the residents freely moved as they ate and discarded their food wherever they were at that time. The distribution of the rodents demonstrates that the farm had a significant amount of rodents present at the site.

Analysis of 11 rodent remains resulted in the tentative positive identification of one right mandible of a house mouse and two separate vole individuals. Tentative positive identification was made upon comparison to the rodent identification (RIK) as well as further analysis of the dentition. All members of the Muridae family present a lower dentition of three molars not including the incisors. Specimen 496 did not fit the dentition formula for the Muridae family; it presented a pattern consistent with lagomorphs, the rabbit and hare family. Identification of specimens 436b and 501 were inconclusive as they were incomplete. Both specimens were missing teeth and specimen 501 was unlike any of the other rodent remains.

In the process of analyzing soil content, twenty-four samples were taken from eight bags of soil. The four sampled bags from the root cellar and four from the dugout/soddie did not reveal the presence of parasite eggs; however, they revealed an animal that does offer some insights about the environment. Six of the eight sampled bags contained the remains of snail shells. These shells are clear to white in color, ranging in size from the point of a lead pencil to the size of a small number 2 pencil eraser. The highest concentration from one sample was from bag 1880 located in the dugout/soddie (N515, E 532) with a depth of 40-50 cm (15.7 in – 19.7 in). Other snail shell discoveries were made at the 80-90 cm (31.5 in – 35.4 in) mark and the 90- 100 cm (35.4 in – 39.4) mark. The varying depth of the snail finds tell us that the snails were widely distributed throughout the soil.

The highest concentrations of fauna are located within the root cellar and the dugout/soddie, which is significant when one considers that the root cellar is where all of the foodstuffs were stored by the family. Three of the previously identified species were placed in the context of the five locations. The bovine (domesticated cow) remains were located in the schoolyard ash midden of the site 14GH103, which is interesting since this midden was probably not used as a primary trash dump. The sus (domesticated pig) remains were distributed between Feature 1, Feature 2, and Feature 1077 of site 14GH102. Feature 2 contained three bags of remains, while Feature 1 contained two bags and Feature 1077 only contained one. The rodent remains were also distributed between the three features. This is interesting since most of the commensal rodent remains were concentrated within the root cellar where all of the foodstuffs were stored. The risk of food contamination and presence of parasites should be particularly high for this feature. Close examination was paid to the soil in this feature for this reason.

It is not significant to find that parasites were absent within the analyzed soil samples. In most cases, researchers will find parasitic remains in areas where the human population is condensed to one area. This is the reason that most parasitic analyses of privies have been conducted in urban environments such as Harper's Ferry, West Virginia, Washington DC, and New York. However, it is known that rodents such as the house mouse and vole do carry diseases. One alternative explanation for the lack of parasite remains could be that the environment was not conducive for preserving egg remains if they had been present. In addition adult parasites such as fleas and ticks may not have been preserved. With the presence of several small bird species it is likely that once they became trapped within the root cellar they would have sought out these parasites for food. Fortunately, health conditions of the Nicodemus residents can still be relatively understood to a certain degree.

Archaeologists can assess environmental conditions through looking at the presence of microfauna. Microfauna are animals such as snails, bats, rats, and species of mollusks that give better indications of environmental conditions than larger animals because they are more sensitive to environmental changes. The presence of snail shells in the soil samples indicates the quality of the soil. When researchers suspect that soil has been polluted by heavy metals such as cadmium, they use snails as one tool to assess how much damage has been caused to the environment. Snails accumulate heavy metals in their soft tissues and their shells (Gomot 1997). Gimbert et al. (2008) refer to snails as biological indicators, or "species which reflect the condition or state of the environment in which they thrive" (736). Snails and other invertebrate animals "are known to be efficient accumulators of trace elements (Dallinger 1994:27). Heavy metal concentrations within the snail's body are ideally supposed to reflect heavy metal concentrations within soil (Dallinger 1994), however, these concentrations can be affected by a number of factors such as the snail's weight and age. Other than measuring accumulation within the body to test soil pollution, snails can also respond to heavy metal concentrations by disrupting their development and nutrition levels (Dallinger 1994). Snails, which are terrestrial gastropods, are known to accumulate trace elements such as copper, cadmium, and lead. Trace elements are elements that are essential to an organism's proper body function, but become toxic at higher concentrations. Usually symptoms associated with exposure to high concentrations of trace elements go unnoticed as the effects are usually chronic and build up over continued exposure (Chang and Page 2000).

Exposure to high concentrations of the three trace elements accumulated in the bodies of snails can lead to a variety of health problems. There is little data to offer support that cadmium is an essential element for the body, in fact, there is more evidence to support the argument that cadmium is toxic to humans regardless of whether it is ingested, injected, or inhaled (Nath 2003). Low-level oral exposure to cadmium can cause damage to the "absorptive cells of the intestinal villi, changes in blood pressure, cardiac hypertrophy, and kidney damage" (Nath 2003:425). Lead poisoning in humans has a variety of impacts on the human body including damaging the kidney, heart, and vascular system (Nath 2003). "There is great interest in the possible effects of low intakes on the nervous system, particularly in children where claims have been made that mental retardation may be correlated with drinking water lead concentrations" (Nath 2003:419). Copper poisoning is rare and "usually results from contamination of foodstuffs or beverages by copper containers or from the accidental or deliberate ingestion of gram quantities of copper salts" (Nath 2003:247).

The discovery of snails within soil can help to reconstruct the environment and health conditions of the Nicodemus residents. While a buildup of trace elements may be beneficial for plant growth, small amounts of chemicals have negative impacts on the organisms who consume them (Chang and Page 2000). Through anthropogenic activities such as intensive farming, humans may increase the presence of trace elements within the soil, which can have a negative impact on both their health and the environment. Snails may help answer a broad range of questions about the quality of the soil during the early years of Nicodemus, the possible effects on food production and consumption, and health problems within the community. More importantly, generalizations about the adaptive mechanisms of the Nicodemus community can be analyzed for success.

The Nicodemus community was able to transform their natural environment through the construction of buildings and agricultural practices. However, measuring their success of adaptation to a new environment will take further investigation. While the residents were able to establish some efficient strategies that enabled them to adjust to the climate and environment, they may have also found these adaptive mechanisms to be a downfall. With increased development, there comes a greater risk of health problems, especially when populations become condensed into one geographical area. For the Nicodemus residents, intensive farming and other activities may have increased the concentrations of heavy metals within the soil, which are good for crops but are detrimental to human health.

The interrelationship between the health and environment of the residents can be better explained through theories of human ecology. Human ecology is the broad study of the interaction humans have with "their biology, their cultures, and their physical environments" (Sutton and Anderson 2004:3) and is composed to two subdivisions (Sutton and Anderson 2004). The first subdivision is human biological ecology, which is "the study of the biological aspect of the human/environment relationship" (Sutton and Anderson 2004:3), while the second subdivision is cultural ecology, which studies adaptation through cultural means (Sutton and Anderson 2004.) By applying the broader theory of human ecology to the results from this archaeological investigation, it becomes vital to understand the full extent of the relationship between the residents and their new environment. Since the residents' anthropogenic activities altered their environment, which in turn affected their physical well-being, it is important to consider human biological theories. At the same time, we should also consider that the residents developed a unique culture that allowed them to adapt to life on the plains. Concurrently, physical environment, biology, and culture are all factors that affected how well the Nicodemus community adapted to life in Kansas.

Future research on life at Nicodemus should continue to investigate the interrelationship of the physical environment, biology, and culture in order to determine just how well the residents adapted. While there is evidence that the community was able to adapt developmentally and economically for a period of time, there is not enough evidence to indicate the same about health. Future soil analyses should determine the levels of heavy metal concentrations of the soil, not only in the root cellar and dugout/soddie, but across the landscape to determine the extent of the exposure to heavy metals. Since exposure to heavy metals manifests in many ways in the human body, death records could be accessed to better understand causes of death.

Only if the descendent community allows, analysis could be done on the remains of the earliest residents to determine the amount of trace elements within the bones. Other research suggestions include identifying all of the species that were present on the site, a full soil analysis, privy analysis, and possibly a comparative study of Nicodemus and other exclusively African American towns established during the Reconstruction period. A comparative analysis would allow researchers to understand whether there were similar adaptive strategies to new environments amongst African American pioneers and other settlers across different parts of the country.

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# Appendix

**Figures & Tables**

**1.1 Artifact Catalog**

| Table 1 | | | | | |
|---|---|---|---|---|---|
| **Artifact Categories & Counts** | | | | | |
| **Species** | **Type** | **Count** | **Modification** | **Modification Type** | **MIN** |
| Pig (sus) | mandible | 3 | yes | sawed | 2 |
| Cow (bos) | scapula | 1 | yes | butchered | 1 |
| Rabbit/Hare | tibia | 1 | no | complete | 1 |
| Small Carnivore | mix | 27 | no | N/A | N/A |
| Rodent | cranium/ mandible & long bone | 14 | no | N/A | 13 |
| Amphibian | uid | N/A | no | complete | N/A |
| Small Bird | mix | 19 | no | gnawed | N/A |
| Chicken | egg shell | 9.7 g | yes | broken | N/A |
| Shell | UID (possibly mollusk/turtle) | 10.1 g | yes | broken | N/A |
| **UID Species** | N/A | N/A | N/A | N/A | N/A |
| | Pelvis- sacrum | 2 | no | complete | N/A |
| | Pelvis- coxal | 6 | no | complete | N/A |
| | Toes | 5 | no | complete | N/A |
| | Ribs | 12 | no | complete | N/A |
| | scapula | 2 | no | complete | N/A |
| | Clavicle | 2 | no | complete | N/A |
| | Vertebra | 28 | no | complete | N/A |
| | Miscellaneous | - | yes | burned/ broken | N/A |

**Table 1.1.** Displays the results from the preliminary faunal analysis which breaks down the remains by species that were identified. This study focuses specifically on the highlighted rodent row.

**1.2 Faunal Frequency**

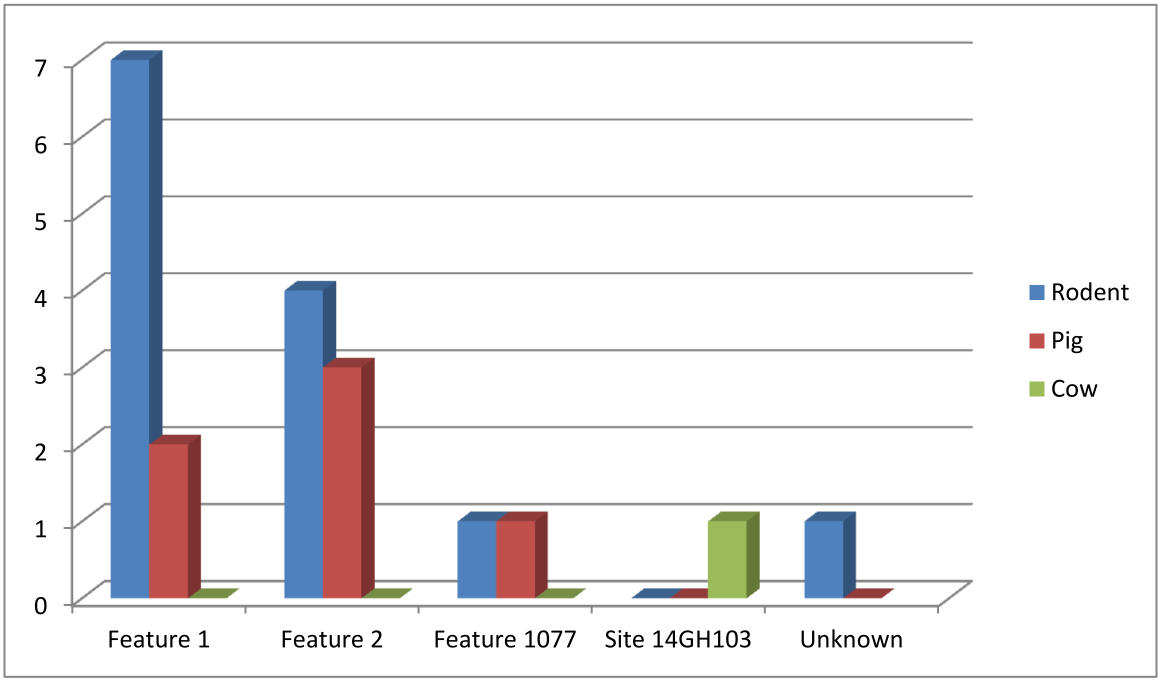



Table 1.2 Shows the frequency of faunal remains within Feature 1, 2, 1077, site 14GH103 (Schoolhouse), and unknown locations. As seen by the above graph, the rodent remains are concentrated heavily in the root cellar (Feature 1).

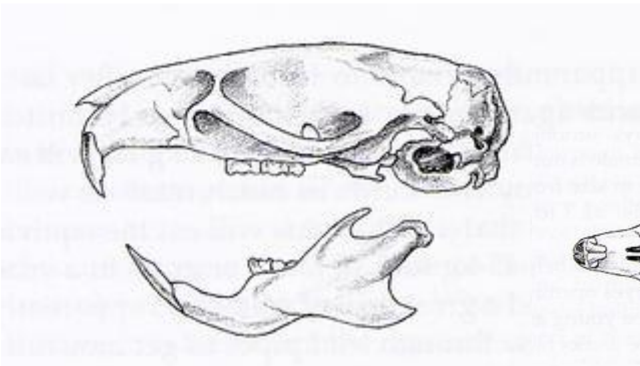
**1.3 Rodent Identification Key**

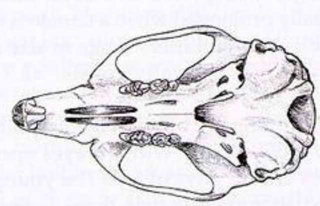
**Order Rodentia**

Family Muridae

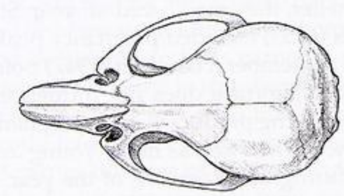
**House mouse (*Mus musculus*)**

**Lateral view**





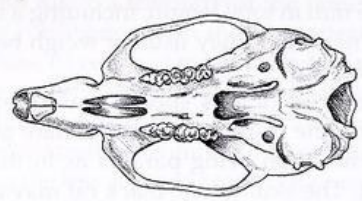
Ventral view



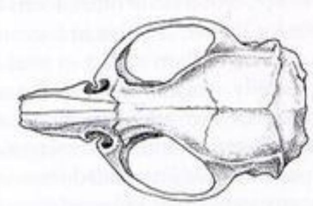
Dorsal view

**Norway rat (*Rattus norvegicus*)**

**Lateral view**



Ventral view



Dorsal view