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Teaching Bones from my Garden

John C. Whittaker
Grinnell College, whittake@grinnell.edu

Abstract

Faunal analysis, or zooarchaeology, is an important subfield that provides information on human ecology, economy, culture, and society. Few of my students have much experience with hunting, farming, anatomy, or even eating meat these days, so faunal analysis labs in an Archaeological Field Methods class present some difficulties.

Faunal assemblages from archaeological sites are often small, fragile, and too valuable for class use. They require good comparative collections, and it may be difficult for students to relate to unfamiliar animals and cultures.

These problems can be overcome by producing a faunal teaching assemblage from home meat consumption. For over 20 years I have composted all organics from my kitchen, and subsequently collected bone from my garden. A useful assemblage can be created in a much shorter time if the bones are prepared by maceration instead of composting. With simple instructional materials, the students can recognize the bones, collect the data, and perform simple quantification like MNI and NISP. The assemblage is then interpretable in terms of most of the issues approached by contemporary faunal analyses, such as preparation techniques, meat preferences, formation processes, and socio-economic status. My classes always find it engaging to analyze their professor's garbage and use it to interpret his life.

When I was in graduate school, departmental lore warned us that a certain eminent faculty member was in the habit of torturing students in the throes of a dissertation defense by introducing to the discussion an unusual (and generally irrelevant) faunal bone such as the skull-like carapace fragment of a desert tortoise, or the baculum of a small carnivore. I believe the point he was trying to make was that all archaeologists, even those whose interests were in the minutiae of ceramic typology or the fracture patterns of brittle rock, should have the kind of general knowledge that led them to appreciate the importance of every kind of data.

The bones of the animals that co-existed with ancient humans are the subject of significant subfields of archaeology. Faunal remains inform us of environmental conditions and changes, dietary practices and preferences,

cultural behaviors and social differences (Russell 2012). Sophisticated archaeological faunal analysis is the pursuit of specialists, requiring background in ecology and comparative anatomy as well as archaeology. My old professor did not really expect everyone to recognize the difference between the humeri of rodents that run and those that dig, but it behooves all archaeologists to understand why faunal remains are important, and the kinds of information that they provide. Peres (2010) is one good recent introduction, and there are many book-length texts that can also be used to back up zooarchaeology classes (Adams and Crabtree 2012; Beisaw 2012; Chaplin 1971; Davis 1987; France 2010; Klein and Cruz-Uribe 1984; O'Connor 2000; Rietz and Wing 1999; Russell 2012). I believe that the topic can be taught with simple resources. What follows is not a lab manual for the replication of my class, but an essay that I hope will be a practical inspiration to the kind of lessons that students enjoy and instructors can organize without specialized collections or training.

The non-specialist is likely to view faunal analysis with trepidation, and it must be admitted that even in a general undergraduate course like the Archaeological Field Methods class that I teach yearly at Grinnell College, conveying an appreciation of faunal analysis is made difficult by a number of issues. First, if you want to explain the fundamentals (the bare bones, so to speak) of faunal analysis in a memorable and hands-on manner, you need access to a comparative collection and suitable faunal assemblages to analyze. It took me several years of working in the Southwest, maintaining the proper permits, macerating stinking road kills, and labeling specimens to put together a merely adequate comparative collection that I could use to identify the faunal remains from our Sinagua sites in northern Arizona (Kamp and Whittaker 1999). A comparative collection assembled with so much effort (as most are) is precious, and its use in class entailed stern warnings to the students about not mixing the bones of different specimens, dropping bones on hard surfaces, or putting them away in the archaeological find bags instead of in their proper trays. The archaeological faunal remains also are fragile and valuable, and I felt I could not use them in classes until I had analyzed and recorded them myself, lest class use muddle the record. Eventually in my career I decided that it was impractical for me to keep up with the zooarchaeology literature

and do properly sophisticated faunal analyses of our excavated material, so now it goes elsewhere for analysis and I no longer struggle to maintain a comparative collection. Nevertheless, I still want to expose students to this important aspect of archaeology in my Field Methods class. Most archaeologists, unless their specialty is zooarchaeology, may have a hard time finding either a comparative collection or an archaeological assemblage they can use for such purposes.

Other problems relate more to the students themselves, and I suppose, to many archaeologists. Although there are exceptions, few of my students have any experience with hunting or farm animals. They may have a beloved pet dog or cat, but they probably have never pried open its jaws to closely examine its teeth. Each year it seems there are more vegetarians or even vegans in my classes, and even those students who do eat meat obtain it wrapped in plastic from the supermarket, and have never thought much about the animals it comes from, let alone killed or butchered one. In fact, many American meat eaters actively avoid recognizing that meat comes from animals. Even our language works to maintain distance between the animals we raise (cows, pigs) and the parts of them we eat (beef, pork), and we have many biases about what parts are labeled as edible. Lovis (2011) is an amusing and pointed reading about this that I use in class. In this American cultural context, it is not easy to teach my students basic skeletal anatomy. I always do the labs on human osteology first, so at least they have one familiar body to which they can relate the bones they handle. Even so, the structure of mammalian and avian skeletons is not very familiar to them, even at the introductory level of my Field Methods class. The mind-set and problems of hunting cultures are probably even more alien to them, especially the ancient cultures that none of us have lived in. I use a different exercise, a mock squirrel hunt, to discuss these last points (Whittaker 2005).

If you are an archaeologist who focuses on faunal analysis or who teaches at an institution that can support specialized classes in osteoarchaeology, you can overcome these problems in a semester. If, like me, you simply want to introduce students in an effective, hands-on manner to one of the important subfields of archaeology and one of the common kinds of remains that archaeologists encounter in excavation, then

you need a simpler and more familiar set of collections. I have found that the faunal remains from my garden meet my teaching needs perfectly.

I have lived in the same house in Iowa for over 30 years. It has a large backyard and I enjoy a bit of gardening. Even a klutz can get nice tomatoes in Iowa with minimal effort. I am also one of those old-fashioned individuals descended from survivors of the Great Depression and World War II who hates to waste anything, and on top of that I am heavily influenced by modern ideas of environmentalism and sustainability, so all the organics from my kitchen and yard go to the compost pile. This includes all the bones from my family's table. Conventional composting gurus tell you not to put meat remains in compost piles because they create odors and attract animals. I don't mind helping out the local raccoons and opossums a bit, and odors are usually not a problem. My yard produces masses of weeds, leaves, grass clippings and the like, and my compost pile is usually hot and active as well as large and deep. Bones are rapidly covered and quickly sterilized, and if I have a large one-time deposit like the remains of a Thanksgiving turkey, even in winter I generally turn the compost over and bury it. Each Fall several wheel-barrow loads of humus from the compost pile are moved onto my garden, making way for the season's harvest of dead leaves that begin the compost pile anew. In the Spring, the compost is spread and tilled into the garden, and I collect the bones, which are now as clean and odorless as any archaeological remains (Figure 1). They have also of course undergone a series of "formation processes," some of which, like turning the pile with a pitchfork, and the visits of scavengers, have left interpretable marks on the bones. After many years of collecting my garden bones, I now have a very large box, some 20 kg, of useful faunal remains. But there is no need to wait 20 years for a teaching assemblage. Something like my garden faunal collection could be made in many more rapid ways, for instance by collecting food remains from several cooperative families, or the university dining hall, and cleaning them with *Dermestid* beetles or maceration.

Figure 1. Bones in garden. I have never conducted an ‘excavation’ with students there, but that would be another teaching possibility.

Processing comparative specimens is another aspect of zooarchaeology that can be easily adapted for teaching purposes. Although I am no longer seriously building a collection, I pick up small road-kills, mostly squirrels and rabbits, and store them in a freezer (not at home, by popular demand). As part of the class sessions devoted to faunal remains, students clean the animals and prepare them for maceration. Sometimes I have them use stone tools, which feeds into the lithic analysis section of the class. Cutting up an animal gives them a bit of experience with anatomy and gets some of them past the “ick factor.” It also builds appreciation for the value of my comparative specimens. I clean the skeletons by lightly boiling the carcasses and then allowing them to macerate in individual closed containers with water. I have a secure spot near my compost pile, and periodically pour off the residue until the bones are clean enough. At that point, although the faunal remains section of my class is over, I have the students assist with a final boil in ammonia to whiten and sterilize the bones, remove any remaining soft tissue, and label with a specimen

number. Instructions for preparation of specimens in more elaborate and museum-standard ways can be found in some texts (Chaplin 1971 50-54; Gilbert 1980:31; Reitz and Wing 1999:361-377) and online, but simple maceration suffices for most purposes.

Comparative material is also more easily obtained for modern food waste than for the African Pleistocene or even the ancient Southwest. You can go the whole hog, so to speak, and process pig, turkey, and cow carcasses, or assemble a set of very specific labeled food remains, or you can rely on pictures. I don't want my comparative material to provide all the answers too easily, so I hand out images of several basic large animal skeletons (Gilbert 1980; Gilbert et al. 1981; Hillson 1992; Reitz and Wing 1999: 346-348; Schmid 1972) with the books they came from as further backup, as well as pages from a very helpful C*ross-sectional Anatomy of the Beef Carcass* (Tucker et al. 1952) published for the meat industry (Figure 2). The

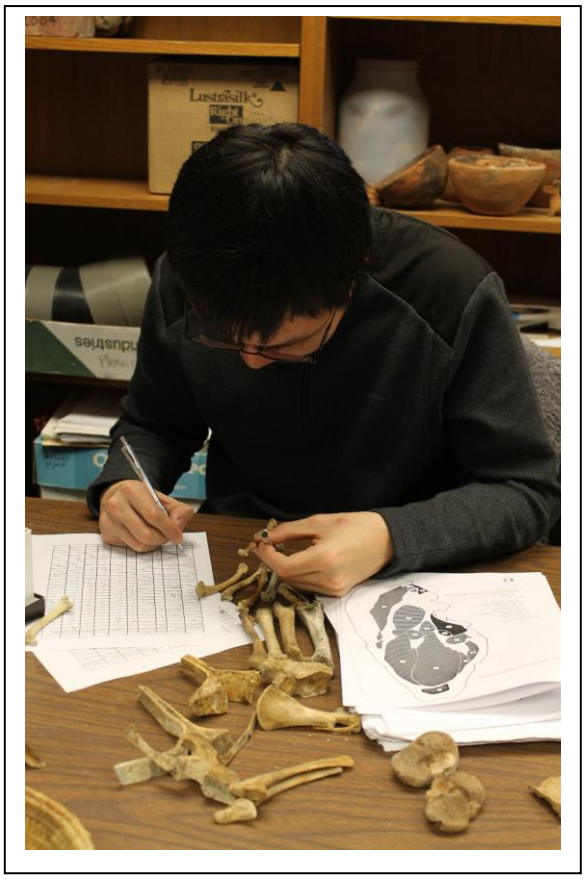

Figure 2. Analysis in progress with simple reference materials.

departmental mounted plastic human skeleton stands to one side, and on the lab tables are my deer, cow, sheep, turkey, and other specimens, and a couple of mounted bird and rabbit skeletons. My all-afternoon lab class is small and I spend most of the time circulating and teaching as the students work on the specimens. Before the lab class, there is also a lecture class in which I pass around specimens of various taphonomic results, butchery and trauma. I briefly show them important features of the skeletons of ungulates, rabbits, and birds. We discuss recovery of faunal remains in archaeological excavations. They have already learned basic bone

structure and something about bone growth and pathologies in the section on human osteology.

Most of the students have in fact seen the kind of bones that come out of my garden on their own family dining tables, if they stop to think about it. At the very least, they are theoretically familiar with common American consumption practices, which makes the garden assemblage not just more easily identified, but more easily interpreted. For instance, once they learn to recognize bird bones, they know that there are only two commonly eaten birds in American cuisine, and these are similar in form but different in size, so they should have no trouble identifying turkey and chicken. But what are these harder, cleaner, more gracile bird remains, larger than most chicken but smaller than turkey? What else do Midwestern Americans occasionally hunt and eat? Pheasants, which tend to be more adult than domesticated fowl when killed and consumed. And some smaller chicken-like bones could be from game hens; all these species can come to mind with a bit of thought and cultural self-reflection.

In an afternoon lab, I can get a class of 12-15, working in pairs, to identify and record a reasonable number of specimens from my garden on a basic recording form that I hand out (Figure 3). Combining their efforts produces a small but adequate data set, which can be augmented with those collected in other years or even imaginary data, so that they can do basic quantified analysis to understand and discuss important

Figure 3. Bones and analysis sheet recording species, bone, side, and condition attributes.

concepts like NISP (Number of Identified Specimens) and MNI (Minimum Number of Individuals) (Grayson 1984; Klein and Cruz-Uribe 1984:24-37 Reitz and Wing 1999:171-238). One of my goals in an archaeology class is teaching students the value of real data, and the importance of understanding and using basic statistical presentations.

The interpretive dimensions of my garden fauna are quite rich, and relevant to both historic and prehistoric contexts. First, we can talk about taphonomy and "formation processes" and discuss how the garden faunal collection formed in the ground and through my gardening and recovery practices. What biases might these processes have introduced in the collection? My class knows a bit about me, and finds it amusing to see what I eat and try to interpret a professor's life-style from my trash. They know I hunt deer, and there are a few *Odocoileus virginianus* leg and foot bits in my garden. Different texture suggests they have not been cooked; they may be butchery remains. But why none of the ribs, vertebrae, and major limb bones, sawn into segments, like those that represent the beef and pork remains? My venison is processed differently; I remove it from the bones rather than sawing it up, and the work is done elsewhere. The few remains of feet come mostly as waste from making bone tools and other experiments – idiosyncratic variability that will probably not be found in most households. But here we can discuss such concepts as Binford's 'utility indices' (Binford 1978) for considering the relative value of different parts of a carcass. The "schlepp effect" proposed by Perkins and Daly (1968) is also relevant: the larger the animal, and the farther away it is killed and processed, the less bone comes home. Other Iowans who eat more venison than I do mostly have it processed into stew, steaks, and ground meat at commercial lockers. If they don't compost, they may have no bones at all on their property. Or, like my hunting partner who farms locally, they may process all their deer themselves, and throw all the bones of complete carcasses out for the dogs, resulting in a very different faunal profile around the yard.

The turkey and chicken bones suggest that poultry often arrives at my house as relatively complete carcasses, quite different from the large mammals, but there are no heads or feet in the assemblage. My students are aware that Americans buy most of their meat in stores, and hate to be

reminded that it was once an animal, so the “inedible” heads and feet are removed, and much processing is done before the market. Beef and pork are represented in my garden only by cut bones, again with no head or foot bones. Large animals are now sawn into servable portions, while smaller poultry is disassembled at the joints. All this is consistent with what students know about American meat processing and preferences.

Can we get at social status through faunal remains? My garden fauna suggest that my family prefers poultry to red meat, although here we can discuss the differences between NISP and MNI, and the fragility of attempts to quantify meat from bones. Beef is mostly represented by sawn vertebral elements identifiable (with the Cross-sectional Anatomy book) as T-bone and similar steaks (Figure 4). Apparently, I have adequate income to eat high-quality meat. But what about hamburger? No way to tell. My students write a short lab analysis in which they are explicitly required to calculate MNI and NISP for the different species represented, use that quantified information to compare the different species, and discuss my meat preferences in light of what they already know about generalized American practices (Appendix). A class discussion afterwards makes them consider the more nuanced and complex problems that the basic analysis may not have exposed, and may not be capable of showing.

Figure 4. Steak dinners past and present. The interpretive possibilities are endless.

At the end of the day, my students are not trained faunal analysts; that is not the goal. They have learned to appreciate what you can do with faunal remains from archaeological sites, some of the interpretive possibilities and problems. And they will probably look more closely the next time they visit KFC or when the Thanksgiving turkey is carved.

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Appendix: The assignment handout.

FAUNAL ANALYSIS LAB 2017 Anthro 290 Whittaker

You will identify and analyze material from a historic midden deposit, the Kamp-Whittaker Garden Site. All organic waste from our kitchen goes into the compost pile, and ultimately into the garden, and I recover the bones as I turn the soil and plant. Accordingly, there is a faunal record of my family's meat-eating habits over the past several years. You will identify the bones, compile the data, make general observations, and attempt to answer some questions about modern American meat use as exemplified in one specific household.

Species Identification

Start by identifying each bone's species of origin. The list is limited: Cow, Pig, Turkey, Chicken, Pheasant, Deer. In addition, there may be a few extraneous wild species as a result of my collecting faunal remains and burying the victims of my cats, and from scavenging by local critters. You can use the faunal specimen drawers to ID these, but don't worry about interpreting them much.

Comparative Specimens: There are several Turkey specimens, one wild. Chicken will look similar, but much smaller. Pheasant is chicken sized, but will look different both in the form of the bones and their condition. You have a handout on bird + animal bones, and a couple of mounted bird skeletons as well. I do not have complete specimens for Cow or Pig. I will put out some cow bones and a complete deer (anatomically similar, but much smaller and more gracile). Pig will be smaller and stockier than cow, but only some bones are represented and things like ribs will be hard to differentiate.

Bone Identification

Identify each bone. For Cow and Pig, most are cut pieces. The *Cross-Sectional Anatomy of the Beef Carcass* will help you ID them, and also lead you to think about what cuts of meat are represented.

Portion

What part of the bone is represented: whole, distal, proximal, shaft.

Condition

Interesting modifications? Cut, burned, fractured, gnawed, unfused epiphyses?

Meat

What cut of meat was it, if you can tell? What would you call it while you were eating?

Research Questions

1. What animals are present? Which is eaten most often, and which provided most meat? You will need to examine both NIS (number of identified specimens) and MNI (minimum number of individuals) for each species.
2. What do you learn about the production of meat - processing, preparation, preferences?
3. How well do the bones reflect actual meat consumption? What taphonomic and cultural factors interfere?
4. What sociological inferences can you make about the Kamp-Whittakers?

Present the relevant data in tables, including NIS and MNI, and a written interpretation in not more than 5 pages, due the following Wednesday.