Small Mammals from the Hell Gap Site, Wyoming and Their Paleoenological Significance

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ABSTRACT

Limited small mammal remains were recovered from the Hell Gap site during the early 1960s. Based on these remains, a lowering of “life zones” was proposed at Hell Gap around ca. 10,800 years B.P. In 1997, the Early Holocene small mammal population of Locality I was stratigraphically sampled. flotation samples were collected by five-centimeter-intervals within defined stratigraphic units. Small mammal remains were also collected during 7 excavation seasons in 1996–1999. Since 1998, additional small mammal remains continued to be collected during excavations and have been recently examined. This endeavor did not identify any new rodent species that were not previously known from the site, and overall rodent abundance and representation of species throughout the stratigraphic profile did not change even with changes in recovery and mapping protocols over the years of excavations at the site. While the rodent samples from the Hell Gap site continue to be sparsely compared with large or medium mammals, these small mammals remain critical for paleoenvironmental reconstructions of this early Holocene period. Paleoenvironmental reconstruction based on the rodent sample indicates the habitat and environment of the Hell Gap area was established before the human occupation of the area and has not substantially changed in the ca. 10,800 years since.

INTRODUCTION

Rodents recovered from archaeological sites are beneficial in providing valuable paleoenvironmental data, even if their ability to shed light on human cultural practices is limited. However, this can only be done if proper identifications are made of the recovered remains and if the extent living fauna and its habitat and environmental conditions are adequately understood. Roberts (1970) published a summary of paleoenvironmental data from the Hell Gap site based on faunal remains from the 1952-1966 excavations and 1967 testing conducted throughout the 1966 excavations. Based on the presence of the three species in the Late Glacial (Paladon through Hell Gap) occupation levels, Roberts proposed montane life conditions may have been lower by up to 600 meters and mean annual air temperatures would have averaged more than 3 degrees C colder than today. The three species on which Roberts based this conclusion were Marmota flaviventris (marmot), Spermophilus richardsonii (montane vole), which all normally found at elevations above 1800 meters in Wyoming. Small mammal remains from the same time period recovered from the Medicine Lodge Creek site in the Bighorn Mountains of northern Wyoming, Walker (1975, 2002) questioned Roberts’ conclusions and countered that life zones and mammalian distributions in Wyoming were established before 13,000 years B.P. as evidenced in the faunal sequence at Medicine Lodge Creek. Additional later studies on faunal remains from other regional localities were summarized by Walker (1986, 1987). Based on these studies, the published paleoenvironmental reconstruction proposed by Roberts (1970) for the Hell Gap site can only be considered an anomaly. That is, if the paleoenvironmental were such as Roberts suggested, then the Hartville UP’s existed in a vacuum, separate from the paleoenvironmental regime of the rest of the region.

METHODOLOGY

In 1997, excavations at Locality I provided the opportunity to strategically examine the small mammal remains at the site (Figure 1). A location along the back wall of Locality I was chosen because the complete stratigraphic sequence was present allowing collection of small mammals from the modern soil horizon to the bottom of the sediment sequence at Hell Gap, dating to the Pleistocene (Figure 2). The various sediment layers defined by Haynes were readily evident in this profile, allowing for tight control of the samples to be collected (Figure 3). Each collected rodent specimen was a maximum of five centimeters thick and restricted to a specific stratigraphic unit. Fifty-six bulk samples were collected from the 2.7 meter-thick profile. These samples were water-screened through a 16-mesh window screen at the University of Wyoming Zooarchaeology Lab after a six month drying period to allow all ground moisture to be evaporated from the samples. The matrix was allowed to air dry after the initial wash and all faunal remains and cultural materials were picked from the remaining sediment. Recovered faunal materials were then identified by comparison to known specimens in the Department of Anthropology Comparative Osteological Museum. Additionally, rodent materials mapped in situ and recovered through field water-screening since the 1997 work have been re-examined to determine if there were differences in the small mammal signature between samples recovered under different excavation and screening protocols.

RESULTS

The first obvious result of this project was that rodent, small mammal, and other small animal remains are sparse in the sediments at Locality I when compared to both medium and large species. Only occasionally were more than 6-10 small animal specimens recovered from any one 1997 five-centimeter collection level (Figure 5). Collection units with higher NISP counts were those from major cultural occupation levels also containing fragmented artiodactyl bone. This has distorted the overall NISP counts from the project and illustrates one of the main problems with looking at NISP counts without allowing for body size or cultural or other bone breakage. Another problem often encountered in small mammal remains is the misidentification of species in small mammal samples. Similar distributions by level were noted when material from each collection level were examined in this manner (Figure 6).

The 1997 collection of small mammals from the Hell Gap site and subsequent samples from later years shows the presence of the prairie vole and sagebrush vole, and strong probability of the long-tailed vole. Walker was more conservative with the current study, only identifying these specimens to the group of Microtus or Microtus sp. The 1997 data was continued to be examined and re-examined. The most interesting result of this study of the small mammal remains from the Hell Gap site is that the small mammal fauna appears to be dominated by only two species, primarily Microtus ochrogaster; the prairie vole, and Lepilemur cinereus the sagebrush vole (Table 1). Both species occur throughout the Early Holocene sequences, along with other species that occur in a variety of habitats. These two species are highly distinctive in their dental characteristics and cannot be misidentified.

DISCUSSION OF PALEOEVIRONMENT AND CONCLUSIONS

Roberts (1970) based his paleoenvironmental reconstruction of Hell Gap on the presence of three montane species: prairie vole, and Wyoming ground squirrel. He argued that the montane vole cannot be distinguished from the long-tailed vole (Microtus longicaudus) based on cranial or mandibular characters, but still chose to identify all the small vole species specifically as the montane vole. Walker was more conservative with the current study, only identifying these specimens to the group of Microtus sp. Additionally, these two taxa occur in different habitats, with only the long-tailed vole found in the Hell Gap site region today (Long 1965; Clark and Stromberg 1987), away from a montane habitat. If one assumes the specimens identified by Roberts are long-tailed vole, most of Roberts’ conclusions are negated, and small mammal remains from the 1960s excavations agree with the results of the 1997 study and are not substantially different from the rodent remains recovered in recent years, either.

The presence of the prairie vole and sagebrush vole, and strong probability of the long-tailed vole; throughout the early Holocene sequence at Hell Gap is suggestive of a xerichabitat around the site area similar to that seen today in the region - an open of open grasslands bordering more forested upland regions under the climatic conditions necessary for those type of habitat (Figure 9). We accept the fact that further away from the foothills toward the interior of the Hartville UP’s the forest cover may have been denser than it is today, but there cannot have been an overall lowering of the life zones by 600 meters as proposed by Roberts. That would have placed this woodland and forest out for into the plains to the east of the site. The 1997 collection of small mammals from the Hell Gap site and subsequent samples from later years shows the paleoenvironment of the site area fits the sequence proposed for the rest of Wyoming over the past 25 years (Walker 1975, 1986, 1987, 2002). The modern environment, habitat, and associated mammalian faunas were well-established over the region before 11,000 years B.P. and not substantially changed since that time. The area around Locality I offers a wide-open view shed over the adjacent short-grass prairie which would have been present throughout the human occupation of the Hell Gap site, allowing for easy sighting of the big game animals upon which they depended for a major food source. Additionally, despite changes in excavation, mapping, and recovery protocols over the years, the rodent assemblage from Hell Gap is consistent in representation of species and in overall abundance.

Figure 1: Overview looking across Hell Gap site Locality 1 (arrow) toward west and the prairie underbrush of the Flare Plains.