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ELIZABETH S. WING**

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F. WAYNE KING, *Editor*
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MARGARET E.B. JOYNER, *Managing Editor*

Send communications concerning purchase or exchange of the publication and manuscripts queries to:

Managing Editor of the BULLETIN
Florida Museum of Natural History
University of Florida
PO Box 117800
Gainesville, FL 32611-7800, U.S.A.
Phone: 352-392-1721, x457
Fax: 352-846-0287
e-mail: mjoyner @ flmnh.ufl.edu

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SOLDIERS' DIET AT VALLEY FORGE: AN ANALYSIS OF THE FAUNAL REMAINS FROM THE 2000 EXCAVATION SEASON

Douglas V. Campana¹ and Pam J. Crabtree²

The 2000 excavation season at Valley Forge National Historical Park focused on the excavation of huts and other features associated with the 1st and 2nd Pennsylvania Brigades. In addition to a rich and diverse assemblage of Revolutionary artifacts, the 2000 excavations produced a sizable collection of animal bone remains. Most of the faunal remains were recovered from features associated with the enlisted men's huts. Both historical sources and the recently excavated faunal remains indicate that the Pennsylvania brigades were provisioned with beef, pork, and small quantities of fish. This paper presents the results of the analysis of the faunal remains from the 2000 excavation season.

Key words: historical archaeology, log cabins, Revolutionary War, Valley Forge, zooarchaeology

In the summer of 2000, with the aid of a generous grant from the Aurora Foods Corporation, the National Park Service undertook the excavation of a portion of the encampment of the 1st and 2nd Pennsylvania Brigades of the Continental Army at Valley Forge, troops under the command of General Anthony Wayne. These excavations revealed intact archaeological deposits representing all aspects of the brigade structure, from enlisted men's quarters near the front line entrenchments, through cabin remains representing the quarters of the officers, ranged behind the enlisted cabins, to support structures, such as field kitchens, in the rear. These remains have yielded a rich array of military and associated artifacts, and, within several trash middens, a substantial quantity of faunal material, the remains of the soldiers' meals. Continued in the summer of 2001, these excavations, and particularly the analysis of the faunal remains, promise to provide new insight into the daily lives of the soldiers at Valley Forge.

The encampment of General George Washington's troops at Valley Forge during the winter of 1777-78 has become almost legendary for American schoolchildren. The Continental Army, as the story goes, marched into Valley Forge as a disheartened array of green troops

and volunteers, then, having endured a harsh winter filled with hardships and privations along with strict training and discipline, emerged six months later as a seasoned fighting force equipped to defeat the British. There is much truth in this traditional history. Having suffered defeats in the battles at Brandywine and Germantown, Washington settled his troops for the winter into a readily defensible location at Valley Forge, 18 miles from Philadelphia, occupied by the British. From Valley Forge, Washington could keep an eye on the British and prevent them from foraging more deeply into Pennsylvania. At the time of the Revolution, the Valley Forge region was an area of rich farmland and pasture. The vast size of Washington's encampment, however, was far too great to be supported by the local resources. The Valley Forge encampment was surrounded by defensive entrenchments and redoubts, in anticipation of a British attack. No attack ever came. Nevertheless, the cold, wet winter, the crowded, unsanitary living conditions, and the chronic shortages of food and clothing took their toll. Dysentery, typhus, and typhoid were widespread. By mid-winter nearly one-third of the approximately 12,000 troops were listed as "unfit for duty." Nearly 2,000 men died at Valley Forge, almost all from disease.

Many army documents from the American Revolution survive in the form of orders, orderly books, quartermaster's accounts, letters, and diaries. For Valley Forge, however, the record is surprisingly sparse. As of this time, no clear descriptions of the encampment have come to light, and there are no extant drawings of its

¹Archaeologist, Valley Forge Center for Cultural Resources, U.S. National Park Service, Valley Forge National Historic Park, Valley Forge, PA, USA.

²Associate Professor of Anthropology, Department of Anthropology, New York University, 25 Waverly Place, New York, NY 10003, USA

appearance. Only a few plans of the encampment survive, the most important of which is the map by the French engineer, Brigadier General Louis Lebègue Duportail, that shows the layout of the camp, but with little detail of the arrangement of the various brigades. What we know of the encampment comes primarily from Washington's General Orders, which describe, but only in general terms, how the camp was to be constructed, how supplies were to be secured and distributed, how the troops were to be trained and disciplined, and all the other command decisions needed to run an army. Such orders, of course, tell us what Washington intended, not necessarily what was actually implemented.

On entering the valley, Washington's first order of business was to secure shelter for his troops. His General Order of December 18, 1777, commanded the troops to construct log cabins, or "huts," for housing:

The Soldier's huts are to be of the following dimensions, viz: fourteen by sixteen each, side, ends and roofs made with logs, and the roof made tight with split slabs, or in some other way; the sides made tight with clay, fireplace made of wood and secured with clay on the inside eighteen inches thick, this fireplace to be in the rear of the hut; the door to be in the end next the street; the door to be made of split oak slabs, unless boards can be procured. Side-walls to be six and a half feet high. Officers' huts to form a line in the rear of the troops, one hut to be allowed for each General Officer, one to the Staff of each brigade, one to the field officers of each regiment, one to the commissioned officers of two companies, and one to every twelve non-commissioned officers and soldiers.

While Washington and his commanding generals set up their headquarters in farmhouses found within the valley, his lower ranking officers lived less comfortably. Depending on their rank, from one to six officers were quartered together. Enlisted men fared even less well, with groups of twelve crammed into huts, squeezed into rows of bunks ranged along the walls.

As confirmed by the current archaeology, the layout of the brigade mirrors an ideal plan in the field notebook of General Von Steuben, written after the encampment at Valley Forge. Washington had chosen Von Steuben, a Prussian, to instill military discipline into the troops. As in the notebook, the huts of the enlisted men appear to be closely packed in a few rows just behind the entrenchments; the officers' huts are more sparsely and irregularly arranged in rows to the rear. To the very rear was found a large mound of earth surrounded by a trench.

This feature represents a field kitchen, where the soldiers were to prepare their meals.

There can be no doubt that much of a Valley Forge soldier's daily life was concerned with preparing and consuming meals. Getting enough to eat was a constant concern. Food supplies were erratic and severe shortages, particularly of meat, were common. Joseph Plumb Martin, a Connecticut soldier who was briefly stationed at Valley Forge, wrote in his memoir: "We arrived at the Valley Forge in the evening [of December 18]. . . . I lay here two nights and one day and had not a morsel of anything to eat all the time, save half of a small pumpkin" (Martin 1979: 103). Logistical problems made the procurement of meat extremely difficult, and Washington was receiving little support from the Continental Congress. His troops were often reduced to foraging the countryside for food. In his letter to Congress of December 23, 1777, Washington wrote: "I am now convinced, beyond a doubt that unless some great or capital change suddenly takes place, . . . this Army must inevitably be reduced to one or other of these three things. Starve, dissolve, or disperse, in order to obtain subsistence in the best manner they can." On February 18, 1778, Washington issued an appeal to the citizens of New Jersey, Pennsylvania, Maryland, and Virginia to supply the army with the desperately needed cattle and other supplies in order (in the words of the appeal) "to save their property from plunder; their families from insult, and their own persons from abuse, hopeless confinement, or perhaps a violent death." During the following months numerous forays were made into the surrounding counties, either to collect what cattle could be found or to head off the British who were also foraging the land. The cattle so obtained were frequently described as lean or of poor quality. The Army did not disperse, but conditions remained difficult.

General Orders called for the troops to receive a ration of "a pound and an half of flour one pound of beef or three quarters of a pound of salt pork and a certain quantity of spirits" (General Orders, February 8, 1778). Monthly commissary reports detail the actual quantities of meat and other necessities issued to the troops. Table 1 shows the quantities of beef, pork, and fish issued to the approximately 2000 men of the 1st and 2nd Pennsylvania Brigades during the winter at Valley Forge.

Figure 1 shows the approximate quantities of meat per man issued to the troops of the 1st and 2nd Pennsylvania Brigades according to commissary records. For much of the winter the troops received considerably less meat than was called for in the General Orders,

although the situation was greatly alleviated when the shad began running in the rivers in early spring. The severe conditions, however, were exacerbated by the feast-or-famine irregularity of the meat supply.

THE VALLEY FORGE EXCAVATION

The numerous huts at Valley Forge were dismantled almost immediately after the troops broke camp and moved out. The site reverted to plowed fields, and traces of the encampment practically disappeared. A few areas, unsuitable for farming because they were too steeply sloped and rocky, reverted to woodlands. Beneath the trees, the hut depressions, deeper there than elsewhere because the huts had been dug into the slopes, were well preserved. In fact, these sites were never really lost. In the late nineteenth century tourists visited them and in the early twentieth century replica huts were occasionally placed directly over the original hut sites. Curiously, very little archaeological investigation was ever made of these remains and what work was done was not properly recorded, with one notable exception. This was the limited excavation of several huts conducted in the 1960s by John Cotter as a field course for students from the University of Pennsylvania (Cotter 1966). Prior searches by amateurs using metal detectors had found a number of trash deposits from which metal objects and other Revolutionary War artifacts were recovered and, for the most part, the locations of these trash deposits are now unknown. In the 1970s, excavations of brigade areas were conducted by the Museum Applied Science Center for Archaeology (MASCA) of the University of Pennsylvania (Parrington 1979) and in the 1980s by National Park Service archeologists (Cooper 1998; Orr et al. 1985). These excavations, however, were done in areas with limited preservation of both features and animal bones. Very few faunal remains were collected, with the exception of a very small sample recovered from the MASCA excavations (Hall 1979).

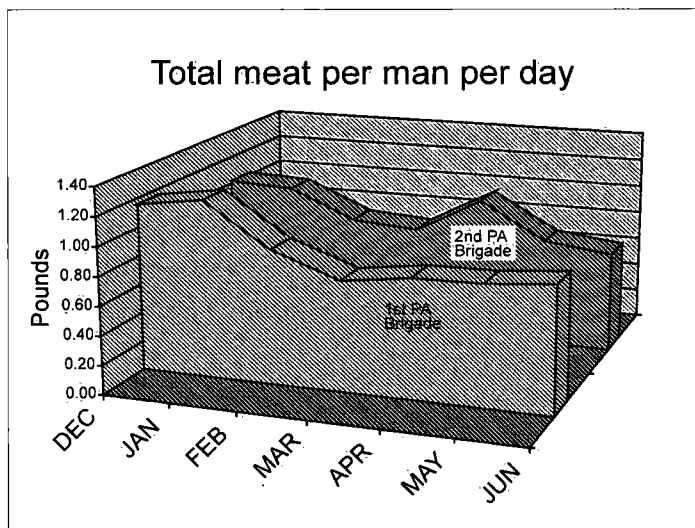


Figure 1. Month-by-month estimates of meat available per man per day for the 1st and 2nd Pennsylvania Brigades.

The goal of the current National Park Service project is to rectify some of the deficiencies and biases of the past, very limited, research. The research design will involve excavating substantial segments of both the officers' and enlisted men's areas of the Pennsylvania Brigades' encampment. This ultimately will entail examination not only of the huts but of other associated features, such as trash deposits, that lie between the huts. During the 2000 season, three officers' huts were partially or completely excavated, yielding scant animal bones that were usually found lying in stone hearths constructed at one end of the huts. Subsequent field work will identify and excavate the trash deposits adjacent to the huts.

The most productive area of the 2000 season was that occupied by the enlisted men. Previous aerial photography and careful field surveys have shown a series of very shallow, faint depressions in the mowed lawn at the top of the ridge, upslope from the officers' quarters. These regularly spaced depressions mark the remains of the enlisted men's huts. The top of a single

Table 1. Meats issued to the 1st and 2nd Pennsylvania Brigades.

	Number of Men	Beef (lbs)	Pork (lbs)	Fish (lbs)	Mutton and veal (lbs)
Dec. 1777	2,397	75,811	3,014	1,823	597
Jan. 1778	1,967	53,972	8,289	4,712	468
Feb. 1778	1,935	36,929	6,573	2,725	261
Mar. 1778	1,860	40,909	1,979	916	0
Apr. 1778	1,978	45,937	7,608	980	77
May 1778	1,959	28,827	10,027	8,921	151

Table 2. Animal species identified from the 2000 excavations of the encampment of the Pennsylvania Brigades at Valley Forge.

Cattle (<i>Bos taurus</i>)	325
Pig (<i>Sus scrofa</i>)	99
Dog (<i>Canis familiaris</i>)	3
Large ungulate	48
Small artiodactyl	24
Domestic chicken (<i>Gallus gallus</i>)	2
Chicken-sized bird	1
Unidentified mammal	11,856
Total	12,358

Note: A single fish vertebra and a raccoon atlas are still under study.

stone protruded just above the ground surface (and, in fact, had frequently been struck by the lawn mowers). As it seemed possible that this stone might be part of a fireplace hearth, an excavation unit was placed around it. The stone proved instead to be part of a unique free-standing oval firepit, filled with ashes and, judging from the melted lead, musket balls, uniform buttons, and other artifacts found within and adjacent to it, probably used for a variety of purposes. The pit was also clearly used for preparing food; beside it were several dense trash deposits filled with animal bone. It is probable that these bones come from food consumed early in the winter, because most of them come from deposits that are

Table 3. Body-part distribution for cattle (*Bos taurus*) and pig (*Sus scrofa*) from the Enlisted Men's area.

Body part	Domestic Cattle (<i>B. taurus</i>)	Pig (<i>S. scrofa</i>)	Body part	Domestic Cattle (<i>B. taurus</i>)	Pig (<i>S. scrofa</i>)
Skull	1		Astragalus	6	
Frontal	2		Calcaneus	3	
Parietal		1	Centro-quartal	1	
Occipital	3	3	Malleolus	1	
Temporal		1	Fused 2nd & 3rd tarsal	2	
Lacrimal		1	Carpal	3	2
Incisive	4	1	Radial carpal	2	1
Skull fragment	20	10	Intermediate carpal	2	1
Horn core	2		Ulnar carpal	1	1
Maxilla	5	1	4th carpal	1	2
Mandible	13	8	Main metatarsal (ungulates)	2	
Hyoid	1	1	4th metatarsal		1
Atlas (1st cervical)	1	1	3rd metacarpal		1
Axis (2nd cervical)	3		Lateral (ancillary) metapodial		1
Cervical vertebra	14	1	2nd phalanx	1	
Thoracic vertebra	14	5	Proximal sesamoid	1	
Lumbar vertebra	7	1	Tooth fragment	16	9
Caudal vertebra	4		Lower incisor	18	3
Sacrum	3		Lower canine		2
Vertebra, indeterminate	5		Upper incisor		3
Costal cartilage	1		Upper canine		1
Rib	69	4	Lower 2nd premolar	3	
Sternum	2		Lower premolar	10	3
Pelvis		1	Upper premolar	14	
Ilium	1		Lower 1st molar		1
Ischium	1		Lower 3rd molar	2	2
Pubis	1		Upper 1st molar		1
Femur	4	3	Upper 2nd molar		3
Patella	1	1	Upper 3rd molar	1	1
Tibia	12		Lower molar	5	
Scapula	3		Upper molar	9	1
Humerus	6	4			
Radius	9	3			
Ulna	2	3			
			Total	319	94

overlain by a crude stone pavement that runs parallel to the line of hut depressions. A few bones and some Revolutionary War artifacts also overlie the pavement. It is likely that this pavement was laid down in the early spring, after the frost had melted and the ground had become muddy and foul with refuse. Most of the sample discussed in this paper comes from these deposits.

ANALYSIS OF THE ANIMAL BONES

MATERIALS AND METHODS

The 2000 excavations at Valley Forge yielded a rich faunal collection, including 12,358 animal bones and fragments. The vast majority of the animal bones (7,387 fragments) were small, burned or calcined fragments of mammal bone. Many of these appear to have been burned in the soldiers' campfires. Washington's General Orders (April 10, 1778) commanded: "All bones, putrid meat, dirty straw and any other kind of filth to be every day collected and burnt."

In the field, all archaeological deposits were screened using 1/4-inch mesh. The faunal remains were identified using the comparative collections of the New York University faunal analysis lab. The animal bones were recorded using the ANIMALS program (Campana and Crabtree 1987), a specialized data-base manager for faunal analysis written in the C programming language. In addition to basic animal bone identification, the ANIMALS program allows the analyst to record data on taphonomy, aging, butchery methods, and bone measurement.

RESULTS AND ANALYSIS

Of the animal bones that were identified to species, the vast majority were the remains of domestic cattle (*Bos taurus*) and pig (*Sus scrofa*). Other identified remains include the partial remains of a buried dog (*Canis familiaris*) and a small number of bones of domestic chicken (*Gallus gallus*). Based on the state of preservation of the chicken bones and the locations from which they were recovered, these remains appear to be modern and intrusive. A single fish vertebra and a raccoon atlas require further study. (See Table 2 for a complete list of the species identified.) The faunal data indicate that the soldiers of Wayne's Brigades were provisioned with beef, pork, and small quantities of fish, a result that is in close agreement with the historical evidence. Notably absent are the remains of white-tailed deer and other large wild mammals, suggesting that hunting did not

Table 4: Age stages for complete cattle mandibles from the 2000 excavations at Valley Forge, following Grant (1982).

Mandible	M1 TWS	M2 TWS	M3 TWS	MWS
0026	l	l	g	42
0037	k	h	g	38

Note: Following Grant (1982), a tooth wear stage (TWS) has been assigned to each permanent molar (M1 represents the first lower molar; M2 represents the second lower molar; and M3 represents the third lower molar). Numerical equivalents were assigned to each TWS. These were summed to arrive at the mandible wear stage (MWS) for the entire jaw. While it is difficult to translate these mandible wear stages into exact ages, it is clear that these mandibles came from mature individuals with extensive wear on the first and second molars and mature wear on the third molars.

play a major role in provisioning the soldiers of the 1st and 2nd Pennsylvania Brigades. In contrast, the 1972-73 excavations of the Virginia Brigade encampment produced a small number of deer remains (Hall 1979), suggesting that the Virginia soldiers may have foraged more extensively than the Pennsylvania Brigades did.

The body-part data (Table 3) clearly indicate that all parts of the cattle and pig skeletons are present at Valley Forge. These data, as well as the historical records, clearly indicate that the cattle and pigs were field-butchered at the campsite. For example, a trash pit from the enlisted men's area of the campsite yielded the complete hock joint of a cow. Additional evidence for field butchery is provided by the butchery marks themselves. Most appear to have been made by unskilled butchers who were trying to divide the carcasses into pieces that could be stewed in iron cauldrons. While the 2000 faunal assemblage is too small to provide a detailed age profile for the cattle and pigs, a number of individual jaws from mature adult cattle were recovered. For example, a cattle mandible recovered from the enlisted men's area had extensive wear on its first and second molars and mature wear on the third molar (see Table 4) and a similar mandible was recovered from a trash pit. Since the third lower molar does not even erupt until 2.5 to 3 years of age (Grant 1982; Silver 1969: 296), these animals must have been quite old and the meat would have required extensive cooking.

Table 1 shows that in May large numbers of shad in the rivers provided the troops with much needed protein. Commissary records note that large quantities of fish were issued to the troops in May and June,

during the Delaware River shad run. The paucity of fish remains in the sample may be explained by the fact that trash middens excavated so far were likely deposited in mid-winter, when fish were very scarce. Many of these deposits were overlain by roads that appear to have been constructed in the early spring.

Future excavations will extend the work in the enlisted men's area. The areas between the officers' quarters will also be examined for a larger sample of food bones to compare to the sample from the enlisted men's huts. This may prove more difficult, as the officer's trash may have been farther removed from their quarters, but some trash deposits have been found in this region in the past. If we are successful in finding a sufficiently large food bone sample, it may be possible to determine whether or not the mid-grade officers at Valley Forge obtained rations significantly better than those allotted to their subordinates.

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