POLLEN, PHYTOLITH, MACROFLORAL, PROTEIN, AND ORGANIC RESIDUE (FTIR) ANALYSES ON SAMPLES FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

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INTRODUCTION

Samples were examined from excavations in the Bishop's Garden area at the San Gabriel Mission Archaeological Site, CA-LAN-184H, in southern California as part of the Alameda Corridor East Construction Authority's (ACE) San Gabriel Trench Grade Separation project. This area contains a large, dense, partially intact Mission period (1769-1834) artifact deposit and two substantial archaeological features associated with occupation of the San Gabriel Mission. A total of 83 column samples from a Water Complex, an adobe Granary structure, and a midden area north of the train tracks were floated to recover macrofloral remains that can provide information concerning plant resources utilized by the Mission occupants. In addition, the wash of a milling stone fragment from a milling complex in the Water Complex was examined for pollen and phytoliths to determine what resources might have been processed using this tool. A brick was analyzed for phytoliths and macrofloral remains. Phytolith and starch analyses also were conducted on a mano, a steatite bowl fragment, and a burned mano/pestle. Pollen analysis was conducted on fill from beneath four ladrillo (brick) floors and an off-site control sample. Two Cottonwood series triangle projectile points, a mano/pestle, a steatite ground stone bowl, and a Native American style metate fragment were examined for protein residues to determine animal and/or plant resources that might have been processed with these tools. A chert biface and a vesicular basalt ground stone bowl fragment were analyzed for both protein and organic residues, the latter using Fourier Transform Infrared Spectroscopy (FTIR). Organic residue (FTIR) analysis also was conducted on a Native American olla. Macrofloral, pollen, phytolith, starch, protein residue, and organic residue analyses are used to help address specific research questions relating to site formation processes and the health, status, and ethnicity of Native Americans at the San Gabriel Mission.

METHODS

Macrofloral

The column samples were floated using a modification of the procedures outlined by Matthews (1979). Each sample was added to approximately 3 gallons of water, then stirred until a strong vortex formed. The floating material (the light fraction) was poured through a 150-micron-mesh sieve. Additional water was added and the process repeated until all floating material was removed from the sample (a minimum of five times). The material that remained in the bottom (the heavy fraction) was poured through a 0.5-mm-mesh screen. The floated portions were allowed to dry.

The light fractions were weighed, then passed through a series of graduated screens (US Standard Sieves with 4-mm, 2-mm, 1-mm, 0.5-mm, and 0.25-mm openings) to separate charcoal debris and to initially sort the remains. The contents of each screen then were examined. Charcoal pieces larger than 2 mm or 1 mm in diameter were separated from the rest of the light fraction and the total charcoal was weighed. Charcoal pieces in a representative sample were broken to expose fresh cross, radial, and tangential sections, then examined under a binocular microscope at a magnification of 70x and under a Nikon Optiphot 66 microscope at magnifications of 320–800x. The weights of each charcoal type within the representative sample were recorded. The material that remained in the 4-mm, 2-mm, 1-mm, 0.5-mm, and 0.25-mm sieves was scanned under a binocular stereo microscope at a magnification of 10x, with some identifications requiring magnifications of up to 70x. The material that passed through the 0.25-mm screen was not examined. The heavy fraction was scanned at a magnification of 2x for the presence of botanic remains. The term "seed" is used to represent seeds, achenes, caryopses, and other disseminules. Remains from the light and heavy fractions were recorded as charred and/or uncharred, whole and/or fragments. Macrofloral remains, including charcoal, were identified using manuals (Carlquist 2001; Hoadley 1990; Martin and Barkley 1961; Musil 1963; Schopmeyer 1974) and by comparison with modern and archaeological references.

Phytolith Extraction from Brick

Several pieces of the brick were removed from various regions and then combined so that a subsample of the entire brick was represented in the phytolith sample. The brick sample was then placed in a beaker with hydrochloric acid to remove any carbonates, and then the sample was boiled in 70% nitric acid to remove the organic fraction. Boiling in nitric acid also aided in disintegrating the brick pieces to silt-sized particles. After water rinses to neutral pH, a small quantity of sodium hexametaphosphate was added to the sample, mixed, and allowed to settle for two hours, after which, the clay-sized particles still in suspension were decanted and discarded. Next, the samples were freeze dried under vacuum. The dried silts and sands were then mixed with sodium polytungstate (density 2.3) and centrifuged to separate the phytoliths, which will float, from the other silica, which will not. The sample was then rinsed with distilled water, then alcohol to remove the water. After several alcohol rinses, the sample was mounted in immersion oil for counting with a light microscope at a magnification of 500x. An initial count of 100 phytoliths was tallied to establish relative abundance, then the entirety of the slide was scanned for phytoliths of taxonomic and economic significance. A phytolith diagram was produced using Tilia and TGView 2.0.2.

Macrofloral Extraction from Brick

Once a phytolith wash was obtained from the brick sample, it was broken using a hammer into about 20 fragments ranging from 2 cm to 8 cm in size. These fragments were examined under a binocular stereo microscope at magnifications of 10-70x for the presence of plant impressions.

Pollen Extraction from Sediment

The feature fill and milling stone wash required different processing methods in the laboratory, which are described below. Recovery of remains from the ground surface is discussed first.

The use of ground stone or other stone tools to process plants and animals can leave evidence on the artifact surface. Concentrations of pollen and starches from the artifact surface may represent plants that were processed using the tools.

First, all visible dirt was removed using tap water and gentle hand pressure to remove any modern contaminants. A small portion of the use surface was tested with dilute (10%) hydrochloric acid (HCl) to detect the presence of any calcium carbonates. If present, these carbonates were removed with additional dilute HCl. Then, the ground or use surface was washed with a 0.5% Triton X-100 solution to recover any pollen and starch grains. The surface was scrubbed with an ultrasonic toothbrush and rinsed thoroughly with reverse osmosis deionized (RODI) water. The sample was then sieved through 250-micron mesh to eliminate any large particles that might have been released during the washing process. After centrifuging, the sample was dried under vacuum, then mixed with sodium polytungstate (SPT) at a of density 1.8 and centrifuged to separate the pollen and starch, which will float, from the silica, which will not. The sample was treated with hydrofluoric (HF) acid to remove silica, then acetylated for 3–5 minutes to remove any extraneous organic matter. The sample was rinsed several times with RODI water, then stained with basic fuschin.

A chemical extraction technique based on flotation is the standard preparation technique used in this laboratory for the removal of pollen grains from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extraction of pollen from soils where preservation has been less than ideal and pollen density is lower than in bogs or lake sediments.

Hydrochloric acid (10%) was used to remove calcium carbonates present in the soil, after which the sample was screened through 250-micron mesh. The sample was rinsed until neutral by adding water, letting the sample stand for 2 hours, then pouring off the supernatant. A small quantity of sodium hexametaphosphate was added to the sample once it reached neutrality, then the beaker again was filled with water and allowed to stand for 2 hours. The sample again was rinsed until neutral, filling the beaker only with water. This step was added to remove clay prior to heavy liquid separation. At this time, the sample was dried, then pulverized. Sodium polytungstate (SPT) at a density of 1.8 was used for the flotation process. The sample was mixed with SPT and centrifuged at 1500 rpm for 10 minutes to separate organic from inorganic remains. The supernatant containing pollen and organic remains was decanted. SPT again was added to the inorganic fraction to repeat the separation process. The supernatant was decanted into the same tube as the supernatant from the first separation. This supernatant then was centrifuged at 1500 rpm for 10 minutes to allow any remaining silica to be separated from the organics. Following this, the supernatant was decanted into a 50-ml conical tube and diluted with distilled water. The sample was centrifuged at 3000 rpm to concentrate the organic fraction in the bottom of the tube. This pollen-rich organic fraction was rinsed, then all samples received a short (20–30 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The sample then was acetylated for 3–5 minutes to remove any extraneous organic matter.

For both samples, a light microscope was used to count pollen at a magnification of 500x. The pollen preservation in this sample was poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible.

"Indeterminate" pollen includes pollen grains that are folded, mutilated, or otherwise distorted beyond recognition. These grains are included in the total pollen count, as they are part of the pollen record. The charcoal frequency registers the relationship between pollen and charcoal. The total number of microscopic charcoal fragments was divided by the pollen sum, resulting in a charcoal frequency that reflects the quantity of charcoal observed, normalized per 100 pollen grains.

Pollen aggregates were recorded during identification of the pollen. Aggregates are clumps of a single type of pollen and may be interpreted to represent either pollen dispersal over short distances or the introduction of portions of the plant represented into an archaeological setting. The aggregates were included in the pollen counts as single grains, as is customary. The presence of aggregates is noted by an "A" next to the pollen frequency on the pollen diagram. A plus (+) on the pollen diagram indicates that pollen was observed, in spite of the fact that pollen was not present in a sufficient concentration to obtain a full count. The pollen diagram was produced using Tilia 2.0 and TGView 2.0.2. Total pollen concentrations are calculated in Tilia using the quantity of sample processed in cubic centimeters (cc), the quantity of exotics (spores) added to the sample, the quantity of exotics counted, and the total pollen counted and expressed as pollen per cc of sediment.

The pollen analysis also included examination for starch granules and, if they were present, their assignment to general categories. Starch granules are a plant's mechanism for storing carbohydrates. Starches are found in numerous seeds, as well as in starchy roots and tubers. The primary categories of starches include the following: with or without visible hila, hilum centric or eccentric, hila patterns (dot, cracked, elongated), and shape of starch (angular, ellipse, circular, eccentric). Some of these starch categories are typical of specific plants, while others are more common and tend to occur in many different types of plants.

Phytolith Extraction from Milling Stone, Ground Stone and Steatite Bowl

First, a sonicating toothbrush and a mild detergent (5% Triton X-100) was used to facilitate release of microscopic residue particles adhering to a small portion of the milling stone surface. In a similar fashion, one-half of the use surface of each mano was washed, and approximately half of the steatite bowl surface was washed. Also, visible charred residue was flaked from the bowl fragment and included in the phytolith extraction. The resulting residue wash samples were rinsed thoroughly and centrifuged using short-duration spins (10 seconds at 3000 rpm) to remove clay-sized particles. Next, the samples were frozen and dried under vacuum. The dried samples were then mixed with potassium cadmium iodide (density 2.3 g/ml) and centrifuged to separate the phytoliths, which will float, from most of the inorganic silica fraction, which will not. Because a significant portion of microscopic organic matter was recovered that hindered microfossil observation, nitric acid was added to each of the samples. After one hour, the samples were rinsed to neutral with water and then a final alcohol rinse. Next, the samples were mounted in optical immersion oil for counting with a light microscope at a magnification of 500x. A minimum count of at least 100 phytoliths was first attempted in order to establish relative abundance, then the entirety of each slide was scanned for phytoliths of taxonomic and economic significance, as well as for starch grains. Diatoms, chrysophyte cysts and sponge spicules, organisms with silica shells, were also noted. A phytolith and starch diagram was produced using Tilia and TGView 2.0.2. The frequency of maize (*Zea mays*) phytoliths and starch grains recovered was also indicated on the diagram.

Protein Residue Analysis

Artifacts submitted for protein residue analysis were tested using an immunologically-based technique referred to as cross-over immunoelectrophoresis (CIEP). This method is based on an antigen-antibody reaction, where a known antibody (immunoglobulin) is used to detect an unknown antigen (Bog-Hansen 1990). Antigens are usually proteins or polysaccharides. The method for CIEP is based on forensic work by Culliford (1964; 1971) with changes made by Newman (1989) following the procedure used by the Royal Canadian Mounted Police Serology Laboratory in Ottawa and the Centre of Forensic Sciences in Toronto. Further changes were made at PaleoResearch Institute following the advice of Dr. Richard Marlar of the Thrombosis Research Laboratory at the Denver VA Medical Center and the University of Colorado Health Sciences Center. Although several different protein detection methods have been employed in archaeological analyses, including enzyme-linked immunosorbant assay (ELISA) and radioimmune assay (RIA), the CIEP test has been found to be extremely sensitive, with the detection of 10^{-8} g of protein possible (Culliford 1964:1092). The specificity of CIEP is further strengthened by testing unknowns against non-immunized animal serum and by the use of soil controls to eliminate the possibility of false positives due to non-specific protein interactions.

Ancient protein residues are sometimes preserved and have been detected on stone tools of considerable age using CIEP (Gerlach, et al. 1996; Hogberg, et al. 2009; Kooyman, et al. 2001; Seeman, et al. 2008; Yost and Cummings 2008). In one of the largest samples of reactive protein residues from an archaeological site, Gerlach et al. (1996) reported a total of 45 positive reactions obtained on 40 of the 130 stone tools tested from an early North American Paleoindian site (ca. 11,200–10,800 years BP).

In an archaeological context, an antigen is the unknown protein adhering to an artifact after its use. Ancient proteins undoubtedly break down into small fragments over time; however, antibodies can recognize small regions of antigens (Marlar, et al. 1995). Studies by Loy (1983) and Gurfinkel and Franklin (1988) suggest that hemoglobin and other proteins bind to soil and clay particles through electrostatic interactions, and that these interactions protect the proteins from microbial attack and removal by groundwater. Sensabaugh (1971) reported that dried blood proteins "covalently cross-linked to form a single proteinaceous mass with a high molecular weight, resulting in decreased solubility." Hyland et al. (1990:105) suggested that protein molecules may be conjoined with fatty tissues, resulting in an insoluble complex that is secure against dissolution by water. These studies explain, in part, mechanisms for prolonged protein preservation and adherence to stone surfaces; however, they also illustrate the challenges of recovery from artifact surfaces.

The lithic artifacts were washed using 1–2 ml of a solution of 0.02M Tris hydrochloride, 0.5M sodium chloride, and 0.5% Triton X-100. The lithic artifacts were then placed in an ultrasonic bath for 30 minutes, on a rotating mixer for 30 minutes, then in the ultrasonic bath for an additional 30 minutes. The ground stone artifacts were washed using a sonicating toothbrush with a new head and 10 ml of a solution of 0.02M Tris hydrochloride, 0.5M sodium chloride, and 0.5% Triton X-100. Dirt and other debris removed along with the protein residue was removed using centrifugation. The resulting protein residue wash solutions were concentrated down to approximately 1 ml using a Centriprep-10 centrifugal concentrator device with a 10,000 molecular weight cut-off membrane.

Because soils contain compounds such as bacteria and animal feces that can cause false positive results for artifacts buried in the soil, control samples also were tested. One gram of soil associated with each artifact was added to 1 ml of the Tris/NaCl/Triton solution, then refrigerated for several days prior to testing.

The residues extracted from the artifacts and the soil controls first were tested against pre-immune goat serum (serum from a non-immunized animal) to detect non-specific binding of proteins. Samples testing negative against pre-immune serum were then tested against prepared animal antisera obtained from ICN Pharmaceuticals, Inc., and Sigma Chemical Company, and against antisera raised under the direction of Robert Sargeant in Lompoc, California, and of Dr. Richard Marlar. Appropriate positive and negative controls were run for each antiserum. A positive control consists of the blood of an animal for which the antiserum is known to test positively, and a negative control consists of the serum/blood of the animal in which the antiserum was raised, either rabbit or goat.

CIEP was performed using agarose gel as the medium. Two holes were punched in the gel about 5 mm apart. The protein extract from each artifact was placed in the cathodic well and the antiserum was placed in the anodic well. The sample was electrophoresed in Barbital buffer (pH 8.6) for 45 minutes at a voltage of 130v to drive the antigens and antibodies towards each other. Positive reactions appeared as a line of precipitation between the two wells. The gels were stained with Coomassie Blue to make the precipitate line easier to see. Samples with initial positive reactions were re-tested with dilute antisera, usually at a concentration of 1:10 or 1:20, to distinguish between true and false positives, increase specificity, and to replicate the initial positive reaction. Positive reactions obtained after this second test then were reported.

The identification of animals represented by positive results is usually made to the family level. All mammalian species have serum protein antigenic determinations in common; therefore, some cross-reactions will occur between closely and sometimes distantly related animals (Gaensslen 1983:241). For example, bovine antiserum will react with bison blood, and deer antiserum will react with other members of the Cervidae (deer) family, such as elk and moose.

FTIR (Fourier Transform Infrared Spectroscopy)

A mixture of chloroform and methanol (CHM) was used as a solvent to remove lipids and other organic substances that had soaked into the surface of the ceramic and stone. This mixture is represented in the FTIR graphics as CHM. The CHM solvent and sample were placed in a glass container, covered, and allowed to sit for several hours. After this period of time, the solvent was pipetted into an aluminum evaporation dish, where the CHM was allowed to evaporate. This process leaves the residue of any absorbed chemicals in the aluminum dish. The residue remaining in the aluminum dish then was placed on the FTIR crystal and the spectra were collected. The aluminum dishes were tilted during the process of evaporation to separate the lighter fraction of the residue from the heavier fraction. The lighter and heavier fractions are designated upper (lighter fraction) and lower (heavier fraction), respectively, in the subsequent analysis.

FTIR is performed using a Nicolet 6700 optical bench with an ATR (attenuated total reflection) accessory and a diamond crystal. The sample is placed in the path of a specially encoded infrared beam, which passes through the sample and produces a signal called an "inferogram." The inferogram contains information about the frequencies of infrared that are absorbed and the strength of the absorptions, which is determined by the sample's chemical make-up. A computer reads the inferogram, uses Fourier transformation to decode the intensity information for each frequency (wave numbers), and presents a spectrum.

FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR) REVIEW

Infrared spectroscopy (IR) is a technical method that measures the atomic vibrations of molecules. It is currently one of the more powerful methods used in organic and analytical chemistry for the extraction and identification of organic compounds. The infrared spectrum is produced by passing infrared radiation through a sample, whether the sample is from a liquid, paste, powder, film, gas or surface. The measurement of this spectrum is an indication of the fraction of the incident radiation that is absorbed at a particular energy level (Stuart 2004). This provides information on infrared radiation absorption, heat conversion, and the structure of the organic molecules. Analysis of specific regions and peaks in the infrared spectrum enables identification of organic compounds, including both plant and animal fats or lipids, plant waxes, esters, proteins, and carbohydrates.

The Fourier Transform Infrared Spectrometer is an instrument that converts the raw data and measures the infrared spectrum to be interpreted. Advantages of using this technique over others include the simultaneous measurement of all wavelengths, a relatively high signal-to-noise ratio, and a short measurement time. Since molecular structures absorb vibrational frequencies (i.e. wavelengths) of infrared radiation the bands of absorbance can be used in the identification of organic compound compositions. The spectrum is divided into two groups, the functional and fingerprint regions. These groups are characterized by the effect of infrared radiation on the respective group's molecules. The functional group region is located between 4000 and c. 1500 wave numbers and the fingerprint region is located below 1500 wave numbers. The molecular bonds display vibrations that can be interpreted as characteristic of the vibrations of fats, lipids, waxes, lignins, proteins, and carbohydrates. The portion of the infrared spectrum that is most useful for this research and in the identification of organic compounds (e.g. carbohydrates, lipids, proteins) is the electromagnetic spectra between 4000 and 400 (Isaksson 1999:36-39). The recorded wavelengths of the electromagnetic spectra can then be compared to the reference collections housed in the PaleoResearch Institute (hereafter PRI) library. The results from the sample are compared with the reference collection, with the aim of identifying the closest match. For example, plant lipids and fats are identifiable between 3000 and 2800 wave numbers. This portion of the spectrum can be suggestive of the presence of animal fats, plant oils, oily nuts (e.g. hickory, walnut, or acorn), or plant waxes.

Samples from archaeological contexts are difficult to analyze because they often result from complex compound mixtures. For instance, groundstone tools and ceramic cooking vessels are often multi-purpose artifacts that were used to process (e.g. crush, grind, cook) a variety of foodstuffs or ingredients. Thus, multi-purpose artifacts can create a spectra that have overlapping absorption bands with few distinctive characteristics. In particular, FTIR is a useful technique in the examination of organic compounds in fire-cracked rock (FCR) because there are so few other techniques that can be used. Organic compounds are often deposited on rocks during cooking. The fats, lipids, waxes, and other organic molecules may be deposited onto rock surfaces as a result of dropping or oozing from foods being cooked or baked in a pit, or seepage out of or spill over from cooking vessels. Re-use of rocks is possible, in which case the organics recovered from the FCR might represent multiple cooking episodes. The PRI extraction method gently removes these organic molecules from the groundstone, ceramics, and/or rocks so that they can be measured with FTIR and subsequently identified. Organic molecules from sediments can also be extracted, measured, and identified. This is useful in the identification of dark horizons that are a result of the decay of organic matter, whether plant or animal. For example, if the dark horizon is the result of decaying organic matter, FTIR will yield a signature of decaying organic remains. If the dark horizon is the result of ash blown from a cultural feature (i.e. hearth), then the signature will be considerably different. Below is a discussion of the common organic materials that can be identified in archaeological samples using FTIR.

Lipids

Lipids that are solid at room temperature are called fats and those that are liquid at room temperature are referred to as oils (Wardlaw and Insel 1996:108). Both forms of lipids can be detrimental, as well as beneficial, to human health. Consumption of certain animal fats rich in saturated fatty acids can lead to heart disease, while ingesting omega-3 fatty acids such as EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), found in both fish and plants, is essential for good health. Lipids, whether fats or oils, are noted between 3000 and 2800 wave numbers on the FTIR spectrum.

Fatty acids are components of most lipids in humans, animals, and plants foods (Wardlaw and Insel 1996:108). A fatty acid is considered saturated if the carbons are connected by single bonds. Saturated fatty acids occur in high proportions in animal fats. If the carbon chain has only one double bond between two of the carbons, then the fatty acid is monounsaturated. If there are two or more double bonds between carbons, then the fatty acid is polyunsaturated. Essential fatty acids are those lipids necessary for human health including normal immune function and vision. Essential fatty acids include omega-3 and omega-6, alpha-lineolic, and linoleic (Wardlaw and Insel 1996:110-111). Diets high in essential fatty acids reduce the risk of heart attacks because they minimize the tendency for blood to clot (Wardlaw and Insel 1996:112).

Esters

Esters are components of the biological compounds fats, oils, and lipids, and as such are an important functional group. In an ester, the basic unit of the molecule is known as a carbonyl. Esters may be recognized using FTIR by three strong bands appearing near 1700, 1200 and 1100 wave numbers. Esters are divided into aliphatic and aromatic groups (Stuart 2004:78) or into saturated and aromatic groups (Smith 1999:108). Aromatic esters take their name from their ability to produce distinctive odors and occur naturally in many plant foods. They are defined by the presence of a benzene ring as part of the alpha carbon (Smith 1999:108). This is recognizable in the FTIR by the wave number assignment of the peaks. Aromatic esters are expressed in the FTIR spectrum by distinct peaks located at 1730-1715, 1310-1250, 1130-1100, and 750-700 wave numbers. In contrast, aliphatic esters do not contain a benzene ring. Some have distinctive odors, while others do not. Saturated esters are defined by saturation of the alpha carbon (Smith 1999:108). Saturated (or aliphatic) esters are represented by peaks in the ranges 1750-1735, 1210-1160, 1100-1030, with a unique peak for acetates expressed at approximately 1240 wave numbers, the latter of which can be very strong (Smith 1999:110-112). It is easy to identify the distinction between saturated/aliphatic and aromatic esters when all three bands are present since they occupy different wave number regions.

Proteins

The majority of the building blocks for proteins, or amino acids, are produced by plants. Humans do not have all the enzymes required for biosynthesis of all the amino acids, which are organic compounds that contain both an amino and a carboxyl group, so many must be supplied by the diet. The human body uses protein from both plant and animal sources to perform key bodily functions (e.g. blood clotting, fluid balance, hormone and enzyme production, cell growth and repair and vision). The human body requires thousands of different types of proteins that are not all available within the body (Wardlaw and Insel 1996:152). Through a process known as translation amino acids are linked in a variety of ways to form necessary proteins (Rodnina 2007). The order in which the amino acids are arranged is determined by the genetic code of the mRNA template, which is a copy of an organism's genetic code (Creighton 1993). Amino acids are divided into standard and non-standard types. There are twenty naturally-occurring standard amino acids (Creighton 1993). These are divided into essential and nonessential amino acids, essential because they are necessary for human growth and cannot be produced by the body (Young 1994). Essential amino acids must be obtained from food sources, and include histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine (Furst and Stehle 2004; Reeds 2000; Wardlaw and Insel 1996:154).

Nonessential amino acids also are essential for human health, but do not need to be obtained from the diet because they can be produced by the body. However, certain nonessential amino acids may become essential on an individual basis if the health of the individual is compromised (Wardlaw and Insel 1996:155), leading to difficulties in producing these amino acids. Nonessential amino acids include alanine, arginine, asparagine, aspartate (aspartic acid), cysteine, glutamate (glutamic acid), glutamine, glycine, proline, serine, and tyrosine (Furst and Stehle 2004; Reeds 2000; Wardlaw and Insel 1996:154). There are also nonstandard amino acids that encompass two groups, those that are chemically altered after incorporation into a protein and those that exist in living organisms but are not found in proteins (Driscoll and Copeland 2003).

Carbohydrates

Carbohydrates are a product of photosynthesis in green plants and are the most prevalent group of compounds on earth. They include sugars, starches, and fibers: sugars are the simple carbohydrates found in table sugar, honey, fruit, and molasses; starches are simple or complex carbohydrates present in legumes, grains, vegetables, and fruits; and fibers (cellulose, hemicellulose, and pectin) are present in whole grains, legumes, vegetables, and fruits (Garrison and Somer 1985:13). There are four groups of carbohydrates that are classified based on their molecular structure. These are monosaccharides, disaccharides, oligosaccharides, and polysaccharides. This discussion presents a brief overview of the different carbohydrates with a more detailed discussion of the polysaccharides.

Monosaccharides, Disaccharides, and Oligosaccharides

Monosaccharides are naturally occurring simple sugars containing three to seven carbon atoms. Variations in the carbon chains create different sugars including, glucose, D-glucose, fructose, galactose, and mannose. The most important dietary monosaccharides are hexoses ($C_6H_{12}O_6$). Disaccharides are formed when two monosaccharides are combined (Wardlaw and Insel 1996:72). Sucrose, lactose, and maltose are the three most common disaccharides found in nature (Wardlaw and Insel 1996:72). Oligosaccharides comprise two or more hexoses with the exclusion of one water molecule ($C_{12}H_{22}O_{11}$). These carbohydrates are water soluble and are able to crystallize. Raffinose and stachyose are oligosaccharides that are found in legumes. Humans (and other monogastric animals) are missing the α-GAL enzyme that allows for the digestion of these two carbohydrates (Wardlaw and Insel 1996:80). Thus, ingestion of raffinose and stachyose results in gas-producing bacteria in the lower intestine (carbon dioxide, methane, and/or hydrogen), which leads to flatulence (and discomfort).

Polysaccharides

Polysaccharides ($C_6H_{10}O_5$) are complex starchy compounds (cellulose in plants and glycogen in animals). These carbohydrates are not sweet, do not crystallize, and are not water soluble. They are formed of repeating units of mono- or disaccharides that are joined together by glycosidic bonds. Polysaccharides are often heterogeneous and slight modifications of the repeating units result in different FTIR signatures. The different types of polysaccharides include storage (starches and glycogen), structural (cellulose and chitin), acidic (containing carboxyl groups, phosphate groups, and/or sulfuric ester groups), neutral (presumably without the acid features), and bacterial (macromolecules that include peptidoglycan, lipopolysaccharides, capsules and exopolysaccharides).

The two primary storage polysaccharides are starch and glycogen, both of which are digestible by humans (Murray, et al. 2000:155; Wardlaw and Insel 1996:80-81). Cooking starches allows for easier digestion by making them more water soluble and available for breakdown by digestive enzymes (Wardlaw and Insel 1996:80). The two primary types of plant starch are amylose and amylopectin, both of which are sources of energy for plants and subsequently for animals (Murray, et al. 2000:155; Wardlaw and Insel 1996:80). Glycogen, often referred to as animal starch, is a storage polysaccharide found in the liver and muscles of humans and other animals. Structurally, glycogen is similar to amylopectin, but it has a more complex branching pattern of glucose molecules that allows for easier energy conversion because the enzyme breakdown of glycogen occurs only at the ends of chains of glucose molecules. This makes glycogen an ideal form for carbohydrate storage in the body (Wardlaw and Insel 1996:81). Breakdown of glycogen yields glucose-phosphate molecules, which can either be converted into glucose by the liver and transferred into the blood stream or be broken down in the muscles through a non-enzymatic process termed glycolysis (Wardlaw and Insel 1996:81,335). Glycolysis in the muscles during intense physical activity or stress yields lactic acid under anaerobic conditions or carbon dioxide and water under aerobic conditions (Wardlaw and Insel 1996:336). Therefore, glycogen is absent in meat from butchered and hunted animals because in response to stress and/or intense physical activity the glycogen is broken down into lactic acid and/or metabolized by the animal (Food and Agriculture Organization of the United Nations 2009; Green, et al. 2006; Sheeler and Bianchi 2004; Wardlaw and Insel 1996:81).

Humans and other animals cannot digest structural polysaccharides, also known as dietary fibers. Structural polysaccharides are primarily composed of cellulose, hemicellulose, pectin, gum, and mucilage (Wardlaw and Insel 1996:82). Lignins are complex alcohol derivatives that make up the only non-carbohydrate component of insoluble plant fibers (Wardlaw and Insel 1996:82). Pectin, gums, and mucilages are soluble fibers found inside and around plant cells that help "glue" them together (Wardlaw and Insel 1996:82).

Acidic polysaccharides are defined as containing carboxyl groups, phosphate groups, and/or sulfuric ester groups. Carboxylates are often identified in FTIR with a signature peak between 1560 and 1410 wave numbers. Neutral polysaccharides lack carboxyl groups, phosphate groups, and/or sulfuric ester groups and include chitin, chitosan, curdlan, dextran, glucan, inulin, arabinogalactan, arabinogalactorhamnoglycan, and other compounds that are a result of fermentation or are plant-specific.

Bacterial polysaccharides are diverse macromolecules that include peptidoglycan, lipopolysaccharides, and exopolysaccharides. Peptidoglycans function as one of the components of structural cell walls. Pathogenic bacterial may produce a thick, mucous-like, encapsulating layer of polysaccharide, which cloaks the antigenic proteins on the surface of the bacteria that are used by the host organism to provoke an immune response, leading to the destruction of the bacteria. These are referred to as "bacterial capsular polysaccharides". This encapsulating layer also protects the bacterium from harsh environments, such as *Pseudomonas* in the human lung. Bacteria, fungi, and algae may secrete polysaccharides to help them adhere to surfaces and/or to prevent them from drying out. Humans have used some of these polysaccharides, such as xanthan gum, as thickening agents in food.

ETHNOBOTANIC REVIEW

Use of historic documents referring to plant use is particularly relevant to the study of remains from the historic era. The ethnobotanic literature, as well as historic records of various types, provide evidence for the exploitation of numerous plants in historic times, both by broad categories and by specific example. Ethnographic sources outside the study area have been consulted to permit a more exhaustive review of potential uses for each plant. Ethnographic sources document that with some plants, the historic use was developed and carried from the past. A plant with medicinal qualities very likely was discovered in prehistoric times and the usage persisted into historic times. There is, however, likely to have been a loss of knowledge concerning the utilization of plant resources as cultures moved from subsistence to agricultural economies and/or were introduced to European foods during the historic period. References on plant domestication, cooking, and food cultures are often consulted when describing plants present in the archaeobotanic record. Macrofloral, pollen, phytolith, starch, protein, and organic residue analyses identified the remains of several types of plants. Many of these plants represent potential and/or probable food resources, while others represent weeds and/or ornamental plants that probably grew nearby. These plants will be discussed in the following paragraphs to provide basic information concerning their origin and uses, as well as to provide an ethnobotanic background for discussing the samples.

Potential Edible and Economically Important Plants

Apiaceae (Parsley Family)

Members of the Apiaceae (parsley family) are biennial or perennial, mostly herbs with stout stems, often aromatic. Many of the species in this family are of economic importance, including *Anethum graveolens* (dill), *Anthriscus cerefolium* (chervil), *Carum carvi* (caraway), *Coriandrum sativum* (coriander), *Cuminum cyminum* (cumin), *Daucus carota* (carrot), *Foeniculum vulgare* (fennel), *Pastinaca sativa* (parsnip), *Petroselinum crispum* (parsley), and *Pimpinella anisum* (anise). Other members of this family, including but not limited to *Cymopterus*, *Lomatium* (biscuitroot, prairie parsley), *Perideridia* (yampa), and *Pseudocymopterus* (mountain parsley), were used by many Native American groups. The roots, stems, and leaves of these plants were used for food, seasoning, and medicine (Harrington 1967; Kirk 1975). Several members are poisonous, such as *Conium maculatum* (poison-hemlock) and species of *Cicuta* (water-hemlock). Members of the Apiaceae are found primarily in the temperate northern hemisphere (Hickey and King 1981:298-299; Muenscher 1987:321-331; Smith 1977:177).

Arctostaphylos (Manzanita, Kinnikinnick, Bearberry)

Arctostaphylos (manzanita, kinnikinnick, bearberry) is a woody, evergreen plant varying from low prostrate and spreading shrubs to small trees with purple or dark red bark and red or brown berries. The berries of all species are edible and can be eaten raw, but are best when cooked in pies, cobblers, and jelly. Kirk (1975:66) reports that Californians make a type of cider drink from scalded and crushed berries added to water, as well as a berry wine. The plant is high in tannic acid. *A. uva-ursi* (kinnikinnick, bearberry) is noted to be a powerful astringent and antiseptic used to treat bladder infections and kidney stones. A wash was used externally to stop the spread of poison ivy rash. This plant also is cultivated as an ornamental. The dry berries were eaten raw, cooked, or dried and ground into a meal by Native American groups, or were dried whole for future use. The seeds were parched and also ground into flour. Seeds and fruits were soaked in water to make a drink. The leaves also were brewed into a medicinal tea that is reported to be good for kidneys, or boiled into a solution that was used on cuts and burns. The wood was used in building houses and to make a variety of utensils. Dried *Arctostaphylos* leaves and bark, especially *A. uva-ursi* were mixed with tobacco (*Nicotiana*) leaves and smoked. *Arctostaphylos* is found in a variety of habitats, including chaparral, woodland, ridges, slopes, forests, open sites, rocky outcrops, and coastal scrub. *A. glauca* (bigberry manzanita) is noted to have been common throughout the southern California coastal regions (Angell 1981:68-70; Barrows 1900:36, 64; Bean 1978:576-578; Bean and Shipek 1978:552; Hedges and Beresford 1986:15; Hickman 1993:545-559; Kirk 1975:53, 66-67; Kruger 1993:37; Luomala 1978:600; Mead 1972:20-24; Tilford 1997:86).

Asteraceae (Sunflower Family)

The Asteraceae (sunflower or aster family) is the largest family of plants in California and the largest family of dicots worldwide. This family consists mostly of herbaceous plants, usually with a taproot. A few species become shrubs or trees. Food plants in this family include *Lactuca* (lettuce), *Helianthus* (sunflower), *Cichorium intybus sativum* (chicory), and *Cichorium endivia* (endive), all members of the tribe Liguliflorae. The High-spine group includes many genera that are highly decorative and are grown as popular ornamentals. Some of these include *Aster* (aster), *Solidago* (golden rod), *Erigeron* (daisy), *Bellis perennis* (English daisy), *Wyethia*, *Coreopsis*, *Tagetes* (marigold), *Helianthus* (sunflower), *Chrysanthemum*, *Cosmos*, *Dahlia*, *Zinnia*, *Centaurea* (cornflower), *Anthemis tinctoria* (yellow chamomile), *Calendula*, *Rudbeckia* (Mexican hat), *Senecio* (groundsel), and *Arnica*. Many species, such as *Ambrosia* (ragweed), are weedy, herbaceous plants found in a variety of habitats, some of which include cultivated fields, meadows, waste places, old fields, pastures, gardens, and lawns (Clements 1927:611-615; Hickey and King 1981:418; Muenscher 1987:422; Niering and Olmstead 1979:354; Tomanova 1986:217; Zomlefer 1994:203).

Members of the Asteraceae family were used in a variety of ways by Native groups, including as construction materials, tools, crafts, medicines, and as food. Seeds were exploited from numerous members of this group including *Artemisia* (sagebrush), *Dicoria* (twinbugs), *Helianthus* (sunflower), *Lasthenia* (goldfields), *Layia* (tidy tips), *Machaeranthera*, and *Malacothrix*. Most Asteraceae seeds ripen in the late summer and fall. *Ambrosia* (ragweed, bursage) leaves are noted to have been cooked, while *Pectis* (cinchweed) leaves were added as a seasoning. *Ambrosia* roots also were eaten. Asteraceae wood was used for making tools, for thatching, and as fuel. Members of this family also were important medicinal resources. *Artemisia* leaves were used to make a ceremonial drink, as well as a medicinal tea for treating colds, easing menstrual cramps, and during childbirth. Leaves also were used as a sweat bath inhalant especially good for rheumatic aches and pains (Ebeling 1986:309; Hickman 1993:174; Hodgson 2001:86-89, 253; King and Rudolph 1991:117; Mead 2003:24, 316; Timbrook 1984; Westrich 1989:125).

Anthemis (Chamomile)

Species of *Anthemis* (chamomile) are annuals or perennials, and all species are European introductions. The dried leaves of *Anthemis nobilis* (Roman chamomile) are used to make the popular chamomile tea, used to treat anxiety, insomnia and other sleep disorders, and a variety of gastrointestinal disturbances. Chamomile is one of the most widely used medicinal plants in the world. *Anthemis cotula* (stinking chamomile, dog fennel, mayweed) is a foul-smelling weed common throughout much of California found in disturbed areas, fields, roadsides, coastal dune areas, chaparral, and oak woodlands. Native groups put fresh leaves in a bath to treat aches and pains from colds (Gardiner 1999:1-2; Hickman 1993:198; Kiple and Ornelas 2000b:1749; Mead 2003:31; Westrich 1989:39).

***Helianthus* (Sunflower)**

Helianthus (sunflower) are annual or perennial plants that were extensively used by many Native American tribes. Sunflower "seeds" are actually a complete fruit called an achene. The seeds were eaten raw, cooked, or roasted. Seeds also were dried or parched and ground into a meal. The seeds are very nutritious. They contain 24% protein, 47% fat, and are good sources of vitamin B. Purple and black dyes were obtained from the seeds and a yellow dye from the flowers. A sunflower tea was used to treat lung ailments, malaria, high fevers, as an astringent, and as a poultice for snake bites and spider bites. A root decoction was used as a warm wash for rheumatism. Sunflower plants can be found in disturbed areas, waste places, dry rocky soils, marshes, open woods, fields, low or damp meadows, prairies, and along roadsides, railroads, and streambanks (Foster and Duke 1990:132; Heizer and Elsasser

1980:136; Hickman 1993:278-280; Johnson 1978:355; Kirk 1975:133; McGee 1984:265, 272; Sweet 1976:40).

***Xanthium* (Cocklebur)**

Xanthium (cocklebur) is a common weedy annual found throughout the United States. The fruit is a pod about one inch long that is covered with stiff, hooked barbs and often called a bur. The inner seeds can be parched and ground into a flour. The leaves of *Xanthium* can be used to treat herpes, skin and bladder infections, and to stop the bleeding of skin cuts and abrasions. A tea made from the leaves is a useful diuretic. Crushed, boiled pods have analgesic, diuretic, and antispasmodic effects, and have been used for diarrhea, rheumatism, and arthritis; however, large quantities or constant use can have toxic effects. The crushed seeds can be used as a blood clotting agent and an antiseptic for skin abrasions, and is a good first aid dressing. *Xanthium* is found growing in dry areas and old fields, along roadsides, around alluvial washes and creek banks, and on beaches (Krochmal and Krochmal 1973:236-237; Moerman 1998:602; Moore 1979:59).

Brassicaceae (Mustard Family)

The Brassicaceae (mustard family) consists of 375 genera and 3200 species of annual, biennial, or perennial herbs or rarely small shrubs with watery, acrid sap. Flowers are noted to be uniform and consist of four separate sepals arranged like a cross. The young leaves are rich in vitamins A, B1, B2, and C and can be boiled as greens. Members of this family cultivated for food include *Brassica oleracea* (broccoli, cabbage, kale, cauliflower, kohl-rabi, and brussel sprouts), *Brassica rapa* (turnip), *Sinapis alba* (yellow mustard), *Nasturtium officinale* syn. *Rorippa nasturtium-aquaticum* (watercress), *Lepidium sativum* (garden cress), and *Armoracia rusticana* (horseradish). Many members of this family are cultivated as ornamentals and include plants such as *Iberis* (candytuft), *Alyssum* (alyssum), *Arabis* (rockcress), *Hesperis matronalis* (dame's rocket), *Lunaria* (honesty, money plant), *Lobularia maritima* (sweet alison), *Matthiola* and *Malcolmia* (stocks), *Erysimum* (wallflower), and *Aubrieta*. These plants seed freely, thus establishing themselves in gardens over a period of many years. Weedy species include *Capsella* (shepherd’s-purse), *Descurainia* (tansy-mustard), and *Lepidium* (pepper-grass). The leaves and stems have a very pungent or peppery flavor. Members of the Brassicaceae are cosmopolitan in distribution, chiefly in northern temperate regions. Wild members of this family can be found in waste places, grain fields, pastures, neglected fields, cultivated areas, in ditches, and along banks of streams (Britton and Brown 1970b:146; Hedrick 1972:100; Hickey and King 1981:150; Martin 1972:64-65; McGee 1984:196; Muenscher 1987:229, 232-236; Zomlefer 1994:125-129).

Members of the Brassicaceae (mustard) family were exploited by Native groups in California for their greens, primarily during the rainy season during the months of November and December (Priestley 1972:50). Peppergrass (*Lepidium* sp.) and other seeds were parched by tossing or stirring the seeds with hot coals or heated granite fragments. Parched seeds could be stored for future use. The parched seeds were ground into a flour and used for cooking mush, cakes, and stews (Luomala 1978:600). Both peppergrass and tansy-mustard (*Descurainia*) seeds are noted to have been eaten in pinole after being roasted (King 1990:12).

***Brassica* (Mustard)**

The *Brassica* (mustard) group includes broccoli, cauliflower, cabbage, brussels sprouts, collards, kale, kohlrabi, turnips, mustards, rutabagas, and rape. This large genus of about 80 species includes many cultivated and weedy varieties. Some varieties were introduced from Europe and Asia, such as *B. nigra* and *B. oleracea*. *B. nigra* (black mustard) is one of the most widespread mustards in the United States and is the chief source of commercial mustard. Cabbage, brussels sprouts, broccoli, cauliflower, kohlrabi, and kale are all different varieties of *B. oleracea*. Mustards are annual, winter annual, or biennial herbs with yellow, four-petaled flowers. The young leaves are rich in vitamins A, B1, B2, and C, and can be boiled as greens. Seeds are used whole as seasonings in pickle recipes or are ground to make hot mustard. Some weedy species can cause damage to grain and flax crops. Wild mustards can be found in waste places, grain fields, pastures, neglected fields, cultivated areas, in ditches, and along banks of streams (Hedrick 1972:100; Martin 1972:64-65; McGee 1984:196; Muenscher 1987:232-236; Peterson 1977:64).

***Descurainia* (Tansy Mustard)**

All species of *Descurainia* (tansy-mustard) are edible. The leaves and young plants were cooked as potherbs. Tilford (1997:158) notes that "the raw or cooked greens of young plants are highly nutritious, containing considerable amounts of trace minerals and vitamins A, B, and C." Greens are noted to have been exploited primarily during the rainy season in California during the months of November and December (Priestley 1972:50). The small seeds were parched by tossing them in a basket with hot stones or coals. The parched seeds were ground into a flour and used for cooking pinole, mush, cakes, and stews. The flour is noted to have had a peppery taste and often was mixed with other flours. A poultice of the plants was applied to toothaches and used as a lotion for frostbite and sore throats. *Descurainia* is a weedy annual or biennial found in open sites, meadows, sagebrush, shrubland, aspen groves, open woodlands, dry or sandy washes, plains, valleys, lake margins, fields, slopes, dry streambeds, pinyon/juniper woodlands, sandy or saline soils, desert shrubland, dunes, waste places, and along roadsides (Ebeling 1986:229-230; Hickman 1993:413-416; King 1990:12; Kirk 1975:38; Luomala 1978:600; Mead 1972:77; Moerman 1986:151; Muenscher 1987:242). *Descurainia* and *Lepidium* seed coats produce a mucilaginous substance when wet, that might be “viscous enough to slow digestion and absorption in the human digestive system, thereby helping control the development of diabetes” (Brand, et al. 1990) in (Hodgson 2001:98).

Cheno-ams

Cheno-ams refer to a group representing the Chenopodiaceae (goosefoot) family and the genus *Amaranthus* (amaranth, pigweed). The Chenopodiaceae family consists of annual or perennial herbs or sometimes shrubs. These plants are especially abundant in weedy, xeric, or saline areas. Food plants in this family include *Beta vulgaris* (beet, swiss chard), *Spinacia oleracea* (spinach), and several species of *Chenopodium* (goosefoot, pigweed, quinoa) that provide edible greens and pseudo-grains. Genera that are grown as ornamentals include species of *Amaranthus*, *Atriplex* (saltbush), some species of *Chenopodium*, *Kochia* (summer-cypress), and *Salicornia* (glasswort). Other species of *Chenopodium* and *Salsola* (Russian thistle) are common weedy plants. Plants such as *Amaranthus, Chenopodium, Atriplex* (saltbush)*, Monolepis* (povertyweed, patata), and *Suaeda* (seepweed) were exploited by Native groups for both their greens and seeds. The young leaves were eaten fresh or cooked as potherbs. Seeds were collected during the late summer, usually with a seed beater and burden basket, then parched and ground into a flour that was used to make mushes and cakes or added to stews. Seeds also were eaten raw. *Chenopodium* and *Amaranthus* are weedy annuals or perennials that thrive in disturbed areas and are capable of producing large quantities of seeds. *Amaranthus* seeds and leaves are noted to be highly nutritious, containing protein and a variety of vitamins and minerals. Cheno-am plants also were important medicinal resources. Amaranthus and *Chenopodium* leaf poultices or leaf teas were used to reduce swellings and to sooth aching teeth. *Chenopodium* leaves are rich in vitamin C and were eaten to treat stomachaches and to prevent scurvy. *Chenopodium* also is rich in calcium and vitamin A. Leaf poultices were applied to burns, and a tea made from the whole plant was used to treat diarrhea. The roots of *Chenopodium californicum* were pounded and used for soap or shampoo. A black dye can be obtained by soaking *Suaeda* leaves and stems in water for many hours, while *Atriplex* leaves, twigs, and blossoms yielded a bright yellow dye. Cheno-am plants are found in a variety of habitats, including arid, moist, saline and alkaline soil, often in disturbed areas (Angier 1978:33-35, 191-193; Bean and Saubel 1972; Brill and Dean 1994:46; Foster and Duke 1990:216; Hickey and King 1981:82; Kelly 1978:417; Kirk 1975:56-63; Krochmal and Krochmal 1973:34-35, 66-67; Levy 1978b:403-404; Mead 1972:58; Moerman 1998:194; Sweet 1976:48; Tilford 1997:14, 88-89; Westrich 1989:55, 98-99; Zigmond 1981; Zomlefer 1994:65).

Amaranthus **(Amaranth, Pigweed)**

Species of *Amaranthus* (amaranth, pigweed) are herbaceous annuals found in moist to dry ground in a variety of habitats. Grain amaranths are noted to be important food crops in high elevations of tropical America and Asia (Weber 1976:73). In these countries, the seeds are popped or ground into a meal and baked into cakes. *Amaranthus* was an important food plant for Native groups in the United States, providing greens and seeds. The small black seeds were collected during the late summer, parched, and ground into a flour that was used to make mushes and cakes or in stews. Seeds also can be eaten raw. The young leaves of *Amaranthus* can be boiled as potherbs and are noted as having an asparagus-like flavor (Bean 1978:578; Kirk 1975:63; Luomala 1978:600). The plant also was used medicinally. *Amaranthus* leaves were an important source of iron. Plant poultices were used to reduce swellings and to sooth aching teeth. A leaf tea was used to stop bleeding and to treat dysentery, ulcers, diarrhea, mouth sores, sore throats, and hoarseness (Angier 1978:33-35; Foster and Duke 1990:216; Krochmal and Krochmal 1973:34-35). Some species are cultivated commercially, such as *A. cruentus* (red amaranth, prince’s feather), *A. tricolor* (Joseph's-coat), and *A. caudatus* (love-lies-bleeding). Most species of *Amaranthus* are considered weeds of late summer and are found in fields, waste places, and disturbed ground (Ambler, et al. 1994:165; Kirk 1975:63; Muenscher 1987:192-195)(Weber 1976:73).

Chenopodium **(Goosefoot, Pigweed)**

Chenopodium (goosefoot, pigweed) are weedy annuals or perennials that thrive in disturbed areas. Seeds were collected by Native groups during the late summer, usually with a seed beater and burden basket, then parched and ground into a flour that was used to make mushes and cakes or added to stews. Seeds also were eaten raw. The young leaves were eaten fresh or cooked as potherbs. *Chenopodium* leaves are rich in vitamin C and were eaten to treat stomachaches and to prevent scurvy. *Chenopodium* also is rich in calcium and vitamin A. Leaf poultices were applied to burns, and a tea made from the whole plant was used to treat diarrhea. Leaf poultices or leaf teas also were used to reduce swellings and to sooth aching teeth. The essential oil distilled from flowering and fruiting *C. ambrosioides* (American wormseed, Mexican tea) was used until recently against roundworms, hookworms, dwarf tapeworms, and intestinal amoeba (Foster and Duke 1990:216). The roots of *Chenopodium californicum* were pounded and used for soap or shampoo. *Chenopodium* plants are found in a variety of habitats, including shrublands, woodlands, coniferous forests, open places, sandy or gravelly areas, and washes (Brill and Dean 1994; Hickman 1993:506-511; Kirk 1975:56-57; Luomala 1978:600) (Mead 2003:111-114; Tilford 1997:88-89; Westrich 1989:98-99).

Citrullus lanatus **(Watermelon)**

Watermelon (*Citrullus lanatus* syn. *Citrullus vulgaris*) is a spreading annual vine that produces round, oval, or oblong fruits that can weigh from 5 to 100 pounds. They are natives of southern Africa that came to the Americas with the slave trade. Watermelons are now cultivated all over the world, and the number of varieties has increased. There are differences in size, shape, color of rind, color of flesh, and color of seeds between the different varieties. Watermelons usually are eaten raw. Juice can be made into wine. The rinds can be eaten as a vegetable, either stir-fried or pickled. Watermelon fruits are a good source of vitamin C, vitamin A, and lycopene, a carotenoid antioxidant, and they contain vitamin B6, vitamin B1, potassium, and magnesium (Ambler, et al. 1994:557; Hedrick 1972:169-172; McGee 1984:184).

Crataegus **(Hawthorn)**

Crataegus (hawthorn) are shrubs or small trees with sharp, pointed thorns on the stems and branches. There are hundreds of species in North America that all hybridize readily and all produce edible berries. Berries are usually red, but also can be yellow, orange, black, blue, or purple. Berries can be eaten raw or cooked in jams and jellies. Berries and flowers can be steeped into a tea that dilates coronary vessels, reduces blood pressure, and acts as a direct and mild heart tonic. Hawthorn acts to "normalize" the heart by either stimulating it or depressing it, depending on the need. Hawthorns are most abundant in the eastern and central United States and are found in woods, thickets, and along streams (Angell 1981:83-84; Foster and Duke 1990:236; Hoffman 1988:200; Kirk 1975:99-100).

Cucurbita **(Squash, Pumpkin)**

The *Cucurbita* (squash, pumpkin) genus contains 27 species of trailing and climbing annuals and perennials. They are natives of the Americas, and some species have been cultivated for 9,000 years. Numerous varieties are now grown. Cultivated species include *C. pepo* (New England pumpkin, zucchini, crookneck squash, acorn squash, cultivated gourd), *C. mixta* (green-striped cushaw, Taos pumpkin, silverseed gourd), *C. moschata* (butternut squash, Kentucky field pumpkin), *C. maxima* (banana squash, turban squash, hubbard squash), and *C. ficifolia* (spaghetti squash). Summer squashes, such as zucchini and yellow squash, are eaten when soft and immature. Winter squashes (acorn squash, turban squash, etc.) and pumpkins are allowed to mature into hard, starchy fruits that will keep for months. Some pumpkins can weigh as much as 100 pounds. Winter squashes are most often eaten baked or grilled, are used as pie filling, or are made into marmalade. The seeds can be roasted and eaten. Species of *Cucurbita* have been used as anthelmintics or vermifuges (worm-expellants) (Ambler, et al. 1994:551, 554-555; Cordell 1984:178; Hedrick 1972; McGee 1984:200; Phillips and Rix 1993:174).

Cyperaceae (Sedge Family)

Members of the Cyperaceae (sedge) family are perennial or annual grass-like herbs of wet places, although some are adapted to drier habitats. A number of plants in this family, especially those in the genera *Carex* (sedge), *Cyperus* (flatsedge), and *Scirpus* (bulrush) are found as weeds in grasslands or recently drained areas (Hickey and King 1981:448; Muenscher 1987:157).

Members of the Cyperaceae family are noted to have been important resources for Native Americans. *Carex* (sedge) stems are filled with a sugary juice, and the tuberous base of the stem was eaten (Yanovsky 1936:9). Most species are found in wet areas, although some are found in open, dry ground (Hitchcock and Cronquist 1973:578-595). Several species of *Cyperus* (flatsedge, nutgrass) have a tuber-like thickening at the base of the plant or possess tubers at the end of slender rootstalks. These tubers were eaten raw, boiled, dried and ground into a flour, or baked in a fire. The roots also can be roasted until dark brown and ground to make coffee. *Cyperus esculentus* is noted to have been a famous plant food since ancient Egyptian times. *Cyperus* is a grass-like perennial found in moist ground, especially in damp sandy soil and waste places (Harrington 1967:174; Kirk 1975:176; Peterson 1977:230). *Scirpus*-type (bulrush, tule) plants are mostly perennial herbs with triangular or circular stems. Recent studies by taxonomists have resulted in the creation of several new genera, such as *Amphiscirpus*, *Bolboshoenus*, *Isolepis*, *Shoenoplectus*, and others. At one point, the *Scirpus* genus held almost 300 species, but many of the species once assigned to this genus have now been reassigned to the new genera, and it now holds an estimated 120 species. In general, bulrushes have cylindrical, bullwhip-like stems, while three-squares have triangular stalks. These plants were used extensively by native groups. The Luiseño and other groups ate the young shoots raw or cooked. Old stems were woven into mats and baskets. Pollen was collected and mixed with other meal to make breads, mush, and cakes. Seeds also were parched and ground into a flour. The starchy roots are edible and were eaten raw, roasted, or dried and ground into a flour for cooking. Young rootstocks were crushed and boiled to make a sweet syrup. Plants also were used as a ceremonial emetic. *Scirpus*-type plants can be found in woods, thickets, meadows, pastures, rice fields, ditches, swamps, bogs, marshes, and in other low, wet places (Britton and Brown 1970a:326; Kirk 1975:175-176; Martin 1972:31; Mead 2003:387; Moerman 1998:446; Muenscher 1987:151; Peterson 1977:230).

Erodium (Storksbill, Filaree)

Erodium (filaree, storksbill, heron's bill, alfilaria) are annual or biennial herbs with seed pods that are shaped like a stork's or heron's bill. Six species are native to the United States. Many species of *Erodium* have been introduced from Europe, Asia, or the Mediterranean region and are now common, widespread weeds. Some of these plants were introduced early in California by the Spaniards, especially *E. cicutarium* and *E. moschatum*, and the leaves were eaten fresh when young and tender or boiled as greens by historic Native American groups. They also used the plant medicinally. *E. cicutarium* is noted to have diuretic, astringent, and anti-inflammatory properties, and it has been used to treat gout, rheumatism, and water retention. *E. macrophyllum* and *E. texanum* are native to the western United States. In California, they are found in open sites, grassland, and shrubland. *Erodium* plants are found on dry soil in fields, pastures, lawns, and waste places (Hedges and Beresford 1986:21; Hickman 1993:672-673; Kirk 1975:27-29; Martin 1972:74; Mead 1972:89; Muenscher 1987:292-294; Munz 1974:490; Tilford 1997:60; Westrich 1989:111).

Fabaceae (Pea or Bean Family)

The Fabaceae (pea or bean) is a large family of about 600 genera and 12,000 species, including trees, shrubs, herbs, water plants, xerophytes, and climbers. A general characteristic of this family is the presence of bacterial nodules in the roots of many plants which enable the plant to take up more atmospheric nitrogen. This practice helps enrich the soil, and many species are valuable as crops on poor soils (Hickey and King 1981:196; Zomlefer 1994:160). Members of the Fabaceae found in southern California include *Amphora* (false indigo), *Astragalus*, *Hoffmannseggia*, *Lathyrus* (wild pea), *Lotus*, *Lupinus* (lupine), *Trifolium* (clover), and *Vicia* (vetch) (Hickman 1993:577-657). Several members of the Fabaceae (pea or bean family) are noted to have edible properties. The young shoots and leaves of *Lotus*, *Lupinus*, and *Trifolium* were cooked as greens by groups such as the Luiseño, Ipai, and Tipai. *Trifolium* greens are noted to have been a mainstay of many native California groups. They were eaten fresh or steamed in earth ovens, or dried and stored for future use. The seeds of *Trifolium* also were eaten (Anderson 2005:269-270; Hedges and Beresford 1986:43; Luomala 1978:600; Moerman 1998:320-321). The Cahuilla are noted to have ground up the pods of *Astragalus* to use as a spice (Mead 1972:31).

***Medicago sativa* (Alfalfa)**

Medicago sativa (alfalfa) is one of the oldest known forage legumes. Because legume plants form a symbiotic relationship with certain soil bacteria that supply the plant with essential nutrients and enrich the soil, alfalfa often is grown as a rotation crop. The five types of alfalfa grown commercially in the United States include common, Turkestan, variegated, non-hardy types, and spreading or creeping types. In China, alfalfa is grown for its young, leafy shoots. Kruger (1993:22) notes that "alfalfa has recently enjoyed a revival of interest due to the high nutritional value of its sprouted seeds." At the sprouting stage, the vitamin and mineral content of alfalfa is much higher than in the mature plant. It is rich in vitamins C, B1, and B2, as well as potassium, chlorophyll, and amino acids. *Medicago sativa* is a deep-rooted herbaceous plant that commonly grows to a height of two to three feet (McGee 1984:228; Phillips Petroleum Company 1963:93, 111; Phillips and Rix 1993:8).

***Trifolium* (Clover)**

Trifolium (clover) are annual or perennial plants with palmate leaves divided into three leaflets and flower heads that vary in color from white, yellow, pink, rose, to purple. Many species of *Trifolium* (clover) have been introduced from Europe, although others are native to North America. *T. repens* (white clover, four-leaf clover) is a familiar weed found in lawns. It is a native of Eurasia that has escaped from cultivation and is widely distributed in North America. *T. pratense* (red clover) is one of the most common perennial, native clovers and is planted as a hay and pasture crop. The entire plant is edible and nutritious with a high protein content. The plants can be eaten raw in small quantities, or eaten in larger quantities if cooked or soaked for several hours in strong salt water. Native groups in southern California are noted to have eaten clover greens, while clover seeds were parched or dried and ground into a meal. A tea can be made by steeping dried flowers in hot water. Clovers are found in a variety of habitats including old fields, roadsides, prairies, dry woods, gardens, and lawns (Johnson 1978:355; Kirk 1975:100-101; Martin 1972:67; Niering and Olmstead 1979:540-542; Peterson 1977:56; Tilford 1997:124).

Ficus carica (Common Fig)

Ficus carica (common fig) is a spreading deciduous tree or large shrub with large leaves and milky sap. This fig is a native of Asia minor that was imported into the Mediterranean area and used by the Egyptians 6,000 years ago. The fig was an important part of the common man's diet in Greece and Rome. Figs were introduced to North America around A.D. 1600, although they were not commercially cultivated until the 1900s. Many cultivars exist. Like the date, the fig is valued for its sugar content. Figs contain about 50% invert sugar, as well as pectin, organic acids, fat, albumin, and vitamins A and B. The fig "fruit" is actually the soft, fleshy, pear-shaped, swollen flower base that encloses the true fruits (achenes). Before ripening, some cultivars are pollinated by a gall wasp that crawls in an opening at the apex of the “fruit”. Figs can be eaten raw, preserved, dried and canned. Figs are mildly purgative and slightly expectorant and have been used to treat constipation and coughs (Bailey and Bailey 1976:477-479; Hedrick 1972:268; McGee 1984:186-187; Thomson 1978:23, 64, 155).

Juglandaceae (Walnut Family)

Nuts of the Juglandaceae (walnut) family are important commercial nuts and include *Carya* (hickory, pecan) and *Juglans* (walnut). Most species of *Carya* are found in the southeastern United States, with some species reaching parts of the Midwest. The pecan (*C. illinoinensis* syn. *C. illinoensis*) is extensively cultivated in Southern states, while mockernut hickory ©*. tomentosa*) and shagbark hickory ©*. ovata*) are the most common commercially grown hickory nuts. Pecans and sweet hickory nuts can be eaten fresh or roasted and are used in baking like walnuts. The sap also can be used to make a syrup. *Carya* nuts are high in fat and are vulnerable to rancidity. For this reason, commercial nuts are usually roasted or deep fried (Hedrick 1972:149-150; McGee 1984:264, 271; Peterson 1977:190).

Juglans (walnut) are second only to the almond in popularity and consumption. *J. regia* (English walnut) is a native of Europe that was introduced to the United States. This walnut is preferred by producers because it is easier to shell. *J. nigra* (black walnut) and *J. cinerea* (butternut) are natives of the United States. Walnuts also can be eaten raw or roasted, and are often used in baking. Walnuts also are high in fat and vulnerable to rancidity (Hedrick 1972:319; McGee 1984:272). The inner bark of *J. cinerea* makes a potent laxative that is safe to use when pregnant. An inner bark decoction also can be used for constipation, as a liver stimulant, and for skin diseases (Ody 1993:71). Black walnut can be found in the deep rich soil of bottomlands and fertile hillsides. Butternut grows best along streams and ravines, particularly in well-drained gravelly soil, but also can be found in the rich soils of deciduous woods. Walnut trees are not found close to one another because the roots produce juglone which is toxic to other walnut trees. Walnut trees also are intolerant of shade (Peattie 1966:119-125; Talalay, et al. 1984:339-340).

Juglans californica (California black walnut) is the only member of the Juglandaceae native to California. This tree or large shrub produces a woody nut with a more or less grooved shell. Nuts can be eaten raw or roasted. *Juglans californica* is found on slopes, in canyons, and in valleys at elevations of 50-900 meters (Hickman 1993:709; Sweet 1976:12).

Juncus (Rush)

Juncus (rush) is a genus of about 200 species. These plants are mainly perennials with flattened, often hollow leaves and hollow or pith-filled stems. The numerous species of *Juncus* are found in wet or dry open soil or water in meadows, bogs, springy woodland, swamps, peats, wet clearings, damp shores, marshes, shallow fresh water, and salt marshes (Fernald 1950:397-416; Hickman 1993:1157-1165; Reid 1987:55).

Juncus leaves and stems were used primarily as wrapping, warp, woof, and foundation material for making baskets by Native groups in southern California, including the Gabrielino, although the fresh shoots were eaten raw by Luiseño peoples. Rush baskets were used for sifting, collecting acorns, cacti, and other foods and for leaching acorn meal (Barrows 1900:42; Bean and Smith 1978a:542; Ebeling 1986:315; Hedges and Beresford 1986:9; Heizer and Elsasser 1980:135; Mead 2003:109-111; Moerman 1998:281-282).

Juniperus (Juniper)

Juniperus (juniper) berries were a commonly exploited resource by Native groups for both food and medicine. Juniper berries are an abundant crop and available throughout the year. The berries were eaten fresh, with piki bread, cooked in stew, boiled, roasted, or used to season meat. Dried berries were stored for winter use, when they might have been ground into meal and used to make mush, cakes, or a beverage. Fresh berries also were pounded to make a liquid drink. Juniper seeds were strung together as beads. Juniper was used medicinally by many groups to cure various ills. The leaves or twigs are high in vitamins E and C and were used to make an "all purpose" medicinal tea, commonly used to treat coughs and colds. Juniper trees had utilitarian uses as well. Ashes from green needles were added to water and used as a mordant when dying. The bark, berries, and needles were used to obtain a brown, orange-tan, or yellow-tan dye. Juniper bark was used for a variety of purposes. It was used as a tinder, to line babies' cradleboards, and to line pits where dried fruits were stored. Juniper bark also was used to weave clothes and sandals. Juniper wood often was used as fuel and construction material. Bows and arrows can be made from juniper wood, and juniper pitch was used to fasten feathers to the arrow shafts (Angell 1981:96; Bryan and Young 1978:17, 39; Elmore 1944:18; Mead 2003:217-220; Moerman 1998; Westrich 1989:71-72).

Lamiaceae (Mint Family)

The Lamiaceae (mint family) is characterized by square stems and hair-like oil glands on the surfaces of leaves and stems that often are used as flavorings. This is a large family of about 180 genera. Several members of the mint family are important culinary herbs including *Ocymum basilicum* (basil), *Marjorana hortensis* (marjoram), *Origanum vulgare* (oregano), *Mentha piperita* (peppermint), *Mentha spicata* (spearmint), *Rosmarinus officinalis* (rosemary), *Salvia officinalis* (sage), *Satureja* (savory), and *Thymus vulgaris* (thyme). Mints also are useful medicinal herbs. *Mentha* (wild mint) is noted to be good for the stomach and has antispasmodic properties. *Hedeoma* (American pennyroyal, false pennyroyal) is a pungent, common annual indigenous to the United States. American pennyroyal has been used to treat colic in children, to offset the symptoms of a cold or flu, and can be applied topically with linseed oil as a dressing for burns. *Scutellaria* (skullcap) is a calming nervine that can be used to treat nervous conditions, menstrual problems, and epilepsy. *Stachys officinalis* (wood betony) is a relaxing herb that can be used for headaches, nervous disorders, digestive problems, and as a diuretic.

A *Leonuris* (motherwort) tonic can be used for anxiety and heart weaknesses, nervous tension, or menstrual pain. *Melissa officinalis* (lemon balm) has been used to treat depression, tension, indigestion and other stomach problems, nervous exhaustion, and colds. *Ocymum basilicum* (basil) leaves are useful for treating insect bites. *Prunella* (self-heal) is widely used to stop bleeding, as well as to treat throat and mouth inflammations and diarrhea. *Rosmarinus officinalis* (rosemary) can be taken for colds, influenza, rheumatic pains, indigestion, and headaches. *Thymus vulgaris* (thyme) is an antiseptic expectorant that is good for treating chest infections. It also can be used for stomach disorders and diarrhea. Other species of mint also are used medicinally, for oils or perfumes, as ornamentals, or they can exist as weedy herbs or undershrubs (Brill and Dean 1994:52; Hickey and King 1981:350; McGee 1984:204-206; Millspaugh 1974:462; Ody 1993; Toussaint-Samat 1992:533).

Members of the Lamiaceae were utilized by Native groups as potherbs, seasonings, flours, and medicines. A tea made from dried or fresh *Mentha* (wild mint) leaves often is used to relieve stomach pain and to treat intestinal disorders. It also can be used as a colic remedy for infants. The active ingredient is menthol, which acts as a carminative and digestive system antispasmodic (Tilford 1997:60). *Monarda* (beebalm, wild oregano) is used as a cough and sore throat remedy, for stomach pain, and to induce sweating. The young leaves and leaf buds also can be used as a seasoning or a potherb (Tilford 1997:18). Several species of *Monardella* were used as food and to make a beverage and medicinal tea by various California groups, including the Tubatulabal, Luiseño, Miwok, Karok, and Maidu (Ebeling 1986:264; Mead 1972:135-136). The seeds of *Pogogyne* (pennyroyal) were eaten as food, the leaves were used as a medicinal resource, and the entire plant was used as an insect repellent (Ebeling 1986:264). All species of *Salvia* (chia, sage) have edible seeds, which are noted to have been a traditional food of native Californians (Hickman 1993:725). Luiseño, Tipai, Ipai, and various other groups used *Salvia* seeds to make a flour. “Seeds were parched, ground, and cooked as a mush in various combinations according to taste and availability” (Bean and Shipek 1978:552). The Luiseño also ate the uncooked, ripe stem tops. The Diegueño added *Salvia* seeds to wheat (*Triticum*) to improve the flavor and used the plants medicinally as a blood tonic, a cold remedy, to fumigate houses after sickness, and to give a person strength for long journeys on foot. Leaves were smoked, eaten, and inhaled in the sweat house as a treatment for the common cold. A leaf tea can be used to treat coughs, fevers, sore throats, stomach gas, and worms. Crushed leaves are used as an antiseptic and to relieve skin wounds and cuts. Crushed leaves mixed with water were used as a shampoo, hair color, and underarm deodorant. *Salvia* is a valued medicine for epilepsy, and sage oil can be rubbed on the skin to keep mosquitos and gnats away. *Salvia* also can be used medicinally to treat stomachaches, colic, and indigestion (Angier 1978; Hedrick 1972; Heinerman 1983:54-55; Kirk 1975:84; Krochmal and Krochmal 1973:198; Levy 1978a:490; Mead 1972:133; 2003:377; Medsger 1966; Moerman 1998:509-510; Westrich 1989:106-107). *Stachys* (hedge nettle, woundwort) has edible leaves and flowers, and "it is used for sore throats, urethritis, cystitis, joint inflammations, and migraine headaches" (Tilford 1997:72). The strong-scented *Trichostema* (blue curls) was used as a flea repellant and fish poison (Ebeling 1986:263).

***Opuntia* (Prickly Pear Cactus)**

Opuntia (prickly pear cactus) has flattened, fleshy joints and produces edible fruit. The fruits can be eaten fresh in salads, chopped in omelettes and stews, pickled, and used to make juices and jellies. Prickly pear and other cacti were important food resources for Native groups in southern California. Both the pads (stems) and the fruits were eaten. The pads were eaten raw as greens, boiled and mixed with other foods, or dried and stored for later use. Peeled pads also were used as a dressing for wounds and burns. Fruits were gathered in the spring and eaten fresh or dried in the sun and stored for winter use. The seeds can be eaten in soups or dried, parched, and ground into a meal to be used in gruel or cakes. Prickly pear cactus plants are found growing wild all over the United States on arid, rocky, or sandy soils. (Bean and Shipek 1978:552; Bean and Smith 1978b:571; Harrington 1964:382-384; Kavasch 1979:61; Kirk 1975:50-52; Luomala 1978:600; Medsger 1966:61; Moerman 1998:365-369; Muenscher 1987:317; Underhill 1941:17).

Pinus (Pine)

Pinus (pine) trees were utilized by Native groups for a variety of purposes. The seeds of most pines are edible and rich in protein and fat. Pine seeds were eaten raw or roasted, or seeds were pounded into a meal that was used to make cakes, gruel, or in soup. The inner bark can be mashed and formed into cakes, and it was used to make poultices and bandages especially good for burns. Pine needles are rich in vitamins A and C and were brewed into a medicinal tea that was used as a diuretic, an expectorant, a ceremonial emetic, to prevent scurvy, and to treat bad coughs, fevers, and sore throats. The needles also were used to make baskets. Buds were chewed to soothe sore throats. Slivers and infections were drawn out with pine pitch, and an eye wash was made from the hardened sap. The gummy pitch also was used to mend canoes, fasten arrowheads and feathers, and line baskets. Pine trees grow nearly everywhere in California, but favor dry slopes, rocky ridges, and gravelly bluffs. They are not likely to be found in soggy soil (Angier 1978:193-197; Bean 1978:578; Mead 2003:305-311; Moerman 1998:409-413; Moore 1979:126; Robinson 1979:123-124; Sweet 1976:14-16; Westrich 1989:99-100).

Poaceae (Grass family)

Members of Poaceae (grass family) have been widely used by native California groups for food, tools, and construction materials. Grass seeds were an important resource for groups in southern California, and seeds from a variety of grasses were utilized including *Agrostis* (bentgrass), *Alopecurus howellii* (Pacific foxtail), *Avena* (wild oat), *Bromus* (brome grass), *Distichlis spicata* (saltgrass), *Elymus* (ryegrass), *Eragrostis diffusa* (lovegrass), *Festuca* (fescue), *Hordeum* (barley), *Lolium* (ryegrass), *Phalaris* (canary grass), *Phragmites australis* (carrizo grass), *Poa* (bluegrass), *Sporobolus* (dropseed, sacaton), and *Stipa* (needlegrass). Local conditions determined which grasses were abundant and available for utilization. Seeds ripen throughout the spring, summer, and fall. Many groups burned dry grass and brush in the late summer and fall to promote a better growth of grass the following year. Grass seeds were often gathered using a seed beater and conical burden basket. Seeds were knocked off into a wide-mouthed basket. Seeds could be eaten raw but most often were parched and ground into a flour that was used to make mush, cakes, and in soups and stews. Young shoots of *Melica* (melic, oniongrass) were eaten raw or boiled as greens. The bulbous corms at the base of the culms also were eaten. Salt was collected from the leaves of *Distichlis spicata* (saltgrass). Grass stems, such as *Muhlenbergia rigens* (deergrass) and *Phragmites* (reed), are noted to have been used for making baskets. *Phragmites* stems also were used to thatch houses and to make arrow shafts, flutes, cordage, and nets. Grass mats were used for doorways, floor coverings, and pillows (Bean 1978:575; Bean and Shipek 1978:552; Ebeling 1986:170-172, 183, 185, 195-198; Hedges and Beresford 1986:25; Kirk 1975; Luomala 1978:600; Mead 1972; Moerman 1998:338).

Cerealia/Cereal-type

Cerealia is a term used in palynology for *Triticum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley), and *Secale cereale* (rye). Other major cereal grains include *Oryza sativa* (rice), *Zea mays* (maize), *Setaria italica* (foxtail millet), *Panicum miliaceum* (proso millet, common millet), and *Sorghum bicolor* (sorghum). The cereal grains were named for *Ceres*, the Roman goddess of agriculture. These seeds are noted to "have played a crucial role in human nutrition and cultural evolution" (McGee 1984:226). Grains are used to make beer and bread, which have been staples in the human diet since at least 3000 B.C. The cereal grains are concentrated sources of protein and carbohydrates and continue to provide the majority of the caloric intake for much of the world's population. Wheat, barley, rye, and oats have been the most important grain in the Middle East and Europe; rice in Asia; maize or corn in the New World; and sorghum and millets in Africa (Hickey and King 1981:436; McGee 1984:227-232).

Avena sativa (Oat)

Avena sativa (oat) is an annual grass and important cereal grain. Oats are noted to have been cultivated by the Celts and Germans about 2000 years ago. Oats once were considered a weed and used only for medicinal purposes or animal fodder. Today, oats are still fed mostly to animals, with about 5% of the world crop used for human consumption. Like rice and barley, oats are complete fruits. The grain is borne in a protective husk that must be removed before the grain can be used as food. The oat grain consists of 8% water, 14% protein, 7% fat, and 68% carbohydrates. Because of the higher fat content, when compared to other cereal grains, oats have a tendency to become rancid. Oats have no gluten-producing proteins; therefore, oat flour can only be used to make heavy breads and porridges. Oat endosperm contains a natural antioxidant, similar in action to BHT (Hedrick 1972:77-78; Kirk 1975:180; McGee 1984:230, 233, 237; Toussaint-Samat 1992:136).

Triticum (Wheat)

Triticum (wheat) was one of the first cultivated plants, and it was the most important cereal in ancient Mediterranean civilizations. Today, there are over 30,000 varieties of wheat and it is the most widely cultivated plant in the world. Early wheat was parched, ground, and made into a gruel. It also was fermented to make a type of beer. The Spanish brought wheat to Mexico in 1529, where it spread as an agricultural crop among the native peoples. Wheat grows best in cool weather, so crops could be grown in winter during the traditionally scarce time of year. Wheat is used for making bread because wheat's storage proteins form a complex called gluten when they are ground up and mixed with water. Gluten makes the dough stick together and gives it the ability to retain gases, resulting in the ability to make raised bread. The three types of modern wheat most commonly grown are based on hardness of the kernel which is a measure of protein content. Durum semolina is the hardest and is used to make pasta products. Hard flour contains little free starch and is used for bread. Soft flour has a high starch content and weak gluten and is used for pastries, biscuits, cookies, and cakes (Heiser 1990:63-74; McGee 1984:234, 285).

Phragmites (Carrizo reed, Reedgrass, Reed)

Phragmites (carrizo reed, reedgrass, reed) is a perennial grass with jointed, stout, leafy, hollow or pithy stems that can grow up to six to twelve feet in height. The stems or culms of reedgrass were used by Native groups in California to make arrow shafts, prayer sticks, weaving rods, pipestems, mats, screens, cordage, nets, thatching, and fishing poles. Young *Phragmites* shoots and leaves were boiled as potherbs. The seeds can be dried and ground into a flour or boiled whole. The roots can be eaten raw, boiled, or roasted. *Phragmites* can be found in freshwater swamps, marshes, sloughs, and ponds; along streams, ditches, and rivers; and around springs and lakes, often in the same places as cattails (Bean and Smith 1978a:542; Heizer and Elsasser 1980:141; Hickman 1993:1282; Kirk 1975:177-179; Mead 2003:302-393; Moerman 1998:304).

***Zea mays* (Corn)**

Zea mays (corn, maize) is a New World cultigen that has become a very important resource. Native people in Central America first domesticated maize over a thousand years ago. Native Americans grew maize as a staple. At the time of European contact, Heiser (1990:89) notes that "maize was the most widely grown plant in the Americas, extending from southern Canada to southern South America, growing at sea level in some places and at elevations higher than eleven thousand feet in others." Maize can show great variability in kernel color, size, and shape; in ear size and shape; and in maturation time. Five types of maize exist, characterized by a different endosperm composition. Pop and flint corn have a hard starch and a high protein content. Flour corn has a soft starch and little protein. Dent corn has a localized deposit of soft starch on top of a hard starch that leaves a depression or dent in the top of the dried kernels. Sweet corn stores more sugar than starch. Native groups prepared maize in a variety of ways. Green corn was eaten raw or boiled. Mature ears were eaten roasted or wrapped in corn husks and boiled. The kernels were popped, parched, boiled, or ground and made into a meal. Kernels also were soaked in *Juniperus* (juniper) wood ashes and made into hominy. Cornmeal can be colored with *Atriplex* (saltbush) ashes. Black corn is used as a dye for basketry and textiles and as a body paint. Maize often was husked immediately upon harvesting. Clean husks were saved for smoking and other uses, such as wrapping food. Corn also was sometimes shelled prior to storage. Ears were allowed to dry on the roof, and ristras of maize may be hung inside from the roof (Heiser 1990 :89-98; (Mangelsdorf 1974; McGee 1984:240-242; Stevenson 1915:73-76).

Today, corn is used for food, starch, alcohol, and animal feed. It is still a staple for millions of people in developing nations in Latin America, Africa, and Asia. Maize continues to be grown by native peoples in the Southwest, and it is big business for American farmers in the corn belt of the Midwest United States. Corn often is grown in gardens. Fresh, boiled ears of corn are a common food when in season, and fresh corn kernels are canned and/or frozen. Kernels also are dried and made into cornmeal. Popcorn is a genetic variant whose kernels are heated and popped. Corn also is fermented into bourbon whiskey (Rhoades 1993:92-117).

Polygonaceae (Buckwheat Family)

The Polygonaceae (buckwheat family) consists mainly of herbs with some shrubs and a few trees. This family has 40 genera and over 1000 species. Species of *Rheum* (rhubarb) are grown for their edible leaf stalks, while *Fagopyrum esculentum* (buckwheat) is grown for its starchy seeds. The fruits of *Coccoloba uvifera* (seaside grape) are edible and are used for making jelly. *Rumex acetosa* (sorrel) has been used as a vegetable. Plants grown as ornamentals include *Polygonum campanulatum* (lesser knotweed), *Polygonum baldschuanicum* (Russian vine), and *Antigonon leptopus* (coral vine). The young stems and leaves of several species of *Polygonum* (smartweed, knotweed) and *Rumex* (dock) are edible in salads or boiled as greens. These plants also are common weeds of the United States and are found in a variety of habitats (Agricultural Research Service of the United States Department of Agriculture 1971:112-131; Hickey and King 1981:86; Peterson 1977:116, 154).

Polygonum **(Smartweed, Knotweed)**

Polygonum (smartweed, knotweed) is a large genus of annual or perennial plants characterized by the angular joints of their stems that look like knots tied in the stem at the base of each alternate leaf. The seeds of *Polygonum* were parched and ground into a meal. The leaves of some species were collected in the spring and used raw in salads or cooked as potherbs. Some species' leaves are peppery and make a good seasoning. Young stems also can be eaten like asparagus. *P. bistortoides* (bistort) has starchy, bulb-like roots that are edible raw and boiled, but are best when roasted. The whole plant was poulticed for pain and rubbed on sores, boils, and poison ivy rashes. *Polygonum* plants are found in a variety of habitats throughout the West, including disturbed areas, wet mountain meadows, shallow lakes, open areas, rocky areas, dry meadows, slopes, dry plains, moist areas, coastal dunes, and along streams (Foster and Duke 1990:160; Hickman 1993:886-891; Kirk 1975:56; Moerman 1998:423-424; Tilford 1997:18-19).

Rumex **(Dock, Sorrel)**

Rumex (dock, sorrel) are perennials, annuals, or biennials with edible leaves and leaf stems, although some species are more tart or bitter than others. Some species are native to the United States, while others were introduced from Europe. *R. acetosa* (sour dock, garden sorrel) is a European dock that sometimes is grown in gardens as a potherb. The roots of dock are noted to have astringent, laxative, alterative, and mildly tonic properties. The various species of dock have been used as a purgatives, a gentle laxative, a blood cleanser, to treat jaundice, scurvy, boils, chronic skin diseases, piles, ulcers, and diarrhea. Leaves of *Rumex obtusifolius* (bitter dock) were applied to burns, scalds, blisters, and nettle stings. Yellow dock (*Rumex crispus*) has been used to treat diphtheria and cancer. Native species can become weeds in meadows and pastures, especially on low, wet ground. Native species also were utilized by groups in California. The seeds were collected and pounded into a flour. The crisp, juicy stems of *Rumex hymenosepalus* (canaigre, wild rhubarb) were eaten, while roots were used in tanning leather. *Rumex* plants are widespread in a variety of habitats including meadows, pastures, fields, lawns, swampy or marshy places, dry or sandy places, disturbed areas, and along roadsides (Ebeling 1986:221-222; Grieve 1982a:258-260; 1982b:752-754; Hedrick 1972:892-895; Kirk 1975:53-54; Martin 1972:38-39; Medsger 1966:164; Moerman 1998:495-496; Muenscher 1987:172-180; Peterson 1977:154; Tilford 1997:168-169).

Portulacaceae (Family)

The Portulacaceae (purslane family) contains 19 genera and about 500 species of mostly annual, sometimes perennial, succulent herbs or suffrutescent shrubs. Eight genera are found in the United States, including *Portulaca* (purslane), *Calandrinia* (redmaids), *Claytonia* (springbeauty), *Montia* (minerslettuce), *Cistanthe* (pussypaws), *Lewisia* (bitterroot), and *Talinum* and *Phemeranthus* (fameflower), and only the latter two are not present in California. These plants are able to grow in dry areas with high light intensity. *Portulaca oleracea* (common purslane) produces edible greens, while species of *Calandrinia*, *Lewisia*, *Portulaca*, and *Talinum* are ornamental plants (Hickey and King 1981:76; Zomlefer 1994).

Many of the plants in this family were important resources for Native groups in California. Young stems and leaves of *Calandrinia*, *Claytonia*, *Montia*, and *Portulaca* were eaten fresh or cooked as greens. *Claytonia* and *Portulaca* seeds were parched and ground into a meal or flour. *Lewisia rediviva* (bitterroot) was an important root plant. Both roots and corms of *Claytonia* can be eaten raw, boiled, or roasted and are noted to have a slightly sweet, rice-like flavor. (Kirk 1975:46, 49, 193; Luomala 1978:600; Mead 1972:86, 228, 267, 324; Moerman 1998:166-167; Tilford 1997:98, 138).

Calandrinia (Calandrinia, Redmaids)

Calandrinia (calandrinia, redmaids) are fleshy, annual herbs with small, brilliant reddish-pink or deep purplish-pink flowers. The small, black seeds were eaten raw or parched and ground into flour by Native groups. Young, tender leaves were eaten as greens. Flowers also were eaten. *Calandrinia* plants are found in moist to dry, open or shaded ground in the Pacific States and Arizona (Anderson 2005:257, 261; Heizer and Elsasser 1980:243; Kirk 1975:193; Mead 1972:45; Parsons 1966:218; Spellenberg 1979:680).

Portulaca (Purslane)

Portulaca (purslane) is a weedy annual with fleshy leaves and small, black seeds. This plant is one of the better-known wild edibles and is considered very nutritious. The leaves and stems are rich in iron and contain vitamins A and C, calcium, phosphorous, and small amounts of omega-3 fatty acids. The whole plant can be cooked and seasoned like spinach or added raw to salads. The leaves also have a high water content and can be eaten raw to quench thirst. If the plant is not entirely removed from the ground, its fleshy stems will take root and mature to seeds. Even when hoed, the stems can stay alive for a long period of time. The greens were boiled and eaten by Native groups, frequently with gravy and sometimes with meat. The plant also was eaten to treat a stomachache. The starchy seeds were parched and ground into a meal or flour that was used in a variety of mushes, breads, and cakes. Seeds can be harvested in the late summer and fall. *Portulaca* is found in gardens, cultivated fields, lawns, waste places, on rich soils, and on dry soil in full sunlight (Elmore 1944:47; Kirk 1975:46; Martin 1972:52; Muenscher 1987:199-201; Niethammer 1974:121; Peterson 1977:72; Vestal 1952:26).

Quercus (Oak)

Quercus (oak) was an important resource for Native groups in California, providing food, medicine, dyes, utensils, games, toys, and construction materials. All species of *Quercus* produce edible acorns, although acorns from trees in the white oak group are sweeter. Acorns are true nuts and contain 14% water, 8% protein, 5% fat, and 68% carbohydrates. Acorns often were staple foods for California Indians. Acorn collecting was a process that could involve the whole family or village, with the men climbing up into and shaking the trees while the women and children gather the acorns from the forest floor. Green acorns were peeled and sun-dried. Dried whole acorns were cracked using a hammerstone and a pitted anvil stone. Nutmeats were pounded into a meal using stone mortars and pestles or in a bedrock mortar located near the village or habitation. Some groups are noted to have buried whole acorns in swampy ground for 6-12 months, after which the blackened acorns were ready to eat whole. A few species of white oak, such as *Quercus gambelii* (Gambel's oak) and *Quercus turbinella* (shrub live oak), have acorns sweet enough to be eaten from the tree. These acorns were pit roasted, shelled, ground into a meal, and then made into a mush by stone-boiling. Most species of oaks, however, have extremely bitter acorns due to an abundance of tannic acid that is readily soluble in water. Leaching, the process of removing the tannin using water, was done in several different ways, and leaching processes varied from group to group. The meal could be placed in a basket and water poured over it until the tannin was removed. Acorn meal also could be placed in a basin dug in the sand near a stream and water poured through the meal. The acorn flour then was used to make mush, cakes, soup, bread, pudding, and dumplings (Anderson 2005:285-287; Cook 1960:242; Kirk 1975:104-106; Peterson 1977:204; Spier 1978:472; Sweet 1976:13; Wallace 1978:464). A tea made from the inner bark of white oak species is astringent and was used to treat chronic diarrhea, dysentery, chronic mucous discharge, bleeding, anal prolapse, piles, and menstrual problems. The tea also was used as a gargle for sore throats and as a wash for skin eruptions, cuts, poison ivy rash, and burns. A tea made from the inner bark of red oak species was often used for the same purposes but was considered weaker than a white oak tea. Acorn meal also was allowed to accumulate a mold that was scraped off, kept in a damp place, and used to heal boils, sores, and other skin problems. Oaks are native to all continents except Australia and occur as deciduous or evergreen, hardwood shrubs to large trees (Foster and Duke 1990:278, 280; Hedrick 1972; Kirk 1975:104-106; McGee 1984:265; Merriam 1918:129-137; Sweet 1976:13). In southern California coastal regions, the coast live oak (*Quercus agrifolia*) was the dominant oak species, occurring in mixed-stand forests with associated shrub species such as California lilac (*Ceanothus*), manzanita (*Arctostaphylos*), coffeeberry (*Rhamnus californica*)(Anderson 2005:32).

Salicaceae (Willow Family)

The Salicaceae family includes both *Populus* (cottonwood/poplar/aspen) and *Salix* (willow) found in moist ground, often along rivers, streams, and in washes. The bark and leaves of all members of this family contain a bitter, white, crystalline glucoside called *salicin*. Salicylic acid is derived from *salicin*, which in turn yields aspirin. A tea made from the inner bark was used by Native groups to treat pain, inflammation, and fever. Crushed leaves and bark were applied to cuts and wounds (Lanner 1983:125; Tilford 1997:114, 164). *Populus* catkins can be eaten raw or boiled in stews. The catkins and leaf buds are good sources of vitamin C. The bark was chewed or boiled and the liquid used as a gargle for sore throats. The leaf buds were used to make an ointment for skin irritations, burns, and wounds. A bud ointment also was rubbed on the chest for coughs, colds, flu, and pneumonia. Crushed leaves were used as an antiseptic, and to treat headaches and earaches. The inner bark of aspen contains quinine that was used by Native groups as an antimalarial (Angier 1978:47-48; Moore 1979:132; Tilford 1997:114). *Salix* (willow) was used for a variety of purposes. Willow bark contains *salicin*, which is closely related to the pain-relieving ingredients in aspirin. A tea made from willow bark or leaves was used to treat pain, fever, and inflammation. A bark wash also was used to treat itchy skin, while a leaf tea was taken for chills, fever, diarrhea, and used as an eye wash. The root was dried, powdered, and sprinkled on babies' navels and hard-to-heal sores. The bark and seeds also were used to treat nosebleeds and toothaches. Roots, bark, and leaves were steeped in water to make a hair rinse. The wood was a common construction material, and willow branches were used in making baskets. The inner bark could be eaten fresh or dried and ground into a flour. Gabrielino women are noted to have worn aprons made from the inner bark of willow or cottonwood trees. The many species of *Salix* are deciduous shrubs or trees generally found along streams or other places where the soil is moist (Bean and Smith

1978a:541; Hedges and Beresford 1986:11; Heizer and Elsasser 1980:132, 138-139; Hoover 1973:7; Kirk 1975:106; Westrich 1989:122-123).

Sambucus **(Elderberry)**

Sambucus (elderberry) berries are usually purplish-black but can be red, blue, or purple. The red berries are reported to be poisonous. Fresh berries of most species are rank smelling and mildly unpleasant tasting; however, the berries can be prepared in pastries, preserves, and wines. The berries also can be dried to remove the unpleasant odor and taste. They are then added to muffins, fruit stews, and pie fillings. Elderberry fruits are rich in vitamin C and organic iron, and contain vitamin A, calcium, potassium, thiamine, and niacin. The flowers of *Sambucus canadensis* sometimes are mixed with batter and baked into cakes. The bark of *Sambucus* shrubs was simmered in lard to make an ointment for chafed skin, rashes, abrasions, ulcers, and burns. The fruits and flowers were poulticed for treating rheumatism, sores, and burns. Flowers were steeped in hot water to make a tea for treating fevers, while a flower tea made with peppermint was used to treat stomachaches. Flower water also was used for sunburns and as an eyewash. Berries were fermented to make a tonic wine and a cooling lotion for feverish patients (Angier 1978:113-117; Krochmal and Krochmal 1973:198-199; Peterson 1977:172). *Sambucus* also was a very important edible and medicinal resource for Native American groups. Berries were collected in the late summer and early fall and eaten fresh, or dried and stored for future use. Dried berries were cooked into a sauce by several native groups in southern California, or pounded into a flour using stone mortars. Young shoots were cooked as potherbs, and the flowers were used to make a tea. A flower decoction was used as an antiseptic wash, and flowers were taken internally to stop bleeding of the lungs. Indians used a tea made from the inner bark as a diuretic, purgative, and emetic. Stems were used as a fuel and to make arrows and flute-like whistles. *Sambucus* grows as shrubs or small trees and can be found growing along streams, in thickets and open woods, and on mountain slopes where there is adequate moisture (Angell 1981:63, 210-212; Heizer and Elsasser 1980:131; Hickman 1993:474; Kirk 1975:128; Medsger 1966; Moerman 1998:512-513; Peterson 1977).

Sesamum **(Sesame)**

Sesamum (sesame) is an herbaceous plant native to Indonesia, India, and East Africa. It was first cultivated in 3000 B.C. in the Middle East. The seeds have a nutty flavor and can be white, grey, black, red, ivory, yellow, beige, tan, or brown in color. The darker, unhulled seeds are rich in protein, calcium, phosphorus, and iron. Kiple and Ornelas (2000b:1851) state that "Sesame is probably the oldest crop grown for its oil." Seeds contain about 40 to 60% oil, of which 80% is unsaturated fatty acids. Oil extracted from the seeds most often is used in cooking. Seeds also are used as a garnish on sweets and breads. Sesame is grown in hot, dry climates (Hedrick 1972:531-532; Kiple and Ornelas 2000a:411-419; 2000b:1851; McGee 1984:214).

Solanaceae (Potato Family)

The Solanaceae (potato) family contains both edible foods and weedy plants. *Capsicum* (red pepper) are cultigens introduced from tropical America. This group has many different varieties including chilies, cayenne pepper, and pimentos. Fruits ripen to a yellow, red, or black color. Peppers are used to add a hot, spicy flavor to many dishes. Cayenne pepper can be used to stop bleeding or to treat sore throats, colds, chicken pox, backaches, and a number of other ailments (Hedrick 1972:135; Heinerman 1983:23-26; Kearney and Peebles 1960:755-756). *Solanum lycopersicum* syn. *Lycopersicon esculentum* (tomato) was widely cultivated in Mexico and South America at the time of Spanish contact. The early introductions to Europe are believed to have been the large-fruited variety from Mexico. In Europe, the fruits acquired a reputation as an aphrodisiac and were called "love apples." It was not until approximately the mid-1800s that tomatoes began to gain popularity, and today there are several varieties with red, yellow, or green fruits. Tomatoes are high in vitamin C. In the United States, the tomato is second only to the potato in popularity. Tomatoes are consumed raw and used in sauces, stews, and soups. Tomatoes also can be included in preserves and jams, either alone or in combination with other fruits. The plant is very adaptable, sometimes re-seeding the following year in the garden or compost areas. Tomatoes are reported as "half-hardy annuals or short-lived perennials" (Phillips and Rix 1993:150). These plants grow best in a hot climate on fertile, well-drained, and moisture retentive soil (Hedrick 1972:343-345; McGee 1984:202). *Solanum melongena* (eggplant, aubergines) are perennials, but usually are grown as annuals. The wild form is native to India and has yellow, bitter fruits. The modern, large-fruited varieties are dark purple, black, or white. Several varieties now exist (Phillips and Rix 1993:160-163).

Datura (Datura, Jimsonweed, Thorn-apple)

Datura (datura, jimsonweed, thorn-apple) is an annual or perennial with stout stems; large leaves with wavy margins; distinctive white or purple, trumpet-shaped flowers; and spiny, egg-shaped fruits. This plant has strong narcotic properties due to the presence of large amounts of tropane alkaloids, including hyoscyamine, atropine (daturine), and scopolamine. Ingestion of any part of the plant can lead to convulsions, hallucinations, respiratory arrest, or death. Schmutz (1979:59) notes that "sleeping near the fragrant flowers can cause headache, nausea, dizziness, and weakness." Children also have been poisoned using the flowers for play trumpets. *Datura* was used as a hallucinogen by many native groups in North America, including tribes in central and southern California; Southwest Indian groups in Arizona, New Mexico, Texas, and Mexico; and numerous Plains Indian groups. *Datura wrightii* syn. *Datura meteloides* (sacred datura, sacred thorn-apple, toloache) is reported to be the most universally used hallucinogenic and medicinal plant known to humans (Bean and Saubel 1972:60; Moerman 1998:194). Drinking an infusion of Toloache was part of the practices of the Chinigchinich cult, which is believed to have originated with the Gabrielino. *Datura* and other hallucinogenic plants, such as tobacco (*Nicotiana*), mescal bean (*Sophora secundiflora*), and other members of the nightshade family (Solanaceae), were used in religious ceremonies, by shamans, and on an individual level to help achieve personal revelation (dreams and visions). *Datura* was prepared in many ways. Seeds, leaves, and/or roots were chewed and eaten. Leaves also were dried and smoked. Seeds, fruits, and roots were dried, powdered, and soaked in water. Fresh leaves and roots were bruised and mixed with water, allowed to soak for several hours, then the liquid was drawn off and consumed. Species of *Datura* also were important medicinal resources, utilized by various tribes in many different ways. *Datura* can be found in abandoned fields and waste areas across North America, mostly on rich alluvial or gravelly soils, and it can be an especially troublesome weed in the southern states (Dobkin de Rios 1990:51-52; Heizer and Elsasser 1980:48; Lehane 1977:146-147; Moerman 1998:194-196; Muenscher 1987:383; Shields 1984:11; Tilford 1997:202-203).

***Nicotiana* (Tobacco)**

Nicotiana (tobacco) is a member of the Solanaceae family that contains a highly toxic alkaloid, nicotine. Tobacco was domesticated in South America, and use of this plant spread around the world after discovery of the New World. Native groups used tobacco for ceremonial purposes. It was dried and smoked ceremonially during historic times, usually rolled in corn husks or pipes. Tobacco can be mixed with dried leaves from other plants such as *Onosmodium* (marbleseed), *Gossypium* (cotton), *Phragmites* (reed), *Populus* (cottonwood/aspen), *Pinus* (pine), and *Pseudotsuga* (Douglas fir). When *Nicotiana* is smoked for medicinal purposes, it can be mixed with *Salvia* (sage) or *Verbascum* (mullein). Today, tobacco leaves are dried and used in a variety of products, such as cigarettes, cigars, chewing tobacco, and snuff. *Nicotiana* is commonly found on dry or moist disturbed sites in valleys and foothills (Arnow, et al. 1980:599; Heiser 1990:183; Moerman 1986:354-357; Moore 1979:153-154; Schmutz and Hamilton 1979:211).

***Physalis* (Groundcherry, Tomatillo)**

There are about 100 species of wild *Physalis* (groundcherry), with *P. ixocarpa* (tomatillo) and *P. pruinosa* (cape gooseberry) currently grown for food. The tomatillo was domesticated in Mexico and naturalized in eastern North America. Tomatillos have green, purple, or yellowish fruits that can be eaten raw or cooked and made into preserves and pies. Boiled fruits frequently are used in sauces such as chile verde and green chile. The cape gooseberry is a native of South America. These fruits also can be eaten raw, made into jam, or dipped in chocolate. *P. alkekengii* (bladder cherry, Chinese lanterns) is an Asiatic species with bright red bladders that is commonly grown as an ornamental. Cultivated species prefer warm, rather dry conditions, while wild species may be found in moist to medium-dry, open ground throughout the West (Kirk 1975; Phillips and Rix 1993:158-159).

Groundcherry fruits were eaten raw or cooked by Native groups, particularly by children. In addition, the berries occasionally were dried. The roots, leaves, and whole plants were used medicinally to treat such conditions such as burns, stomachaches, venereal disease, lack of appetite, headache, stomach trouble, and as a dressing for wounds (Moerman 1998:395-396).

***Solanum* (Nightshade)**

Solanum (nightshade) are annual or perennial plants found in a variety of habitats including open woods, fields, pastures, meadows, prairies, yards, gardens, clearings, along roadsides, fencerows, banks of streams or ditches, and in waste places. There are many species of *Solanum*, representing native and introduced plants. Many species contain solanine, which is a poisonous alkaloid, and many can be troublesome weeds. *S. tuberosum* (potato) and *S. melongena* (eggplant) are cultivated as foods (Fernald 1950:1253-1254; Muenscher 1987:386; Niering and Olmstead 1979:804-806).

Nightshades were used by Native groups either as food or medicines, depending on the species. *Solanum douglasii* (greenspot nightshade) berries were used medicinally by both the Cahuilla and Luiseño as an eye medicine. In addition, the Luiseño used the berry juice for tattooing, while the Cahuilla used it as a dye. The Luiseño also ate the greens as food (Bean and Saubel 1972:140; Mead 2003:401; Moerman 1998:534).

Vitis (Grape)

Vitis (grape) is a native of Asia Minor and North America that has been cultivated for wine and table grapes. The Egyptians are believed to have first cultivated grapes 6000 years ago. The majority of wines and table grapes are made from varieties of the European *Vitis vinifera*. *Vitis vinifera* was introduced to the New World by Columbus, and cultivation of this species dates back as far as 1494 in Haiti and the early seventeenth century in the colonies. Cultivation of *Vitis vinifera* in the United States ultimately failed due to the harsher climate and new diseases and pests to which the European grape had no resistance. Subsequently, it has been hybridized with native species of *Vitis* to increase its hardiness. American jelly, grape juice, and northeastern wines are made from Concord grapes, a variety of the American *Vitis labrusca* (fox grape). Many other species of *Vitis* are native to the United States and produce edible fruit that can be purple, blue, black, or amber. Wild grapes often are too tart to be eaten raw but are used in jams, jellies, and juices. Generally, wild grapes need more sweetening than cultivated grapes and contain plenty of pectin before fully ripe. Young grape leaves can be cooked as greens or used to wrap meat for baking. Internally and externally, leaves were used to cure snake bites and disorders of the internal organs. Grape leaves soaked in water were used as a poultice for wounds. Wild grapes are found throughout the southwest and northeast United States growing in thickets and edges of woods (Angell 1981:156; Hedrick 1972:603-604; Kiple and Ornelas 2000a:734-737; Kirk 1975:263; McGee 1984:187; Medsger 1966:53-59; Peterson 1977:198).

Yucca (Yucca, Spanish bayonet, Soapweed)

Yucca (yucca, Spanish bayonet, soapweed) was an important resource for Native peoples in the American Southwest. The buds, flowers, and flower stalks were eaten raw or boiled, and the flower stalks were roasted like agave. Young flower stalks and the basal portion of the plant with the leaves removed were pit roasted by several groups in southern California. Anderson (2005:269) notes that "cutting flower stalks before flowering may have caused hormonal changes in the plants, forcing them to produce 'pups'—small, genetically identical plants adjacent to the parent plant." Yucca seeds also were used as food. Yucca roots contain saponin, and the peeled roots were pounded with cold water to produce suds that were used for washing. Fiber from yucca leaves was used to make rope, twine, nets, baskets, mats, hats, sandals, cloth, and hairbrushes. The leaves also were used to make brushes for painting pottery and decorating a variety of objects. *Y. baccata* (banana yucca) and *Y. schidigera* (Mojave yucca) produce fleshy fruits that were eaten raw or roasted; the fruits also were dried and ground into a meal or stored for future use. A fermented beverage could be made from the fruits. *Y. baccata* is reported to hybridize with *Y. schidigera.* Yucca can be found in chaparral, coastal or desert scrub, and creosote-bush scrub; on desert flats and slopes; and in dry Joshua tree (*Yucca brevifolia*) woodlands
(Anderson 2005:245, 268-269, 338; Bean and Smith 1978a:541; Bryan and Young 1978:13; Heizer and Elsasser 1980:138; Hickman 1993:1210; Kelly 1964; Luomala 1978:600; McKelvey 1947; Mead 2003:449-451; Moerman 1998:603-608; Stevenson 1915:72-73, 78-79, 82-83; Turner, et al. 1995:412; Westrich 1989:70). The stalks, flowers, and fleshy fruits of *Hesperoyucca whipplei* syn. *Yucca whipplei* (chaparral yucca, Our Lord's Candle, Spanish dagger) were eaten by the Cahuilla, Luiseño, and other groups in southern California. The flowering stalks were dried, ground into a flour, and mixed with water to make cakes. Flowers and stalks also were sun-dried for future use. The Diegueño made saddle blankets from the fibers. Like other species of *Yucca*, the roots of chaparral yucca were used as soap and to treat

minor skin problems. The leaves are rich in salicylic acid, and a leaf tea was used to treat pain, inflammation, and stiffness of arthritis (Bean and Saubel 1972:150; Moerman 1998:609; Westrich 1989:95-96).

Probable Weeds

Muenscher (1987:3) describes weeds as "those plants that grow where they are not wanted. Whether a plant of a given species is considered a weed depends not only on its characteristics and habitats, but also on its relative position with reference to other plants and man." Weeds often are able to thrive in diverse and adverse circumstances. They commonly are found in disturbed areas or in places undesirable to other plants. Many weed species produce enormous quantities of seeds, and these seeds often are widely dispersed. Other weed species are capable of reproducing vegetatively. These factors combine to produce a plant that is very successful in competition with other plant species. The word "weed" is assigned here to those plants that were most likely not eaten by the historic occupants of the San Gabriel Mission.

Caryophyllaceae (Pink Family)

Members of the Caryophyllaceae (pink) family include weeds that grow in waste places, grasslands, lawns, rich woods, damp thickets, meadows, on shaded rocky slopes, and along shores and wet places. Many members of this family are common ornamental plants. Species of *Dianthus* (pinks, Sweet William, carnation) were introduced from Europe. These flowers may escape cultivation and grow as weeds, but they are specifically planted and cultivated for their flowers. Other members such as *Stellaria* (chickweed) and *Silene* (catchfly, campion) are common weeds in cosmopolitan areas (Fernald 1950:622-624; Hickey and King 1981:72).

Members of the Caryophyllaceae found in Los Angeles County, California, include species of *Arenaria* (sandwort), *Cardionema* (cardionema), *Cerastium* (mouse-ear chickweed), *Herniaria* (rupturewort), *Loeflingia* (loeflingia), *Minuartia* (stitchwort), *Polycarpon* (manyseed), *Sagina* (pearlwort), *Silene* (catchfly), *Spergularia* (sandspurry), and *Stellaria* (starwort) (USDA Natural Resources Conservation Service 2011).

***Silene* (Catchfly, Campion)**

Species of *Silene* (catchfly, campion) are annuals, biennials, or perennials. Approximately 500 species are reported to grow in the northern hemisphere. The young shoots of several species be boiled and eaten like spinach, while the entire above ground plant of *S. acaulis* be used. The fresh leaves are slightly bitter due to a harmless amount of the toxin *saponin*. *S. stellata* often grows in wildflower gardens pollinated by butterflies and moths. *Silene* is found along roadsides and railroads, and in fields, meadows, thickets, gardens, open woods, open areas, coniferous forests, rocky slopes, shrubland, chaparral, alpine, disturbed areas, and waste places (Hickman 1993:488-493; Kirk 1975:44-46; Muenscher 1987:209; Niering and Olmstead 1979:459-461).

***Stellaria* (Chickweed, Starwort)**

Stellaria (chickweed, starwort) are annual or perennial, prostrate or erect plants. *S. media* is an edible cosmopolitan weed that resembles spinach when boiled and is a favorite food of chickens and wild birds. *Stellaria* is common in rich woods, rocky slopes, waste places, cultivated ground, roadsides, gardens, lawns, meadows, streambanks, swamps, moist woods, mossy banks, bogs, dry creeks, shaded areas, or disturbed areas (Hickman 1993:496-497; Kirk 1975:44; Medsger 1966:146; Niering and Olmstead 1979:461-462).

Chamaesyce syn. *Euphorbia* (Sandmat, Spurge)

Chamaesyce syn. *Euphorbia* (sandmat, spurge) is a low-growing, weedy annual with thin, stringy stems, milky white sap, very small greenish-yellow flowers, and oval leaves. Spurge is sometimes found growing alongside purslane (*Portulaca*). *Chamaesyce* can be found throughout the North American continent in all but its northernmost regions (Brill and Dean 1994:29).

Cynareae (Thistle Tribe)

The Cynareae is a tribe of annual, biennial, or perennial herbs in the Asteraceae (sunflower family). Many species have prickly leaves, stems, or flowers. This tribe consists of almost 80 genera with 2500 species native to regions of Europe and Asia, Australia, and tropical Africa. Common members of this tribe include *Cirsium* (thistle), *Carduus* (plumeless thistle), *Cynara* (globe artichoke, cardoon), and *Onopordum* (cottonthistle). Only *Cirsium*, *Centaurea* (knapweed), and *Saussurea* (sawwort) have species native to the United States (Hickman 1993; USDA Natural Resources Conservation Service 2011). Species of *Cirsium* are stout annual, biennial, or perennial herbs with prickly or spiny stems, leaves, fruits, and roots. With the spines removed, young leaves can be added to salads or cooked as greens. The young stems can be peeled and eaten raw or cooked. Roots of first-year plants (those without stems) make a good survival food and can be eaten raw, boiled, or roasted. Thistles also were used medicinally to help stop bleeding, to stimulate milk production in nursing mothers, and as a contraceptive. Many species of *Cirsium* have been introduced and naturalized from Europe. Native species can be found growing in a variety of habitats including grassy meadows, the openings in coniferous woods, or dry waste places (Foster and Duke 1990:146; Kirk 1975:145; Medsger 1966:200-201; Peterson 1977:126).

Eriogonum (False Buckwheat)

Eriogonum (false buckwheat, wild buckwheat, umbrella plant) is a large genus of annual or perennial herbs and shrubs. The stems are noted to be edible raw or cooked if picked before they have flowered. The many species of *Eriogonum* may be found on dry, rocky plains, hillsides, meadows, and mesas (Harrington 1964:185-195; Kirk 1975:231; Weber 1976:261-263).

Malvaceae (Mallow Family)

Native members of the Malvaceae (mallow family) found in southern California include *Abutilon* (Indian mallow), *Eremalche* (mallow), *Hibiscus* (paleface, rosemallow, flower of an hour), *Horsfordia* (velvetmallow), *Lavatera assurgentiflora* (island mallow), *Malacothamnus* (bushmallow), *Malvella leprosa* (alkali mallow), *Modiola caroliniana* (Carolina bristlemallow), *Sidalcea* (checkermallow, checkerbloom), and *Sphaeralcea* (globemallow), while introduced members of the family include *Lavatera* (tree mallow) and *Malva* (mallow, cheeseweed). *Eremalche* and *Sidalcea* leaves were eaten as greens by Native groups, while *Abutilon*, *Malvella*, and *Sphaeralcea* were used medicinally (Hickman 1993:746-762; Moerman 1998; Shields 1984:53).

***Malva* (Mallow, Cheeseweed)**

Malva (mallow, cheeseweed) are biennial or annual weeds that were introduced from Europe and Asia, some as ornamentals. The young stems and leaves can be boiled and eaten like spinach or used to thicken soups and stews. The cheese-shaped disks of young, green fruits can be eaten raw. *Malva*, especially *M. neglecta* (common mallow), is widespread throughout the United States and can be found in dry, grassy fields, meadows, cultivated areas, disturbed places, lawns, farmyards, and gardens (Britton and Brown 1970b:514-516; Hedrick 1972:754; Kirk 1975:27; Martin 1972:83; Muenscher 1987:311-313; Peterson 1977:108).

Poaceae (Grass Family)

The Poaceae (grass) family is one of the most widely distributed families in the world. Grasses are annual or perennial herbs with fibrous roots, sometimes woody stems, forming loose to dense tufts or mats. The grass family is probably of greater economic importance than any other family. The grass family provides food for man, fodder for domestic animals, and thatching. Grasses also are used in lawns and other turfed areas, grown for ornament in gardens, and dried for floral decorations. Grasses are found in a variety of habitats, sometimes becoming troublesome weeds (Hickey and King 1981:136-437; Zomlefer 1994:350).

***Bromus* (Brome, Bromegrass, Chess, Cheat)**

Species of *Bromus* (brome, bromegrass, chess, cheat) are low or tall annuals or perennials. Native perennial species often are important forage plants, although *Bromus inermis* (smooth brome) is a native of Eurasia that is cultivated for hay and pasture in the northern part of the Great Plains. Most weedy species of *Bromus* are winter annuals that have been naturalized from Europe or Eurasia. *Bromus secalinus* (chess, cheat) is an especially common weed in winter rye and wheat fields. Species of *Bromus* are often found in pastures, fields, meadows, waste places, open ground, open woods, hillsides, foothills, grassy or rocky slopes, moist ground, and along roadsides (Agricultural Research Service of the United States Department of Agriculture 1971:40-47; Hitchcock 1971:31-56; Martin 1972:12).

***Leersia oryzoides* (Rice cutgrass)**

Leersia oryzoides (rice cutgrass) is a weedy perennial of the Poaceae family. Rice cutgrass is found growing in warm, tropical temperatures, in marshlands, on streambanks, and in shallow water. *Leersia oryzoides* is widely distributed throughout northern California and inland southern California (Clayton and Renvoize 1986:73; Hickman 1993:1267).

***Phalaris* (Canarygrass)**

Phalaris (canarygrass) are annual or perennial grasses, including both native and introduced species. Many species are considered weedy plants, a few species are cultivated for fodder, and *P. canariensis* (annual canarygrass) is grown for birdseed. *Phalaris* is found throughout North America, including most counties of California, in generally wet areas such as marshes, sloughs, ditches, streambanks, and wet areas in grasslands, meadows, and woodlands, as well as in disturbed areas (Barkworth 2007; Hickman 1993:1281-1282).

***Oxalis* (Wood sorrel)**

Oxalis (wood sorrel, oxalis) are annual, perennial, or shrubby plants. Some species grow as weedy wild flowers, some are noxious weeds, while others are grown as ornamentals. The sour leaves can be used in salads or steeped in water to make a drink. A type of rhubarb pie can be made from the sour stems. *O. acetosella* (true wood sorrel) was cultivated in gardens as a minor vegetable but never was used extensively. In California, *Oxalis* is found in on coastal grasslands, coastal scrub, chaparral, disturbed places, gardens, fields, conifer forests, waste places, and open woods (Hickman 1993:808-809; Kirk 1975:29; Martin 1972:73; Medsger 1966:165; Niering and Olmstead 1979:667-669; Peterson 1977:104).

***Phacelia* (Phacelia)**

Phacelia are perennial, biennial, or annual herbs with blue, purple, or white flowers. *Phacelia* are found in woods, thickets, clearings, gardens, fields, mountains, prairies, waste places, dry soil, and along streams (Britton and Brown 1970c:68-71; Fernald 1950:1193-1195; Muenscher 1987:356). In California, the young shoots of *Phacelia ramosissima* (scorpionweed) are noted to have been cooked as greens by Native groups (Mead 2003:297; Moerman 1998:390; Yanovsky 1936:53).

Scrophulariaceae (Figwort or Snapdragon Family)

Scrophulariaceae (figwort family) are annual, biennial or perennial, mostly herbs, sometimes shrubs, or rarely trees. This family consists of 220 genera worldwide, with 73 genera found in the United States and Canada. *Digitalis purpurea* (foxglove) leaves are valued for their glycosides digitoxin, digoxin, and digitalin, which are used to make a cardiac drug. Ornamental plants include *Antirrhinum* (snapdragon), *Calceolaria* (slipper flower), *Castilleja* (Indian paintbrush), *Digitalis*, *Penstemon* (beardtongue), *Russelia* (fire-cracker plant), and *Veronica* (speedwell). The many members of the figwort family are found in a variety of habitats including moist places, thickets, mountains, meadows, prairies, fields, pastures, bogs, roadsides, waste places, damp sandy soil, streambanks, pond margins, dry to moist woods, open areas, shady or rocky sites, (Hickey and King 1981:360-373; Niering and Olmstead 1979:783-801; Zomlefer 1994:250-254).

Ethnohistorically, some genera in the Scrophulariaceae were a vital source of salt for Native Americans. Fresh green leaves were rolled into little balls, dried, then baked in a small fire until they were reduced to salty ashes. Members of the figwort family also were used as a disinfectant. A poultice of heated twigs was applied to swollen sores, or a poultice of leaves was applied to boils. The plant juice also was used as an eyewash for poor vision or sore eyes.

Members of the figwort family are commonly found in damp places, especially thickets (Moerman 1998:524; Westrich 1989:48).

***Schinus molle* (Peruvian Pepper Tree)**

Schinus molle (Peruvian pepper tree) is a shrub or small evergreen tree with narrow, spiky leaves and red, pink, or purplish berries that is native to South America. All parts of the tree have a high oil content that produces a spicy, aromatic odor. The berries have a peppery flavor due to the presence of the alkaloid piperine, and dried berries have been used as a seasoning called "pink peppercorns." It was, and still is, an important tree to the Peruvians. A wine-like drink was made from the berries, while the leaves were used medicinally for opthalmia and rheumatism. The milky sap that exudes from cut bark was applied externally for pains, swellings, and sores. *Schinus* is noted to still be used in herbal medicine today in many countries. *Schinus molle* was introduced to California by the Spanish missionaries, who cultivated the trees for shade and used the dried berries as a seasoning and for export. It is believed that the plant originally was introduced to the Mission of San Luis Rey in San Diego. *Schinus molle*, and its close relative, *Schinus terebinthifolius* (Brazilian peppertree), are especially resistant to drought, fire, frost, and pests and have escaped cultivation to become invasive "weeds" in Hawaii, southern California, southern Arizona, Texas, Louisiana, Florida, and Puerto Rico (California Invasive Plant Council 2006; Henn 2012; Hight, et al. 2002; Kramer 1957; Taylor 2005).

***Taraxacum* (Dandelion)**

Taraxacum (dandelion) is a very common perennial weed with a single golden-yellow flower that adorns a hollow stalk. After the plant goes to seed, the seed heads give the appearance of a "puff ball". Leaves grow immediately from the root, and all parts of the plant contain a milky sap that can irritate the skin. Young greens are potassium-rich and can be eaten fresh in salads. The leaves also can be used as a diuretic, and a decoction of the roots may be used as a stimulant. Both native and introduced species of *Taraxacum* can be found growing in lawns, fields, and disturbed areas throughout North America (Bailey and Bailey 1976; Foster and Duke 1990:130; Hickey and King 1981:424; Ody 1993:103; Weiner 1990:75-76).

***Tribulus terrestris* (Puncture-Vine, Caltrop)**

Tribulus terrestris (caltrop, puncture-vine) is a prostrate, herbaceous plant with spiny stems and hard, spiny seed cases. It is naturalized from the Old World and can be found growing in disturbed habitats of waste places, along roadsides, and even in deserts (Munz 1974:159).

***Zannichellia palustris* (Horned pondweed)**

Zannichellia palustris (horned pondweed) is a perennial aquatic with slender, creeping rhizomes and fibrous roots. It is found in fresh or brackish water in streams, ponds, ditches, and lakes throughout North America (Britton and Brown 1970a:88-89; Hickman 1993:1310).

DISCUSSION

The San Gabriel Mission Archaeological Site (CA-LAN-184H) is situated in the city of San Gabriel and includes building foundations, ruins, and archaeological deposits. This mission was a Spanish and Native American religious and agricultural community initially established in 1771 near the confluence of the Rio Hondo and San Gabriel Rivers. This area was prone to flooding; therefore, the mission was moved five miles northwest in 1775. The new location was near a Gabrielino village called *Shevaanga* (McCawley 1996). In addition to the mission church, a variety of other structures were present that were mostly made of adobe. The mission also had gardens, vineyards, animal pens, grazing land, and an aqueduct. The San Gabriel Trench Separation project area crosses the location of a garden and orchard (*huerta*), known as Bishop's Garden, that originally was enclosed by a wooden wall and a prickly pear cactus (*Opuntia*) hedge. By 1852, the garden had been enclosed by an adobe wall. Stone-lined irrigation ditches watered the garden. Occupation of the Mission has been divided into four periods including the Initial Contact period (AD 1542-1769), the Mission period (AD 1769-1834), the Secularization period (AD 1834-1848), and the American period (AD 1848-present). Much of the artifact deposit at the site is associated with the Mission period (Dietler, et al. 2010:i, 9-10).

Samples were recovered from three main areas of the site including the Water Complex, an adobe granary structure, and a midden in a featureless area north of the train tracks. These samples were examined for macrofloral remains, pollen, phytoliths, starches, protein residues, and/or organic residues. In addition, a pollen control sample (07776) was collected from a depth of 0-4 cm below surface (cmbs) from an area west of the site (Table 1). Although this sample was collected from off-site, it is in an area heavily used by pedestrians. This sample yielded the largest quantity of arboreal pollen, reflecting trees growing in the area, of any of the samples examined. *Pinus* and *Quercus* pollen (Figure 1, Table 2), representing pine and oak trees, were noted in the largest quantities. In addition, small quantities of *Alnus*, *Betula*, *Eucalyptus*, *Castanea*, *Carya*, *Juglans*, *Liquidambar*, and *Ulmus* pollen were noted, indicating local growth of alder, birch, eucalyptus, chestnut, hickory, walnut, gum trees, and elm trees. Small to moderate quantities of Apiaceae, *Artemisia*, Low-spine Asteraceae, High-spine Asteraceae, Liguliflorae, Brassicaceae, Caryophyllaceae, *Ceanothus*, Cheno-am, *Ephedra torreyana*-type, *Eriogonum*, Fabaceae, Lamiaceae, *Plantago*, Poaceae, Rosaceae, *Adenostoma*, *Heteromeles*, two types of *Typha*, and *Nicotiana* pollen were recorded, representing a member of the umbel family, sagebrush, various members of the sunflower family including the chicory tribe, members of the mustard and pink families, buckbrush, members of the goosefoot family and/or amaranth, ephedra, wild buckwheat, legumes, a member of the mint family, plantain, grasses, members of the rose family including both chamise and toyon, cattail, and tobacco. This variety of plants includes ornamentals, weedy plants, plants introduced during the historic era, and plants native to this portion of California. Only a small quantity of microscopic charcoal was noted. Total pollen concentration was very high at nearly 140,000 pollen per cubic centimeter (cc) of sediment.

Water Complex

The Water Complex is a group of features consisting of the foundations of a mill, its millrace, and two water reservoirs. This milling complex was noted in the center of Bishop's

Garden, south of the mission church. Two columns were examined for macrofloral remains from this area, and a pollen sample was collected from beneath a tile floor in a water retention basin. A milling stone was washed to recover pollen and phytoliths, while two projectile points were examined for possible protein residues.

Unit 104

A column was excavated in Unit 104, north of the mill and immediately west of the millrace. This area contains Feature 10, a triangular water retention basin with a plastered tile (ladrillo) floor; however, the column came from fill stratigraphically above Feature 10. This column is noted to cut through layers of rubble, burned soil, adobe melt, and a prominent ash lens (John Dietler, personal communication, March 26, 2012). A total of nine samples from the column were examined for macrofloral remains, representing a depth of 60-132 cm below datum (cmbd). The column samples are believed to date to the AD 1820's, ± 20 years. This time frame represents the end of the Mission period and beginning of the Secularization period (Dietler, et al. 2010).

In general, the macrofloral record yielded a variety of charred seeds, charcoal, and cultural trash. Pieces of *Quercus* charcoal and Salicaceae charcoal, including *Populus* and/or *Salix*, were found in all nine macrofloral samples examined, indicating that oak, willow, and cottonwood/poplar commonly were burned as fuel (Tables 3, 4, and 5; Figure 2). Fragments of charred Salicaceae periderm (bark) were present in the five upper samples, as well as in sample 05985 from a depth of 120-127 cmbd, reflecting burning wood with adhering bark. Unidentified charred periderm fragments in samples from 100-110 cmbd and 110-120 cmbd might also reflect Salicaceae periderm. Many of the *Quercus* charcoal fragments were identifiable as members of the *Erythrobalanus* (red oak) group, *Leucobalanus* (white oak) group, and live oak group. Reid (1926:72-73, in Dietler 2010:4) notes that the area was heavily forested with oak (*Quercus*), sycamore (*Platanus racemosa*), cottonwood (*Populus*), and willows (*Salix*) prior to modern development; therefore, it is not surprising to find *Quercus* and Salicaceae dominating the charcoal assemblage. Other charcoal types were present in fewer frequencies. *Umbellularia californica* charcoal was noted in the bottom three samples, as well as in samples from 90-100 cmbd and 81-90 cmbd, while the lower four samples yielded fragments of *Rhamnus* charcoal. *Pseudotsuga* charcoal was found in the upper two samples and the lowest two samples. The upper two samples and sample 05793 from 100-110 cm yielded pieces of *Chrysothamnus* charcoal, while Asteraceae charcoal was noted in samples 05983 (81-90 cmbd) and 05985 (120-127 cmbd). California sycamore is reflected by *Platanus racemosa* charcoal in samples 05987 (70-75 cmbd) and 05793 (100-110 cmbd). *Vitis* charcoal was present at a depth of 110-120 cmbd, *Crataegus* charcoal was noted at 90-100 cmbd, and *Juniperus* charcoal was found at 81-90 cmbd. Charred termite fecal pellets also were present in all nine column samples, indicating that some of the burned wood contained termites. Wood-dwelling termite fecal pellets are small, hard, oblong-shaped, and exhibit six surfaces. Wood-dwelling termites are noted to be entirely confined to wood, with the whole colony living in a small section of trunk or branch. Both living and dead termite colonies would contain fecal pellets, which would be charred when the wood was burned (Adams 1984; Light 1946).

Sample 05985 from a depth of 120-127 cmbd and the upper sample 05792 from a depth of 60-70 cmbd yielded the majority of the uncharred remains and many remains found only in one or two of these samples. These two samples contained the only uncharred Solanaceae seed fragments, representing a member of the nightshade family, as well as several uncharred

Nicotiana seeds, representing tobacco. These two samples also contained the only fragments of coal and the only *Olivella* shell beads. In addition, sample 05985 yielded *Cylindropuntia* (cholla) charcoal, uncharred *Pseudotsuga* wood, a charred *Sesamum* (sesame) seed, a charred *Bromus*-type caryopsis fragment, a tooth fragment, a piece of clear glass, and a piece of green glass. The upper sample 05792 contained a charred Asteraceae seed, a charred probable Cyperaceae seed fragment, two charred Poaceae awn fragments, a charred Poaceae C caryopsis, an uncharred *Ficus carica* (fig) seed, an uncharred dicot stem fragment, an uncharred *Trifolium* (clover) seed, and fragments of coal clinker not found in any other sample. Poaceae C caryopses reflect grasses with small seeds, such as *Agrostis* (bentgrass), *Muhlenbergia* (muhly grass), *Poa* (bluegrass), etc.

Charred *Vitis* (grape) seeds were fairly common in the column samples, found in the upper three samples, as well as in samples from depths of 100-110 cmbd, 110-120 cmbd, and 120-127 cmbd. The lowest four samples yielded charred *Zea mays* kernel fragments, indicating that the mission occupants grew, and likely ate, corn. Charred *Triticum aestivum* (wheat) caryopses were found in samples from depths of 120-127 cmbd, 110-120 cmbd, and 81-90 cmbd. Charred Malvaceae seeds were noted in five samples, ranging from 120-127 cmbd, 100-110 cmbd, 81-90 cmbd, 75-81 cmbd, and 60-70 cmbd. Pieces of charred, vitrified tissue were found in the lowest sample, as well as in samples from depths of 110-120 cmbd, 90-100 cmbd, and 60-70 cmbd. Vitrified tissue has a shiny, glassy appearance due to fusion by heat and might reflect charcoal or other plant tissue too vitrified for identification. Pieces of charred parenchymous tissue were found in the upper three samples, as well as in sample 05793 from 110-120 cmbd. Parenchyma is the botanical term for relatively undifferentiated tissue composed of many similar cells with thin primary walls. Parenchyma occurs in many different plant tissues in varying amounts, especially large fleshy organs such as roots and stems, but also in fruits, seeds, cones, periderm (bark), leaves, needles, etc. (Hather 2000:1; Mauseth 1988). Other seeds present in the column samples include a charred *Leersia oryzoides*-type seed at a depth of 81-90 cmbd, a charred Poaceae B floret from a depth of 75-81 cmbd, and an uncharred *Amaranthus* seed at a depth of 70-75 cmbd. Poaceae B represents grasses with medium-sized caryopses such as *Festuca* (fescue), *Hordeum* (wild barley), and *Stipa* (needlegrass).

Each of the macrofloral samples also contained uncharred bone fragments, calcined bone fragments, brick/tile fragments, and mortar fragments. Ceramic fragments were noted in each sample except sample 05984 from a depth of 127-132 cm. Charred bone fragments and eggshell fragments also were very common, absent only from the lowest sample and from sample 05987 at a depth of 70-75 cm. The lowest sample examined yielded the only evidence of fish scales, suggesting that the mission occupants ate fish. Ctenoid fish scales have tiny, comb-like teeth, called ctenii, on the posterior edge of the scale and are common in the majority of bony fishes.

Feature 10, Unit 137

Feature 10 is a triangular water retention basin with a plastered tile (ladrillo) floor north of the mill and immediately west of the millrace (Feature 1). This feature is noted to start at a depth of 128 cmbd (Kimberly Owens, personal communication, November 30, 2012). The millrace forms the east wall and was built on top of Feature 10. Embedded sandy sediments below the north edge of the floor suggest that Feature 10 was built on top of a natural channel or drainage. Pollen sample 09748 was recovered from fill from beneath the tile floor at a depth of 147-150 in Unit 137, immediately south of Unit 104. This sample was dominated by High-spine Asteraceae pollen, and Liguliflorae pollen was noted as a strong sub-dominant. This indicates a disturbed landscape that supported large quantities of plants in the sunflower family, including plants in the chicory tribe, perhaps dandelion. Pollen representing trees was very much reduced from the quantity observed in the control sample. Only small quantities of *Quercus*, *Juglans*, and *Pinus* pollen were noted, representing oak, walnut, and pine trees. A large variety of shrubby and herbaceous plants are represented by small to moderately small quantities of pollen that included Apiaceae, *Artemisia*, Low-spine Asteraceae, Brassicaceae, Cheno-am, *Eriogonum*, *Erodium*, Fabaceae, *Geranium*, Onagraceae, *Oenothera*, *Malva neglecta*, Poaceae, Polemoniaceae, *Adenostoma*, and *Typha angustifolia*-type, representing a member of the umbel family, sagebrush, plants in the ragweed portion of the sunflower family, members of the mustard and goosefoot families, wild buckwheat, filaree, legumes, wild or cultivated geranium, a member of the evening primrose family, showy primrose, mallow, grasses, a member of the phlox family, chamise, and cattail. Although some members of the Apiaceae are used as herbs to flavor food, recovery of this pollen in the control sample in a similar quantity to that noted in this sample suggests that its presence here is likely in the context of a weedy plant. Most of the pollen signature from this sample appears to represent local vegetation and indicates a population of weedy plants growing in the area. Recovery of Cerealia pollen that was accompanied by aggregates from this context, representing any of a number of cereal grains such as wheat, barley, rye, or oats, suggests use of sediments containing at least some cultural debris as fill beneath the floor. Aggregates indicate that the Cerealia pollen was not introduced into the sediments by wind transport, but rather by direct contact with the processed or unprocessed cereals. The presence of the cereal pollen might be related more to the original context of the sediment than to its presence beneath the tile floor. Also, it might reflect the abundance of cereal flour in the atmosphere in the vicinity of the mill so that it was among the particles that settled on the water in the retention basin. It is possible that if the tile floor was permeable or had cracks that some of the flour, including pollen, was able to make its way through into the sediments below.

Unit 145, Feature 11

Feature 11 is a brick enclosure believed to be a second water reservoir on the east side of the millrace. A total of 14 macrofloral samples were taken from Unit 145 at a depth of 68-190 cmbd. These samples yielded various charred and uncharred macrofloral remains and cultural trash. The majority of the macrofloral remains were found in the upper half of Unit 145. Samples from this part of the unit also yielded the majority of uncharred seeds, such as *Chenopodium* and Scrophulariaceae in sample 20793, *Pinus* fragments in six samples from depths of 68-78 cmbd and 98-143 cmbd, and *Sambucus nigra* in five samples from depths of 68-88 cmbd, 98-118 cmbd, and 123-133 cmbd (Tables 6 and 4). These seeds represent goosefoot/pigweed, a member of the figwort family, pine, and black elderberry. As pine trees likely were not growing in the immediate vicinity of the Mission, pine nuts would have been gathered by the mission occupants, most likely the Native Americans. Various seeds from the Solanaceae also were noted in the samples from upper levels, including a *Solanum/Physalis* seed fragment in sample 20779 (78-88 cmbd), a single *Nicotiana* seed in sample 20798 (88-98 cmbd), and a few *Datura wrightii*-type seed fragments present in samples 20812 and 20793 from a depth of 98-123 cmbd. *Datura* seed fragments in samples 20798 and 20771 (118-123 cmbd) most likely also represent *Datura wrightii*-type, however the seed fragments were too small for specific identification. Sacred datura and tobacco appear to have been present at the mission during the time represented by these samples. Charred and uncharred Malvaceae seeds, including the introduced *Malva*, also were present in this upper part of the unit with the exception of sample

20777 from a depth of 152-158 cmbd. Samples 20812 (98-108 cmbd) and 20793 (108-118 cmbd) yielded the greatest numbers and variety of macrofloral remains including charred Brassicaceae seed fragments (sample 20793), charred periderm (sample 20812), and pieces of charred parenchymous tissue (both). In addition, sample 20812 contained an uncharred *Zea mays* cupule, indicating the presence of cultivated maize/corn. Charred Cereal-type caryopses in sample 20779 reflect cultivated cereal grains such as *Triticum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley), *Secale cereale* (rye), etc. Fragments of charred Poaceae A caryopses were present in samples 20811 (68-78 cmbd) and 20812 and note the presence of grasses with larger-sized caryopses, possibly the cultivated cereal grains or native grasses such as *Agropyron* (wheatgrass), *Elymus* (ryegrass), *Bromus* (brome grass), etc. A single charred *Crataegus* seed fragment was identified in sample 20782 (123-133 cmbd), reflecting hawthorn. Sample 20798 yielded two charred *Schinus molle* fragments, indicating the presence of the introduced Peruvian pepper trees.

The lower levels of Unit 145 yielded fewer remains, and the remains present were mostly charred. Sample 20788 from a depth of 133-143 cmbd and sample 20777 from a depth of 152-158 cmbd yielded the majority of the macrofloral remains. These two samples contained the only charred *Triticum aestivum* (wheat) caryopses from this unit. Uncharred *Pinus* seed fragments and charred *Zea mays* cupule fragments also were noted in sample 20788, reflecting pine nuts and cultivated maize/corn. A charred *Carya illinoinensis* nutshell fragment, charred Malvaceae seed fragments, and vitrified fragments of unidentified rhizome were present in sample 20777, noting pecans, members of the mallow family, and plants with creeping rhizomes. Charred macrofloral remains in the lowest samples of Unit 145 (20769 and 20787), from a depth of 177-190 cmbd, include a Cheno-am seed fragment, a *Carex* (sedge) seed, *Erodium* awn and seed fragments, and Poaceae awn fragments.

The charcoal assemblage in Unit 145 is mostly represented by fragments of *Quercus*, Salicaceae including *Populus* and/or *Salix*, *Rhamnus*, and *Pseudotsuga* charcoal (Figure 3). Charcoal in the mission samples likely is derived from burning wood as fuel, and the most ubiquitous and abundant charcoal are those from trees in the local vegetation community. Pieces of *Quercus* charcoal again were present in every sample from the column. *Quercus* charcoal fragments identifiable as *Erythrobalanus* (red oak) group were recovered only in sample 20787, which is the lowest sample in the unit (187-190 cmbd). Nine samples recovered mostly from the lower part of the column yielded pieces of *Quercus* - *Leucobalanus* (white oak) group charcoal, while seven samples derived from upper half of the column (78-143 cmbd) yielded fragments of *Quercus* - live oak group charcoal. Pieces of Salicaceae charcoal were identified in most of the samples except 20782 and 20789. Fragments of Rhamnaceae charcoal, primarily represented by *Rhamnus*, were present in nine samples, starting from the uppermost sample (20811) at a depth of 68-78 cmbd to sample 20777 at a depth of 152-158 cmbd. Sample 20777 was the only one where fragments of Asteraceae and Rosaceae charcoal were identified, reflecting members of the sunflower and rose families. Other hardwood charcoal recovered from this column includes *Acer* in samples 20793 (108-118 cmbd) and 20789 (158-167 cmbd), *Alnus* in sample 20777, *Betula* in samples 20772 and 20769 (167-187 cmbd), *Platanus racemosa* in sample 20771 (118-123 cmbd), and *Ulmus* in sample 20768 (143-152 cmbd), reflecting the presence of maple, alder, birch, sycamore, and elm. Conifers, including *Picea* and *Pinus*, were sparse compared to the hardwoods; however, a few fragments of *Pseudotsuga* charcoal were present in six samples from the upper half of the column (68-78 cmbd and 88-133 cmbd) and in two samples close to the bottom of the column (167-187 cmbd). A single piece of vitrified *Cylindropuntia* charcoal was identified in sample 20788 from a depth of 133-143 cmbd, indicating the presence of cholla cactus. Charred termite fecal pellets were noted in ten samples, while a few uncharred termite fecal pellets were present only in the five uppermost column samples (20811, 20779, 20798, 20812, and 20793), again noting the presence of wood-dwelling termites.

All fourteen samples yielded uncharred bone fragments, eleven samples contained charred bone fragments, and calcined bone fragments were present in nine samples. Some bones represent large/medium sized mammals that were eaten by mission occupants. Four fragments of bird bone were noted in sample 20772. A single fragment of uncharred tooth was recovered from sample 20788. Other non-floral remains include fragments of asphaltum, brick/tile, ceramic, clinker, lime, and mortar. A few pieces of coal were present only in sample 20768 (143-152 cmbd). Sample 20782 yielded an uncharred shell fragment, while a whole snail shell with an oblong shape was recovered from sample 20812. An uncharred coral fragment was noted in sample 20789 from a depth of 158-167 cmbd.

Unit 157, Millstone

Sample 05669 consists of a large millstone fragment from a depth of 140-150 cm in Unit 157, northwest of the mill foundation and west of the millrace. This millstone fragment was washed to recover pollen and phytoliths. The pollen record was sparse, including Cerealia pollen, as well as indicators of local vegetation represented by *Pinus*, *Quercus*, High-spine Asteraceae, Cheno-am, *Eriogonum*, Poaceae, and *Sphaeralcea* pollen. Local vegetation included at least pine, oak, various members of the sunflower family, Cheno-ams, wild buckwheat, grasses, and globemallow. Recovery of Cerealia pollen indicates that this millstone was used to grind cultivated cereal grains. A surprisingly large quantity of microscopic charcoal was noted in this sample, suggesting either that the sediments in which this millstone fragment was buried were burned or contained ash or that the stone itself had been subjected to fire. There is no discoloration of the stone, suggesting that the stone had not been in a fire. Total pollen concentration was only approximately 5 pollen per cm^2 of grinding surface.

Phytolith analysis of a wash of a portion of the millstone surface yielded a phytolith record dominated by small broken fragments of dendriform phytoliths (grass inflorescence) and trapeziform sinuate phytoliths (grass stem and leaf material) from cool season, C_3 metabolism grasses (Figure 4). Dendriforms originate in the chaff material (lemmas, paleas and glumes) that surrounds the seed/grain (caryopsis) of some wild and domesticated grasses. They are very common in the chaff of Pooideae grasses, some of which are domesticated cereal grain producers. The presence of these broken dendriforms indicates that grass grains were possibly ground to flour with this millstone. This is because the dendriform-bearing plant material that encapsulates the grass seed is never entirely removed from all of the grains during harvesting, threshing, and hulling steps. These dendriforms can then be cooked, digested, and incorporated into the archaeological and geological records. Disarticulated and fragmented dendriforms such as the ones observed here cannot be reliably ascribed to a particular grass such as wheat, barley, or rye. Sheets of silicified chaff epidermis with dendriforms *in situ* can be identified to the genus level; however, none of these silicified sheets were observed from this sample. This suggests that the grains either were hulled and processed to a high degree before grinding with this stone, or that milling was particularly efficient at breaking up all of the dendritic epidermal sheet elements. An example of a fragmented dendriform phytolith can be seen in Figure 5A, and an unbroken dendriform can be seen in Figure 5G.

Projectile Points

Two Cottonwood series triangle projectile points from the Water Complex area were tested for protein residues against the antisera listed in Table 7. Sample 05416 was recovered from a depth of 170-180 cmbd in Unit 154 immediately south of Unit 143 on the east side of the millrace, while sample 04631 was found at a depth of 100-110 cmbd in Unit 110 in the western portion of the Water Complex. The two projectile points yielded negative results to all antisera tested. It is possible that these two projectile points had never been used, that they were used for hunting animals other than those represented by the available antisera, or that insufficient amounts of protein residues were retained on the artifact surfaces.

Granary Structure

An adobe building believed to be a granary structure was located west of the Water Complex. Feature 5 is a north-south running cobble wall that forms the west wall of the granary structure, while Feature 3 is the north-south running cobble wall that forms the granary's east wall. The granary appears to have had an asphaltum roof that collapsed, and it contained a refuse deposit with several depositional episodes. Tile (ladrillo) floors were noted on the west and east sides of the granary that might represent small patios. Macrofloral columns were examined from the center and the northwest corner of the granary, as well as in the center of the refuse deposit. A mano from the granary fill was washed for phytoliths and starches. Pollen samples were collected from beneath tiles in the ladrillo floors. Phytolith, starch, protein, and organic residue analyses were performed on various artifacts found outside the Granary.

Unit 263

Unit 263 was placed just inside the west wall (Feature 5) of the granary, north of the refuse deposit. The 18 samples in the macrofloral column from Unit 263 represent depths of 90-250 cmbd, with sample 20806 from a depth of 134-139 cmbd directly associated with the Feature 5 cobble wall.

Samples 20826 (180-190 cmbd), 18418 (170-180 cmbd), 20831 (160-170 cmbd), 18605 (130-134 cmbd), and 18595 (120-130) yielded charred *Zea mays* cupule fragments, reflecting the presence of cultivated maize/corn (Tables 8 and 4). Six samples (20840, 18595, 20806, 20844, 18418, and 20770) yielded uncharred *Pinus* seed fragments, while samples 18499 (240-250 cmbd) and 20840 (90-100 cmbd) each contained a single charred *Pinus* seed fragment. Pine appear to have been used by the mission occupants. Uncharred *Sambucus nigra* seed fragments in samples from depths of 140-200 cmbd (18498, 20826, 18418, 20831, 20844, and 20820) and 110-130 cmbd (10832 and 19595) suggest that black elderberries were grown at the Mission and/or eaten by the Mission occupants.

Quantitatively, uncharred *Datura wrightii*-type seeds make the largest group of macrofloral remains from this unit. Approximately 377 fragments of sacred datura seeds were counted in sample 20844 (150-160 cmbd). Fewer uncharred seed fragments also were present in samples 20834 (200-210 cmbd), 18418 (170-180 cmbd), 20831(160-170 cmbd), 20832 (110-120 cmbd), 20763 (100-110 cmbd), and the uppermost 20840. Seeds from other members of the nightshade family include an uncharred *Nicotiana* fragment in sample 20840 and single uncharred *Solanum* fragments in samples 18418 (170-180 cmbd) and 20806 (134-139).

Members of the Chenopodiaceae were sparsely present in Unit 263. Samples 20770 (220-230 cmbd), 20844 (150-160 cmbd), and the uppermost 20840 yielded few charred *Chenopodium* seed fragments, while uncharred *Chenopodium* seeds, including *Chenopodium berlandieri*-type (similar to pitseed goosefoot), were present in samples 20840 and 20831. These seeds reflect the presence of goosefoot. A few uncharred *Amaranthus* seed fragments were noted in samples 20840, 20832, and 18418, noting the presence of amaranth. These or other members of the Cheno-am group are represented by five charred Cheno-am seed fragments in sample 20831 (160-170 cmbd), charred Cheno-am perisperm in samples 20844 (150-160 cmbd) and 20832 (110-120 cmbd), and uncharred Cheno-am perisperm in sample 20840. Members of the Cheno-am group had been important resources for Native Americans in southern California and might have been used by the mission neophytes. The same can be said of *Calandrinia*, as charred and uncharred *Calandrinia* seeds in samples 18595, 20831, 20834, 20770, and 18499 might reflect use of redmaids. A charred *Arctostaphylos* seed in sample 20844 (150-160 cmbd) reflects the presence of manzanita and might represent use of berries. Charred fragments of *Schinus molle* seed fragments were recovered in six samples from depths of 90-110, 150-160, and 190-220 cmbd, while pieces of Peruvian peppertree charcoal were only noted in sample 18595 at a depth of 120-130 cmbd. The upper sample 20840 yielded the only uncharred *Ficus carica* seed fragment, reflecting the common fig.

Various Poaceae parts were noted in 14 of the 18 samples, including an uncharred Poaceae awn fragment in the upper sample 20840 (90-100 cmbd), charred Poaceae awn fragments in samples from depths of 230-240, 190-210, 140-180, and 110-134 cmbd, and uncharred Poaceae leaf/stem fragments in samples 20834 (200-210 cmbd), 18418 (170-180 cmbd), 20832 (110-120), and the upper 20840. A single uncharred Poaceae B caryopsis in sample 20840 (90-100 cmbd) represents a grass with medium-sized caryopses such as *Festuca* (fescue), *Hordeum* (wild barley), *Stipa* (needlegrass), etc. Charred Poaceae caryopses were recovered in samples 20770 (220-230 cmbd), 20829 (210-220 cmbd), 20844 (150-160 cmbd), and 20820 (140-150 cmbd). Grasses appear to have been common at the mission.

Typical weedy plants in the uppermost sample 20840 are represented by a single uncharred *Taraxacum* (dandelion) seed fragment, an uncharred *Erodium* awn fragment, and two charred *Xanthium*-type fruit fragments. A few uncharred *Erodium* awn fragments also were present in sample 20834 from a depth of 200-210 cmbd, representing a native or introduced storksbill. A charred *Helianthus* seed fragment in sample 20834 reflects a native sunflower, possibly used by the mission occupants. Charred and uncharred *Malva* seeds in samples 20840, 20806, 20820, 18418, 20826, 18498 reflect the introduced mallow. A charred Malvaceae seed in sample 20844 (150-160 cmbd) might also represent mallow or another member of this family.

Other plant remains noted in the column samples from Unit 263 include an uncharred *Betula* seed fragment in sample 20829 (210-220 cmbd), an uncharred *Stellaria* seed fragment in sample 20820 (140-150 cmbd), a charred *Chamaesyce* seed and an uncharred *Trifolium* seed in sample 20831 (160-170 cmbd), and uncharred *Tribulus terrestris* seed fragments in samples 20840, 20832, 20806, and 18418, reflecting birch, starwort, sandmat, clover, and puncturevine. The unit also yielded a few charred fragments of periderm, parenchymous tissue, and vitrified tissue.

A total of 342 charcoal fragments were identified in the Unit 263 column samples. A total of 51% of all identified charcoal fragments were *Quercus* charcoal, including *Erythrobalanus* (red oak group), *Leucobalanus* (white oak group) and live oak types. All of the samples except sample 18580 (230-240 cmbd) yielded fragments of *Quercus* charcoal (Figure 6). The second largest group of charcoal from this unit are Rhamnaceae (buckthorn family), with 26 fragments of *Rhamnus* (buckthorn) charcoal present in samples 20840, 20832, 18595, 18605, 20806, and 20826. Other hardwoods present in the samples from Unit 263 include *Acer* (sample 18498), Asteraceae (samples 20840 and 18418), *Encelia californica* (sample 20844), probable *Fraxinus* (sample 20832), *Platanus racemosa* (samples 20806 and 20834), Rosaceae (samples 20844, 20831, and 20826), *Prunus* (sample 20740), *Schinus molle* (sample 18595), and *Umbellularia californica* (sample 20806), reflecting maple/box elder, members of the sunflower family, California brittlebush/encelia, probable ash, California sycamore, members of the rose family, cherry/plum, Peruvian pepper tree, and California laurel that burned. Twenty-two fragments of Salicaceae (willow family) charcoal recovered in ten samples from varying depths may represent aspen, cottonwood, and/or willow. A total of 20% of the identified charcoal fragments in these samples was only identifiable as “unidentified hardwood”. These fragments were too small or too vitrified for further identification. Uncharred wood from Unit 263 is represented by a fragment of Asteraceae (sample 18418), fragments of conifer wood (sample 20763, 18418, and 18498), and *Pseudotsuga* wood (sample 20826). Charred termite fecal pellets were present in fifteen samples, while uncharred termite fecal pellets were noted only in four samples (20740, 20832, 18532, and 20820).

A total of fourteen samples from Unit 263 contained asphaltum fragments, representing depths of 190-220 cmbd and 90-180 cmbd). Bone fragments were recovered in fifteen samples from depths of 90-210 cmbd and 230-240 cmbd, with decreasing frequencies found in the lower samples of the column. No bone fragments were noted in samples from depths of 240-250 cmbd and 210-230 cmbd. Uncharred bone fragments were present in thirteen samples, charred bone fragments in four samples (20832,18595, 20806, and 20844), and calcined bone fragments were noted in four samples (20763, 20806, 20820, and 18498). A total of eleven samples contained brick/tile fragments representing depths of 90-139, 140-160, 170-180, and 190-210 cmbd, while ceramic fragments were noted only in samples 20831 (160-170 cmbd) and the uppermost 20840 (90-100 cmbd). Other non-floral remains from this unit include glass fragments, clinker fragments, lime fragments, and mortar fragments. Metal objects are represented by pieces of rusted flat metal in samples 20834 (200-210 cmbd), 18498 (190-200 cmbd), 20844 (150-160 cmbd), 20832 (110-120 cmbd), 20763 (100-110 cmbd) and 20840; a rusted nail/pin fragment in sample 20840; a metal screw in sample 20844 and rusted wire fragments in samples 20831 and 20844. A single fragment of green yarn was noted in the upper sample 20840.

Unit 258, Feature 14

Feature 14 is a refuse deposit within the granary structure. It appears to contain several depositional episodes, which resulted in a fluctuating size. Unit 258 was placed in the geographical center of the deposit, and a macrofloral column was taken from the unit’s north wall. A total of 25 samples were examined from this column. Two samples are stratigraphically above the Feature 14 deposit, seventeen samples are from the feature deposit, and six samples are stratigraphically below the deposit.

The six samples from below the Feature 14 deposit (265-310 cmbd) and the seven lowest samples of the Feature 14 deposit (200-265 cmbd) yielded relatively few seeds and other plant remains. By contrast, samples in the upper part of the column, from 84-200 cmbd, contained the greatest numbers and varieties of macrofloral remains, both charred and uncharred, including several types found only in the samples from this Unit. These depths include the two samples found stratigraphically above the Feature 14 deposit and the upper ten samples within the Feature 14 deposit.

In general, the most ubiquitous seed type from Unit 258 was *Pinus*. Uncharred seed fragments were noted in 17 of the 25 total samples from Unit 258, and charred seeds were found in samples 20085 (180-190 cmbd), 20804 (150-160 cmbd), 20815 (140-150 cmbd), and 18697 (120-130 cmbd) (Tables 9, 4, and 5). Pine seeds appear to have been an important resource for the mission occupants. A single charred conifer cone scale fragment in sample 20082 from a depth of 110-120 cmbd might also reflect gathering pine seeds or possibly a cone from another type of conifer.

Charred and uncharred seeds from the Cheno-am group were present mainly in the upper samples from 84-200 cmbd. *Chenopodium* seeds were the most abundant of this group, with uncharred seeds and/or seed fragments found in ten of the upper samples and a single uncharred seed present in sample 20853 from a depth of 290-300 cmbd. Charred *Chenopodium* seeds were noted in 8 of the upper 12 samples. Samples 20082 (110-120 cmbd) and 18597 contained the most numerous fragments of both charred and uncharred *Chenopodium* seeds, and charred *Chenopodium* seed fragments also were numerous in sample 20778 from a depth of 130-140 cmbd. A single uncharred *Chenopodium berlandieri*-type seed with a honeycomb-pitted seed coat was noted in sample 20849 (220-230 cmbd), while few to several uncharred seeds were present in five samples from depths of 100-110 cmbd 21530), 120-130 cmbd (18597) and 160-190 cmbd (20822, 20181, and 20085). Charred *Chenopodium berlandieri*-type seeds and seed fragments were present in five of the samples from depths between 120 and 190 cmbd. Fewer *Amaranthus* seeds were noted, with uncharred seeds noted in four samples between depths of 84-130 cmbd, and charred seeds found in the four samples from depths of 110-150 cmbd. Two uncharred Cheno-am seed fragments in sample 20082 were too small for further identification. Cheno-am seed perisperm (similar to endosperm) consists of the nutritive tissue of the seed, surrounding and absorbed by the embryo. It represents a mature seed that has lost the outer seed coat (testa). Without the diagnostic outer seed coat, Cheno-am perisperm cannot be assigned to a specific genus. Recovery of charred and uncharred Cheno-am perisperm in Unit 258 might reflect *Chenopodium*, *Amaranthus*, or possibly another member of this group. An uncharred Cheno-am perisperm and perisperm fragment were present in sample 18813 from a depth of 280-186 cmbd, a single uncharred perisperm fragment was noted in sample 20859 from a depth of 210-220 cmbd, and uncharred Cheno-am perisperms were noted in 9 of the 12 upper samples in the column. A charred Cheno-am perisperm fragment also was noted in sample 20859 and in the 9 samples at depths of 110-190 cmbd. If charred remains in the refuse deposit levels reflect material cleaned out of features used for cooking, it appears that goosefoot, amaranth, and possibly other Cheno-am seeds might have been processed by the Native American occupants of the mission during the time represented by this feature. Alternatively, these seeds might reflect weedy members of the Cheno-am group growing nearby.

Other edible foods represented by seeds in the Unit 258 samples include charred Cereal-type caryopsis fragments in samples 18818 (270-280 cmbd), 20085 (180-190 cmbd), and 20814 (90-100 cmbd). Two charred Cereal-type rachis fragments also were noted in sample 20085. These charred remains reflect cereal grains such as wheat, oat, barley, rye, etc. Charred Poaceae A caryopsis fragments in samples from depths of 170-180 cmbd (20818), 140-150 cmbd (20815), and 100-130 cmbd (21530, 20082, and 18597) might also reflect cereal grains or possibly native grasses with larger-sized caryopses. Single charred *Zea mays* kernel fragments in samples 18814 (260-265 cmbd) and 20084 (250-260 cmbd), as well as single charred *Zea mays* cupule fragments in samples 20822, 20181, and 20085 (160-190 cmbd), indicate cultivated maize/corn. A few uncharred *Sambucus nigra* seeds/seed fragments were noted in eight of the lower samples, representing depths of 220-300 cmbd, and in five of the upper samples from depths of 100-190 cmbd. The only charred *Sambucus nigra* seed fragment found in the Mission San Gabriel samples was from sample 20082 at a depth of 110-120 cmbd. Black elderberries might have been grown in the garden or collected from plant communities outside the mission. Four charred *Citrullus lanatus* seed fragments were noted only in sample 20085 and reflect the presence of watermelon, probably grown in the mission garden. Figs are represented by two uncharred *Ficus carica* seed fragments noted in each of samples 20085, 20818, and 20804 from the upper part of the Feature 14 deposit. A charred *Juglans* nutshell fragment was recovered only in sample 20855, indicating the presence of walnuts. A charred *Crataegus* seed fragment in sample 20855 from a depth of 190-200 cmbd might reflect growth/use of hawthorn at the mission. Sample 20815 (140-150 cmbd) was the only sample from the project to contain a charred *Medicago sativa* seed, suggesting that alfalfa was grown at the mission, likely as feed for livestock. Charred *Opuntia* seed fragments in 20085 and 20855 (180-200 cmbd) might reflect the time period when part of the garden was enclosed by a prickly pear cactus (*Opuntia*) hedge.

Charred *Schinus molle* seeds were present in nine of the upper samples from depths of 90-180 cmbd. These charred seeds indicate the presence of the introduced Peruvian pepper trees at the mission. Seeds might have been used as “peppercorns”. Several members of the Solanaceae (pepper family) appear to have been grown in the garden and/or used by the mission occupants. Uncharred or charred *Datura* seed fragments were present in 11 of the 12 uppermost samples from Unit 258. Uncharred *Datura wrightii*-type seed fragments were especially numerous in the eight samples from depths of 90-170 cmbd. A few charred *Datura wrightii*-type seed fragments were noted in samples from depths of 160-170 cmbd (20822) and 110-140 cmbd (samples 20082, 18597, and 20778). Sacred datura was an important plant for Native American groups. Plants might have been grown in the garden and/or continued to be used by the Native American occupants of the mission. Several uncharred *Nicotiana* seeds were found in six of the seven samples at depths of 90-160 cmbd, absent only from sample 20815 (140-150 cmbd), suggesting use of tobacco. A single uncharred *Physalis* seed was noted in sample 20084 from a depth of 250-260 cmbd, reflecting growth/use of groundcherry/tomatillo. Three samples from the lower half of the column (18813, 20083, and 20849) and three samples from the upper half of the column (20085, 20082, and 20814) contained small fragments of *Physalis*/*Solanum* seeds, where the fragments were too small for an accurate identification. A total of nine samples contained charred *Solanum douglasii*-type seeds, including sample 20849 from a depth of 220-230 cmbd and eight of the nine samples from depths of 110-200 cmbd, absent only from the 150-160 cmbd level (sample 20804). Some groups in southern California used this plant as a medicinal resource and a food. The plant might have been used by the mission occupants, or it might have been present as a weed. Nightshades also are represented by recovery of an uncharred *Solanum* seed fragment in sample 18813 (280-286 cmbd) and a charred *Solanum* seed in sample 20815 (140-150 cmbd). Uncharred Solanaceae seed fragments in samples 18814 (260-265 cmbd), 20075 (230-240 cmbd), 20822 (160-170 cmbd) and 20778 (130-140 cmbd) were too small for further identification.

A charred *Brassica* seed fragment in sample 20084 (250-260 cmbd) might reflect a member of the cultivated *Brassica oleracea* group (broccoli, cauliflower, kale, etc.) or one of the weedy, introduced mustards. Two uncharred *Descurainia* seeds in sample 20814 (90-100 cmbd) note the presence of tansy-mustard. Charred *Calandrinia* seeds and/or seed fragments were present in samples 18813 (280-286), 20075 (230-240 cmbd), 20855 (190-200 cmbd), and 20778 (130-140 cmbd), while single uncharred *Calandrinia* seed fragments were noted in samples 18817 (286-290 cmbd), 18814 (260-265 cmbd), and 20085 (180-190 cmbd). Redmaids might have been used by the Native American occupants of the mission. Three charred Lamiaceae seeds in sample 20082 might reflect use of mints by the mission occupants. An uncharred *Salvia* seed in sample 21530 and several charred *Salvia* seeds and seed fragments in samples from a depth of 120-130 cmbd (18597) and depths of 160-190 cmbd (samples 20822, 20818, and 10085) reflect the presence of sage. Charred probable *Salvia* seeds were noted in samples 20814 and 20082. Species of *Salvia* are noted to have been a traditional food of native groups in California, and seeds might have been utilized by the San Gabriel Mission occupants. Sample 20822 (160-170 cmbd) yielded the only uncharred *Juncus* seed recovered for this project. Rushes might have been growing in wet areas at or near the mission. Rush stems were important resources for making baskets. Single uncharred *Trifolium* seeds were present in samples 20084 (250-260 cmbd) and 20849 (220-230 cmbd) from the bottom half of the column, as well as in sample 20804 from a depth of 150-160 cmbd. Clover greens and clover seeds are noted to have been eaten by native groups in southern California. It is likely that clovers were growing in the area, and these plants might have been exploited by the mission occupants. Fragments of charred PET (processed edible tissue) fruity tissue in samples 20778 and 20805 might reflect a fleshy fruit/berry or a succulent plant part such as cactus pads. A few charred pieces of parenchymous tissue were noted in samples 20075, 20854, 20822, and 20815, while numerous charred fragments were noted in sample 20778.

A charred Poaceae B caryopsis fragment was present in sample 20815 and seven charred fragments were noted in sample 18597. Poaceae B represents grasses with medium-sized caryopses such as *Festuca* (fescue), *Hordeum* (wild barley), and *Stipa* (needlegrass). Other evidence for use/discard of grasses include charred Poaceae awn fragments in three of the lower samples and seven of the upper samples, a charred Poaceae C caryopsis in sample 20855 (190-200 cmbd), and a charred Poaceae caryopsis fragment in sample 20778 (130-140 cmbd). Samples from Unit 258 were the only ones to contain charred Poaceae rachis fragments (samples 20815, 18597, and 20082), an uncharred Poaceae rachis fragment (uppermost sample 20807), uncharred Poaceae florets (samples 20778 and 20807), charred Poaceae scutella (samples 20855 and 20082), and a charred probable Poaceae caryopsis fragment (sample 20855). Sample 20082 from a depth of 110-120 cmbd contained both charred *Erodium* and charred Poaceae awn fragments, as well as several charred awn fragments too small to determine which type was represented. A variety of grasses appear to have been growing at the mission.

Charred and uncharred *Erodium* awn and/or seed fragments were present in 9 of the 11 upper samples from depths of 84-190 cmbd, possibly indicating greater disturbance to this area. Other weedy seeds typical of disturbed areas include *Malva*, other Malvaceae, members of the Asteraceae, members of the Caryophyllaceae, *Chamaesyce*, *Oxalis*, *Phacelia*, members of the Polygonaceae, *Portulaca, Tribulus palustris*, and possible *Zannichellia*. Many of these weedy seed types were noted only in the Unit 258 samples. Small amounts of uncharred *Malva* seeds were present in five of the lower samples and six of the upper samples from Unit 258. Charred *Malva* seeds were noted in the lower sample 18817 (286-290 cmbd) and in the upper samples 20085, 18597, and 20814 (90-100 cmbd). Six of the eight samples between depths of 110 and 190 cmbd contained charred Malvaceae fruits and seeds, possibly reflecting other members of the mallow family. Seeds from several members of the Asteraceae were present. Single charred Asteraceae, Cynareae seed fragments in samples 20082 and 18597 (110-130 cmbd) reflect members of the thistle tribe. A few uncharred *Ambrosia* seed fragments and a charred *Ambrosia* seed in the uppermost sample 20807 note the presence of ragweed. A charred *Anthemis* seed in sample 20815 (140-150 cmbd) represents the introduced chamomile, possibly *Anthemis nobilis* (Roman chamomile), which is used to make chamomile tea, or one of the weedy chamomiles. An uncharred *Helianthus* seed in sample 21530 (100-110 cmbd) reflects a wild sunflower. Three charred fragments of a spiny fruit pod, most similar to *Xanthium*, were recovered in sample 18597 (120-130 cmbd) and suggest the presence of cocklebur. A charred Asteraceae seed fragment in sample 20085 was too small for further identification.

Seeds from members of the Caryophyllaceae were noted only in the Unit 258 samples. An uncharred *Silene* seed was found in sample 20814 (90-100 cmbd), while uncharred *Stellaria* seeds and/or seed fragments were present in samples from a depth of 150-160 cmbd (20804) and 84-110 cmbd (20807, 20814, and 21530). An uncharred Caryophyllaceae seed fragment in sample 20822 was too small for further identification. The two uppermost samples (20807 and 20814) yielded the only uncharred *Chamaesyce* seeds recovered from this site, while the upper samples 20778, 21530, and 20814 contained the only uncharred *Oxalis* seeds. A charred *Phacelia* seed was noted only in sample 20085 from a depth of 180-190 cmbd. Samples from the upper half of Unit 258 contained the only seeds from members of the Polygonaceae. Charred *Polygonum* seeds were found in samples 20818 (170-180 cmbd) and 20807 (84-90 cmbd), while charred *Rumex* seeds were noted in samples 20815 (140-150 cmbd) and 20082 (110-120 cmbd). This unit also yielded a charred *Polygonum/Rumex* seed and seed fragment in sample 20085 from a depth of 180-190 cmbd and a charred Polygonaceae seed fragment in sample 18597 at a depth of 120-130 cmbd. Uncharred *Portulaca* seeds were noted in samples from depths of 190-210 cmbd (20855 and 10854), 100-130 cmbd (21530, 20082, and 18597), and 84-90 cmbd (20807). Charred *Portulaca* seeds also were noted in sample 18597. Introduced puncturevine plants are represented by several uncharred *Tribulus terrestris* seeds found in the two uppermost samples of Unit 258 and an uncharred seed fragment in sample 20804 (150-160 cmbd). A charred possible *Zannichellia palustris* seed fragment in sample 20085 might reflect the presence of horned pondweed growing in a wet area at or near the Mission.

Several other plant remains were noted in the Unit 258 samples. Three charred Fabaceae endosperm fragments in the uppermost sample 20807 most likely reflect a native member of the pea/bean family, while three uncharred *Juniperus* leaf fragments reflect a juniper tree. A charred bud fragment was noted in sample 20082 (110-120 cmbd). Charred periderm fragments were found in samples 20085, 20778, and 21530, most likely as a result of burning logs/branches with adhering bark. Sample 20778 also contained a few charred spine and thorn fragments, and single charred thorns or thorn fragments were present in samples 20815, 18597, and 20082. Nine samples collected between depths of 120-270 cmbd yielded pieces of charred, vitrified tissue representing charcoal or other plant tissue too vitrified for identification. Sample 20853 from a depth of 290-300 cmbd was the only sample from the project to contain a few sclerotia. Sclerotia are commonly called "carbon balls." They are small, black, solid or hollow spheres that can be smooth or lightly sculpted. These forms range from 0.5 to 4 mm in size. Sclerotia are the resting structures of mycorrhizae fungi, such as *Cenococcum graniforme*, that have a mutualistic relationship with tree roots. Many trees are noted to depend heavily on mycorrhizae and might not be successful without them. "The mycelial strands of these fungi grow into the roots and take some of the sugary compounds produced by the tree during photosynthesis. However, mycorrhizal fungi benefit the tree because they take in minerals from the soil, which are then used by the tree" (Kricher and Morrison 1988:285). Sclerotia appear to be ubiquitous and are found with coniferous and deciduous trees including *Abies* (fir), *Juniperus communis* (common juniper), *Larix* (larch), *Picea* (spruce), *Pinus* (pine), *Pseudotsuga* (Douglas fir), *Alnus* (alder), *Betula* (birch), *Populus* (poplar, cottonwood, aspen), *Quercus* (oak), and *Salix* (willow). These forms originally were identified by Dr. Kristiina Vogt, Professor of Ecology in the School of Forestry and Environmental Studies at Yale University (McWeeney 1989:229-230; Trappe 1962).

The Unit 258 samples contained the most varied charcoal assemblage of any of the columns examined from this project, yet it still was dominated by *Quercus* (Figure 7). Fragments of *Quercus* charcoal, including members of the *Leucobalanus* and live oak groups, were present in every sample except the lowest at 300-310 cmbd. Two pieces of *Quercus* - *Erythrobalanus* group charcoal were present only in sample 18818 at a depth of 270-280 cmbd. Salicaceae charcoal also was a common component of the charcoal assemblage from Unit 258, present in 20 of the 25 samples from this column. Charcoal identifiable as *Populus* was noted in sample 20855 (190-200 cmbd), while *Salix* charcoal was present in samples 20857 and 18818 (265-270 cmbd), sample 20085 (180-190 cmbd), and 20778 (130-140 cmbd). Buckthorn trees appear to either have been grown in the garden or have been part of the local vegetation community as evidenced by the presence of *Rhamnus* charcoal in ten of the samples ranging in depths from 100-280 cmbd.

The Unit 258 samples contained the most conifer charcoal of any of the columns examined and included pieces of *Juniperus* (sample 20849), *Pinus* (samples 20855 and 20804), and *Sequoia sempervirens* (samples 20815, 20778, and 21530), as well as *Pseudotsuga* charcoal in 11 samples at depths ranging from 84-260 cmbd. A few fragments of uncharred conifer and *Pseudotsuga* wood were found in 10 samples at varying depths throughout the column, most likely reflecting wood used as construction materials. The majority of the conifer charcoal was found in the upper half of the column.

The majority of the six samples containing *Umbellularia californica* charcoal also were in the upper half of the column, noted in five of the six upper samples at depths of 84-140 cmbd and absent only in sample 20814 from a depth of 90-200 cmbd. A few fragments of Asteraceae were present in samples from depths of 250-2690 cmbd (20084), 230-240 cmbd (20075), and 160-190 cmbd (20822, 20818, and 20085), reflecting woody members of the sunflower family. Charcoal representing other members of this family includes *Chrysothamnus* in sample 20875 (265-270 cmbd) and *Encelia californica* in samples 18597 and 20778 (120-140 cmbd). Woody members of the rose family are reflected by Rosaceae charcoal in samples 18814, 20075, 20085, and 20804. *Prunus* charcoal in sample 20083 (240-250 cmbd) suggests the presence of a cherry/plum tree, while *Rosa* charcoal in samples 20822 and 20778 reflect roses, either cultivated or wild. *Platanus racemosa* charcoal in samples 20084 (250-260 cmbd), 20075 (230-240 cmbd), 20849 (220-230 cmbd), and 20085 (180-190 cmbd) reflect the local California sycamore, while the introduced Peruvian pepper tree is reflected by *Schinus molle* charcoal in samples 20857 (265-270 cmbd), 20822 and 20818 (160-180 cmbd), and 20814 (90-100 cmbd). Charcoal types noted less frequently include *Acer* charcoal in sample 18813 (280-286 cmbd), Betulaceae charcoal in sample 20857 (265-270 cmbd), and *Ulmus* charcoal in sample 20815 (140-150 cmbd), reflecting maple, a member of the birch family, and elm wood. A total of 17 samples yielded fragments of charcoal too small and/or vitrified for identification other than “unidentified hardwood.”

An abundance of non-floral cultural remains also were present in the Unit 258 samples, as is expected in a trash deposit. All 25 samples yielded fragments of asphaltum. The roof of the granary is noted to have been made from asphaltum. Uncharred, charred, and/or calcined bone fragments were present in most of the samples from this unit, absent only from the lowest sample 20856, sample 18817 (286-290 cmbd), sample 18814 (260-265 cmbd), and sample 20849 (220-230 cmbd). Sample 20804 at a depth of 150-160 cmbd yielded the only fish vertebra recovered for this project. Fish scales were present in one sample from Unit 104. If fish were being eaten by the mission occupants, the remains were not often discarded in the areas represented by the six macrofloral columns. The majority of the Unit 258 samples also contained fragments of brick/tile. Clinker was found in 10 of the upper samples from the column, as well as in two of the samples from the lower half. Coal fragments were found only in three of the upper samples from depths of 130-140 cmbd, 110-120 cmbd, and 84-90 cmbd. Several glass fragments were present, including amber, clear, and green glass in the uppermost sample 20807; brown and clear glass in sample 20814 (90-100 cmbd), and yellow glass in samples 20822 and 20818 (160-180 cmbd). Clear glass fragments also were noted in samples from depths of 240-250 cmbd (20083), 150-160 cmbd (20804), and 110-140 cmbd (20082, 18597, and 20778). Pieces of flat, rusted metal were present in each of the 10 upper samples, with rusted nails in three of the samples and rusted wire in another three samples. An eyelet was noted in sample 20822 (160-170 cmbd), while a steel metal filing was found in the uppermost sample 20807. Sample 20857 from a depth of 265-270 yielded a porcelain fragment, as did samples 20822, 20778, 18597, and 20082 from the upper half of the column. Mortar fragments were noted in samples 18813 (280-286 cmbd), 20818 (170-180 cmbd), and 20778 (130-140 cmbd). Recovery of metal fragments, wire fragments, nails, a straight pin, glass fragments, mortar, and a variety of seeds from introduced plants suggests that the upper half of Unit 258 represents the American Period (1848-Present). A piece of daub with plant impressions was noted in sample 18817 from a depth of 286-290 cmbd.

Unit 161

Sample 05471 represents a mano recovered from a depth of 150-160 cm in Unit 161, found in the southern portion of the granary structure immediately east of the Feature 5 west cobble wall. This mano was washed to recover phytoliths and starches. No starch grains and only 25 phytoliths were recovered from the surface of this tool. Of these, phytoliths derived from cool season, C3 metabolism grasses were most prevalent. Many of these phytoliths likely represent an environmental signal and may not be directly related to the use of this tool to process plant material. However, several phytoliths derived from edible plant parts were recovered. Dendriform phytoliths derived from grass seed chaff were present at about 15% relative abundance, indicating that grass seeds (grains) were processed with this tool. As mentioned previously for the milling stone (05669) from Unit 143, disarticulated and fragmented dendriforms such as the ones observed here cannot be reliably ascribed to a particular grass such as wheat, barley, or rye. Also observed in this sample were numerous papillae phytoliths (Figure 5C). Papillae diameters and pit numbers have been used to distinguish between barley (*Hordeum*), wheat (*Triticum*) and goatgrass (*Aegilops*) (Tubb, et al. 1993). The size of the papillae observed in this sample is consistent with the size of those found in species of wheat (*Triticum*), suggesting that wheat may have been processed with this tool. A single maize cob-type rondel phytolith was observed (Figure 5B). This phytolith lacks some characteristics that would make it unequivocally diagnostic of maize; however, this particular morphotype is well within the range of variation observed from modern *Zea mays* cob reference material. Also, since maize cupules have been recovered from this area, this phytolith is most likely derived from maize.

It should also be mentioned that numerous freshwater sponge spicules were recovered from the surface of this mano. Freshwater sponges (Porifera, Spongillidae) inhabit submerged surfaces in wetlands, ponds, lakes, and rivers. They typically thrive in water that is alkaline (above pH 7), and their abundance is negatively correlated with turbidity and sediment load (Cohen 2003; Harrison 1988). The presence of a relatively high percentage of sponge spicules suggests that water may have been used with this tool for some of the grain processing.

Unit 267

Unit 267 was placed just inside the northwest adobe wall of the granary structure. Macrofloral samples 20852 and 20835 reflect depths of 106-110 and 90-100 cmbd within this unit. The majority of macrofloral remains in these samples are charred. Cultivated maize/corn is represented by a moderate amount of charred *Zea mays* kernel fragments in sample 20852 (106-110 cmbd) and by numerous charred *Zea mays* stem fragments in sample 20835 (90-100 cmbd) (Tables 10 and 4). Both samples yielded a few uncharred *Pinus* and *Nicotiana* seed fragments, reflecting pine nuts and tobacco.

Sample 20852 also yielded two charred Malvaceae (mallow family) seeds and few fragments of vitrified tissue, while uncharred *Datura* seed fragments and charred *Datura* seed endosperm, most likely represent *Datura wrightii*-type (sacred datura). Sample 20835 contained a charred *Chenopodium berlandieri*-type seed fragment, a charred fragment of *Opuntia* seed fragment, an uncharred *Sambucus nigra* seed fragment, reflecting goosefoot with a honeycomb-pitted seed coat similar to pitseed goosefoot, prickly pear cactus, and black elderberry. A few pieces of charred parenchymous tissue also were noted.

The charcoal assemblage from these samples is dominated by *Pseudotsuga* and *Quercus* (Figure 8). *Pseudotsuga* is the main charcoal type present in sample 20852, reflecting Douglas-fir wood that was burned. In addition to Douglas-fir and oak charcoal, sample 20852 also yielded pieces of Rosaceae and Salicaceae charcoal, representing woody members of the rose and willow families. Charred termite fecal pellets in this sample indicate the presence of wood-dwelling termites.

Fragments of *Quercus* - live oak group charcoal make up the majority of charcoal identified in sample 20835. A few fragments of Betulaceae charcoal, including *Betula*, reflect birch and another woody member of the birch family. A few fragments of unidentified hardwood charcoal also were noted.

Uncharred eggshell fragments, calcined bone fragments, and brick/tile fragments were found in both samples 20852 and 20835. These two samples, and six samples from Unit 104, were the only samples from the project to contain eggshell (Table 5). Uncharred bone fragments, clear and opaque glass fragments also were noted in sample 20835.

Feature 13

Feature 13 is a large tile (ladrillo) floor found west of Feature 5, the west cobble wall of the adobe granary structure. Pollen sample 06028 consists of fill from between the floor tiles at a depth of 130 cmbd in Unit 164, while pollen sample 05691 was recovered from fill beneath a floor tile at a depth of 133-134 cmbd in Unit 165. Sample 06028 was dominated by Brassicaceae pollen, which was accompanied by aggregates, indicating local growth of a member of the mustard family in the sediments that underlay this tile floor. Members of the mustard family that are very common on the landscape today in California are weedy plants that were introduced into California along with agricultural plants. Alternatively, it is possible that the elevated Brassicaceae pollen is more directly related to the contents of the granary if mustard seeds were stored. It is also possible that pollen from weedy plants in the mustard family growing in agricultural fields from which crops were harvested were transported with the grains or other items that were stored. Given the presence of aggregates of Brassicaceae pollen, this last possibility is unlikely, particularly since plants in the mustard family flower a long time prior to when grains are ready for harvest. Moderately large quantities of High-spine Asteraceae and Cheno-am pollen probably reflect local vegetation that included members of the sunflower family and plants in the Chenopodiaceae (goosefoot) family and/or the genus *Amaranthus* (amaranth). Recovery of small quantities of *Pinus*, *Quercus*, Apiaceae, *Artemisia*, Low-spine Asteraceae, Liguliflorae, *Eriogonum*, *Erodium*, Fabaceae, Poaceae, *Rhus*, Rosaceae, *Adenostoma*, and *Tribulus*-type pollen indicates that local vegetation included pine and oak trees, a member of the umbel family, wormwood or sagebrush, ragweed and related plants, dandelion and related plants, wild buckwheat, filaree or stork's bill, legumes, grasses, sumac, members of the rose family that included chamise, and puncturevine. Several of these are weedy plants that were introduced during the historic era including at least ragweed, dandelions, filaree, and puncturevine. There are, of course, native plants that produce Low-spine Asteraceae and Liguliflorae pollen, so these two types of pollen cannot be interpreted to represent exclusively introduced plants. The *Erodium* pollen exhibited characteristics more typical of introduced species than native species. No evidence of cereal processing was noted in sample 06028. The microscopic charcoal frequency was elevated in this sample, which suggests use of fire, possibly in the field. Total pollen concentration was more than 5000 pollen per cc of sediment.

Pollen sample 05691 displayed a larger High-spine Asteraceae pollen frequency that probably represents weedy members of the sunflower family. Quantities and types of arboreal pollen were similar in the two samples, with sample 05691 containing *Alnus*, *Quercus*, *Juglans*, and *Pinus* pollen, reflecting alder, oak, walnut, and pine trees. Recovery of small to moderate quantities of Apiaceae, Low-spine Asteraceae, Liguliflorae, Brassicaceae, Caryophyllaceae, Cheno-am, *Eriogonum*, *Erodium*, Euphorbiaceae, *Geranium*, Lamiaceae, *Oenothera*, *Plantago*, Poaceae, Polemoniaceae, *Adenostoma*, and *Typha* pollen indicates that local shrubby, herbaceous, and weedy vegetation included at least a member of the umbel family, ragweed-type plants, members of the chicory tribe of the sunflower family such as dandelion, members of the mustard and pink families, members of the goosefoot family and/or amaranth, wild buckwheat, filaree, spurge, wild or cultivated geranium, a member of the mint family, showy primrose, plantain, grasses, a member of the phlox family, chamise, and cattail. This pollen signature, representing slightly lower fill from beneath the ladrillo floor, emphasizes the large quantity of Brassicaceae pollen noted in sample 06028. It is likely that it represents either growth of weedy mustards in an agricultural field and accidental introduction of this pollen along with the crop that was harvested. The slightly elevated quantity of Cheno-am pollen observed in sample 06028 also might reflect field weeds. Again, no evidence of cereals was observed in this sample, although the quantity of Poaceae pollen was slightly elevated and accompanied by aggregates. It is possible that a cereal crop was grown and stored here, but that it did not produce pollen that was larger in size than the typical grasses. The quantity of microscopic charcoal was significantly lower in this sample than was noted in sample 06028. Total pollen concentration was almost 1700 pollen per cc of sediment, which is less than that observed in sample 06028.

Unit 253

Sample 15458 represents a steatite bowl fragment with exterior charred residue found in Unit 253 just west of Feature 13. This bowl fragment was washed to recover phytoliths and starches. No starch grains were noted; however, numerous phytoliths derived from food were recovered. A total of 200 phytoliths first were counted, followed by a scan for rare phytolith types of economic importance. Starting with the environmental portion of the record, this bowl yielded a variety of grass phytoliths. One rondel phytolith diagnostic of common reed (*Phragmites australis*) was observed, as well as numerous phytoliths most likely derived from canarygrass (*Phalaris* spp.)(Figure 5E). Although these grasses might simply be a part of the environmental record, common reed has numerous documented utilitarian uses, and species of canarygrass were utilized for their seeds by native groups across North America. A sedge root phytolith was observed (Figure 5D) that most likely is derived from *Scirpus*, *Schoenoplectus*, or *Cyperus*. Since these phytoliths are common in some California soils examined for paleoenvironmental studies, the sedge root phytolith here simply might be a part of the environmental signal. However, starchy sedge rhizomes are a well-known edible plant portion and might have been part of the foodstuffs contained in this bowl.

The strongest phytolith evidence for food processed, cooked, or contained in this bowl was the recovery of seven wavy-top rondels diagnostic of maize (*Zea mays*) cob material. One of these wavy-top rondels can be seen in Figure 5F. Wavy-top rondels can be produced in large numbers in the glume material for many varieties of maize (*Zea mays*). A small amount of these phytoliths can accompany the processing, cooking, and consumption of maize, and can be recovered from artifacts and features that represent these various activities. This particular phytolith appears to meet all of the requirements, as outlined by Pearsall (2003), to be considered a maize (*Zea mays*) cob wavy-top rondel. The main characteristics are that maize wavy-top rondels have a circular to oval base in outline (top view) that is flat, not concave in side view; the base must be longer than the body is high or tall; the top (the side opposite the rondel base) is a single, complete wave that is equal to or less than the length of the rondel base; and the peak or sides of this wave are not horns or spikes. Thus, the phytolith evidence indicates that maize was at least part of the food component that was cooked or contained in this bowl.

Brick (Ladrillo)

Sample 02477 is a brick (ladrillo) from an area 1 meter north of Unit 263 originally designated as Feature 4; however, further excavation revealed that this was not a feature (Kimberly Owens, personal communication, March 29, 2012). This location suggests that the brick is associated with the granary structure. The mission bricks (ladrillos) are noted to be relatively large and to have been "fired at relatively low temperatures in poor firing conditions, resulting in a soft finished product with a prominent black interior. They were made by pressing clay into wooden forms" (Dietler, et al.:46). Bricks are believed to have been made at the mission (Costello 1985:49, 54; Williams and Newlands 1996:31, in Dietler, et al.:47). Sample 02477 was washed to recover phytoliths and examined for possible macrofloral remains.

Phytolith analysis of the brick (ladrillo) yielded an assemblage that appears to be derived from as few as two different grass species. First and foremost, the phytolith record was dominated by unbroken dendriform phytoliths (Figure 5G). This is in sharp contrast with dendriforms from the milling stone (sample 05669) that were severely broken. Thus, it appears that discarded chaff from cereal grain was used in the construction of these bricks. As previously mentioned, disarticulated dendriform phytoliths cannot be readily ascribed to any particular taxa; however, the ornamentation of these dendriforms is consistent with those produced by wheat (*Triticum*) and barley (*Hordeum*). This sample also produced a moderate amount of papillae phytoliths. Like dendriforms, papillae (small outgrowths with a central protrusion) are common silicified structures in chaff material. Papillae diameters and pit numbers have been used to distinguish between barley (*Hordeum*), wheat (*Triticum*) and goatgrass (*Aegilops*) (Tubb, et al. 1993). Although not considered diagnostic, the average diameters and pit numbers for the papilla observed here are within the range reported as common for wheat (*Triticum aestivum*) by Tubb et al. (1993). Also observed in this sample were numerous *Stipa*-type bilobates diagnostic of the grass subfamily Stipeae. Common Stipeae native to this area include species of *Achnatherum* (syn. *Oryzopsis*) and *Nassella*. Common Eurasian Stipeae introductions to this area include *Stipa viridula* and *Piptatherum miliaceum*. Thus, it appears that wheat chaff and material from a native or non-native Stipeae grass was used in the construction of this brick. It's also possible that the Stipeae grass was growing as a weed within the wheat fields and was inadvertently incorporated with the wheat harvest.

Macrofloral analysis of the brick sample did not yield physical plant remains, only plant impressions within the brick. Examination of the interior of the brick fragments yielded Poaceae leaf and stem impressions; Poaceae A floret and caryopsis impressions; and Cerealia spike, floret, and caryopsis impressions (Tables 11 and 4). This is consistent with the interpretation that cereal grasses were used in the construction of these bricks, as evidenced from the phytolith record. Spike, floret, and caryopsis impressions indicate that some of the grasses retained their inflorescences, and that it was not just the discarded chaff that was used. Pieces of quartz and small bits of rock/gravel reflect binding material.

Feature 9

Feature 9 is a small tile (ladrillo) floor adjacent to Feature 3, the east cobble wall of the adobe granary structure. Pollen sample 08400 was examined from fill beneath Tile 3 in the ladrillo floor. This sample was dominated by *Typha angustofolia*-type pollen, indicating growth of cattails very close to this location. This interpretation is underscored by recovery of aggregates of *Typha* pollen, which indicates that cattail grew very close to this location. This indicates proximity to marshy conditions that might have been created through introduction of a water feature. Either standing or moving water might be indicated. Cattails grow best in areas where the ground is saturated much of the time. It is interesting to note that Cerealia pollen was observed in its largest quantity in this sample and that aggregates were present, suggesting that cereals might have grown in the general vicinity of this feature. Small quantities of *Cucurbita* and *Zea mays* pollen also were noted in this sample. This area appears to have functioned as a temporary depository for crops that were taken into the granary or perhaps was on a pathway used to transport crops to the granary. Other elements of the pollen signature from this sample are similar to those noted in other samples from this site, but the quantities are smaller due to the dominance by *Typha* pollen. Also included in this record are small quantities of *Quercus*, *Pinus*, *Artemisia*, Low-spine Asteraceae, High-spine Asteraceae, Liguliflorae, Brassicaceae, Cheno-am, Corylaceae, *Eriogonum*, *Erodium*, Fabaceae, *Geranium*, Onagraceae, Poaceae, and *Adenostoma* pollen representing oak, pine, sagebrush, ragweed-type plants, various members of the sunflower family, members of the chicory tribe of the sunflower family, members of the mustard family, members of the goosefoot family and/or amaranth, hazel shrubs, wild buckwheat, filaree, legumes, wild or cultivated geranium, a member of the evening primrose family, grasses, and chamise. A moderate quantity of microscopic charcoal was observed in this sample. Total pollen concentration was moderate at slightly less than 1000 pollen per cc of sediment.

Unit 248

Sample 08049 represents a granitic mano/pestle found approximately 50 cm east of the southern most corner of the Feature 9 floor, and sample 08050 is the soil control for this tool. The mano/pestle was washed for possible protein residues and tested against the antisera listed in Table 7. Two positive results were obtained, one to grasshopper antisera and one to yucca antisera (Table 12). The soil control yielded negative results to both yucca and grasshopper.

Since yucca antiserum cross-reacts with agave, as well as with some members of the lily family (Liliaceae), it cannot be said with certainty which plant is represented by the positive result to yucca antiserum. Since yucca produces a very important fiber, this mano/pestle likely was used at some point to pound and process yucca leaves for fiber.

Insects were an important part of the subsistence strategy in the Great Basin, Southwest, and California, as insects are high in protein, fat, vitamins, and minerals. In fact, insects such as grasshoppers provide similar nutrients to those provided by beef, chicken, fish, and eggs (DeFoliart 1975; Ebeling 1986:100). Some of the insects used as food in the western United States include the migratory grasshopper (*Melanoplus sanguinipes*), field cricket (*Gryllus* sp.), Mormon cricket (*Anabrus simplex*), Jerusalem cricket (*Stenopelmatus fuscus*), California salmonfly (*Pteronarcys californica*), and common blue-eyed darner (*Aeshna multicolor*), as well as cicadas, nymphs, aphids, ants, worms, and bees. In the arid West, as well as much of California, grasshoppers provided the bulk of the insect food resource used by Native Americans (Ebeling 1986:25-26; Heizer and Elsasser 1980:104).

Numerous accounts of grasshopper gathering are included in ethnographies from across the West. A grasshopper gathering, or drive, was a common practice throughout much of California, from the mountainous areas of northern California to the arid portions of southern California. These grasshopper drives typically involved digging a pit or series of trenches 10 to 12 feet wide and 4 to 5 feet deep in the center of a 2 to 5 acre area. The pits were covered with a thin layer of straw, and then the grasshoppers were driven into the pits by beating the ground with branches. The straw then was lit on fire, filling the pits with partially roasted grasshoppers with most of their wings singed off. Grasshoppers also were gathered in the early morning when they were inactive and could be knocked from bushes into baskets (DeFoliart 1994). Specific accounts from California describe the use of intentionally set wild fires by the Yukuts, Yana, and Pomo to gather large quantities of roasted grasshoppers and caterpillars. A similar practice was described for the Luiseño, Chumash, Wintu, and Maidu, who would drive the grasshoppers to a central grass patch and then set it on fire (Anderson 2005:150,177,273; Ebeling 1986: 303, 313; Skinner 1910). The Cahuilla also gathered insects, such as grasshoppers, during periods of their migrations (Ebeling 1986: 400).

Grasshopper preparation was varied, from eating fresh to roasting and drying. Grasshoppers were a hugely esteemed and important food source for the Miwok. They would parch grasshoppers in a basket or cook them in an earth oven, then dry them for winter use

(Ebeling 1986: 180). The Luiseño gathered grasshoppers and prepared them for eating in the same manner described for the Miwok (Ebeling 1986: 313). Pima Indians made a kind of mush of dried grasshoppers and meal (Ebeling 1986: 595). Grasshoppers also were put in containers with salt water and then roasted in a earth oven with hot rocks (Heizer and Elsasser 1980:105). The Honey Lake Paiute were noted to make a Mormon cricket soup after gathering crickets early in the morning. They would dig a pit and build a fire in it, allowing it to burn down to coals, then place the crickets on the coals and immediately cover it with earth and wait until they were roasted. After roasting, the crickets were removed, dried in the sun, and then later boiled to make soup, which was reported to taste like that made from dried deer meat (DeFoliart 1994; Heizer and Elsasser 1980:109). Great Basin Indians also made a Mormon cricket bread that was very dark in color (Egan 1917). The crickets were dried, then ground on the same mill used to grind pine nuts or grass seed. This would result in a fine flour that could be stored and made into a bread. The addition of crickets may have resulted in a sweeter bread, as well as enhancing the nutritional value. Early settlers referred to this bread as desert fruitcake. It also should be noted that the Mono Indians would collect and dry reed fly pupae in the sun, then mix them with acorns, berries, and grass seed to make a bread called cuchaba (DeFoliart 1994).

Unit 195

A Native American olla fragment (sample 06785) was found at a depth of 103-107 cmbd in Unit 195, east of the Feature 3 cobble wall and north of the Feature 9 ladrillo floor. The olla fragment exhibited dark brown residue. Organic residue analysis of this sample yielded peaks representing major categories (functional groups) of compounds (4000-1500 wave number), as well as specific compounds noted in the fingerprint region (1500-400 wave numbers) of the spectrum. The functional group peaks indicate the presence of fats/oils/lipids and/or plant waxes (Tables 13 and 14). Lipids are organic compounds insoluble in water but soluble in nonpolar organic solvents such as chloroform, ether, and/or methanol, that, along with proteins and carbohydrates, constitute the principal structural components of living cells. Lipids include fats, waxes, sterols, triglycerides, phosphatides, cerebrosides, and related and derived compounds. Peaks observed within the fingerprint region represent the presence of aromatic rings; aromatic and saturated esters; phospholipids; protein; the amino acids lysine, glutamate, alanine, and serine; alcohol; pectin; β-D-sucrose; cellulose and carbohydrates; and the polysaccharides arabinan and glucomannan. The signatures obtained from three different parts of the sample preparation dish yielded two very different signatures. The signatures obtained from the lower and middle portions of the dish are very similar to one another. The signature obtained from the upper part of the dish, representing the more volatile compounds that evaporated first, provided a very complex signature.

Matches with the signatures typical of the lower and middle portion of the sample processing dish are discussed first. Matches were made with drippings from baked *Sagittaria latifolia* in the cellulose/carbohydrates (1004, 1000 wave numbers) and in the β-D-sucrose (912 wave numbers) portions of the spectrum (Table 15). Unfortunately, this signature is also a very good match with deteriorated cellulose in the same portions of the spectrum and might represent nothing more than deteriorated cellulose from any plant. Possible calcium oleate peaks were noted at 1577 and 1540 wave numbers, suggesting the possibility that meat with bones and fat were cooked and/or contained in the olla. This signature was rather weak. Although peaks between 1700 and 1500 wave numbers are usually associated with proteins, the double peak visible at 1577 and 1540 wave numbers alternatively might represent the compound calcium oleate (Hanumantha Rao and Forssberg 1991:885). Calcium oleate is a calcium salt formed when calcium-containing alkaline materials, such as limestone, shell, or bone, are combined with oleic acid (common in many plant and animal fats) through heating (Wang, et al. 2008). The presence of this double peak in the sample might reflect the formation and deposition of this type of calcium salt on the ceramic sherd by cooking fatty foods in a vessel tempered with calcium rich materials. Alternatively, cooking meat on the bone or including de-fleshed bones in food mixtures that are cooked also allows the alkaline calcium in bone to join with plant and animal fats and can result in the deposition of calcium oleates in the ceramic matrix of the vessel. Absence of matches with these peaks for any food references in the PaleoResearch libraries further supports the interpretation that calcium oleate is formed during a cooking process.

The signature in the upper portion of the sample processing dish is much more complex and exhibits many peaks not observed in other locations on the dish. A match was obtained with cattail roots, for which there is evidence in the pollen record elsewhere at this site. Cattail roots also exhibit a complex signature. The fats/lipids peaks between approximately 3000 and 2800 wave numbers were an excellent match between the olla sample and cattail roots. Other peaks that matched include the protein peaks at 1700/01 wave numbers, alanine at 1462/63 wave numbers, protein and the amino acid glutamate at 1431 and 1411 wave numbers, and aromatic esters at 720 wave numbers. However, several of these peaks also matched with raw plant seeds, raw nutshells, raw plant stems, and raw plant roots for the aromatic ester peak (1701 wave numbers), protein (1700 wave numbers), protein and the amino acid alanine at 1471 and 1463 wave numbers, protein and the amino acid glutamate at 1431 and 1411wave numbers, and aromatic esters at 727 and 720 wave numbers. In addition, peaks typical of raw plant roots for alcohol (1205 wave numbers) and glucomannan (941 wave numbers) were observed in the olla sample. Therefore, although numerous peaks were represented in the upper portion of the evaporation dish, they do not appear to be helpful in resolving the issue of what was contained within the olla. The signatures obtained from the olla sherd suggest the possibility that baked wapato and/or cattails roots were present. Both are plants that grow in wet or marshy areas, although wapato requires more water than does cattail.

Unit 189

Several artifacts were found in Unit 189 located east of the Feature 3 cobble wall and south of the Feature 9 ladrillo floor. These artifacts were washed to recover organic residues, protein residues, and/or phytoliths and starches.

Vesicular Basalt Groundstone Bowl Fragment (Sample 06787)

A vesicular basalt groundstone bowl fragment (sample 06787), recovered from a depth of 180-190 cmbd, was tested for both organic and protein residues. FTIR analysis of sample 06787 yielded peaks representing functional group compounds including fats/oils/lipids and/or plant waxes. Other peaks indicating the presence of aromatic rings; aromatic and saturated esters; phospholipids; protein; the amino acids glutamate, alanine, and serine; alcohol; calcium oxalates; pectin; cellulose and carbohydrates were observed in the fingerprint range.

Given the complexity of the signature recovered from this bowl fragment, it is not unusual that matches were found to numerous items. The high amplitude fats/lipids peaks between 3000 and 2800 wave numbers match well with marrow fat from mammals and slightly less well with fatty duck skin. In addition, the peak at 1413 wave numbers, representing protein and the amino acid glutamate, is present in both marrow fat and duck skin. However, this peak is common in many animals and in some plants, such as raw pine needles. The peak at 1286 wave numbers representing the amino acid serine matched with that in marrow fat. In contrast, a peak representing saturated esters at 1195 wave numbers is shared by the sample and fatty duck skin. A saturated ester peak also is noted in raw plant roots at 1186 wave numbers. Fats that probably included animal fats, such as marrow fat from mammal bones or perhaps other animals like birds, appears to have been combined with other foods in this basalt bowl. Plant oils match for the saturated ester/phospholipids peak at 1736 wave numbers, for aromatic esters at 1729 and 717 wave numbers, proteins and the amino acid glutamate at 1413 and 1390 wave numbers, saturated esters at 1195 and 1061 wave numbers, and lipids at 1177 wave numbers. Saturated esters at 1195 wave numbers and lipids at 1177 wave numbers also are shared with the reference for fatty duck skin. This combination of matches suggests the probability that plant fats also are present in this bowl. Plant roots and/or tubers such as cattail also might be indicated by matches with peaks at 1701 wave numbers for aromatic esters, 1206 wave numbers for alcohol, and 1186 wave numbers for saturated esters. Possible contributions from plastic were noted in the following three characteristic locations: fats/lipids at 2972-2820 wave numbers, proteins at 1479-1452 wave numbers, and aromatic esters between 732 and 705 wave numbers. This sample was contained in a plastic bag and off-gassed at PaleoResearch for two weeks in an effort to remove the compounds originating in plastic. This treatment appears to have been somewhat less than successful for this bowl.

Protein residue analysis of ground stone sample 06787 yielded negative results to the antisera tested. It is possible that this ground stone was not used to grind insects or animal remains or that the material ground is not represented by the available antisera. Especially limiting is the fact that there are very few antisera developed against plant proteins, in part because the protein content of many plants is very low, making their detection difficult. It is also possible that insufficient amounts of protein residues were retained on the ground stone surface for recovery and identification.

Burned Granitic Mano Turned Pestle (Sample 11714)

Sample 11714 consists of a burned granitic mano that later was used as a pestle found at a depth of 190-200 cm in Unit 189. This mano/pestle was washed to recover phytoliths and starches. One starch grain and numerous phytoliths were recovered from the surface of this tool. Although most of the phytoliths recovered appear to be part of the environmental signal, several are derived from plant material processed with the tool. The starch grain recovered was spherical to subangular in shape and had a central hilum (Figure 5J). These characteristics are consistent with starches produced by many native grass seeds, as well as some of the starches found in maize kernels. The starch recovered here is not typical of those produced by wheat (*Triticum*), barley (*Hordeum* - domesticated or wild), rye grass (*Elymus* - domesticated or wild), or the native western wheatgrass (*Pascopyrum smithii*). Thus, this grass seed starch may be derived from another native grass or possibly maize (*Zea mays*).

As is typical of ground stone tools, a significant portion of the phytolith record is derived from the surrounding environment; however, some of these phytoliths appear to be derived from plant material processed with this tool. Some of the phytoliths that most likely reflect an environmental signal are derived from canarygrass (*Phalaris* spp.), common reed (*Phragmites arundinacea*), members of the Stipeae tribe, and members of the sedge (Cyperaceae) family. The strongest phytolith evidence for plant processing was the recovery of two dendritic epidermal sheet elements from grass chaff (Figure 5H and I). Unfortunately, these fragments were not quite large enough to adequately discern the wavy patterns between the dendritic long cells for genus-level identification. However, what was visible appears to be consistent with domesticated wheat (*Triticum*). What can be said with certainty is that this tool was used to process grass seeds. Also, one possible *Zea mays* rondel phytolith was observed. Unfortunately, this phytolith lacked some characteristics that would make it unequivocally diagnostic of maize; however, this particular morphotype is well within the range of variation observed from modern *Zea mays* cob reference material. As previously mentioned, the starch grain recovered here could possibly be derived from maize. Thus, the phytolith and starch record suggests that maize also may have been processed with this tool.

<u>Chert Biface (Sample 07951)</u>

A possible Franciscan chert biface (sample 07951), recovered from a depth of 210-220 cmbd, also was tested for both organic and protein residues. FTIR analysis yielded functional group peaks indicating the presence of fats/oils/lipids and/or plant waxes. Peaks identified within the fingerprint portion of the spectrum represent saturated esters, phospholipids, and protein.

The residue removed from this biface yielded only limited and low amplitude peaks, with few exceptions. Peaks at 2922 and 2851 wave numbers represent the presence of at least a small quantity of fats/lipids/plant waxes. They were low amplitude and not matched in our reference collection. In addition, a small peak at 1458 wave numbers, which is common to many of our animal and plant references, was noted. Although this sample was curated in a plastic bag, it was off-gassed for two weeks after arriving at PaleoResearch. Characteristic peaks of plastic were not observed in this sample. Very little residue was visible on the surface of the FTIR drying dish and it was difficult to obtain a signature suggesting that this biface either contained or retained little organic residue.

Protein residue analysis of sample 07951 yielded negative results to all antisera tested. It is possible that this biface had never been used, that it was used for hunting/processing animals other than those represented by the available antisera, or that insufficient amounts of protein residues were retained on its surface.

<u>Unit 268</u>

Unit 268 is located in a featureless area north of the train tracks. Sample 11588 consists of a steatite bowl fragment recovered from a depth of 123-130 cm and washed to recover possible protein residues. This sample tested positive to both bay anchovy and trout antisera.

The positive to bay anchovy most likely reflects the consumption of northern anchovy (*Engraulis mordax*). Anchovies (Engraulidae family) are small, delicate fishes and are almost entirely marine, although some species enter fresh waters. Northern anchovies grow up to 9" in length and are found in coastal waters from British Columbia to Baja, California. Northern anchovies spawn during the winter and spring and are an important commercial fish (Boschung 1983:386).

The positive to trout antiserum indicates that a member of the trout/salmon family (Salmonidae) was prepared and most likely consumed. The Salmonidae family contains species of salmon (*Oncorhynchus*), and trout (*Salmo*), as well as brook trout (*Salvelinus fontinalis*), lake trout (*Salvelinas namaycush*), lake whitefish (*Coregonus clupeaformis*), round whitefish (*Prosopium cylindraceum*), and arctic grayling (*Thymallus arcticus*). Many salmonids are important food and game fish. Based on the native ranges of the Salmonidae, rainbow trout (*Salmo gairdneri*) are the only salmonids native to the coastal waters and inland streams of southern California. Salmon are native to central and northern waters of California. Sea-run rainbow trout usually spend 2 to 4 years in their home stream before venturing to sea. They return to their home stream in winter to spawn. Rainbow trout that exist solely in fresh water spawn in the spring (Boschung 1983:388-398).

Unit 291

Fifteen macrofloral samples were taken from Unit 291, which is a column from the north wall of Unit 269. It is part of the North Midden Complex in the featureless area north of the train tracks. The macrofloral column samples represent depths between 39 and 170 cmbd. In general, the samples from Unit 291 are second richest in macrofloral remains, following Unit 258. Like those in Unit 258, samples from the upper levels (39-120 cmbd) yielded the most abundant remains.

Uncharred and, to a lesser extent, charred *Pinus* seed fragments were the most ubiquitous and most abundant plant remain, other than charcoal, in the Unit 291 samples (Tables 16, 4, and 5). A few uncharred *Pinus* seed fragments were present in samples 17821 (137-140 cmbd), 18690 (130-137 cmbd), and 18609 (120-125 cmbd); however *Pinus* seed fragments were recovered in great values (~ 399 fragments from sample 20089 alone) in every sample from the upper part of the column (39-120 cmbd). Charred *Pinus* seed fragments were noted in six of the eight upper samples from depths of 80-110 cmbd (20089, 18819, and 20861) and 39-70 cmbd (18155, 29863, and 20862. Pine seeds appear to have been heavily exploited during the time period represented by these upper samples. A few uncharred *Sambucus nigra* seed fragments and moderate amounts of uncharred *Nicotiana* seeds and seed fragments also were present in each of the nine samples from the upper part of the column (39-125 cmbd), suggesting that black elderberries and tobacco commonly were used during this time. Black elderberry fruits are noted to have been used in baking and desserts, as well as medicinally by Native and Anglo groups. Recovery of these seeds in this midden might reflect either culinary or medicinal use of black elderberry fruits.

In addition, other members of the nightshade family were noted only in the upper parts of the column. Uncharred *Datura wrightii*-type seed fragments in samples from depths of 70-120 cmbd (18170, 20089, 18819, 20861, and 18812) and 39-60 cmbd (18155 and 20863), and a charred *Datura wrightii*-type seed fragment in sample 20862 (60-70 cmbd) suggest the presence of sacred datura at the mission. Uncharred *Datura* seed fragments in sample 20089 (80-90 cmbd) most likely also represent the *Datura wrightii*-type; however, the fragments were too small to be ascribed to species. Nightshades are represented by an uncharred *Solanum* seed in sample 18155 and single charred *Solanum douglasii*-type seeds in samples 20863 and 20862. Uncharred Solanaceae seed fragments in samples 20862 and 20089 were too small for specific identification.

Recovery of a single *Avena sativa* caryopsis fragment in sample 18170 (70-80 cmbd), a charred cereal-type rachis fragment in sample 18819 (90-100 cmbd), and a few charred cereal-type caryopses and/or caryopsis fragments in samples from depths of 125-130 cmbd (18583), 80-120 cmbd (20089, 18819, 20861, and 18812), and the upper 39-70 cmbd represent common oat and possibly other cereal grains that likely were grown at the mission. A few charred Poaceae A caryopses and/or caryopsis fragments in six of the seven samples from depths of 50-120 cmbd might also reflect economic cereals or possibly native grasses with larger-sized caryopses. Two charred Poaceae B caryopses and two caryopsis fragments in sample 20089 note a grass with medium-sized caryopses, while a charred Poaceae C caryopsis in sample 20861 (100-110 cmbd) reflects a grass with small-sized caryopses. Grasses also are represented by charred Poaceae caryopsis fragments in sample 20862 (60-70 cmbd), a charred probable Poaceae stem fragment in sample 18150 (150-160 cmbd), and charred Poaceae awn fragments in samples 18812 (110-120 cmbd), 18819 (90-100 cmbd), 20862, and 20863. Charred monocot stem fragments in samples 17821(137-140 cmbd), 18812 (110-120 cmbd), 20089 (80-90 cmbd), 18170 (70-80 cmbd) and 20863 (50-60 cmbd) might also reflect grass stems or possibly stems from another type of monocot. Single charred *Zea mays* cupule fragments in samples 18812 and 18170 and single charred kernel fragments in samples from depths of 100-120 cmbd (20861 and 18812) and 80-90 cmbd (20089) indicate the presence of cultivated maize/corn. A charred Juglandaceae nutshell fragment in sample 18819 (90-100 cmbd) notes the presence of a member of the walnut family with a thick shell, such as walnut or hickory, while a charred *Carya illinoinensis* nutshell fragment in sample 20862 (60-70 cmbd) reflects the thinner-shelled pecan. Three charred *Quercus* acorn shell fragments in sample 20089 might indicate processing acorns, while two charred *Crataegus* seed fragments in sample 18170 (70-80 cmbd) might reflect use of hawthorn fruits.

Several types of seeds from plants known to have been resources for Native American groups in California were recovered in the Unit 291 samples. Many of these plants also can be common weeds. Uncharred *Calandrinia* seed fragments were present in samples 20093 (160-170 cmbd) and 17821 (137-140 cmbd), while a charred seed was noted in sample 18150 (150-160 cmbd). Two charred *Amaranthus* seed fragments in sample 20089 (80-90 cmbd), a single uncharred *Amaranthus* seed in sample 18690 (130-137 cmbd), and several uncharred *Amaranthus* seeds and seed fragments in the uppermost sample 18155 reflect amaranth/pigweed. The uppermost sample also yielded several uncharred *Chenopodium* seeds and seed fragments, while a few uncharred seeds or seed fragments were noted in samples from depths of 100-120 cmbd and 80-90 cmbd. A few charred *Chenopodium* seeds or seed fragments were present in samples from depths of 80-120 cmbd and 60-70 cmbd. Single charred *Chenopodium berlandieri*-type seed fragments in samples 18609 (120-125 cmbd) and 18819 (90-100 cmbd) reflect a goosefoot with a honeycomb-pitted seed such as pitseed goosefoot. A few charred Cheno-am perisperms/perisperm fragments in samples from 70-90 cmbd and several uncharred Cheno-am perisperms in the uppermost sample 18155 likely also represent amaranth and/or goosefoot. Single charred and uncharred *Trifolium* seeds were present in samples 20861 (100-110 cmbd) and 20862 (60-70 cmbd), while sample 18819 (90-100 cmbd) contained two uncharred *Trifolium* seeds. A single charred probable Fabaceae seed endosperm in sample 20863 appears to represent another member of the pea/bean family. Single charred *Salvia* seeds were noted in samples 20863 and 20862 (50-70 cmbd), and a charred probable *Salvia* seed endosperm was recovered in sample 20861. A charred Cyperaceae seed fragment in sample 18812 (110-120 cmbd) reflects a member of the sedge family. Sample 20862, collected from a depth of 60-70 cmbd, yielded two charred Asteraceae seed fragments, an uncharred Brassicaceae seed, and a charred probable Brassicaceae seed endosperm. An uncharred Apiaceae seed or two were noted in samples 18609 (120-125 cmbd) and 20863 (50-60 cmbd), while numerous uncharred seed fragments were present in the uppermost sample 18155.

A few charred *Schinus molle* seed fragments in each of the seven samples from depths of 50-120 cmbd represent the introduced Peruvian pepper tree. Introduced mallow is noted by recovery of a few uncharred *Malva* seeds in samples from depths of 100-120 (20861 and 18812), 60-80 cmbd (20862 and 18170), and 39-50 cmbd (18155). Two uncharred *Malva* fruits also were present in sample 20861. A charred Malvaceae fruit fragment and two uncharred Malvaceae seeds in the uppermost sample 18155, as well as a few charred Malvaceae seeds in samples from depths of 90-120 cmbd and 39-70 cmbd, appear to represent another member of the mallow family. Either the introduced filaree or a native storksbill is represented by charred *Erodium* seeds and seed fragments in sample 18690 (130-137 cmbd) and in all but one (18170) of the eight samples from the upper portion of the column, as well as charred *Erodium* awn fragments in all but one (20861) of the upper column samples. Remains from typically weedy plants include a charred *Oxalis* seed in sample 20089, single uncharred *Portulaca* seed fragments in samples 20089 and 18155, an uncharred Portulacaceae seed fragment in sample 18170, a few Scrophulariaceae-type seeds in samples 20863 and 18155, and an uncharred *Verbesina* seed, an uncharred *Chamaesyce* fruit and seed fragment, and two *Tribulus terrestris* seed fragments in the uppermost sample 18155. The uppermost sample also contained a moderate amount of uncharred leaf bud fragments.

A few charred fragments of parenchymous and vitrified tissue were present in few samples from Unit 291. No macrofloral remains, other than charcoal, were recovered from sample 17812 at a depth of 140-150 cmbd.

A total of 402 pieces of charcoal were identified from this unit. Fragments of *Quercus* charcoal were present in every column sample (Figure 9), including some fragments of *Leucobalanus* and live oak group. Live oak was noted only in samples from the upper portion of the column (50-120 cmbd), although *Leucobalanus* group charcoal was found in seven of the ten samples ranging from 60-160 cmbd. Fragments of *Pseudotsuga* charcoal also are very frequent, absent only from three samples in the lower part of the column (18583, 17812, 18150). Other conifers are represented by pieces of *Pinus* charcoal in sample 20863 (50-60 cmbd) and *Sequoia sempervirens* charcoal in samples 18155, 18819, 20861, 18812 from the upper half of the column. Salicaceae charcoal was recovered in six of the seven samples from depths of 50-120 cmbd, with *Salix* charcoal also present in sample 20089. Seven of the eight samples from depths of 39-120 cmbd yielded fragments of *Umbellularia californica* charcoal. *Rhamnus* charcoal was present in four of the five samples from depths of 70-120 cmbd, absent only from sample 20899 (80-90 cmbd). Like the charcoal records in other columns from this site, the Unit 291 charcoal record notes most frequent burning of oak, Douglas-fir, willow family, California laurel, and buckthorn wood.

Other charcoal types encountered less frequently include *Aesculus californica* in sample 20861(100-110 cmbd), Asteraceae in samples 20089 (80-90 cmbd) and 20862 (60-70 cmbd), *Platanus racemosa* in samples 18819 and 20861 (90-110 cmbd), *Rosa* in sample 20089, *Sambucus* in sample 18170 (70-80 cmbd), and *Schinus molle* in samples 20861(100-110 cmbd) and 20863 (50-60 cmbd). These charcoal types were present only in the upper levels of the column at a depth of 39-120 cmbd and note burning California buckeye, a woody member of the sunflower family, California sycamore, rose, elderberry, and Peruvian pepper tree wood. The charcoal record from samples at depths of 120-170 cmbd generally was sparse and less variable in comparison to samples from the upper portion of the column and consisted mainly of oak, conifers, and unidentified hardwood. Pieces of uncharred conifer (sample 20863), *Pseudotsuga* (sample 20861), and unidentified hardwood twig (sample 18155) also were recovered. Charred termite fecal pellets were noted in eight of the upper samples and in two of the lower samples (17812 and 18150), while a few uncharred termite fecal pellets were present in three samples from depths of 39-60 cmbd and 70-80 cmbd.

As expected for a midden deposit, several types of non-floral remains representing cultural trash were noted in the Unit 291 samples. Fourteen of the fifteen total samples yielded uncharred bone fragments, while charred and/or calcined bone were found in nine samples. Clinker, brick/tile, and asphaltum also were ubiquitous remains, noted in 14, 12, and 10 samples, respectively. Pieces of flat rusted metal, rusted wire, rusted nail/pin fragments, and some coal were noted in the upper samples, as well as aluminum/tin foil fragments (samples 18155 and 20089), pieces of possible leather (20862 and 18155) lime fragments (samples 20862 and 20863), glazed and white ceramic fragments (20863 and 18155), porcelain fragments (18819 and 18170) and glass in a variety of colors. In addition, a small bead (sample 18812), a single charred fragment of woven fibers (sample 20863), and an uncharred feather fragment (sample 20089) were present in Unit 291.

Sample 09211

Sample 09211 represents a Native American style metate fragment. This metate fragment was washed to recover possible protein residues; however, it yielded negative results to all antisera tested.

SUMMARY AND CONCLUSIONS

Macrofloral, pollen, phytolith, starch, protein residue, and organic residue analyses of samples from the Bishop's Garden area at the San Gabriel Mission Archaeological Site, CA-LAN-184H, in southern California yielded a rich record of remains.

The pollen record indicates there has been a considerable change in local landscape plants since the mission originally was occupied. Trees common either growing on the mission or nearby today are far more numerous than they were previously. Alder, birch, eucalyptus, chestnut, hickory, gum, and elm trees appear to have been added fairly recently or perhaps were present only in very small quantities in the past. This suggests that the mission might have been built in an area that did not support many trees or that trees already growing in the area were cut down to build the mission and the grounds. Either way, the mission looked considerably different at the time of the original occupation than it does today.

Pine seeds were the most ubiquitous seed type, present in macrofloral samples from each of the units except Unit 104 (Table 5). Uncharred pine seed fragments were present in 42 of the total 83 macrofloral samples (51%) and charred pine seed fragments were noted in 12 samples (14%). Pine charcoal was noted in only four samples. The paucity of pine charcoal suggests that pine trees were not growing near the site. Pine seeds appear to have been important resources for the Native Americans living at the mission, who would have had to obtain the seeds from elsewhere, perhaps as part of a seasonal gathering strategy. The second most ubiquitous seed type was *Sambucus nigra*. A few uncharred seeds/seed fragments were noted in 36 samples representing all units except Unit 104. Black elderberry bushes might have been grown in the mission garden. These fruits appear to have been used in cooking and/or as medicine. Uncharred *Datura wrightii*-type seeds/seed fragments were noted in 25 samples from Units 145, 263, 258, and 291, suggesting the presence of sacred datura. These plants have showy flowers and might have been grown in the garden. Datura also was an important plant for Native American groups. Charred *Schinus molle* seeds were noted in 23 samples representing Units 145, 263, 258, and 291, indicating the presence of the introduced Peruvian pepper tree. These trees are noted to have been planted at Spanish missions as shade trees and for their dried fruits that were used as a seasoning similar to pepper. Tobacco seed fragments were found in a total of 21 samples, including at least one sample from all six units. Tobacco likely was grown at the mission. *Nicotiana* pollen was noted only in the control sample, indicating that tobacco is currently (or was recently) a member of the local vegetation community. A single charred *Medicago sativa* seed from Unit 258 suggests that alfalfa was grown.

Oats, wheat, possibly other cereals, and maize/corn also appear to have been grown at the mission. A charred oat (*Avena sativa*) caryopsis was present in Unit 291. Evidence for wheat includes charred *Triticum aestivum* caryopses in two samples from Unit 145 and charred caryopsis and rachilla fragments from three samples in Unit 104. Charred cereal-type caryopsis fragments not identified to genus were present in 12 samples for this project from Units 145, 258, and 291, while charred cereal-type rachis fragments were found in single samples from Units 258 and 291. Charred Poaceae A caryopsis fragments in 14 samples from Units 145, 263, 258, and 291 might also reflect economic cereal grains, although it also is possible that they represent native grasses with larger-sized caryopses. Pollen evidence for cereal grains was recovered in Feature 10 under the floor, from the milling stone recovered in Unit 143 (sample 05669), and from below the Feature 9 tile floor. Phytolith evidence for cereal grains was recovered in all of the phytolith samples examined. In particular, the presence of mostly broken dendriform phytoliths from the milling stone suggests that the grains might have been hulled and processed to a high degree before grinding. It also is possible that “whole grain” was ground, yielding a whole grain flour. This would indicate leaving bran attached to the grain when it was ground. Maize/corn is reflected by charred stem fragments in Unit 267; charred cupules in 12 samples from all units except Unit 267; an uncharred cupule from a single sample in Unit 145; charred kernels in samples from Units 104, 258, 267, and 291; maize pollen from beneath the tile floor in Feature 9 (sample 08400); and possible maize cob phytoliths in mano sample 05471 and mano/pestle sample 11714.

Other plants of economic importance represented by macrofloral remains include watermelon in one sample from Unit 258; fig seeds in one sample from Unit 104, one sample from Unit 263, and three samples from Unit 258; charred walnut shell in a single sample from Unit 258; charred shell from either walnut or hickory and charred pecan shell in a sample from Unit 291; and a charred sesame seed and charred and uncharred grape seed fragments in samples from Unit 104. This is an unusually small quantity of fig seeds suggesting that the mission did not import dried or canned figs regularly. Pollen representing squash/pumpkin was recovered from the tile floor fill in Feature 9. Cattail pollen was surprisingly abundant in the Feature 9 tile floor fill sample, suggesting the possibility that cattail heads, pollen, or fluff also was collected and stored in the granary. An elevated Brassicaceae pollen frequency was noted in sample 06028, collected beneath the tile floor in Feature 13, adjacent to a granary. It is possible that members of the mustard family grew in the immediate vicinity of this floor or that plants in the mustard family were grown as an agricultural crop and transported across this floor, possibly into the granary. Cheno-am pollen was elevated in this same sample and likely represents weedy plants growing in the vicinity.

Many of the pollen types and macrofloral remains in the San Gabriel Mission Archaeological Site samples represent plants that were known to have been important resources for Native groups in southern California, but also are typical weedy plants, especially in disturbed areas. These remains most likely represent components of the local vegetation, but these resources also might have been utilized by Native groups. These plants include goosefoot, amaranth, possibly other members of the Cheno-am group, members of the mustard family, clover, sage, grasses, redmaids, rush, manzanita, and hawthorn. The pollen and macrofloral records further suggest that a variety of members of the sunflower family, from plants such as ragweed to members of the chicory tribe, grew in abundance in the garden areas. Some of these plants, such as ragweed, would have been weeds, while others, such as chicory, might have been grown for their leaves, which could be used in salads, or their roots, which could be roasted and ground to make a beverage. Most likely, much of the High-spine Asteraceae pollen represents weedy members of the sunflower family unless members of this family were planted as ornamentals. Identified members of the Asteraceae present in the macrofloral samples include a member of the thistle tribe, ragweed, chamomile, sunflower, dandelion, crownbeard, and possibly cocklebur. Ragweed and cocklebur produce pollen that is included in the Low-spine Asteraceae category. Dandelion produces “Liguliflorae” pollen, and the remainder of these named members of the sunflower family produce High-spine Asteraceae pollen. A variety of other seed and pollen types were noted from plants that likely only represent local vegetation. Recovery of charred seeds from typically weedy plants might reflect burning weeds by the mission occupants.

The charcoal record was overwhelmingly dominated by oak, including members of the white oak group, live oak group, and red oak group (Figure 10), followed by willow and/or cottonwood. This reflects the local oak woodland community that contained willows and cottonwoods. Douglas-fir charcoal also was a common component of the charcoal record, found in small amounts in 42 (51%) of the samples examined. A total of 32 samples (38.5%) yielded buckthorn charcoal and California laurel charcoal was noted in 19 (23%) samples, suggesting that species of *Rhamnus* and *Umbellularia californica* also were fairly common in the local vegetation. Although a variety of other charcoal types were recovered for this project, they were present in fewer samples, many found in only one or two samples from the entire project. Other types of hardwoods include maple, California buckeye, rabbitbrush, California brittlebush, another woody member or members of the sunflower family, alder, birch, possibly another member of the birch family, cholla, probable ash, California sycamore, hawthorn, plum/cherry, rose, another member or members of the rose family, elderberry, Peruvian pepper tree, elm, and grape. Many of the hardwood charcoal fragments from this project were too small and/or vitrified for further identification.

Conifer charcoal not specified to genus was noted in 21 (25%) of the samples. Charcoal from identified conifers includes a few fragments of juniper charcoal in single samples from Units 104 and 258 and spruce charcoal in single samples from Units 124 and 263. A few pieces of pine charcoal were noted one sample from Unit 145, two samples from Unit 258, and a single sample from Unit 291. Small fragments of redwood charcoal were present in a total of eight samples from Units 263, 258, and 291.

Protein residue analysis using CIEP returned mixed results on the lithic, ground stone, and steatite artifacts submitted for analysis. Two Cottonwood series triangle projectile points from the Water Complex yielded negative results. A granitic mano/pestle from Unit 248 yielded positive results to both grasshopper and yucca antiserum, indicating that it was used to process grasshoppers and likely also was used at some point to pound and process yucca leaves for fiber. Protein residue analysis of ground stone sample 06787 and a chert biface (07951) recovered from Unit 189 yielded negative results to the antisera tested. A steatite bowl from Unit 268 tested positive to both bay anchovy and trout antisera, suggesting consumption of northern anchovy and rainbow trout. A metate fragment (sample 09211) recovered from Unit 291 yielded negative results to all antisera tested.

FTIR analysis yielded evidence suggestive of processing fats, possibly from marrow or fatty birds such as duck, as well as wetland tubers such as cattail in the basalt ground stone bowl represented by sample 06787. Organic residues recovered from an olla fragment (06785) yielded peaks typical of calcium oleate, suggesting cooking meat and bones together, and also evidence of cooking cattail and/or *Sagittaria* (wapato) tubers.

TABLES

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Feature No.	Unit	Stratum	Depth (cmbd)	Provenience/ Description	Analysis
07776				0-4 cmbs	Soil control from area to the west of the main excavations	Pollen
05792		104		60-70	Column through layers of rubble, burned soil, adobe melt, and a prominent ash lens in Water Complex in center of garden; north of the mill and immediately west of the millrace	Macrofloral
05987				70-75		Macrofloral
05986			I	75-81		Macrofloral
05983				81-90		Macrofloral
05948				90-100		Macrofloral
05793			II	100-110		Macrofloral
05949				110-120		Macrofloral
05985				120-127		Macrofloral
05984			III	127-132		Macrofloral
09748	10	STP 103 Unit 137		147-150	Fill from under plastered tile (ladrillo) floor in a water retention basin; Water Complex	Pollen
20811	11	145		68-78	Column through fill inside brick enclosure thought to be a reservoir in the Water Complex	Macrofloral
20779				78-88		Macrofloral
20798				88-98		Macrofloral
20812				98-108		Macrofloral
20793				108-118		Macrofloral
20771				118-123		Macrofloral
20782				123-133		Macrofloral
20788				133-143		Macrofloral
20768				143-152		Macrofloral
20777				152-158		Macrofloral
20789				158-167		Macrofloral
20772				167-177		Macrofloral
20769				177-187		Macrofloral
20787				187-190		Macrofloral
05669		143		140-150	Milling stone fragment from east of the millrace; Water Complex	Pollen Phytolith
05416		154		170-180	Cottonwood series triangle projectile point from east of the millrace in the Water Complex	Protein

TABLE 1 (Continued)

Sample No.	Feature No.	Unit	Stratum	Depth (cmbd)	Provenience/ Description	Analysis
04631		110		100-110	Cottonwood series triangle projectile point from west area of the Water Complex	Protein
20840		263		90-100	Column through interior of adobe building; Granary structure	Macrofloral
20763				100-110		Macrofloral
20832				110-120		Macrofloral
18595				120-130		Macrofloral
18605				130-134		Macrofloral
20806	5			134-139	Associated with the cobble west wall of the Granary	Macrofloral
20805				139-140		Macrofloral
20820				140-150		Macrofloral
20844				150-160		Macrofloral
20831				160-170		Macrofloral
18418				170-180		Macrofloral
20826				180-190		Macrofloral
18498				190-200		Macrofloral
20834				200-210		Macrofloral
20829				210-220		Macrofloral
20770				220-230		Macrofloral
18580				230-240		Macrofloral
18499				240-250		Macrofloral
20807		258		84-90	Column in adobe Granary structure; above refuse deposit	Macrofloral
20814				90-100		Macrofloral
21530	14			100-110	Column through refuse deposit in adobe Granary structure	Macrofloral
20082				110-120		Macrofloral
18597				120-130		Macrofloral
20778				130-140		Macrofloral
20815				140-150		Macrofloral
20804				150-160		Macrofloral
20822				160-170		Macrofloral
20818				170-180		Macrofloral
20085				180-190		Macrofloral
20855				190-200		Macrofloral

TABLE 1 (Continued)

Sample No.	Feature No.	Unit	Stratum	Depth (cmbd)	Provenience/ Description	Analysis
20854	14	258		200-210	Column through refuse deposit in adobe Granary structure	Macrofloral
20859				210-220		Macrofloral
20849				220-230		Macrofloral
20075				230-240		Macrofloral
20083				240-250		Macrofloral
20084				250-260		Macrofloral
18814				260-265		Macrofloral
20857				265-270	Column in adobe Granary structure; below refuse deposit	Macrofloral
18818				270-280		Macrofloral
18813				280-286		Macrofloral
18817				286-290		Macrofloral
20853				290-300		Macrofloral
20856				300-310		Macrofloral
05471		161		150-160	Mano inside southern portion of adobe Granary structure	Phytolith Starch
20835		267		90-100	Fill from unit just inside the northwest wall of the adobe Granary structure	Macrofloral
20852				106-110		Macrofloral
06028	13	164		130	Fill between the tiles of a large tile (ladrillo) floor adjacent to west wall (Feature 5) of Granary	Pollen
05691		165		133-134	Fill beneath one of the tiles in the large tile (ladrillo) floor	Pollen
15458		253		130-140	Steatite bowl fragment with exterior charred residue in unit just west of Feature 13	Phytolith Starch
02477	4				Brick (ladrillo) from area one meter north of Unit 263, outside the west wall of the Granary	Macrofloral Phytolith
08400	9	121, 247		123-126	Fill beneath Tile 3 in a small tile (ladrillo) floor adjacent to the east wall (Feature 3) of Granary	Pollen
08049		248		110-120	Granitic mano/pestle found ≈ 50 cm east of the southern most corner of the Feature 9 floor	Protein
08050					Soil control for 08049	Protein

TABLE 1 (Continued)

Sample No.	Feature No.	Unit	Stratum	Depth (cmbd)	Provenience/ Description	Analysis
06785		195		103-107	Native American olla fragment found east of the north-south cobble wall (Feature 3) forming the east wall of the Granary structure; north of Feature 9	FTIR
06787		189 east of Feat. 3, south of Feat. 9		180-190	Vesicular basalt ground stone bowl fragment	FTIR, Protein
06788					Soil control for 06787	Protein
11714				190-200	Burned granitic mano turned pestle	Phytolith Starch
07951				210-220	Chert biface (Franciscan?)	FTIR, Protein
07952					Soil control for 07951	Protein
11588		268		123-130	Steatite ground stone bowl fragment from unit in featureless area north of the train tracks	Protein
18155		291		39-50	Column from north wall of Unit 269; part of the North Midden Complex in featureless area north of the train tracks	Macrofloral
20863				50-60		Macrofloral
20862				60-70		Macrofloral
18170				70-80		Macrofloral
20089				80-90		Macrofloral
18819				90-100		Macrofloral
20861				100-110		Macrofloral
18812				110-120		Macrofloral
18609				120-125		Macrofloral
18583				125-130		Macrofloral
18690				130-137		Macrofloral
17821				137-140		Macrofloral
17812				140-150		Macrofloral
18150				150-160		Macrofloral
20093				160-170		Macrofloral
09211					Native American style metate fragment	Protein

FTIR = Fourier Transform Infrared Spectroscopy
Feat. = Feature

TABLE 2
POLLEN TYPES OBSERVED IN SAMPLES FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Scientific Name	Common Name
ARBOREAL POLLEN:	
Betulaceae:	Birch family
Alnus	Alder
Betula	Birch
Eucalyptus	Eucalyptus
Fagaceae:	Legume family
Castanea	Chestnut
Quercus	Oak
Juglandaceae:	Walnut family
Carya	Hickory, pecan
Juglans	Walnut
Liquidambar	Sweetgum
Pinus	Pine
Ulmus	Elm
NON-ARBOREAL POLLEN:	
Apiaceae	Umbel family
Asteraceae:	Sunflower family
Artemisia	Sagebrush
Low-spine	Includes ragweed, cocklebur, sumpweed
High-spine	Includes aster, rabbitbrush, snakeweed, sunflower, etc.
Liguliflorae	Chicory tribe, includes dandelion and chicory
Brassicaceae	Mustard or cabbage family
Caryophyllaceae	Pink family
Ceanothus	Ceanothus, California-lilac, Buckbrush, Deerbrush
Cheno-am	Includes the goosefoot family and amaranth
Corylaceae	Hazel family
Ephedra torreyana-type (includes *E. torreyana*, *E. trifurca*, and *E. antisyphilitica*)	Ephedra, Jointfir, Mormon tea

TABLE 2 (Continued)

Scientific Name	Common Name
Eriogonum	Wild buckwheat
Euphorbiaceae	Spurge family
Fabaceae	Bean or Legume family
Gerianiaceae:	Geranium family
Erodium	Storksbill, Heron-bill, Filaree
Geranium	Geranium, Cranesbill
Lamiaceae	Mint family
Malva neglecta	Common mallow, Cheeseweed
Nyctaginaceae	Four o'clock family
Onagraceae:	Evening primrose family
Oenothera	Evening primrose
Plantago	Plantain
Poaceae	Grass family
Polemoniaceae	Phlox family
Rhus	Sumac
Rosaceae:	Rose family
Adenostoma	Chamise
Heteromeles	Toyon
Sphaeralcea	Globemallow
Tribulus-type	Puncturevine
Typha angustifolia-type	Narrowleaf cattail
Typha latifolia-type	Broadleaf cattail
CULTIGENS:	
Cerealia	Economic members of the grass family including *Triticum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley), and *Secale cereale* (rye)
Cucurbita	Squash, Pumpkin, Gourd
Nicotiana	Tobacco
Zea mays	Maize, Corn
Indeterminate	Too badly deteriorated to identify

TABLE 2 (Continued)

Scientific Name	Common Name
SPORES:	
Trilete	Fern
OTHER:	
Microscopic charcoal	Microscopic charcoal fragments
Total pollen concentration	Quantity of pollen per cubic centimeter (cc) of sediment

TABLE 3
MACROFLORAL REMAINS FROM UNIT 104 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05792	Liters Floated						4.50 L
Unit 104	Light Fraction Weight						7.299 g
60-70	FLORAL REMAINS:						
cmbd	cf. Asteraceae	Seed	1				0.0001 g
	cf. Cyperaceae	Seed		1			< 0.0001 g
	Malvaceae	Seed	3	2			0.0019 g
	Parenchymous tissue ≥ 2 mm			3			0.0073 g
	Poaceae	Awn		2			< 0.0001 g
	Poaceae C	Caryopsis	1				0.0001 g
	Zea mays	Scutellum	1				0.0093 g
	Salicaceae ≥ 2 mm	Periderm		4			0.2143 g
	Vitis ≥ 0.5 mm	Seed	6	79			0.0555 g
	Vitrified tissue ≥ 2 mm			12			0.0647 g
	Vitrified tissue < 2 mm			X			Few
	Unidentified	Seed		2			0.0008 g
	Ficus carica	Seed			1		
	Dicot	Stem				1	
	Nicotiana	Seed			40	72	
	Solanaceae	Seed				X	Few
	Trifolium	Seed			1		
	Vitis	Seed				1	
	Unidentified ≥ 2 mm	Leaf				3	
	Unidentified < 2 mm	Leaf				X	Few
	Roots					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.3907 g
	Chrysothamnus	Charcoal		16			0.1029 g
	Pseudotsuga	Charcoal		2			0.0109 g
	Quercus - vitrified	Charcoal		6			0.1674 g
	Quercus - Leucobalanus group	Charcoal		8			0.2826 g
	Quercus - Live oak	Charcoal		3			0.0292 g
	Salicaceae	Charcoal		2			0.0185 g
	Populus	Charcoal		4			0.0995 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05792	NON-FLORAL REMAINS:						
Unit 104	Bone - calcined ≥ 2 mm			7			0.4095 g
60-70	Bone - calcined < 2 mm			X			Moderate
cmbd	Bone ≥ 2 mm					15	0.4074 g
	Bone < 2 mm					X	Moderate
	Vertebra ≥ 1 mm				1		0.0010 g
	Brick ≥ 20 mm					1	158.760 g
	Brick/Tile < 20 mm					X	Numerous
	Ceramic sherd ≥ 4 mm					3	54.400 g
	Ceramic sherd - rim ≥ 4 mm					1	68.800 g
	Coal					X	Few
	Coal clinker ≥ 2 mm					22	0.1404 g
	Insect	Chitin				X	Few
	Insect	Egg			X		Moderate
	Insect	Puparia				2	
	Mortar					X	Few
	Muscovite					X	Few
	Olivella bead					1	0.0224 g
	Rock					X	Numerous
	Snail shell ≥ 2 mm					3	0.0082 g
	Snail shell < 2 mm					X	Few
	Snail shell - oblong ≥ 0.5 mm					2	
	Termite fecal pellet		X	X			Numerous
	Termite fecal pellet				1		
05987	Liters Floated						2.70 L
Unit 104	Light Fraction Weight						0.847 g
70-75	FLORAL REMAINS:						
cmbd	Parenchymous tissue ≥ 1 mm			23			0.0352 g
	Salicaceae	Periderm		3			0.0598 g
	Amaranthus	Seed			1		
	Rootlets					X	Few

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05987	CHARCOAL/WOOD:						
Unit 104	Total charcoal ≥ 1 mm						0.2307 g
70-75 cmbd	*Platanus racemosa*	Charcoal		1			0.0011 g
	Pseudotsuga	Charcoal		1			0.0003 g
	Quercus	Charcoal		4			0.0029 g
	Salicaceae	Charcoal		30			0.0826 g
	Populus	Charcoal		2			0.0231 g
	Salix	Charcoal		1			0.0142 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0011 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			1			0.0352 g
	Bone - calcined < 2 mm			1			
	Bone ≥ 2 mm					1	0.0102 g
	Brick/Tile					X	Numerous
	Mortar					X	Few
	Ceramic sherd					1	28.269 g
	Muscovite					X	Few
	Rock					X	Moderate
	Snail shell ≥ 1 mm					5	0.0059 g
	Termite fecal pellet		X	X			Numerous
05986	Liters Floated						2.00 L
Unit 104	Light Fraction Weight						16.832 g
Stratum I	FLORAL REMAINS:						
75-81 cmbd	Malvaceae	Seed	1				0.0003 g
	Parenchymous tissue ≥ 2 mm			3			0.0136 g
	Parenchymous tissue < 2 mm			X			Moderate
	Salicaceae ≥ 2 mm	Periderm		189			4.4224 g
	Poaceae B	Floret	1				0.0002 g
	Vitis	Seed	1	13			0.0307 g
	Roots					X	Few

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05986	CHARCOAL/WOOD:						
Unit 104	Total charcoal ≥ 2 mm						2.4831 g
Stratum I	*Chrysothamnus*	Charcoal		1			0.0016 g
75-81	*Quercus - Leucobalanus* group	Charcoal		1			0.0020 g
cmbd	Salicaceae	Charcoal		27			0.1403 g
	Populus	Charcoal		2			0.0586 g
	Salix	Charcoal		9			0.3046 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			3			0.0705 g
	Bone - calcined < 2 mm			2			
	Bone ≥ 2 mm			2			0.0138 g
	Bone < 2 mm			7			
	Bone ≥ 2 mm					2	0.0312 g
	Bone < 2 mm					2	
	Brick/Tile					X	Moderate
	Eggshell					1	0.0050 g
	Insect	Chitin				1	
	Mortar					X	Few
	Muscovite					X	Few
	Rock					X	Few
	Small rodent fecal pellet				X		Few
	Termite fecal pellet		X	X			Numerous
05983	Liters Floated						4.60 L
Unit 104	Light Fraction Weight						8.378 g
Stratum I	FLORAL REMAINS:						
81-90	*Leersia oryzoides*-type	Caryopsis	1				0.0008 g
cmbd	Malvaceae	Mericarp	1				0.0006 g
	Malvaceae	Seed	1				0.0004 g
	Salicaceae ≥ 2 mm	Periderm		7			0.0787 g
	Triticum aestivum	Caryopsis	1	4			0.0235 g
	Vitis	Seed	1				0.0030 g
	Unidentified R	Seed	1				0.0001 g
	Rootlets					X	Few

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05983	CHARCOAL/WOOD:						
Unit 104	Total charcoal ≥ 2 mm						0.3049 g
Stratum I	Asteraceae	Charcoal		1			0.0049 g
81-90	*Juniperus*	Charcoal		3			0.0506 g
cmbd	*Quercus*	Charcoal		7			0.0591 g
	Quercus - vitrified	Charcoal		4			0.0222 g
	Quercus - *Erythrobalanus* group	Charcoal		3			0.0157 g
	Quercus - Leucobalanus group	Charcoal		2			0.0290 g
	Salicaceae	Charcoal		6			0.0225 g
	Populus	Charcoal		1			0.0031 g
	Salix	Charcoal		5			0.0329 g
	Umbellularia californica	Charcoal		4			0.0285 g
	Umbellularia californica - vitrified	Charcoal		2			0.0129 g
	Unidentified hardwood	Charcoal		1			0.0045 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0024 g
	NON-FLORAL REMAINS:						
	Bone calcined ≥ 2 mm			1			0.0147 g
	Bone ≥ 2 mm				1	15	1.5660 g
	Bone < 2 mm					X	Few
	Bone ≥ 2 mm					6 ic, pc	1.8110 g
	Brick/Tile					X	Moderate
	Ceramic sherd					1	6.167 g
	Eggshell ≥ 1 mm					2	0.0065 g
	Mortar					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Small rodent fecal pellet				X		Few
	Snail shell ≥ 1 mm					1	0.0019 g
	Termite fecal pellet		X	X			Moderate

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05948	Liters Floated						4.00 L
Unit 104	Light Fraction Weight						11.543 g
Stratum I	FLORAL REMAINS:						
90-100	Salicaceae ≥ 2 mm	Periderm		35			0.3040 g
cmbd	Vitrified tissue ≥ 2 mm			2			0.0057 g
	Zea mays	Kernel		1			0.0053 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.4197 g
	Crataegus	Charcoal		1			0.0106 g
	Quercus	Charcoal		5			0.1216 g
	Quercus - vitrified	Charcoal		2			0.0437 g
	Quercus - *Erythrobalanus* group	Charcoal		10			0.1489 g
	Quercus - *Erythrobalanus* group twig	Charcoal		1			0.0454 g
	Quercus - *Leucobalanus* group	Charcoal		3			0.1136 g
	Salicaceae	Charcoal		5			0.0333 g
	Populus	Charcoal		9			0.0912 g
	Salix	Charcoal		1			0.0323 g
	Umbellularia californica	Charcoal		2			0.0248 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0053 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			7			0.2580 g
	Bone - calcined < 2 mm			X			Few
	Bone ≥ 2 mm			1			0.0100 g
	Bone ≥ 2 mm					22	1.6259 g
	Bone < 2 mm					X	Moderate
	Bone ≥ 2 mm					2 ic, pc	0.7919 g
	Brick/Tile					X	Moderate
	Ceramic sherd					4	11.970 g
	Eggshell ≥ 2 mm					1	0.0039 g
	Eggshell < 2 mm					4	
	Mortar					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Moderate

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05948	NON-FLORAL REMAINS (Continued):						
Unit 104	Shell ≥ 2 mm					2	0.0111 g
90-100	Snail shell ≥ 1 mm					1	0.0025 g
cmbd	Small rodent fecal pellet				X	X	Moderate
	Termite fecal pellet		X	X			Moderate
05793	Liters Floated						3.00 L
Unit 104	Light Fraction Weight						11.743 g
Stratum	FLORAL REMAINS:						
II	Malvaceae	Seed	1				0.0006 g
100-110	Periderm ≥ 2 mm			2			0.0968 g
cmbd	*Vitis*	Seed	1	8			0.0227 g
	Zea mays	Kernel		2			0.0081 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						3.5962 g
	Chrysothamnus	Charcoal		1			0.0159 g
	Platanus racemosa	Charcoal		2			0.0083 g
	Quercus - vitrified	Charcoal		1			0.1363 g
	Quercus - *Erythrobalanus* group	Charcoal		10			0.3842 g
	Quercus - *Leucobalanus* group	Charcoal		2			0.0251 g
	Quercus - Live oak	Charcoal		1			0.0026 g
	Rhamnus	Charcoal		2			0.1175 g
	Salicaceae	Charcoal		3			0.0209 g
	Populus	Charcoal		9			0.3359 g
	Salix	Charcoal		7			0.2454 g
	Unidentified hardwood	Charcoal		2			0.0121 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			15			0.8617 g
	Bone - calcined < 2 mm			X			Moderate
	Bone ≥ 2 mm			6			0.1066 g
	Bone < 2 mm			X			Few
	Bone ≥ 2 mm					19	2.3343 g
	Bone < 2 mm					X	Few
	Vertebra ≥ 2 mm				1		0.0033 g
	Bone ≥ 2 mm					6 ic, pc	0.3186 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05793	NON-FLORAL REMAINS:						
Unit 104	Brick/Tile					X	Few
Stratum	Ceramic sherd					1	1.8600 g
II	Eggshell ≥ 1 mm					1	0.0007 g
100-110	Insect	Chitin		1			0.0065 g
cmbd	Insect	Chitin				X	Few
	Mortar					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Small rodent fecal pellet				X	X	Moderate
	Snail shell ≥ 2 mm					2	0.0027 g
	Termite fecal pellet		X	X			Moderate
05949	Liters Floated						4.00 L
Unit 104	Light Fraction Weight						7.041 g
Stratum	FLORAL REMAINS:						
II	Parenchymous tissue ≥ 2 mm			1			0.0007 g
110-120	Periderm ≥ 2 mm			5			0.0287 g
cmbd	*Triticum aestivum*	Rachilla		2			0.0039 g
	Triticum aestivum	Caryopsis		3			0.0104 g
	Vitis	Seed		3			0.0097 g
	Vitrified tissue ≥ 2 mm			4			0.0191 g
	Unidentified	Seed		1			0.0002 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.8065 g
	Quercus	Charcoal		4			0.0513 g
	Quercus - Erythrobalanus group	Charcoal		16			0.6733 g
	Quercus - Leucobalanus group	Charcoal		2			0.0509 g
	Quercus - Live oak	Charcoal		2			0.0178 g
	Rhamnus	Charcoal		1			0.0039 g
	Salicaceae	Charcoal		7			0.0470 g
	Populus	Charcoal		5			0.1049 g
	Salix	Charcoal		1			0.0125 g
	Umbellularia californica	Charcoal		1			0.1110 g
	Vitis	Charcoal		1			0.0024 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05949	NON-FLORAL REMAINS:						
Unit 104	Bone - calcined ≥ 2 mm			20			1.4246 g
Stratum	Bone - calcined < 2 mm			X			Moderate
II	Bone ≥ 2 mm			10			0.9692 g
110-120	Bone < 2 mm			X			Few
cmbd	Bone ≥ 2 mm					31	4.0584 g
	Bone < 2 mm					X	Moderate
	Bone ≥ 2 mm					5 ic, pc	0.3584 g
	Brick/Tile					X	Few
	Ceramic sherd					4	40.026 g
	Ceramic sherd with cf. *Umbellularia californica* impression					1	21.608 g
	Eggshell ≥ 1 mm					1	0.0009 g
	Mortar					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Shell ≥ 1 mm					4	0.0015 g
	Termite fecal pellet		X	X			Few
05985	Liters Floated						4.00 L
Unit 104	Light Fraction Weight						9.868 g
Stratum	FLORAL REMAINS:						
II	*Bromus*-type	Caryopsis		1			0.0012 g
120-127	Malvaceae	Seed	3				0.0009 g
cmbd	Salicaceae ≥ 2 mm	Periderm		5			0.0240 g
	Sesamum	Seed	1				0.0007 g
	Triticum aestivum	Rachilla		2			0.0005 g
	Triticum aestivum	Caryopsis		1			0.0039 g
	Vitis	Seed	5	23			0.0701 g
	Zea mays	Cupule		1			0.0030 g
	Zea mays	Kernel		6			0.0351 g
	Nicotiana	Seed			37	46	
	Solanaceae	Seed				13	< 0.0001 g
	Roots					X	Few
	Rootlets					X	Few

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05985	CHARCOAL/WOOD:						
Unit 104	Total charcoal ≥ 2 mm						1.7883 g
Stratum	Asteraceae	Charcoal		4			0.0419 g
II	*Cylindropuntia*	Charcoal		2			0.0065 g
120-127	*Pseudotsuga*	Charcoal		3			0.0249 g
cmbd	*Quercus*	Charcoal		1			0.0095 g
	Quercus - Erythrobalanus group	Charcoal		11			0.3861 g
	Quercus - Leucobalanus group	Charcoal		1			0.0047 g
	Rhamnus	Charcoal		1			0.0220 g
	Salicaceae	Charcoal		8			0.0749 g
	Salicaceae - knot	Charcoal		1			0.0844 g
	Populus	Charcoal		4			0.0566 g
	Salix	Charcoal		3			0.0739 g
	Umbellularia californica	Charcoal		1			0.0185 g
	Total wood ≥ 2 mm						2.0298 g
	Pseudotsuga	Wood				3	2.0298 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			18			2.8521 g
	Bone - calcined < 2 mm			X			Few
	Bone ≥ 2 mm			5			1.2255 g
	Bone ≥ 2 mm				1	17	3.2634 g
	Bone < 2 mm					X	Few
	Tooth ≥ 2 mm					1	0.0857 g
	Bone ≥ 2 mm					1 ic, pc	0.0172 g
	Brick/Tile					X	Few
	Ceramic sherd					2	81.040 g
	Coal					X	Few
	Eggshell ≥ 1 mm					1	0.0023 g
	Glass - clear ≥ 2 mm					1	0.0167 g
	Glass - green ≥ 2 mm					1	0.5058 g
	Insect	Chitin				X	Few
	Insect	Egg			X	X	Moderate
	Mortar					X	Moderate
	Muscovite					X	Few
	Ostracod					3	< 0.0001 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
05985	NON-FLORAL REMAINS (Continued):						
Unit 104	Rock/Gravel					X	Few
120-127	Shell ≥ 1 mm					1	< 0.0001 g
cmbd	*Olivella* bead				1		0.0703 g
	Small rodent fecal pellet				X	X	Moderate
	Termite fecal pellet		X	X			Moderate
05984	Liters Floated						0.70 L
Unit 104	Light Fraction Weight						0.457 g
Stratum	FLORAL REMAINS:						
III	Vitrified tissue ≥ 1 mm			1			0.0004 g
127-132	*Zea mays*	Kernel		3			0.0016 g
cmbd	Unidentified - vitrified	Seed		1			0.0007 g
	Roots					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0443 g
	Pseudotsuga	Charcoal		1			0.0002 g
	Quercus	Charcoal		8			0.0221 g
	Rhamnus	Charcoal		9			0.0132 g
	Salicaceae	Charcoal		8			0.0078 g
	Umbellularia californica	Charcoal		1			0.0010 g
	Total wood ≥ 1 mm						0.0004 g
	Pseudotsuga	Wood				1	0.0004 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			1			0.0068 g
	Bone ≥ 2 mm					2	0.1839 g
	Bone < 2 mm					X	Few
	Brick/Tile					X	Few
	Fish scale - ctenoid ≥ 2 mm					1	0.0021 g
	Mortar					X	Moderate
	Muscovite					X	Few
	Ostracod					X	Few
	Rock/Gravel					X	Few
	Small rodent fecal pellet				1	4	
	Termite fecal pellet		X	X			Few

W = Whole F = Fragment L = Liter g = grams mm = millimeters
pc = partially charred ic = incompletely charred X = Presence noted in sample

TABLE 4
INDEX OF MACROFLORAL REMAINS RECOVERED FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Scientific Name	Common Name
FLORAL REMAINS:	
Apiaceae	Parsley family
Arctostaphylos	Manzanita, Bearberry, Kinnikinnick
Asteraceae	Sunflower family
Ambrosia	Ragweed
Anthemis	Chamomile
Cynareae	Thistles
Helianthus	Sunflower
Taraxacum	Dandelion
Verbesina	Crownbeard, Cowpen daisy
Xanthium-type	Similar to Cocklebur
Betula	Birch
Brassicaceae	Mustard family
Brassica	Mustard
Descurainia	Tansy mustard, Flixweed
Bud	A swelling on a plant stem consisting of overlapping immature leaves or petals
Caryophyllaceae	Pink family
Silene	Catchfly, Campion, silene
Stellaria	Starwort
Chamaesyce (syn. *Euphorbia*)	Sandmat
Cheno-am	Includes Goosefoot and Amaranth families
Amaranthus	Pigweed, Amaranth
Chenopodium	Goosefoot, Pigweed
Chenopodium berlandieri-type	Similar to Pitseed goosefoot with honeycomb-pitted seeds
Citrullus lanatus (Citrullus vulgaris)	Watermelon
Conifer	Cone-bearing, gymnospermous trees and shrubs, mostly evergreens, including the pine, spruce, fir, juniper, cedar, yew, hemlock, redwood, and cypress
Juniperus	Juniper
Pinus	Pine
Crataegus	Hawthorn
Cyperaceae	Sedge family

TABLE 4 (Continued)

Scientific Name	Common Name
Carex	Sedge
Dicot	A member of the Dicotyledonae class of Angiosperms
Erodium	Storksbill, Filaree
Fabaceae	Bean family
Medicago sativa	Alfalfa
Trifolium	Clover
Ficus carica	Common fig
Fruit	The structure of a plant that contains its seeds, derived from one or more ovaries, including dry fruits such as pod, samara, silique, capsule, cone, etc.
Juglandaceae	Walnut family
Carya illinoinensis (syn. *Carya illinoensis*)	Pecan
Juglans	Walnut
Juncus	Rush
Lamiaceae	Mint family
Salvia	Sage
Malvaceae	Mallow family
Malva	Mallow, Cheeseweed
Monocot	A member of the Monocotyledonae class of Angiosperms, which include grasses, sedges, lilies, and palms
Opuntia	Prickly pear cactus, Cholla
Oxalis	Wood sorrel
Periderm	Technical term for bark; Consists of the cork (phellum) which is produced by the cork cambium, as well as any epidermis, cortex, and primary or secondary phloem exterior to the cork cambium
Phacelia	Phacelia
Poaceae	Grass family
Poaceae A	Members of the grass family with larger-sized caryopses, including native grasses such as *Agropyron* (wheatgrass), *Elymus* (ryegrass), *Bromus* (brome grass), etc., as well as economic grasses including *Triticum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley), *Secale cereale* (rye), etc.
Poaceae B	Members of the grass family with medium-sized caryopses, such as *Festuca* (fescue), *Hordeum* (wild barley), *Stipa* (needlegrass), etc.

TABLE 4 (Continued)

Scientific Name	Common Name
Poaceae C	Members of the grass family with small caryopses, such as *Agrostis* (bentgrass), *Muhlenbergia* (muhly grass), *Poa* (bluegrass), etc.
Cereal-type	Economic members of the grass family including *Triticum* (Wheat), *Avena sativa* (Oat), *Hordeum vulgare* (Barley), *Oryza sativa* (Rice), and *Secale cereale* (Rye)
Avena sativa	Common oat
Triticum aestivum	Common wheat
Bromus-type	Grass with larger-sized florets, similar to brome grass
Leersia oryzoides-type	Similar to Rice cutgrass
Zea mays	Maize, Corn
Polygonaceae	Knotweed family
Polygonum	Smartweed; Knotweed
Polygonum - triangular	Smartweed; Knotweed (seeds are triangular in cross-section)
Rumex	Dock
Portulacaceae	Purslane family
Calandrinia	Calandrinia, Red maids
Portulaca	Purslane
Quercus	Oak
Rhizome	Shallow, horizontal, underground root runners that can produce new plantlets some distance away from the mother plant
Salicaceae	Willow family
Sambucus nigra	Black elderberry
Schinus molle	Peruvian peppertree
Scrophulariaceae	Figwort or Snapdragon family
Scrophulariaceae-type	similar to Figwort or Snapdragon family
Sesamum	Sesame
Solanaceae	Nightshade family
Datura	Datura, Jimsonweed, Thorn-apple
Datura wrightii-type	similar to Sacred datura, Sacred thorn-apple, Toloache
Nicotiana	Tobacco

TABLE 4 (Continued)

Scientific Name	Common Name
Physalis	Groundcherry, Tomatillo
Solanum	Nightshade
Solanum douglasii-type	Similar to greenspot nightshade
Tribulus terrestris	Puncturevine
Vitis	Grape
Zannichellia palustris	Horned pondweed
Parenchymous tissue	Relatively undifferentiated tissue composed of many similar cells with thin primary walls–occurs in different plant organs in varying amounts, especially large fleshy organs such as roots and stems, but also fruits, seeds, cones, periderm (bark), leaves, needles, etc.
PET fruity tissue	Fruity epitheloid tissues; resemble sugar-laden fruit or berry tissue without the seeds, or succulent plant tissue such as cactus pads
Vitrified tissue	Charred material with a shiny, glassy appearance due to fusion by heat
Sclerotia	Resting structures of mycorrhizae fungi
CHARCOAL/WOOD:	
Acer	Maple, Box elder
Aesculus californica	California buckeye
Asteraceae	Sunflower family
Chrysothamnus	Rabbitbrush
Encelia californica	California brittlebush, Encelia, Coast sunflower
Betulaceae	Birch family
Alnus	Alder
Betula	Birch
Conifer	Cone-bearing, gymnospermous trees and shrubs, mostly evergreens, including the pine, spruce, fir, juniper, cedar, yew, hemlock, redwood, and cypress
Juniperus	Juniper
Picea	Spruce
Pinus	Pine
Pseudotsuga	Douglas-fir
Sequoia sempervirens	Redwood

TABLE 4 (Continued)

Scientific Name	Common Name
Cylindropuntia (syn. *Opuntia*)	Cholla
Fraxinus	Ash
Platanus racemosa	California sycamore
Quercus	Oak
Quercus - Erythrobalanus group	Red oak group - Species in the red oak group exhibit open earlywood vessels and thick-walled, round latewood vessels
Quercus - *Leucobalanus* group	White oak group - Species in the white oak group exhibit earlywood vessels occluded with tyloses, thin-walled and angular latewood vessels, and longer rays than species in the red oak group
Quercus - Live oak	Oaks with evergreen leaves that remain green and "live" throughout winter
Rhamnaceae	Buckthorn family
Rhamnus	Buckthorn
Rosaceae	Rose family
Crataegus	Hawthorn
Prunus	Cherry, Plum
Rosa	Rose, Wild rose
Salicaceae	Willow family
Populus	Aspen, Cottonwood
Salix	Willow
Sambucus	Elderberry
Schinus molle	Peruvian peppertree
Ulmus	Elm
Umbellularia californica	California laurel, California bay, Pepperwood
Vitis	Grape
Unidentified hardwood	Wood from a broad-leaved flowering tree or shrub
Unidentified hardwood - small	Wood from a broad-leaved flowering tree or shrub, fragments too small for further identification
Unidentified hardwood - vitrified	Wood from a broad-leaved flowering tree or shrub, exhibiting a shiny, glassy appearance due to fusion by heat

TABLE 4 (Continued)

Scientific Name	Common Name
Unidentified hardwood - central pith	Central pith of small, woody twigs from a broad-leaved flowering tree or shrub; consists mainly of parenchyma with no diagnostic elements
Unidentifiable - vitrified	Charcoal exhibiting a shiny, glassy appearance due to fusion by heat
NON-FLORAL REMAINS:	
Asphaltum	A brown or black, tar-like (bituminous) substance found in natural beds from oil seeps
Chitin	A natural polymer found in insect and crustacean exoskeleton
Clinker	The incombustible residue, fused into an irregular lump, that remains after the combustion of coal
Daub	Clay with plant stem impressions
Fish scale - ctenoid	Fish scales with tiny teeth called *ctenii* on the posterior edge that give them a rough texture; usually found on fish with spiny fin rays, such as perch, bass, crappie, etc.
Insect puparium	A rigid outer shell made from tough material that includes chitin (a natural polymer found in insect exoskeleton and crab shells) and hardens from a larva's skin to protect the pupa as it develops into an adult insect
Muscovite	The most common mica, found in granites, pegmatites, gneisses and schists, with a layered structure of aluminum silicate sheets weakly bonded together by layers of potassium ions
Olivella	Purple olive, a marine shell
Ostracod	Small, bivalved crustaceans widely distributed in fresh and saline water, normally under well oxygenated conditions in lakes, ponds, springs, and streams
Snail shell - oblong	Snail shell with an oblong shape where the height is much bigger than the width
Termite fecal pellet	Fecal pellets from wood-dwelling termites that are small, hard, oblong-shaped, and exhibiting six surfaces

TABLE 5
SUMMARY OF MACROFLORAL REMAINS RECOVERED FROM THE MISSION SAN GABRIEL GARDEN COMPLEX,
SITE CA-LAN-184H, CALIFORNIA

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)
FLORAL REMAINS:							
Apiaceae seed, uncharred	3 (4%)						3 (20%)
Arctostaphylos seed, charred	1 (1%)			1 (5.5%)			
Asteraceae seed, charred	2 (2%)				1 (4%)		1 (7%)
cf. Asteraceae seed, charred	1 (1%)	1 (11%)					
Asteraceae, Cynareae seed, charred	2 (2%)				2 (8%)		
Ambrosia seed, uncharred	1 (1%)				1 (4%)		
Ambrosia seed, charred	1 (1%)				1 (4%)		
Anthemis seed, charred	1 (1%)				1 (4%)		
Helianthus seed, uncharred	1 (1%)				1 (4%)		
Helianthus seed, charred	1 (1%)			1 (5.5%)			
Taraxacum seed, uncharred	1 (1%)			1 (5.5%)			
Verbesina seed, uncharred	1 (1%)						1 (7%)
Xanthium-type fruit, charred	3 (4%)			1 (5.5%)	2 (8%)		
Betula seed, uncharred	1 (1%)			1 (5.5%)			
Brassicaceae seed, uncharred	1 (1%)						1 (7%)
Brassicaceae seed, charred	1 (1%)		1 (7%)				

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
cf. Brassicaceae endosperm, charred	1 (1%)						1 (7%)
Brassica seed, charred	1 (1%)				1 (4%)		
Descurainia seed, uncharred	2 (2%)				2 (8%)		
Caryophyllaceae seed, uncharred	1 (1%)				1 (4%)		
Silene seed, uncharred	1 (1%)				1 (4%)		
Stellaria seed, uncharred	5 (6%)			1 (5.5%)	4 (16%)		
Chamaesyce fruit, uncharred	1 (1%)						1 (7%)
Chamaesyce seed, uncharred	3 (4%)				2 (8%)		1 (7%)
Chamaesyce seed, charred	1 (1%)			1 (5.5%)			
Cheno-am seed, uncharred	1 (1%)				1 (4%)		
Cheno-am seed, charred	2 (2%)		1 (7%)	1 (5.5%)			
Cheno-am perisperm, uncharred	13 (16%)			1 (5.5%)	11 (44%)		1 (7%)
Cheno-am perisperm, charred	13 (16%)			2 (11%)	9 (36%)		2 (13%)
Amaranthus seed, uncharred	10 (12%)	1 (11%)		3 (17%)	4 (16%)		2 (13%)
Amaranthus seed, charred	5 (6%)				4 (16%)		1 (7%)
Chenopodium seed, uncharred	18 (22%)		1 (7%)	2 (11%)	11 (44%)		4 (27%)
Chenopodium seed, charred	16 (19%)			3 (17%)	8 (32%)		5 (33%)
Chenopodium berlandieri-type seed, uncharred	7 (8%)			1 (5.5%)	6 (24%)		
Chenopodium berlandieri-type seed, charred	8 (10%)				5 (20%)	1 (50%)	2 (13%)
Citrullus lanatus seed, charred	1 (1%)				1 (4%)		

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
cf. Conifer cone scale, charred	1 (1%)				1 (4%)		
Juniperus leaf, uncharred	1 (1%)				1 (4%)		
Pinus seed, uncharred	42 (51%)		6 (43%)	6 (33%)	17 (68%)	2 (100%)	11 (73%)
Pinus seed, charred	12 (14%)			2 (11%)	4 (16%)		6 (40%)
Crataegus seed, charred	3 (4%)		1 (7%)		1 (4%)		1 (7%)
Cyperaceae seed, charred	1 (1%)						1 (7%)
cf. Cyperaceae seed, charred	1 (1%)	1 (11%)					
Carex seed, charred	1 (1%)		1 (7%)				
Dicot stem, uncharred	1 (1%)	1 (11%)					
Erodium awn, uncharred	1 (1%)				1 (4%)		
Erodium awn, charred	18 (22%)		1 (7%)	1 (5.5%)	9 (36%)		7 (47%)
Erodium seed, uncharred	2 (2%)			1 (5.5%)	1 (4%)		
Erodium seed, charred	13 (16%)		1 (7%)		4 (16%)		8 (53%)
Fabaceae endosperm, charred	1 (1%)		1 (7%)				
cf. Fabaceae endosperm, charred	2 (2%)				1 (4%)		1 (7%)
Medicago sativa seed, charred	1 (1%)				1 (4%)		
Trifolium seed, uncharred	8 (10%)	1 (11%)		1 (5.5%)	3 (12%)		3 (20%)
Trifolium seed, charred	2 (2%)						2 (13%)
Ficus carica seed, uncharred	5 (6%)	1 (11%)		1 (5.5%)	3 (12%)		

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Juglandaceae nutshell, charred	1 (1%)						1 (7%)
Carya illinoinensis nutshell, charred	2 (2%)		1 (7%)				1 (7%)
Juglans nutshell, charred	1 (1%)				1 (4%)		
Juncus seed, uncharred	1 (1%)				1 (4%)		
Lamiaceae seed, charred	1 (1%)				1 (4%)		
Salvia seed, uncharred	1 (1%)				1 (4%)		
Salvia seed, charred	6 (7%)				4 (16%)		2 (13%)
cf. *Salvia* seed, charred	2 (2%)				2 (8%)		
cf. *Salvia* endosperm, charred	1 (1%)						1 (7%)
Malvaceae fruit, charred	10 (12%)	1 (11%)	1 (7%)		6 (24%)		2 (13%)
Malvaceae seed, uncharred	2 (2%)		1 (7%)				1 (7%)
Malvaceae seed, charred	22 (26.5%)	4 (44%)	2 (14%)	1 (5.5%)	8 (32%)	1 (50%)	6 (40%)
Malva fruit, uncharred	1 (1%)						1 (7%)
Malva seed, uncharred	24 (29%)		2 (14%)	6 (33%)	11 (44%)		5 (33%)
Malva seed, charred	7 (8%)	1 (11%)	1 (7%)	1 (5.5%)	4 (16%)		
Monocot stem, charred	7 (8%)			2 (11%)			5 (33%)
Opuntia seed, charred	3 (4%)				2 (8%)	1 (50%)	
Oxalis seed, uncharred	3 (4%)				3 (12%)		
Oxalis seed, charred	1 (1%)						1 (7%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Periderm, charred	10 (12%)	2 (22%)	1 (7%)	4 (22%)	3 (12%)		
Salicaceae periderm, charred	6 (7%)	6 (67%)					
Phacelia seed, charred	1 (1%)				1 (4%)		
Poaceae stem, uncharred	1 (1%)		1 (7%)				
Poaceae stem, charred - vitrified	1 (1%)		1 (7%)				
cf. Poaceae stem, charred	1 (1%)						1 (7%)
Poaceae leaf/stem, uncharred	4 (5%)			4 (22%)			
Poaceae awn, uncharred	1 (1%)			1 (5.5%)			
Poaceae awn, charred	8 (10%)				4 (16%)		4 (27%)
Poaceae/*Erodium* awn, charred	1 (1%)				1 (4%)		
Poaceae rachis, uncharred	1 (1%)				1 (4%)		
Poaceae rachis, charred	3 (4%)				3 (12%)		
Poaceae floret uncharred	2 (2%)				2 (8%)		
Poaceae caryopsis, charred	4 (5%)			2 (11%)	1 (4%)		1 (7%)
cf. Poaceae caryopsis, charred	1 (1%)				1 (4%)		
Poaceae A caryopsis, uncharred	1 (1%)				1 (4%)		
Poaceae A caryopsis, charred	14 (17%)		2 (14%)	1 (5.5%)	5 (20%)		6 (40%)
Poaceae B floret, charred	1 (1%)	1 (11%)					
Poaceae B caryopsis, uncharred	1 (1%)			1 (5.5%)			
Poaceae B caryopsis, charred	3 (4%)				2 (8%)		1 (7%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Poaceae C caryopsis, charred	4 (5%)	1 (11%)		1 (5.5%)	1 (4%)		1 (7%)
Poaceae scutellum, charred	2 (2%)				2 (8%)		
Cereal-type rachis, charred	2 (2%)				1 (4%)		1 (7%)
Cereal-type caryopsis, charred	12 (14%)		1 (7%)		3 (12%)		8 (53%)
Avena sativa caryopsis, charred	1 (1%)						1 (7%)
Triticum aestivum rachilla, charred	2 (2%)	2 (22%)					
Triticum aestivum caryopsis, charred	5 (6%)	3 (33%)	2 (14%)				
Bromus-type caryopsis, charred	1 (1%)	1 (11%)					
Leersia oryzoides-type caryopsis, charred	1 (1%)	1 (11%)					
Zea mays stem, charred	1 (1%)					1 (50%)	
Zea mays cupule, uncharred	1 (1%)		1 (7%)				
Zea mays cupule, charred	12 (14%)	1 (11%)	1 (7%)	5 (28%)	3 (12%)		2 (13%)
Zea mays kernel, charred	10 (12%)	4 (44%)			2 (8%)	1 (50%)	3 (20%)
Zea mays scutellum, charred	1 (1%)	1 (11%)					
Polygonaceae seed, charred	1 (1%)				1 (4%)		
Polygonum seed, charred	1 (1%)				1 (4%)		
Polygonum - triangular seed, uncharred	1 (1%)				1 (4%)		
Polygonum/Rumex seed, charred	1 (1%)				1 (4%)		
Rumex seed, charred	2 (2%)				2 (8%)		

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Portulacaceae seed, uncharred	1 (1%)						1 (7%)
Calandrinia seed, uncharred	9 (11%)			4 (22%)	3 (12%)		2 (13%)
Calandrinia seed, charred	7 (8%)			2 (11%)	4 (16%)		1 (7%)
Portulaca seed, uncharred	8 (10%)				6 (24%)		2 (13%)
Portulaca seed, charred	1 (1%)				1 (4%)		
Quercus acorn shell, charred	1 (1%)						1 (7%)
Rhizome, charred - vitrified	1 (1%)		1 (7%)				
Sambucus nigra seed, uncharred	36 (43%)		5 (36%)	8 (44%)	13 (52%)	1 (50%)	9 (60%)
Sambucus nigra seed, charred	1 (1%)				1 (4%)		
Schinus molle seed, charred	23 (28%)		1 (7%)	6 (33%)	9 (36%)		7 (47%)
Scrophulariaceae seed, uncharred	1 (1%)		1 (7%)				
Scrophulariaceae-type seed, uncharred	2 (2%)						2 (13%)
Sesamum seed, charred	1 (1%)	1 (11%)					
Solanaceae seed, uncharred	8 (10%)	2 (22%)			4 (16%)		2 (13%)
Datura seed, uncharred	5 (6%)		2 (14%)		1 (4%)	1 (50%)	1 (7%)
Datura seed, charred	1 (1%)				1 (4%)		
Datura endosperm, charred	1 (1%)					1 (50%)	
Datura wrightii-type seed, uncharred	25 (30%)		2 (14%)	7 (39%)	10 (40%)		6 (40%)
Datura wrightii-type seed, charred	5 (6%)				4 (16%)		1 (7%)
Nicotiana seed, uncharred	21 (25%)	2 (22%)	1 (7%)	1 (5.5%)	6 (24%)	2 (100%)	9 (60%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Physalis seed, uncharred	1 (1%)				1 (4%)		
Physalis/Solanum seed, uncharred	7 (8%)		1 (7%)		6 (24%)		
Solanum seed, uncharred	4 (5%)			2 (11%)	1 (4%)		1 (7%)
Solanum seed, charred	1 (1%)				1 (4%)		
Solanum douglasii-type seed, charred	11 (13%)				9 (36%)		2 (13%)
Tribulus terrestris seed, uncharred	8 (10%)			4 (22%)	3 (12%)		1 (7%)
Vitis seed, uncharred	1 (1%)	1 (11%)					
Vitis seed, charred	6 (7%)	6 (67%)					
cf. *Zannichellia palustris* seed, charred	1 (1%)				1 (4%)		
Bud, charred	1 (1%)				1 (4%)		
Leaf bud, uncharred	2 (2%)						2 (13%)
Parenchymous tissue, charred	22 (26.5%)	4 (44%)	3 (21%)	5 (28%)	5 (20%)	1 (50%)	4 (27%)
PET fruity tissue, charred	2 (2%)				2 (8%)		
Spine, charred	1 (1%)				1 (4%)		
Thorn, charred	4 (5%)				4 (16%)		
Vitrified tissue, charred	23 (28%)	4 (44%)	2 (14%)	4 (22%)	9 (36%)	1 (50%)	3 (20%)
Sclerotia	1 (1%)				1 (4%)		
CHARCOAL:							
Acer	4 (5%)		2 (14%)	1 (5.5%)	1 (4%)		
Aesculus californica	1 (1%)						1 (7%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Asteraceae	12 (14%)	2 (22%)	1 (7%)	2 (11%)	5 (20%)		2 (13%)
Chrysothamnus	4 (5%)	3 (33%)			1 (4%)		
Encelia californica	3 (4%)			1 (5.5%)	2 (8%)		
Betulaceae	2 (2%)				1 (4%)	1 (50%)	
Alnus	1 (1%)		1 (7%)				
Betula	3 (4%)		2 (14%)			1 (50%)	
Conifer	21 (25%)		3 (21%)	5 (28%)	5 (20%)		8 (53%)
Juniperus	2 (2%)	1 (11%)			1 (4%)		
Picea	2 (2%)		1 (7%)	1 (5.5%)			
Pinus	4 (5%)		1 (7%)		2 (8%)		1 (7%)
Pseudotsuga	42 (51%)	4 (44%)	8 (57%)	5 (28%)	11 (44%)	2 (100%)	12 (80%)
Sequoia sempervirens	8 (10%)			1 (5.5%)	3 (12%)		5 (33%)
Cylindropuntia (syn. *Opuntia*)	2 (2%)	1 (11%)	1 (7%)				
cf. *Fraxinus*	1 (1%)			1 (5.5%)			
Platanus racemosa	11 (13%)	2 (22%)	1 (7%)	2 (11%)	4 (16%)		2 (13%)
Quercus	74 (89%)	8 (89%)	14 (100%)	17 (94%)	21 (84%)	1 (50%)	13 (87%)
Quercus - *Erythrobalanus* group	9 (11%)	5 (55.5%)	1 (7%)	2 (11%)	1 (4%)		
Quercus - *Leucobalanus* group	43 (52%)	7 (78%)	9 (64%)	8 (44%)	19 (76%)		7 (47%)
Quercus - Live oak	36 (43%)	3 (33%)	7 (50%)	5 (28%)	13 (52%)	1 (50%)	7 (47%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Rhamnaceae	4 (5%)		1 (7%)	1 (5.5%)	2 (8%)		
Rhamnus	32 (38.5%)	4 (44%)	8 (57%)	6 (33%)	10 (40%)		4 (27%)
Rosaceae	9 (11%)		1 (7%)	3 (17%)	4 (16%)	1 (50%)	
Crataegus	1 (1%)	1 (11%)					
Prunus	2 (2%)			1 (5.5%)	1 (4%)		
Rosa	3 (4%)				2 (8%)		1 (7%)
Salicaceae	58 (70%)	9 (100%)	12 (86%)	10 (55.5)	20 (80%)	1 (50%)	6 (40%)
Populus	10 (12%)	8 (89%)	1 (7%)		1 (4%)		
Salix	12 (14%)	7 (78%)			4 (16%)		1 (7%)
Sambucus	1 (1%)						1 (7%)
Schinus molle	7 (8%)			1 (5.5%)	4 (16%)		2 (13%)
Ulmus	2 (2%)		1 (7%)		1 (4%)		
Umbellularia californica	19 (23%)	5 (55.5%)		1 (5.5%)	6 (24%)		7 (47%)
Vitis	1 (1%)	1 (11%)					
Unidentified hardwood	50 (60%)	4 (44%)	8 (57%)	8 (44%)	17 (68%)	2 (100%)	11 (73%)
WOOD:							
Asteraceae	1 (1%)			1 (5.5%)			
Conifer	10 (12%)			3 (17%)	6 (24%)		1 (7%)
Pseudotsuga	8 (10%)	2 (22%)		1 (5.5%)	4 (16%)		1 (7%)
Unidentified hardwood	1 (1%)						1 (7%)

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
NON-FLORAL REMAINS:							
Aluminium/Tin foil	2 (2%)						2 (13%)
Asphaltum	57 (69%)		7 (50%)	14 (78%)	25 (100%)	1 (50%)	10 (67%)
Bead	1 (1%)						1 (7%)
Bead - blue shell	1 (1%)				1 (4%)		
Bead - *Olivella*	2 (2%)	2 (22%)					
Bone, uncharred	72 (87 %)	9 (100%)	14 (100%)	13 (72%)	21 (84%)	1 (50%)	14 (93%)
Fish vertebra, uncharred	1 (1%)				1 (4%)		
Tooth, uncharred	6 (7%)	1 (11%)	1 (7%)		1 (4%)		3 (20%)
Rodent tooth, uncharred	6 (7%)				3 (12%)		3 (20%)
Bone, charred	30 (36%)	5 (55.5%)	11 (78.5%)	4 (22%)	6 (24%)		4 (27%)
Bone - calcined	39 (47%)	9 (100%)	9 (64%)	4 (22%)	7 (28%)	2 (100%)	8 (53%)
Brick/Tile	65 (78%)	9 (100%)	11 (78.5%)	11 (61%)	21 (84%)	1 (50%)	12 (80%)
Brick	4 (5%)	1 (11%)	2 (14%)			1 (50%)	
Tile	1 (1%)		1 (7%)				
Ceramic	17 (20%)	7 (78%)	6 (43%)	2 (11%)			2 (13%)
Clinker	36 (43%)	1 (11%)	5 (36%)	4 (22%)	12 (48%)		14 (93%)
Coal	10 (12%)	2 (22%)	1 (7%)		3 (12%)		4 (27%)
Daub	1 (1%)				1 (4%)		

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Eggshell, uncharred	8 (10%)	6 (67%)				2 (100%)	
Feather	1 (1%)						1 (7%)
Fibrous material	1 (1%)				1 (4%)		
Woven fibers, charred	1 (1%)						1 (7%)
Fish scale - ctenoid	1 (1%)	1 (11%)					
Glass - amber	2 (2%)			1 (5.5%)	1 (4%)		
Glass - brown	5 (6%)				1 (4%)		4 (27%)
Glass - clear	20 (24%)	1 (11%)		5 (28%)	7 (28%)	1 (50%)	6 (40%)
Glass - green	3 (4%)	1 (11%)			1 (4%)		1 (7%)
Glass - light purple	1 (1%)						1 (7%)
Glass - opaque	3 (4%)					1 (50%)	2 (13%)
Glass - yellow	2 (2%)				2 (8%)		
cf. Leather	2 (2%)						2 (13%)
Lime	21 (25%)		9 (64%)	3 (17%)	4 (16%)		5 (33%)
Metal - flat, rusted	23 (28%)			6 (33%)	10 (40%)		7 (47%)
Eyelet	1 (1%)				1 (4%)		
Nail/Pin	4 (5%)			1 (5.5%)	1 (4%)		2 (13%)
Nail - rusted	6 (7%)				3 (12%)		3 (20%)
Screw	1 (1%)			1 (5.5%)			
Steel metal filing	1 (1%)				1 (4%)		

TABLE 5 (Continued)

	Total	Unit 104	Unit 145	Unit 263	Unit 258	Unit 267	Unit 291
Straight pin	1 (1%)				1 (4%)		
Wire - rusted	7 (8%)			2 (11%)	3 (12%)		2 (13%)
Mortar	19 (23%)	9 (100%)	6 (43%)	1 (5.5%)	3 (12%)		
Shell	3 (4%)	2 (22%)	1 (7%)				
Ostracod	2 (2%)	2 (22%)					
Porcelain	7 (8%)				5 (20%)		2 (13%)
Yarn - green	1 (1%)			1 (5.5%)			
TOTAL NUMBER OF SAMPLES	83	9	14	18	25	2	15

TABLE 6
MACROFLORAL REMAINS FROM UNIT 145 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20811	Liters Floated						3.00 L
68-78	Light Fraction Weight						1.359 g
cmbd	FLORAL REMAINS:						
	Fabaceae	Endosperm	1				
	Pinus	Seed				1	< 0.0001 g
	Poaceae	Stem				1	
	Poaceae A	Caryopsis		1			0.0008 g
	Sambucus nigra	Seed				3	
	Unidentified	Seed		1			
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0771 g
	Pseudotsuga	Charcoal		1			0.0008 g
	Quercus	Charcoal		8			0.0307 g
	Rhamnus	Charcoal		2			0.0026 g
	Salicaceae	Charcoal		10			0.0114 g
	Unidentified hardwood - small	Charcoal		15			0.0060 g
	Unidentified hardwood - vitrified	Charcoal		4			0.0042 g
	NON-FLORAL REMAINS:						
	Bone ≥ 2 mm					2	0.5001 g
	Brick/Tile					X	Few
	Insect	Chitin				X	Few
	Lime ≥ 2 mm					4	0.0412 g
	Lime < 2 mm					X	Moderate
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X	1		Few
20779	Liters Floated						2.20 L
78-88	Light Fraction Weight						3.300 g
cmbd	FLORAL REMAINS:						
	Cereal-type	Caryopsis	1	2			0.0106 g
	Physalis/Solanum	Seed				1	
	Sambucus nigra	Seed				2	
	Roots					X	Few
	Rootlets					X	Moderate

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20779	CHARCOAL/WOOD:						
78-88	Total charcoal ≥ 1 mm						0.1891 g
cmbd	*Quercus*	Charcoal		20			0.0452 g
	Quercus - vitrified	Charcoal		2			0.0086 g
	Quercus - Leucobalanus group	Charcoal		4			0.0114 g
	Quercus - Live oak	Charcoal		3			0.0171 g
	Rhamnus	Charcoal		1			0.0010 g
	Salicaceae	Charcoal		3			0.0039 g
	Unidentified hardwood - small	Charcoal		2			0.0010 g
	Unidentified hardwood - vitrified	Charcoal		5			0.0088 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					7	0.0532 g
	Asphaltum < 2 mm					X	Few
	Bone ≥ 4 mm					3	0.3039 g
	Bone < 4 mm					X	Few
	Brick ≥ 4 mm					39	83.020 g
	Brick < 4 mm					X	Few
	Ceramic with white glaze ≥ 4 mm					1	2.1073 g
	Clinker					1	0.0023 g
	Insect	Chitin				X	Few
	Lime ≥ 2 mm					3	0.0718 g
	Lime < 2 mm					X	Few
	Mortar					X	Moderate
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Numerous
	Termite fecal pellet		X	X	X	X	Few
20798	Liters Floated						2.00 L
88-98	Light Fraction Weight						6.158 g
cmbd	FLORAL REMAINS:						
	Datura	Seed				2	
	Malvaceae	Seed	1				0.0003 g
	Nicotiana	Seed			1		
	Schinus molle	Seed		2			0.0005 g
	Vitrified tissued			5			0.0049 g
	Roots					X	Few
	Rootlets					X	Moderate

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20798	CHARCOAL/WOOD:						
88-98	Total charcoal > 2 mm						0.1700 g
cmbd	Conifer	Charcoal		1			0.0015 g
	Pseudotsuga	Charcoal		1			0.0028 g
	Quercus	Charcoal		3			0.0073 g
	Quercus - vitrified	Charcoal		6			0.0268 g
	Quercus - Live oak	Charcoal		3			0.0118 g
	Rhamnus	Charcoal		1			0.0061 g
	Salicaceae	Charcoal		3			0.0088 g
	Unidentified hardwood - vitrified	Charcoal		3			0.0191 g
	Unidentifiable - vitrified	Charcoal		3			0.0631 g
	NON-FLORAL REMAINS:						
	Bone > 2 mm					11	0.8261 g
	Bone < 2 mm					X	Few
	Bone > 2 mm			1			0.0260 g
	Bone - calcined > 2 mm			4			0.0946 g
	Brick/Tile > 2 mm					102	18.4318 g
	Brick/Tile < 2 mm					X	Numerous
	Ceramic					3 pc	6.1739 g
	Clinker					1	0.0043 g
	Insect - small beetle				1		
	Insect	Chitin				3	
	Mortar					5	0.1079 g
	Muscovite					X	Moderate
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X		Numerous
	Rodent fecal pellet - small				X		Moderate
	Termite fecal pellet				X		Few

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20812	Liters Floated						2.40 L
98-108	Light Fraction Weight						15.277 g
cmbd	FLORAL REMAINS:						
	Datura wrightii-type	Seed				1	
	Malvaceae	Seed				1	
	Malva	Seed			1		
	Parenchymous tissue ≥ 1 mm			1			0.0001 g
	Periderm ≥ 2 mm			2			0.0156 g
	Pinus ≥ 0.5 mm	Seed				7	< 0.0001 g
	Poaceae A	Caryopsis		1			0.0010 g
	Zea mays	Cupule			1		0.0059 g
	Sambucus nigra	Seed				2	
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.2259 g
	Conifer	Charcoal		1			0.0011 g
	Pinus	Charcoal		1			0.0016 g
	Pseudotsuga	Charcoal		4			0.0029 g
	Quercus	Charcoal		17			0.0348 g
	Quercus - vitrified	Charcoal		3			0.0107 g
	Quercus - Leucobalanus group	Charcoal		1			0.0025 g
	Quercus - Live oak	Charcoal		4			0.0476 g
	Rhamnus	Charcoal		2			0.0133 g
	Salicaceae	Charcoal		5			0.0045 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0005 g
	Unidentified hardwood knot	Charcoal		1			0.0122 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					2	0.0374 g
	Asphaltum < 2 mm					X	Few
	Bone ≥ 4 mm					12	7.3627 g
	Bone < 4 mm					X	Few
	Bone ≥ 4 mm			1			1.1710 g
	Bone - calcined ≥ 4 mm			1			0.1462 g
	Bone - calcined < 4 mm			X			Few
	Brick/Tile ≥ 4 mm					26	12.898 g

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20812	NON-FLORAL REMAINS (Continued):						
98-108 cmbd	Brick/Tile < 4 mm					X	Few
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					7	0.4523 g
	Lime < 4 mm					X	Moderate
	Mortar ≥ 4 mm					20	535.00 g
	Mortar < 4 mm					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Numerous
	Rodent fecal pellet - small				X	X	Moderate
	Snail shell - oblong				1		0.0173 g
	Termite fecal pellet		X		1		Few
20793	Liters Floated						3.00 L
108-118 cmbd	Light Fraction Weight						37.226 g
	FLORAL REMAINS:						
	Brassicaceae	Seed		1			
	Chenopodium	Seed				1	
	Datura wrightii-type	Seed				3	
	Malvaceae	Fruit	1				
	Malva	Seed	1				
	Parenchymous tissue ≥ 2 mm			13			0.0429 g
	Pinus	Seed				3	
	Sambucus nigra	Seed				1	
	Scrophulariaceae	Seed			1		
	Roots					X	Moderate
	Rootlets					X	Moderate

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20793	CHARCOAL/WOOD:						
108-118	Total charcoal ≥ 1 mm						0.3380 g
cmbd	*Acer*	Charcoal		1			0.0021 g
	Picea	Charcoal		1			0.0044 g
	Pseudotsuga	Charcoal		6			0.0119 g
	Quercus	Charcoal		14			0.0511 g
	Quercus - vitrified	Charcoal		5			0.0292 g
	Quercus - Live oak	Charcoal		1			0.0025 g
	Rhamnus	Charcoal		3			0.0148 g
	Rhamnus twig	Charcoal		1			0.0070 g
	Salicaceae	Charcoal		1			0.0033 g
	Unidentified hardwood	Charcoal		5			0.0182 g
	Unidentified hardwood - vitrified	Charcoal		2			0.0103 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 4 mm					35	6.9925 g
	Bone < 4 mm					X	Numerous
	Large mammal - phalange				1		24.628 g
	Bone ≥ 4 mm			1			0.1121 g
	Bone - calcined ≥ 4 mm			3			0.7944 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile					X	Moderate
	Clinker					X	Few
	Insect	Chitin				X	Few
	Mortar					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Numerous
	Rodent fecal pellet - small				X	X	Numerous
	Termite fecal pellet		X	X	1		Few

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20771	Liters Floated						2.40 L
118-123	Light Fraction Weight						12.769 g
cmbd	FLORAL REMAINS:						
	Datura	Seed				1	
	Pinus ≥ 1 mm	Seed				4	0.0031 g
	Vitrified tissue ≥ 2 mm			4			0.0199 g
	Unidentified	Seed		1			
	Roots					X	Moderate
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.2347 g
	Platanus racemosa	Charcoal		1			0.0024 g
	Pseudotsuga	Charcoal		10			0.0288 g
	Quercus	Charcoal		19			0.0584 g
	Quercus - vitrified	Charcoal		5			0.0229 g
	Quercus - Live oak	Charcoal		2			0.0256 g
	Salicaceae	Charcoal		3			0.0033 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					5	0.0917 g
	Asphaltum < 2 mm					X	Few
	Bone ≥ 4 mm					19	7.4692 g
	Bone < 4 mm					X	Moderate
	Bone ≥ 4 mm			3			0.9763 g
	Bone - calcined ≥ 4 mm			7			1.9575 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile ≥ 4 mm					24	681.00 g
	Brick/Tile < 4 mm					X	Few
	Clinker ≥ 2 mm					2	0.0149 g
	Insect	Chitin				X	Few
	Lime ≥ 2 mm					5	0.0442 g
	Lime < 2 mm					X	Moderate
	Mortar ≥ 4 mm					1	0.5315 g
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Numerous
	Rodent fecal pellet - small				X	X	Numerous

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20782	Liters Floated						4.00 L
123-133	Light Fraction Weight						10.443 g
cmbd	FLORAL REMAINS:						
	Crataegus	Seed		1			0.0017 g
	Pinus ≥ 1 mm	Seed			1	9	0.0280 g
	Pinus < 1 mm	Seed				X	Moderate
	Sambucus nigra	Seed				2	
	Unidentified	Fruit		1			
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.3111 g
	Pseudotsuga	Charcoal		1			0.0010 g
	Quercus	Charcoal		15			0.0574 g
	Quercus - vitrified	Charcoal		8			0.0707 g
	Quercus - Leucobalanus group	Charcoal		3			0.0244 g
	Quercus - Live oak	Charcoal		9			0.1210 g
	Rhamnus	Charcoal		4			0.0201 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					1	0.0310 g
	Asphaltum < 2 mm					X	Few
	Bone - large/medium mammal					14	7.4251 g
	Bone < 4 mm					X	Moderate
	Bone ≥ 4 mm			9			4.9570 g
	Bone < 4 mm			X			Few
	Bone - calcined ≥ 4 mm			26			6.7388 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile ≥ 4 mm					54	179.52 g
	Brick/Tile < 4 mm					X	Few
	Ceramic ≥ 4 mm					1	11.352 g
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					4	0.5523 g
	Lime < 4 mm					X	Numerous
	Mortar ≥ 4 mm			2			30.457 g
	Rock/Gravel					X	Numerous
	Rodent fecal pellet - medium				X	X	Numerous

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20782	NON-FLORAL REMAINS (Continued):						
123-133	Rodent fecal pellet - small				X	X	Numerous
cmbd	Shell ≥ 4 mm					1	0.5371 g
	Termite fecal pellet		X	X			Few
20788	Liters Floated						4.00 L
133-143	Light Fraction Weight						41.490 g
cmbd	FLORAL REMAINS:						
	Pinus ≥ 1 mm	Seed				2	0.0003 g
	Pinus < 1 mm	Seed				X	Few
	Poaceae - vitrified	Stem		3			0.0144 g
	Triticum aestivum	Caryopsis	1				0.0133 g
	Zea mays	Cupule		2			0.0025 g
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.2195 g
	Alnus - vitrified	Charcoal		1			0.0061 g
	Cylindropuntia - vitrified	Charcoal		1			0.0023 g
	Quercus	Charcoal		16			0.0574 g
	Quercus - vitrified	Charcoal		4			0.0222 g
	Quercus - *Leucobalanus* group	Charcoal		9			0.0559 g
	Quercus - Live oak	Charcoal		2			0.0106 g
	Rhamnus	Charcoal		2			0.0073 g
	Salicaceae	Charcoal		2			0.0200 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0162 g
	Unidentified hardwood twig	Charcoal		2			0.0119 g
	Unidentifiable - vitrified	Charcoal		2			0.0096 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					9	0.3233 g
	Asphaltum < 2 mm					X	Few
	Bone ≥ 4 mm					40	53.776 g
	Bone < 4 mm					X	Moderate
	Tooth ≥ 4 mm					1	0.1215 g
	Bone - large/medium mammal ≥ 4 mm			2			0.2301 g
	Bone - calcined ≥ 4 mm			5			0.7340 g

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20788	NON-FLORAL REMAINS (Continued):						
133-143	Bone - calcined < 4 mm			X			Few
cmbd	Brick/Tile ≥ 4 mm					54	133.48 g
	Brick/Tile < 4 mm					X	Few
	Ceramic ≥ 4 mm					1	19.600 g
	Clinker ≥ 2 mm					2	0.0245 g
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					2	1.1806 g
	Lime < 4 mm					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Rodent fecal pellet - medium				X	X	Moderate
	Rodent fecal pellet - small				X	X	Moderate
	Termite fecal pellet		X	X			Few
20768	Liters Floated						4.00 L
143-152	Light Fraction Weight						5.065 g
cmbd	FLORAL REMAINS:						
	Parenchymous tissue			1			0.0071 g
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						
	Quercus - vitrified	Charcoal		6			0.0382 g
	Quercus - Leucobalanus group	Charcoal		5			0.0169 g
	Quercus - Leucobalanus group - vitrified	Charcoal		5			0.0236 g
	Rhamnaceae	Charcoal		2			0.1179 g
	Salicaceae	Charcoal		1			0.0126 g
	Ulmus	Charcoal		1			0.0045 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					11	0.9475 g
	Bone < 2 mm			X		X	Few
	Bone - calcined ≥ 2 mm			3			0.1047 g
	Brick/Tile					X	Few
	Tile					2	54.619 g

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20768	NON-FLORAL REMAINS (Continued):						
143-152	Coal ≥ 2 mm					5	0.522 g
cmbd	Coal < 2 mm					X	Few
	Insect	Chitin				4	
	Lime					X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Moderate
	Sand					X	Numerous
	Rodent fecal pellet - medium				X	X	Numerous
	Rodent fecal pellet - small				X	X	Numerous
	Termite fecal pellet		X	X			Few
20777	Liters Floated						3.50 L
152-158	Light Fraction Weight						4.862 g
cmbd	FLORAL REMAINS:						
	Carya illinoinensis	Nutshell		1			0.0028 g
	Malvaceae	Seed		1			
	Triticum aestivum	Caryopsis		1			0.0056 g
	Unidentified	cf. Fruit		1			0.0009 g
	Unidentified - vitrified	Rhizome		2			0.0146 g
	Roots					X	Few
	Rootlets					X	Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.1487 g
	Asteraceae	Charcoal		1			0.0217 g
	Quercus	Charcoal		17			0.0272 g
	Quercus - vitrified	Charcoal		9			0.0406 g
	Rhamnus	Charcoal		2			0.0012 g
	Rosaceae	Charcoal		1			0.0030 g
	Salicaceae	Charcoal		2			0.0012 g
	Unidentified hardwood - central pith	Charcoal		1			0.0001 g
	Unidentified hardwood - small	Charcoal		1			0.0001 g
	Unidentified hardwood - vitrified	Charcoal		6			0.0244 g

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20777	NON-FLORAL REMAINS:						
152-158	Bone - large/medium mammal					6	6.5882 g
cmbd	Bone < 4 mm					X	Few
	Bone ≥ 4 mm			1			0.0796 g
	Brick/Tile ≥ 4 mm					25	115.21 g
	Brick/Tile < 4 mm					X	Few
	Ceramic ≥ 4 mm					5	21.202 g
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					10	6.053 g
	Lime < 4 mm					X	Moderate
	Rock/Gravel					X	Numerous
	Rodent fecal pellet - medium				X	X	Numerous
	Rodent fecal pellet - small				X	X	Numerous
20789	Liters Floated						4.00 L
	Light Fraction Weight						2.447 g
	FLORAL REMAINS:						
	Roots					X	Few
	Rootlets					X	Moderate
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						
	Acer	Charcoal		1			0.0013 g
	Quercus	Charcoal		6			0.0042 g
	Quercus - vitrified	Charcoal		5			0.0057 g
	Quercus - Leucobalanus group	Charcoal		13			0.0202 g
	NON-FLORAL REMAINS:						
	Bone ≥ 2 mm					11	9.1150 g
	Bone < 2 mm			X		X	Few
	Bone - calcined ≥ 2 mm			3			0.6637 g
	Brick/Tile ≥ 4 mm					32	187.81 g
	Brick/Tile < 4 mm					X	Few
	Coral					1	0.5347 g
	Muscovite					X	Moderate
	Ceramic					2	7.8120 g
	Rock/Gravel					X	Numerous
	Rodent fecal pellet - medium				X	X	Moderate
	Rodent fecal pellet - small				X	X	Moderate

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20772	Liters Floated						4.00 L
167-177	Light Fraction Weight						4.023 g
cmbd	FLORAL REMAINS:						
	Malva	Seed				1	
	Roots					X	Numerous
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.1220 g
	Betula	Charcoal		1			0.0065 g
	Pseudotsuga	Charcoal		6			0.0072 g
	Quercus	Charcoal		15			0.0235 g
	Quercus - vitrified	Charcoal		6			0.0223 g
	Quercus - Leucobalanus group	Charcoal		5			0.0159 g
	Salicaceae	Charcoal		2			0.0010 g
	Populus	Charcoal		2			0.0039 g
	Unidentified hardwood	Charcoal		3			0.0021 g
	NON-FLORAL REMAINS:						
	Bone ≥ 2 mm					1	0.0158 g
	Bird bone ≥ 2 mm					4	0.1729 g
	Bone < 2 mm					X	Few
	Brick/Tile					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Moderate
	Rodent fecal pellet - small				X	X	Moderate
	Termite fecal pellet		X	X			Few
20769	Liters Floated						3.10 L
177-187	Light Fraction Weight						5.413 g
cmbd	FLORAL REMAINS:						
	Carex	Seed	1				
	Erodium	Awn		2			
	Erodium	Seed	1				
	Poaceae	Awn		1			
	Roots					X	Moderate
	Rootlets					X	Numerous

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20769	CHARCOAL/WOOD:						
177-187	Total charcoal ≥ 1 mm						0.1225 g
cmbd	*Betula*	Charcoal		1			0.0107 g
	Conifer	Charcoal		1			0.0030 g
	Pseudotsuga	Charcoal		9			0.0068 g
	Quercus	Charcoal		21			0.0299 g
	Quercus - vitrified	Charcoal		2			0.0034 g
	Quercus - *Leucobalanus* group	Charcoal		2			0.0145 g
	Salicaceae	Charcoal		4			0.0047 g
	NON-FLORAL REMAINS:						
	Bone ≥ 2 mm					2	0.0175 g
	Bone ≥ 2 mm			1			0.6218 g
	Brick/Tile ≥ 2 mm					1	0.0741 g
	Insect	Chitin				X	Few
	Lime					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Moderate
	Rodent fecal pellet - small				X	X	Numerous
	Termite fecal pellet		X	X			Few
20787	Liters Floated						1.70 L
187-190	Light Fraction Weight						2.1415 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Seed		1			
	Poaceae	Awn		2			
	Roots					X	Few
	Rootlets					X	Moderate
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.1745 g
	Quercus	Charcoal		5			0.0104 g
	Quercus - *Erythrobalanus* group	Charcoal		9			0.1345 g
	Quercus - *Leucobalanus* group	Charcoal		3			0.0128 g
	Salicaceae	Charcoal		3			0.0044 g

TABLE 6 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20787	NON-FLORAL REMAINS:						
187-190	Bone ≥ 2 mm					5	0.1818 g
cmbd	Bone ≥ 2 mm			1			0.1377 g
	Bone - calcined ≥ 2 mm			1			0.0113 g
	Insect	Chitin				1	
	Insect	Egg			X		Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Moderate
	Rodent fecal pellet - medium				X	X	Few
	Rodent fecal pellet -small				X	X	Moderate
	Termite fecal pellet		X				Few

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters
pc = partially charred

TABLE 7
LIST OF ANTISERA USED IN TESTING ARTIFACTS FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

ANTISERUM	SOURCE	POSSIBLE RESULTS
ANIMALS:		
Bear	ICN Pharmaceuticals, Inc.	Black bear, Brown bear, Grizzly, Polar bear
Bison	Prepared under the direction of Dr. Richard Marlar at the University of Colorado Health Sciences Center	Bison, Domestic bovids
Bovine	Sigma Chemical Company	Domestic bovids, Bison
Cat	Sigma Chemical Company	Domestic cat, Mountain lion, Bobcat, Lynx, other wild cat species
Chicken	Sigma Chemical Company	Domestic chicken, Partridge, Quail, Grouse, Ptarmigan, Pheasant
Deer	ICN Pharmaceuticals, Inc.	White tail deer, Mule deer, Elk, Moose, Caribou, Wapiti
Dog	Sigma Chemical Company	Domestic dog, Coyote, Wolf, Fox
Duck	Nordic Immunological Laboratories	Duck, Goose, Pigeon, Domestic turkey, Wild turkey
Goat	Sigma Chemical Company	Pronghorn, Mountain goat, Domestic goat
Guinea pig	Sigma Chemical Company	Guinea pig, Porcupine, Beaver, Squirrel family (Squirrel, Marmot, Ground squirrel, Chipmunk, etc.)
Grasshopper	Prepared at PaleoResearch Institute	Unknown specificity, but would likely cross-react with many insects in the order Orthoptera, which includes grasshoppers, crickets, and locusts
Human	ICN Pharmaceuticals, Inc.	Human
Mouse	Sigma Chemical Company	Members of the New World rats and mice family, Members of the Old World rats and mice family
Rabbit	Sigma Chemical Company	Rabbit, Jackrabbit (hare)
Rat	Sigma Chemical Company	Members of the New World rats and mice family, Members of the Old World rats and mice family
Sheep	ICN Pharmaceuticals, Inc.	Domestic sheep, Bighorn sheep

TABLE 7 (Continued)

ANTISERUM	SOURCE	POSSIBLE RESULTS
Turkey	Sigma Chemical Company	Domestic turkey, Wild turkey, Ducks
FISH/AQUATIC:		
Bay anchovy	Robert Sargeant	Engraulidae family (Anchovies)
Catfish	Sigma Chemical Company	Catfish, Carp
Sturgeon	Robert Sargeant	Acipenseridae family (Sturgeons)
Striped bass	Robert Sargeant	Perciformes order (Spiny-rayed or percoid fish)
Trout	Sigma Chemical Company	Salmonidae family (Trout and salmon)
PLANTS:		
Acorn	Prepared at PaleoResearch Institute	Acorn
Agave	Prepared at PaleoResearch Institute	Agave, Yucca, Camas, Aloe, & all members of the Agave and Lily families
Yucca	Prepared at PaleoResearch Institute	Yucca, Agave, Camas, Aloe, & all members of the Agave and Lily families

TABLE 8
MACROFLORAL REMAINS FROM UNIT 263 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20840	Liters Floated						4.00 L
90-100	Light Fraction Weight						46.542 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm			2	1	
	Amaranthus	Seed			3		
	Chenopodium	Seed		1	1		
	Datura wrightii-type	Seed				12	
	Erodium	Seed			1		
	Ficus carica	Seed			1		
	Malva	Seed			1		
	Nicotiana	Seed				1	
	Pinus	Seed		1		3	0.0026 g
	Poaceae	Leaf/Stem				X	Few
	Poaceae	Awn				1	
	Poaceae B	Caryopsis			1		
	Schinus molle ≥ 0.5 mm	Seed	1	18			0.0163 g
	Schinus molle < 0.5 mm	Seed		X			Few
	Taraxacum	Seed				1	
	Tribulus terrestris	Seed				13	
	Xanthium-type	Fruit		2			0.0032 g
	Periderm			3			0.0097 g
	Root					1	
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0688 g
	Asteraceae	Charcoal		2			0.0012 g
	Conifer	Charcoal		1			0.0011 g
	Picea	Charcoal		1			0.0079 g
	Pseudotsuga	Charcoal		6			0.0121 g
	Prunus	Charcoal		1			0.0027 g
	Quercus	Charcoal		1			0.0009 g
	Quercus - Leucobalanus group	Charcoal		2			0.0055 g
	Rhamnus	Charcoal		4			0.0207 g
	Salicaceae	Charcoal		1			0.0018 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20840	NON-FLORAL REMAINS:						
90-100	Asphaltum					X	Numerous
cmbd	Bone ≥ 2 mm					16	0.3170 g
	Bone < 2 mm					X	Few
	Brick/Tile			Xpc		X	Moderate
	Ceramic - white					1	0.0985 g
	Clinker ≥ 2 mm					45	0.6871 g
	Clinker < 2 mm					X	Moderate
	Glass - amber					7	1.4358 g
	Glass - clear ≥ 2 mm					12	2.5550 g
	Glass - clear < 2 mm					X	Few
	Insect	Chitin				10	
	Insect	Egg			X		Few
	Metal - flat, rusted ≥ 4 mm					34	5.4681 g
	Metal - flat, rusted < 4 mm					X	Moderate
	Muscovite					X	Moderate
	Mortar					X	Few
	Small nail/Pin					1	0.0204 g
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X		X		Few
	Yarn - green					1	0.0062 g
20763	Liters Floated						2.80 L
100-110	Light Fraction Weight						24.342 g
cmbd	FLORAL REMAINS:						
	Datura wrightii-type	Seed				3	
	Schinus molle	Seed		1			
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0131 g
	Pseudotsuga	Charcoal		1			0.0002 g
	Quercus	Charcoal		13			0.0129 g
	Total wood ≥ 1 mm						0.0087 g
	Conifer	Wood				8	0.0087 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20763	NON-FLORAL REMAINS:						
100-110	Asphaltum ≥ 2 mm					X	9.164 g
cmbd	Asphaltum < 2 mm					X	Numerous
	Bone - calcined ≥ 2 mm			3			0.1843 g
	Brick/Tile					X	Few
	Metal - flat, rusted					X	Few
	Rock					X	Few
	Termite fecal pellet		1				
20832	Liters Floated						4.00 L
110-120	Light Fraction Weight						21.301 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm	1				0.0005 g
	Amaranthus	Seed				1	
	Datura wrightii-type	Seed				1	
	Poaceae	Leaf/Stem				X	Few
	Poaceae	Awn		1			< 0.0001 g
	Tribulus terrestris	Seed				2	0.0010 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0470 g
	cf. *Fraxinus*	Charcoal		1			0.0004 g
	Pseudotsuga	Charcoal		1			< 0.0001 g
	Quercus	Charcoal		6			0.0061 g
	Quercus - Leucobalanus group	Charcoal		3			0.0050 g
	Rhamnus	Charcoal		2			0.0023 g
	Salicaceae	Charcoal		2			0.0272 g
	Sequoia sempervirens	Charcoal		1			0.0024 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Numerous
	Bone < 2 mm			X			Few
	Brick/Tile					X	Few
	Clinker					1	0.0010 g
	Insect	Chitin				4	
	Insect	Egg			X		Few
	Metal - flat, rusted					1	0.0155 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20832	NON-FLORAL REMAINS (Continued):						
110-120 cmbd	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X	1		Few
18595	Liters Floated						3.00 L
120-130 cmbd	Light Fraction Weight						4.213 g
	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	Pinus	Seed				1	
	Poaceae	Awn		2			
	Sambucus nigra	Seed				3	
	Zea mays	Cupule		4			0.0086 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0496 g
	Pseudotsuga	Charcoal		5			0.0028 g
	Quercus	Charcoal		5			0.0053 g
	Quercus - Leucobalanus group	Charcoal		1			0.0014 g
	Quercus - Live oak	Charcoal		1			0.0035 g
	Rhamnus	Charcoal		17			0.0283 g
	Salicaceae	Charcoal		1			0.0021 g
	Schinus molle	Charcoal		2			0.0030 g
	Unidentified hardwood - small	Charcoal		1			0.0003 g
	Unidentified hardwood - vitrified	Charcoal		3			0.0029 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					X	0.7561 g
	Asphaltum < 2 mm					X	Numerous
	Bone ≥ 4 mm			1			0.1132 g
	Bone ≥ 2 mm					2	0.0866 g
	Bone < 2 mm					X	Few
	Brick/Tile ≥ 4 mm					3	2.5864 g
	Brick/Tile < 4 mm					X	Few
	Glass - clear					1	0.0201 g
	Insect	Chitin				X	Few
	Rock					X	Moderate
	Termite fecal pellet		X	X			Moderate
	Termite fecal pellet				X	X	Few

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred		Uncharred		Weights/ Comments
			W	F	W	F	
18605	Liters Floated						1.10 L
130-134	Light Fraction Weight						0.969 g
cmbd	FLORAL REMAINS:						
	Periderm			1			0.0011 g
	Poaceae	Awn		1			< 0.0001 g
	Sambucus nigra	Seed				5	
	Zea mays	Cupule		1			0.0069 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0092 g
	Quercus	Charcoal		4			0.0075 g
	Rhamnus	Charcoal		1			0.0007 g
	Salicaceae	Charcoal		1			0.0010 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Numerous
	Bone ≥ 2 mm					1	0.0056 g
	Brick/Tile ≥ 2 mm					5	2.2325 g
	Brick/Tile < 2 mm					X	Few
	Glass - clear					1	1.8545 g
	Insect	Chitin				4	
	Insect	Egg			X		Few
	Lime					X	Few
	Muscovite					X	Moderate
	Termite fecal pellet		X				Few
20806	Liters Floated						1.50 L
134-139	Light Fraction Weight						1.757 g
cmbd	FLORAL REMAINS:						
	Malva	Seed			1		
	Pinus ≥ 1 mm	Seed				2	0.0008 g
	Pinus < 1 mm	Seed				24	
	Solanum	Seed				1	
	Tribulus terrestris	Seed			1		0.0228 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred		Uncharred		Weights/ Comments
			W	F	W	F	
20806	CHARCOAL/WOOD:						
134-139	Total charcoal ≥ 2 mm						0.0234 g
cmbd	Conifer	Charcoal		1			0.0028 g
	Platanus racemosa	Charcoal		1			0.0022 g
	Quercus	Charcoal		6			0.0073 g
	Rhamnus	Charcoal		1			0.0025 g
	Umbellularia californica	Charcoal		1			0.0033 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					42	1.8689 g
	Bone < 2 mm					X	Moderate
	Bone ≥ 2 mm			17			0.4977 g
	Bone < 2 mm			X			Few
	Bone - calcined ≥ 2 mm			13			0.8019 g
	Brick/Tile ≥ 4 mm					31	7.0280 g
	Brick/Tile < 4 mm					X	Moderate
	Glass - clear					1	0.1627 g
	Lime ≥ 2 mm					5	0.0706 g
	Lime < 2 mm					X	Moderate
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X				Few
20805	Liters Floated						0.25 L
139-140	Light Fraction Weight						0.394 g
cmbd	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0018 g
	Conifer	Charcoal		1			0.0006 g
	Quercus	Charcoal		2			0.0012 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					9	0.9603 g
	Bone < 2 mm					X	Few
	Lime					X	Numerous
	Metal ball ≈ 2 mm in diameter				1		0.0492 g
	Muscovite					X	Few

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20820	Liters Floated						5.00 L
140-150	Light Fraction Weight						2.644 g
cmbd	FLORAL REMAINS:						
	Malva	Seed			1		0.0014 g
	Parenchymous tissue			5			0.0045 g
	Poaceae	Awn		5			
	Poaceae	Caryopsis		1			0.0004 g
	Sambucus nigra	Seed				3	
	Stellaria	Seed				1	
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 2 mm						0.1215 g
	Pseudotsuga	Charcoal		1			0.0009 g
	Quercus	Charcoal		15			0.0124 g
	Quercus - *Leucobalanus* group	Charcoal		5			0.0487 g
	Quercus - Live oak	Charcoal		3			0.0189 g
	Salicaceae	Charcoal		1			0.0055 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone $\geq$ 2 mm					1	0.1029 g
	Bone < 2 mm					X	Few
	Bone - calcined			1			0.0799 g
	Brick/Tile $\geq$ 4 mm					8	40.9541 g
	Brick/Tile < 4 mm					X	Few
	Insect	Chitin				11	
	Insect	Egg			X	X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X	3		Few

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20844	Liters Floated						3.20 L
150-160	Light Fraction Weight						3.482 g
cmbd	FLORAL REMAINS:						
	Arctostaphylos	Seed	1				0.0009 g
	Cheno-am	Perisperm	1				< 0.0001 g
	Chenopodium	Seed		1			< 0.0001 g
	Datura wrightii-type ≥ 1 mm	Seed				25	0.0026 g
	Datura wrightii-type < 1 mm	Seed		4*		352*	
	Malvaceae	Seed	1				0.0001 g
	Parenchymous tissue			1			0.0001 g
	Pinus	Seed				5	0.0006 g
	Poaceae	Awn		9			0.0005 g
	Poaceae A	Caryopsis		7			0.0050 g
	Sambucus nigra	Seed				2	
	Schinus molle	Seed	5	7			0.0200 g
	Vitrified tissue < 2 mm			X			Few
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.2298 g
	Encelia californica	Charcoal		3			0.0048 g
	Quercus	Charcoal		3			0.0096 g
	Quercus - vitrified	Charcoal		1			0.0109 g
	Quercus - *Erythrobalanus* group	Charcoal		9			0.1163 g
	Quercus - *Leucobalanus* group	Charcoal		1			0.0080 g
	Rosaceae	Charcoal		1			0.0022 g
	Salicaceae	Charcoal		1			0.0044 g
	Unidentified hardwood knot	Charcoal		1			0.0066 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					6	0.1383 g
	Bone < 2 mm					X	Few
	Bone ≥ 2 mm			1			0.0155 g
	Brick/Tile					X	Few
	Clinker < 2 mm					X	Few
	Insect	Chitin				3	

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20844	NON-FLORAL REMAINS (Continued):						
150-160	Insect	Egg			X		Moderate
cmbd	Metal - flat, rusted ≥ 2 mm					15	0.8399 g
	Metal - flat, rusted < 22 mm					X	Few
	Metal screw				1		0.3197 g
	Wire - rusted ≥ 2 mm					6	0.0194 g
	Wire - rusted < 2 mm					X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
20831	Liters Floated						4.00 L
160-170	Light Fraction Weight						1.983 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed		2		1	
	Chamaesyce	Seed	1				
	Cheno-am	Seed		5			
	Chenopodium	Seed				1	
	Chenopodium berlandieri-type	Seed				2	
	Datura wrightii-type	Seed				7	0.0003 g
	Parenchymous tissue			4			0.0005 g
	Poaceae	Awn		29			0.0006 g
	Zea mays	Cupule		2			0.0017 g
	Sambucus nigra	Seed				3	
	Trifolium	Seed			1		0.0039 g
	Unidentified	Seed		1			0.0001 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.1269 g
	Quercus	Charcoal		6			0.0333 g
	Quercus - *Leucobalanus* group	Charcoal		10			0.0579 g
	Quercus - Live oak	Charcoal		2			0.0165 g
	Rosaceae	Charcoal		2			0.0045 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20831	NON-FLORAL REMAINS:						
160-170	Asphaltum					X	
cmbd	Bone ≥ 2 mm					6	0.0737 g
	Bone < 2 mm					X	Few
	Ceramic					1	0.2117 g
	Insect	Chitin				6	
	Beetle				1		
	Insect	Egg			1	2	
	Insect	Larva				1	
	Lime					X	Few
	Metal wire					X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
18418	Liters Floated						4.00 L
170-180	Light Fraction Weight						6.922 g
cmbd	FLORAL REMAINS:						
	Amaranthus	Seed			1		
	Datura wrightii-type	Seed				1	
	Malva	Seed	1		6		0.0104 g
	Parenchymous tissue			2			0.0019 g
	Periderm			1			0.0046 g
	Pinus	Seed				2	0.0016 g
	Poaceae	Leaf/Stem				X	Few
	Poaceae	Awn		2			< 0.0001 g
	Zea mays	Cupule		1			0.0013 g
	Sambucus nigra	Seed				2	
	Solanum	Seed				1	
	Tribulus terrestris	Seed				1	0.0074 g
	Rootlets					X	Few

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18418	CHARCOAL/WOOD:						
170-180	Total charcoal ≥ 2 mm						0.1511 g
cmbd	Asteraceae	Charcoal		1			0.0017 g
	Quercus	Charcoal		6			0.0202 g
	Quercus - Live oak	Charcoal		6			0.1188 g
	Rhamnaceae	Charcoal		1			0.0016 g
	Salicaceae	Charcoal		2			0.0071 g
	Total wood ≥ 2 mm						0.0070 g
	Asteraceae	Wood				1	0.0035 g
	Conifer	Wood				1	0.0035 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Moderate
	Bone ≥ 2 mm					8	1.2254 g
	Bone < 2 mm					X	Few
	Brick/Tile					X	Few
	Glass - clear					1	0.0992 g
	Insect	Chitin				1	
	Beetle				1		
	Insect	Egg			X		Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
20826	Liters Floated						4.00 L
180-190	Light Fraction Weight						1.984 g
cmbd	FLORAL REMAINS:						
	Malva	Seed			1		
	Monocot	Stem		1			0.0006 g
	Parenchymous tissue ≥ 1 mm			2			0.0001 g
	Periderm ≥ 2 mm			2			0.0042 g
	Sambucus nigra	Seed			1	13	
	Vitrified tissue ≥ 2 mm					4	0.0068 g
	Zea mays	Cupule		2			0.0013 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20826	CHARCOAL/WOOD:						
180-190	Total charcoal ≥ 1 mm						0.2036 g
cmbd	*Quercus*	Charcoal		23			0.0864 g
	Quercus - vitrified	Charcoal		5			0.0227 g
	Rhamnus	Charcoal		1			0.0085 g
	Rosaceae	Charcoal		7			0.0193 g
	Unidentified hardwood	Charcoal		4			0.0022 g
	Total wood ≥ 2 mm						0.0030 g
	Pseudotsuga	Wood				1	0.0030 g
	NON-FLORAL REMAINS:						
	Bone ≥ 2 mm					1	0.0313 g
	Bone < 2 mm					X	Few
	Insect	Chitin				X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
18498	Liters Floated						4.00 L
190-200	Light Fraction Weight						2.640 g
cmbd	FLORAL REMAINS:						
	Malva	Seed			1		0.0021 g
	Poaceae	Awn		4			0.0001 g
	Sambucus nigra	Seed				3	
	cf. *Schinus molle*	Seed		1			< 0.0001 g
	Unidentified A	Seed		2			0.0024 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.0516 g
	Acer	Charcoal		3			0.0022 g
	Quercus	Charcoal		7			0.0081 g
	Quercus - vitrified	Charcoal		1			0.0066 g
	Quercus - *Erythrobalanus* group	Charcoal		1			0.0023 g
	Quercus - *Leucobalanus* group	Charcoal		2			0.0086 g
	Quercus - Live oak	Charcoal		3			0.0038 g
	Salicaceae	Charcoal		1			0.0040 g
	Unidentified hardwood	Charcoal		1			0.0039 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18498	Total wood ≥ 2 mm						0.0018 g
190-200	Conifer	Wood				2	0.0018 g
cmbd	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone < 2 mm					X	Few
	Bone - calcined ≥ 2 mm			2			0.0288 g
	Brick/Tile					X	Few
	Insect	Chitin				6	
	Insect	Egg			X		Few
	Metal - flat, rusted					1	0.0136 g
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X				Few
20834	Liters Floated						3.70 L
200-210	Light Fraction Weight						0.483 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed		6			
	Datura wrightii-type	Seed				4	0.0002 g
	Erodium	Awn		6			0.0002 g
	Helianthus	Seed		1			0.0001 g
	Poaceae	Leaf/Stem				X	Few
	Poaceae	Awn		1			< 0.0001 g
	Schinus molle	Seed	1	2			0.0035 g
	Vitrified tissue < 2 mm			X			Moderate
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0076 g
	Platanus racemosa	Charcoal		1			0.0002 g
	Quercus	Charcoal		4			0.0049 g
	Quercus - Leucobalanus group	Charcoal		3			0.0025 g

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20834	NON-FLORAL REMAINS:						
200-210	Asphaltum					X	Few
cmbd	Bone < 2 mm					X	Few
	Brick/Tile					X	Few
	Clinker < 2 mm					X	Few
	Insect	Chitin				2	
	Insect	Egg			X		Few
	Metal					X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
20829	Liters Floated						3.50 L
210-220	Light Fraction Weight						0.286 g
cmbd	FLORAL REMAINS:						
	Betula	Seed				1	
	Poaceae	Caryopsis		1			< 0.0001 g
	Schinus molle	Seed		1			0.0002 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.5 mm						0.0067 g
	Quercus	Charcoal		7			0.0016 g
	Salicaceae	Charcoal		11			0.0023 g
	Unidentified hardwood - small	Charcoal		26			0.0028 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					14	0.0317 g
	Asphaltum < 2 mm					X	Few
	Insect	Chitin				X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20770	Liters Floated						4.00 L
220-230	Light Fraction Weight						0.169 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				2	
	Chenopodium	Seed		1			
	Monocot	Stem		4			0.0022 g
	Pinus	Seed		1			< 0.0001 g
	Poaceae C	Caryopsis		1			< 0.0001 g
	Vitrified tissue			1			0.0004 g
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 0.5 mm						0.0017 g
	Quercus	Charcoal		1			< 0.0001 g
	Salicaceae	Charcoal		1			< 0.0001 g
	Unidentified hardwood - small	Charcoal		19			0.0016 g
	NON-FLORAL REMAINS:						
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
18580	Liters Floated						4.00 L
230-240	Light Fraction Weight						1.318 g
cmbd	FLORAL REMAINS:						
	Poaceae	Awn		1			< 0.0001 g
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 0.5 mm						0.0037 g
	Conifer	Charcoal		1			0.0002 g
	Unidentified hardwood knot	Charcoal		1			0.0025 g
	Unidentified hardwood - small, vitrified	Charcoal		7			0.0010 g
	NON-FLORAL REMAINS:						
	Bone < 2 mm					1	
	Insect	Chitin				2	
	Insect	Egg			X		Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		1				

TABLE 8 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18499	Liters Floated						5.50 L
240-250	Light Fraction Weight						0.185 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	Pinus	Seed		1			< 0.0001 g
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 0.5 mm						0.0046 g
	Conifer	Charcoal		1			< 0.0001 g
	Quercus	Charcoal		8			0.0020 g
	Unidentified hardwood - small	Charcoal		7			0.0025 g
	NON-FLORAL REMAINS:						
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters
pc = partially charred
* = Estimated frequency

TABLE 9
MACROFLORAL REMAINS FROM UNIT 258 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20807	Liters Floated						1.80 L
84-90	Light Fraction Weight						13.289 g
cmbd	FLORAL REMAINS:						
	Ambrosia	Seed	1			9	
	Chamaesyce	Seed			1		
	Cheno-am	Perisperm			3		
	Amaranthus	Seed			30	2	
	Chenopodium	Seed			6		
	Datura	Seed				43	
	Erodium	Seed			1		
	Juniperus	Leaf				3	
	Pinus	Seed				2	0.0012 g
	Poaceae	Rachis				1	
	Poaceae	Floret				2	
	Poaceae A	Caryopsis				1	
	Portulaca	Seed			1		
	Stellaria	Seed			19	2	
	Tribulus terrestris	Seed			5	22	
	Unidentified	Seed		9			0.0210 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 1 mm						0.0303 g
	Pseudotsuga	Charcoal		4			0.0175 g
	Quercus - Leucobalanus group	Charcoal		2			0.0085 g
	Quercus - Leucobalanus group - vitrified	Charcoal		1			0.0021 g
	Umbellularia californica	Charcoal		1			0.0008 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone $\geq$ 2 mm					6	0.1492 g
	Bone < 2 mm					X	Few
	Bone - calcined $\geq$ 2 mm			2			0.2773 g
	Bone - calcined < 2 mm			X			Few
	Brick/Tile					X	Moderate
	Clinker $\geq$ 2 mm					97	2.0125 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20807	NON-FLORAL REMAINS (Continued):						
84-90	Clinker < 2 mm					X	Moderate
cmbd	Coal ≥ 2 mm					34	1.5222 g
	Coal < 2 mm					X	Few
	Glass - amber					2	0.0032 g
	Glass - clear ≥ 1 mm					6	0.7969 g
	Glass - clear < 1 mm					X	Few
	Glass - green					1	0.0396 g
	Insect	Chitin				34	
	Metal - flat, rusted ≥ 2 mm					9	0.4672 g
	Metal - flat, rusted < 2 mm					X	Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Moderate
	Steel metal filing					1	0.0493 g
	Termite fecal pellet				2		
20814	Liters Floated						4.00 L
90-100	Light Fraction Weight						54.430 g
cmbd	FLORAL REMAINS:						
	Cereal-type	Caryopsis		1			0.0006 g
	Chamaesyce	Seed			3		
	Cheno-am ≥ 0.5 mm	Perisperm			21		
	Cheno-am < 0.5 mm	Perisperm			X	X	Moderate
	Amaranthus ≥ 0.5 mm	Seed			27	9	
	Amaranthus < 0.5 mm	Seed			X	X	Moderate
	Chenopodium ≥ 0.5 mm	Seed			9	4	
	Chenopodium < 0.5 mm	Seed				X	Few
	Datura wrightii-type ≥ 1 mm	Seed			1	98	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Descurainia	Seed			2		
	Erodium	Awn		1			
	Erodium	Seed		2			
	cf. Fabaceae	Endosperm	3				
	Malva	Seed	1		1		
	Nicotiana	Seed			14*	18*	
	Oxalis	Seed			2		
	Physalis/Solanum	Seed				2	

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20814	FLORAL REMAINS (Continued):						
90-100 cmbd	*Pinus* ≥ 1 mm	Seed				19	0.0125 g
	Pinus < 1 mm	Seed				X	Few
	Polygonum - triangular	Seed			1		
	cf. *Salvia*	Seed		1			
	Schinus molle	Seed		8			0.0032 g
	Silene	Seed			1		
	Stellaria	Seed			7	4	
	Tribulus terrestris ≥ 1 mm	Seed			4	17	
	Unidentified	Endosperm			3		
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.2286 g
	Pseudotsuga	Charcoal		20			0.0319 g
	Quercus	Charcoal		7			0.0182 g
	Quercus - vitrified	Charcoal		1			0.0111 g
	Quercus - *Leucobalanus* group	Charcoal		3			0.0489 g
	Quercus - Live oak	Charcoal		2			0.0106 g
	Salicaceae	Charcoal		3			0.0018 g
	Schinus molle	Charcoal		2			0.0175 g
	Unidentified hardwood	Charcoal		1			0.0010 g
	Unidentified hardwood - vitrified	Charcoal		2			0.0106 g
	Total wood ≥ 2 mm						0.0985 g
	Conifer	Wood				7	0.0985 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Numerous
	Bone ≥ 4 mm					3	0.7284 g
	Bone < 4 mm					X	Moderate
	Brick/Tile					X	Moderate
	Clinker ≥ 4 mm					11	2.0527 g
	Clinker < 4 mm					X	Moderate
	Glass - brown ≥ 2 mm					2	0.4678 g
	Glass - clear ≥ 2 mm					5	0.9773 g
	Insect	Chitin				X	Few
	Metal - flat, rusted					X	Moderate
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X	X	X	Moderate

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
21530	Liters Floated						2.00 L
100-110	Light Fraction Weight						68.840 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm			13		
	Chenopodium ≥ 0.5 mm	Seed		1		3	
	Chenopodium < 0.5 mm	Seed				X	Few
	Chenopodium berlandieri-type	Seed			1	3	
	Datura wrightii-type ≥ 1 mm	Seed			2	43	0.0091 g
	Datura wrightii-type ≥ 1 mm	Seed				3 ic,pc	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Erodium	Awn		3			
	Erodium	Seed		1			
	Helianthus	Seed			1		
	Nicotiana	Seed			19	23	
	Oxalis	Seed			1		
	Periderm ≥ 2 mm			1			0.0026 g
	Pinus ≥ 1 mm	Seed				3	0.0012 g
	Pinus < 1 mm	Seed				X	Few
	Poaceae A	Caryopsis		2			0.0010 g
	Portulaca	Seed			2		
	Salvia	Seed			1		
	Sambucus nigra	Seed				1	
	Schinus molle ≥ 1 mm	Seed		5			0.0025 g
	Schinus molle < 1 mm	Seed		X			Few
	Stellaria	Seed			2		
	Unidentified	Seed	1				
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0599 g
	Pseudotsuga	Charcoal		10			0.0071 g
	Quercus	Charcoal		12			0.0137 g
	Quercus - vitrified	Charcoal		2			0.0125 g
	Quercus - *Leucobalanus* group	Charcoal		1			0.0010 g
	Quercus - Live oak	Charcoal		1			0.0011 g
	Rhamnus	Charcoal		2			0.0033 g
	Salicaceae	Charcoal		9			0.0161 g
	Sequoia sempervirens	Charcoal		1			0.0017 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
21530	CHARCOAL/WOOD (Continued):						
100-110 cmbd	*Umbellularia californica*	Charcoal		1			0.0002 g
	Unidentified hardwood - small	Charcoal		3			0.0032 g
	NON-FLORAL REMAINS:						
	Asphaltum $\geq$ 4 mm					X	270.00 g
	Asphaltum < 4 mm					X	Numerous
	Bone $\geq$ 2 mm					4	0.4214 g
	Bone < 2 mm					X	Few
	Brick/Tile $\geq$ 2 mm					9	17.592 g
	Brick/Tile < 2 mm					X	Few
	Clinker $\geq$ 4 mm					3	0.420 g
	Clinker < 4 mm					X	Few
	Insect	Chitin				X	Moderate
	Metal - flat, rusted $\geq$ 4 mm					33	7.369 g
	Rock/Sand					X	Moderate
	Termite fecal pellet				X	X	Few
20082	Liters Floated						3.00 L
110-120 cmbd	Light Fraction Weight						29.959 g
	FLORAL REMAINS:						
	Asteraceae, Cynareae	Seed		1			0.0008 g
	Bud			1			
	Cheno-am	Seed			2	2	
	Cheno-am $\geq$ 0.5 mm	Perisperm	1	5	3		
	Cheno-am < 0.5 mm	Perisperm			X	X	Moderate
	Amaranthus	Seed	3		1	3	
	Chenopodium $\geq$ 0.5 mm	Seed	22	13	4		
	Chenopodium < 0.5 mm	Seed	X	X	X	X	Numerous
	cf. Conifer	Cone scale		1			0.0013 g
	Pinus	Seed				3	0.0067 g
	Datura wrightii-type $\geq$ 2 mm	Seed			1	17	0.0088 g
	Datura wrightii-type $\geq$ 1 mm	Seed				226	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Datura wrightii-type $\geq$ 2 mm	Seed				2 ic,pc	0.0009 g
	Datura wrightii-type $\geq$ 1 mm	Seed				30 ic,pc	
	Datura wrightii-type $\geq$ 1 mm	Seed		3			0.0022 g
	Datura wrightii-type < 1 mm	Seed		X		X ic,pc	Moderate

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20082	FLORAL REMAINS (Continued):						
110-120	*Erodium* > 0.25 mm	Awn		7			0.0008 g
cmbd	*Erodium*	Seed	2	1			0.0006 g
	Lamiaceae	Seed	3				0.0003 g
	cf. *Salvia*	Seed	1				
	Malvaceae	Fruit		7			0.0012 g
	Malvaceae	Seed	5				0.0023 g
	Nicotiana	Seed			28	6	
	Physalis/Solanum	Seed				1	< 0.0001 g
	Poaceae > 0.25 mm	Awn		2			0.0001 g
	Poaceae/*Erodium* < 0.25 mm	Awn		X			Moderate
	Poaceae	Rachis		1			< 0.0001 g
	Poaceae A	Caryopsis	2	20			0.0086 g
	Poaceae	Scutellum	1				< 0.0001 g
	Portulaca	Seed			2		
	Rumex	Seed	1				
	Sambucus nigra	Seed		1			
	Schinus molle > 1 mm	Seed	8	81			0.0946 g
	Schinus molle < 1 mm	Seed		X			Moderate
	Solanum douglasii-type	Seed	2				
	Thorn			1			
	CHARCOAL/WOOD:						
	Total charcoal > 2 mm						0.1923 g
	Conifer - vitrified	Charcoal		3			0.0034 g
	Pseudotsuga	Charcoal		2			0.0011 g
	Quercus	Charcoal		9			0.0874 g
	Quercus - vitrified	Charcoal		1			0.0055 g
	Quercus - Leucobalanus group	Charcoal		3			0.0139 g
	Quercus - Live oak	Charcoal		2			0.0553 g
	Rhamnaceae	Charcoal		1			0.0009 g
	Rhamnus	Charcoal		1			0.0027 g
	Salicaceae	Charcoal		5			0.0138 g
	Umbellularia californica	Charcoal		1			0.0052 g
	Unidentified hardwood	Charcoal		1			0.0015 g
	Unidentified hardwood twig	Charcoal		1			0.0016 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20082	Total wood ≥ 2 mm						0.0026 g
110-120	*Pseudotsuga*	Wood				1 ic,pc	0.0026 g
cmbd	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					14	1.0590 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 2 mm					50	2.4189 g
	Bone < 2 mm					X	Moderate
	Tooth ≥ 2 mm					1	0.0034 g
	Rodent incisor tooth ≥ 4 mm					1	0.0188 g
	Bone ≥ 2 mm					19 ic,pc	1.2969 g
	Bone - calcined ≥ 1 mm			1			0.0020 g
	Brick/Tile ≥ 4 mm					3	0.1277 g
	Clinker ≥ 4 mm					12	0.3677 g
	Coal					X	Few
	Glass - clear ≥ 2 mm					1	0.0501 g
	Insect	Chitin				X	Few
	Metal - flat, rusted					X	Numerous
	Wire - rusted					X	Moderate
	Muscovite					X	Few
	Porcelain ≥ 4 mm					2	2.8114 g
	Porcelain < 4 mm					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Moderate
18597	Liters Floated						3.70 L
120-130	Light Fraction Weight						43.130 g
cmbd	FLORAL REMAINS:						
	Asteraceae, Cynareae	Seed		1			
	Xanthium-type	Fruit		3			0.0028 g
	Cheno-am ≥ 0.5 mm	Perisperm	16	15	19		
	Cheno-am < 0.5 mm	Perisperm		X		X	Few
	Amaranthus ≥ 0.5 mm	Seed	13	4	1		
	Amaranthus < 0.5 mm	Seed		X			Few
	Chenopodium ≥ 0.5 mm	Seed	3	9	4	8	
	Chenopodium < 0.5 mm	Seed		X		X	Numerous
	Chenopodium berlandieri-type ≥ 0.5 mm	Seed	35	122	2	9	

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18597	FLORAL REMAINS (Continued):						
120-130	*Datura wrightii*-type ≥ 2 mm	Seed		1			0.0004 g
cmbd	*Datura wrightii*-type ≥ 2 mm	Seed			3	8	0.0064 g
	Datura wrightii-type ≥ 1 mm	Seed		3		220	
	Datura wrightii-type ≥ 1 mm	Seed				14 ic,pc	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Erodium ≥ 0.5 mm	Awn		10			
	Erodium < 0.5 mm	Awn		X			Moderate
	Erodium	Seed	2				
	Malvaceae	Fruit		44			
	Malvaceae	Seed	12	15			
	Malva	Seed	8		1		
	Nicotiana	Seed			24*		
	Pinus ≥ 1 mm	Seed		1			0.0034 g
	Pinus ≥ 1 mm	Seed				9	0.0309 g
	Pinus < 1 mm	Seed				X	Few
	Poaceae	Rachis		2			0.0001 g
	Poaceae A	Caryopsis		10			0.0038 g
	Poaceae B	Caryopsis		7			0.0008 g
	Polygonaceae	Seed		1			
	Portulaca	Seed	3		1	3	
	Salvia	Seed	12	1			
	Sambucus nigra	Seed				3	
	Schinus molle ≥ 2 mm	Seed	62	19			0.2713 g
	Schinus molle ≥ 1 mm	Seed		392			
	Schinus molle < 1 mm	Seed		X			Numerous
	Solanum douglasii-type	Seed	9	4			
	Thorn		1				0.0009 g
	Unidentified	Fruit		1			0.0011 g
	Unidentified G	Fruit		9			0.0054 g
	Unidentified	Seed		2			
	Vitrified tissue ≥ 4 mm			5			0.1908 g
	Vitrified tissue < 4 mm			X			Moderate

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18597	CHARCOAL/WOOD:						
120-130	Total charcoal ≥ 2 mm						0.4633 g
cmbd	*Encelia californica*	Charcoal		16			0.1546 g
	Pseudotsuga	Charcoal		2			0.0107 g
	Quercus	Charcoal		1			0.0040 g
	Quercus - Leucobalanus group	Charcoal		1			0.0035 g
	Quercus - Live oak	Charcoal		3			0.0476 g
	Rhamnus	Charcoal		1			0.0027 g
	Salicaceae	Charcoal		6			0.0660 g
	Umbellularia californica	Charcoal		6			0.0192 g
	Unidentified hardwood	Charcoal		4			0.0102 g
	Unidentified hardwood twig	Charcoal		4			0.0347 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					51	10.834 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					3	0.6692 g
	Bone ≥ 4 mm					2 ic,pc	0.1277 g
	Bone < 4 mm					X	Moderate
	Rodent tooth ≥ 2 mm					1	0.0047 g
	Brick/Tile ≥ 4 mm					11	21.146 g
	Brick/Tile < 4 mm					X	Few
	Clinker ≥ 4 mm					18	1.7310 g
	Clinker < 4 mm					X	Moderate
	Glass - clear ≥ 2 mm					1	0.2560 g
	Lime ≥ 4 mm					3	0.0226 g
	Lime < 4 mm					X	Few
	Metal - flat, rusted ≥ 4 mm					X	227.40 g
	Metal - flat, rusted < 4 mm					X	Numerous
	Porcelain ≥ 4 mm					1	0.0686 g
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X	X	X	Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20778	Liters Floated						2.60 L
130-140	Light Fraction Weight						18.821 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed	1	2			
	Cheno-am	Perisperm		64*	8*		
	Amaranthus	Seed	1	24*			
	Chenopodium	Seed	80*	368*	32*		
	Erodium	Awn		48*			
	Malvaceae	Fruit		16*			
	Malvaceae	Seed	8				
	Oxalis	Seed			1		
	Parenchymous tissue ≥ 2 mm			17			0.2456 g
	Parenchymous tissue < 2 mm			X			Numerous
	Periderm ≥ 2 mm			1			0.0123 g
	PET fruity tissue			40*			
	Pinus	Seed				3	0.0150 g
	Poaceae	Awn		48*			
	Poaceae	Floret				2	
	Poaceae	Caryopsis		1			
	Sambucus nigra	Seed				8*	
	Schinus molle ≥ 2 mm	Seed	48	16	3 pc		0.2215 g
	Schinus molle < 2 mm	Seed		824*			
	Solanaceae	Seed				8*	
	Datura wrightii-type ≥ 2 mm	Seed		1	1	5	
	Datura wrightii-type < 2 mm	Seed		32*		1896*	
	Nicotiana	Seed			64*	56*	
	Solanum douglasii-type	Seed	2				
	Spine			X			Few
	Thorn		2	X			Few
	Vitrified tissue			X			Numerous
	Unidentified	Seed		X			
	Rootlets					X	Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20778	CHARCOAL/WOOD:						
130-140	Total charcoal ≥ 2 mm						0.2756 g
cmbd	Conifer twig	Charcoal		2			0.0133 g
	Sequoia sempervirens	Charcoal		3			0.0380 g
	Encelia californica	Charcoal		7			0.0353 g
	Quercus - Leucobalanus group	Charcoal		3			0.0135 g
	Quercus - Leucobalanus group - vitrified	Charcoal		2			0.0114 g
	Rosa	Charcoal		7			0.0595 g
	Salix	Charcoal		6			0.0329 g
	Umbellularia californica	Charcoal		4			0.0333 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					16	3.3226 g
	Bone ≥ 2 mm			3			0.3782 g
	Bone < 2 mm			X		X	Few
	Brick/Tile					X	Few
	Burned sediment			X			Few
	Coal ≥ 2 mm					7	0.4014 g
	Coal < 2 mm					X	Few
	Glass - clear ≥ 2 mm					6	8.9885 g
	Insect	Chitin		2		72*	
	Insect	Egg			X		Few
	Insect	Puparium				16*	
	Metal - flat, rusted ≥ 4 mm					547	334.50 g
	Metal - flat, rusted < 4 mm					X	Numerous
	Nail - rusted ≥ 4 mm					40	16.5101 g
	Nail - rusted < 4 mm					X	Few
	Mortar					X	Few
	Porcelain					7	1.6181 g
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X				Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20815	Liters Floated						3.20 L
140-150	Light Fraction Weight						15.202 g
cmbd	FLORAL REMAINS:						
	Anthemis	Seed	1				
	Cheno-am	Perisperm	5	4	2		
	Amaranthus	Seed	2	1			
	Chenopodium	Seed	18*	24*	2		
	Chenopodium berlandieri-type	Seed	15*	16*			
	Datura wrightii-type	Seed				40*	
	Erodium	Awn		2			
	Malvaceae	Fruit		9			0.0011 g
	Malvaceae	Seed	18	15			0.0108 g
	Malva	Seed			4		
	Medicago sativa	Seed	1				
	Parenchymous tissue			49			0.5336 g
	PET fruity tissue with seed fragments			1			0.0001 g
	Pinus	Seed		2		1	
	Poaceae	Awn		10*			
	Poaceae	Rachis		1			
	Poaceae A	Caryopsis		1			0.0015 g
	Poaceae B	Caryopsis		1			0.0006 g
	Rumex	Seed	1				
	Schinus molle ≥ 2 mm	Seed	26	7			0.1269 g
	Schinus molle < 2 mm	Seed		240*			
	Solanum	Seed	1				
	Solanum douglasii-type	Seed	2				
	Thorn			1			< 0.0001 g
	Vitrified tissue			X			Few
	Unidentified	Fruit		1			0.0024 g
	Unidentified	Seed	8				
	Unidentified	Endosperm	1				

TABLE 9 (Continued)

Sample			Charred		Uncharred		Weights/
No.	Identification	Part	W	F	W	F	Comments
20815	CHARCOAL/WOOD:						
140-150	Total charcoal ≥ 1 mm						0.1172 g
cmbd	Conifer	Charcoal		1			0.0001 g
	Pseudotsuga	Charcoal		1			0.0013 g
	Sequoia sempervirens	Charcoal		3			0.0016 g
	Quercus - Leucobalanus group	Charcoal		11			0.0255 g
	Salicaceae	Charcoal		7			0.0191 g
	Ulmus	Charcoal		1			0.0030 g
	Unidentified hardwood Y	Charcoal		5			0.0227 g
	Total wood ≥ 1 mm						0.0012 g
	Conifer	Wood				2	0.0012 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Moderate
	Bone - vertebra				1		0.3848 g
	Brick/Tile					X	Few
	Metal - flat, rusted ≥ 4 mm					190	227.07 g
	Metal - flat, rusted < 4 mm					X	Numerous
	Nail - rusted					8	4.5824 g
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Straight pin				1		
	Termite fecal pellet		X				Few
20804	Liters Floated						3.50 L
150-160	Light Fraction Weight						311.77 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm		1	7		
	Chenopodium	Seed			1	3	
	Datura wrightii-type ≥ 1 mm	Seed			1	32	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Descurainia	Seed			1		
	Erodium	Awn				1	
	Ficus carica	Seed				2	
	Nicotiana	Seed			10	9	
	Pinus	Seed		1		3	
	Poaceae	Awn		5			
	Sambucus nigra	Seed			1	5	

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20804	FLORAL REMAINS (Continued):						
150-160	*Schinus molle*	Seed	1	5			
cmbd	*Stellaria*	Seed				1	
	Tribulus terrestris	Seed				1	
	Trifolium	Seed			1		
	Unidentified	Seed	2	2			
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0630 g
	Conifer - vitrified	Charcoal		3			0.0011 g
	Pinus	Charcoal		2			0.0108 g
	Pseudotsuga	Charcoal		8			0.0235 g
	Quercus	Charcoal		5			0.0051 g
	Quercus - Leucobalanus group	Charcoal		1			0.0005 g
	Quercus - Live oak	Charcoal		1			0.0084 g
	Rosaceae - vitrified	Charcoal		1			0.0054 g
	Salicaceae	Charcoal		6			0.0063 g
	Unidentified hardwood	Charcoal		2			0.0019 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					X	216.03 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 2 mm					16	0.6716 g
	Bone ≥ 2 mm					1 ic,pc	0.4061 g
	Bone < 2 mm					X	Few
	Fish vertebra ≥ 2 mm				1		0.0009 g
	Bone ≥ 2 mm			4			0.0935 g
	Bone - calcined ≥ 2 mm			11			0.6881 g
	Bone - calcined < 2 mm			X			Few
	Brick/Tile					X	Few
	Clinker ≥ 2 mm					X	Few
	Glass - clear ≥ 2 mm					3	0.0363 g
	Insect	Chitin				X	Few
	Metal - flat, rusted					X	Moderate
	Wire - rusted					1	0.0029 g
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X		1		Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20822	Liters Floated						4.00 L
160-170	Light Fraction Weight						13.598 g
cmbd	FLORAL REMAINS:						
	Caryophyllaceae	Seed				1	
	Cheno-am	Perisperm		1			
	Chenopodium berlandieri-type	Seed	2	9		3	
	Juncus	Seed			1		
	Malvaceae	Fruit		1			
	Malvaceae	Seed	3				
	Malva	Seed			1		
	Parenchymous tissue			1			0.0035 g
	Pinus	Seed				4	
	Poaceae	Awn		1			
	Zea mays	Cupule		1			0.0007 g
	Salvia	Seed		1			
	Solanaceae	Seed				1	
	Datura wrightii-type	Seed		1			
	Datura wrightii-type ≥ 1 mm	Seed				8	
	Datura wrightii-type < 1 mm	Seed				X	Numerous
	Solanum douglasii-type	Seed	1				
	Schinus molle ≥ 1 mm	Seed	8	23			0.0513 g
	Schinus molle < 1 mm	Seed		X			Moderate
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.2595 g
	Asteraceae	Charcoal		1			0.0051 g
	Quercus	Charcoal		4			0.0137 g
	Quercus - Live oak	Charcoal		2			0.0614 g
	Rhamnus	Charcoal		3			0.0311 g
	Rosa	Charcoal		2			0.0125 g
	Rosa twig	Charcoal		7			0.1043 g
	Salicaceae	Charcoal		2			0.0172 g
	Schinus molle	Charcoal		1			0.0010 g
	Unidentified hardwood - vitrified	Charcoal		2			0.0132 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20822	NON-FLORAL REMAINS:						
160-170 cmbd	Asphaltum ≥ 4 mm					15	1.3968 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					4	1.7349 g
	Bone < 4 mm					X	Moderate
	Bone ≥ 2 mm					1 ic	0.0608 g
	Clinker ≥ 4 mm					2	0.0508 g
	Clinker < 4 mm					X	Few
	Fibrous material					1	0.0178 g
	Glass - yellow ≥ 2 mm					1	0.0106 g
	Metal - flat, rusted					X	Moderate
	Metal eylet				1		0.1095 g
	Wire - rusted					X	Few
	Muscovite					X	Few
	Porcelain ≥ 4 mm					1	0.3077 g
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X				Few
20818	Liters Floated						3.00 L
170-180	Light Fraction Weight						6.519 g
cmbd	FLORAL REMAINS:						
	Cheno-am ≥ 0.5 mm	Perisperm	12	9			
	Chenopodium ≥ 0.5 mm	Seed	9	5			
	Chenopodium < 0.5 mm	Seed		X		X	Moderate
	Chenopodium berlandieri-type ≥ 0.5 mm	Seed	44	35	9	10	
	Datura wrightii-type	Seed				1	
	Ficus carica	Seed				2	
	Malva	Seed			3		
	Pinus ≥ 1 mm	Seed				45	0.0556 g
	Pinus < 1 mm	Seed				X	Moderate
	Poaceae	Awn		2			< 0.0001 g
	Poaceae A	Caryopsis		1			0.0003 g
	Cereal-type	Rachis		2			0.0016 g
	Cereal-type	Caryopsis		1			0.0007 g
	Zea mays	Cupule		1			0.0005 g
	Polygonum	Seed	1				

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20818	FLORAL REMAINS (Continued):						
170-180	*Salvia*	Seed	17	28			
cmbd	*Schinus molle*	Seed		1			
	Solanum douglasii-type	Seed	22	5			
	Unidentified L	Seed	4				
	Unidentified S	Seed	1				
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.1027 g
	Asteraceae	Charcoal		1			0.0012 g
	Pseudotsuga	Charcoal		3			0.0079 g
	Quercus	Charcoal		19			0.0214 g
	Quercus - Leucobalanus group	Charcoal		1			0.0015 g
	Rhamnus	Charcoal		2			0.0122 g
	Salicaceae	Charcoal		2			0.0017 g
	Schinus molle	Charcoal		6			0.0205 g
	Unidentified hardwood - small	Charcoal		5			0.0028 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0081 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					8	2.0113 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					3	0.2066 g
	Bone < 4 mm					X	Few
	Brick/Tile ≥ 4 mm					4	0.940 g
	Brick/Tile < 4 mm					X	Few
	Clinker					X	Few
	Glass - yellow ≥ 4 mm					1	0.2172 g
	Metal - flat, rusted ≥ 4 mm					1	0.1118 g
	Metal - flat, rusted < 4 mm					X	Few
	Nail - rusted ≥ 4 mm					1	1.5833 g
	Mortar ≥ 4 mm					3	3.690 g
	Mortar < 4 mm					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20085	Liters Floated						4.00 L
180-190	Light Fraction Weight						18.381 g
cmbd	FLORAL REMAINS:						
	Asteraceae	Seed		1			
	Xanthium-type	Fruit		2			
	Calandrinia	Seed				1	
	Cheno-am ≥ 0.5 mm	Perisperm	10	14			
	Cheno-am < 0.5 mm	Perisperm		X			Few
	Chenopodium berlandieri-type ≥ 0.5 mm	Seed	39	60	2	26	
	Chenopodium < 0.5 mm	Seed		X		X	Few
	Citrullus lanatus	Seed		4			0.0027 g
	Datura	Seed		6			0.0029 g
	Erodium	Awn		13			
	Ficus carica	Seed				2	
	Malvaceae	Fruit		2			
	Malvaceae	Seed	2	2			
	Malva	Seed	2		3		
	Opuntia	Seed		6			0.0040 g
	Phacelia	Seed	1				
	Physalis/Solanum	Seed				3	
	Pinus ≥ 1 mm	Seed				3	0.0010 g
	Pinus < 1 mm	Seed				X	Few
	Pinus ≥ 0.5 mm	Seed		2			0.0005 g
	Poaceae	Scutellum		1			< 0.0001 g
	Zea mays	Cupule		1			0.0044 g
	Polygonum/Rumex	Seed	1	1			
	Salvia	Seed	30	35			
	Sambucus nigra ≥ 0.5 mm	Seed			1	8	
	Sambucus nigra < 0.5 mm	Seed				X	Few
	Solanum douglasii-type	Seed	23	6			
	Vitrified tissue ≥ 2 mm			1			0.0014 g
	cf. *Zannichellia palustris*	Seed		1			
	Unidentified	Fruit		1			

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20085	CHARCOAL/WOOD:						
180-190	Total charcoal ≥ 2 mm						0.1143 g
cmbd	Asteraceae	Charcoal		1			0.0021 g
	Conifer - vitrified	Charcoal		1			0.0004 g
	Platanus racemosa	Charcoal		5			0.0086 g
	Platanus racemosa twig	Charcoal		1			0.0054 g
	Quercus	Charcoal		5			0.0167 g
	Quercus - vitrified	Charcoal		1			0.0019 g
	Quercus - Live oak	Charcoal		2			0.0384 g
	Rosaceae twig	Charcoal		3			0.0066 g
	Salicaceae	Charcoal		1			0.0018 g
	Salix	Charcoal		1			0.0064 g
	Unidentified hardwood	Charcoal		2			0.0061 g
	Unidentified hardwood twig	Charcoal		6			0.0199 g
	Total wood ≥ 2 mm						0.0033 g
	Pseudotsuga	Wood				1	0.0033 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					X	6.456 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 2 mm					3	0.4436 g
	Bone < 2 mm					X	Few
	Bone - calcined ≥ 1 mm			1			0.0018 g
	Brick/Tile					X	Few
	Clinker					X	Few
	Insect	Chitin				X	Few
	Lime ≥ 2 mm					3	0.0857 g
	Lime < 2 mm					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Moderate

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20855	Liters Floated						4.00 L
190-200	Light Fraction Weight						6.370 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed	1				0.0001 g
	Cheno-am	Perisperm			1		
	Chenopodium	Seed		1	1		
	Crataegus	Seed		1			0.0013 g
	Juglans	Nutshell		1			0.0102 g
	Opuntia	Seed		1			0.0028 g
	Pinus	Seed				2	0.0019 g
	Poaceae	Awn		1			
	cf. Poaceae	Caryopsis		1			
	Poaceae C	Caryopsis	1				< 0.0001 g
	Portulaca	Seed			4		
	Solanum douglasii-type	Seed	1				
	Vitrified tissue			1			
	Unidentified	Fruit		1			0.0210 g
	Unidentified	Seed	2				< 0.0001
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0570 g
	Pinus	Charcoal		1			0.0010 g
	Pseudotsuga	Charcoal		2			0.0010 g
	Quercus	Charcoal		2			0.0025 g
	Rhamnaceae	Charcoal		11			0.0184 g
	Salicaceae	Charcoal		2			0.0247 g
	Populus	Charcoal		1			0.0100 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0004 g
	Total wood ≥ 1 mm						0.0002 g
	Conifer	Wood				3	0.0002 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 1 mm				1		0.0103 g
	Bone - calcined ≥ 1 mm			2			0.0090 g
	Brick/Tile					X	Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20855	NON-FLORAL REMAINS (Continued):						
190-200	Insect	Chitin				X	Few
cmbd	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet			X	1		Few
20854	Liters Floated						4.00 L
200-210	Light Fraction Weight						2.607 g
cmbd	FLORAL REMAINS:						
	Malvaceae	Seed		1			
	Parenchymous tissue			1			0.0001 g
	Portulaca	Seed			2	1	
	Vitrified tissue			1			0.0005 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0765 g
	Pseudotsuga	Charcoal		1			0.0011 g
	Quercus	Charcoal		26			0.0321 g
	Quercus - vitrified	Charcoal		1			0.0041 g
	Salicaceae	Charcoal		6			0.0055 g
	Unidentified hardwood	Charcoal		3			0.0021 g
	Unidentified hardwood - vitrified	Charcoal		3			0.0124 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					6	0.5283 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					2	0.3310 g
	Bone < 4 mm					X	Few
	Brick/Tile					X	Few
	Clinker					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20859	Liters Floated						4.00 L
210-220	Light Fraction Weight						1.162 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm		1		1	
	Vitrified tissue			1			0.0052 g
	Unidentified A	Seed		2			0.0021 g
	Rootlets					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.0540 g
	Quercus	Charcoal		9			0.0191 g
	Quercus - Leucobalanus group	Charcoal		6			0.0182 g
	Rhamnus	Charcoal		1			0.0009 g
	Salicaceae	Charcoal		4			0.0080 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					3	0.0826 g
	Bone < 2 mm			X		X	Few
	Rodent tooth enamel					2	0.0037 g
	Bone - calcined ≥ 2 mm			1			0.0553 g
	Brick/Tile					X	Few
	Insect	Chitin				1	
	Insect	Egg			X		Few
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Few
20849	Liters Floated						4.00 L
220-230	Light Fraction Weight						27.445 g
cmbd	FLORAL REMAINS:						
	Chenopodium berlandieri-type	Seed				1	
	Physalis/Solanum	Seed				2	
	Sambucus nigra	Seed				2	
	Solanum douglasii-type	Seed	1				
	Trifolium	Seed			1		

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20849	CHARCOAL/WOOD:						
220-230	Total charcoal ≥ 1 mm						0.1905 g
cmbd	*Juniperus*	Charcoal		1			0.0010 g
	Platanus racemosa	Charcoal		1			0.0042 g
	Quercus	Charcoal		28			0.0896 g
	Quercus - *Leucobalanus* group	Charcoal		3			0.0271 g
	Quercus - Live oak	Charcoal		1			0.0023 g
	Rhamnus	Charcoal		3			0.0020 g
	Salicaceae	Charcoal		3			0.0041 g
	Total wood ≥ 2 mm						0.0020 g
	Pseudotsuga	Wood				1	0.0020 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					X	16.007 g
	Asphaltum < 4 mm					X	Numerous
	Clinker					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
20075	Liters Floated						4.00 L
230-240	Light Fraction Weight						15.340 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed		1			< 0.0001 g
	Malva	Seed			1		
	Parenchymous tissue ≥ 1 mm			10			0.0122 g
	Parenchymous tissue < 1 mm			X			Few
	Poaceae	Awn		2			< 0.0001 g
	Sambucus nigra	Seed				1	
	Solanaceae	Seed				3	
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.4047 g
	Asteraceae	Charcoal		2			0.0016 g
	Platanus racemosa	Charcoal		2			0.0113 g
	Quercus	Charcoal		6			0.0128 g
	Quercus - vitrified	Charcoal		1			0.0061 g
	Quercus - *Leucobalanus* group	Charcoal		11			0.0912 g
	Quercus - Live oak	Charcoal		10			0.1640 g
	Rosaceae	Charcoal		2			0.0050 g
	Salicaceae	Charcoal		1			0.0010 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20075	Total wood ≥ 2 mm						0.0057 g
230-240	Conifer	Wood				5	0.0057 g
cmbd	NON-FLORAL REMAINS:						
	Asphaltum					X	Moderate
	Bead - blue shell				1		0.3232 g
	Bone ≥ 2 mm					5	0.0553 g
	Bone ≥ 2 mm			1			0.0221 g
	Bone - calcined ≥ 2 mm			1			0.0309 g
	Bone < 2 mm			X		X	Few
	Brick/Tile					X	Few
	Insect	Chitin				X	Few
	Metal drop				1		0.0201 g
	Muscovite					X	Moderate
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X				Few
20083	Liters Floated						4.00 L
240-250	Light Fraction Weight						19.058 g
cmbd	FLORAL REMAINS:						
	Erodium	Awn		2			
	Physalis/Solanum	Seed				4	
	Pinus	Seed				2	
	Sambucus nigra	Seed				2	
	Vitrified tissue			X			Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.1716 g
	Prunus - vitrified	Charcoal		1			0.0044 g
	Quercus	Charcoal		23			0.0649 g
	Quercus - Leucobalanus group	Charcoal		7			0.0879 g
	Quercus - Live oak	Charcoal		1			0.0074 g
	Salicaceae	Charcoal		2			0.0042 g
	Umbellularia californica	Charcoal		1			0.0028 g
	Total wood ≥ 2 mm						0.0024 g
	Pseudotsuga	Wood				1	0.0024 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20083	NON-FLORAL REMAINS:						
240-250 cmbd	Asphaltum ≥ 4 mm					X	4.696 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 2 mm				1	1	0.0953 g
	Brick/Tile ≥ 4 mm					X	15.066 g
	Brick/Tile < 4mm					X	Few
	Glass - clear ≥ 4 mm					1	0.2632 g
	Insect	Chitin				1	
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
20084	Liters Floated						4.20 L
250-260 cmbd	Light Fraction Weight						6.356 g
	FLORAL REMAINS:						
	Brassica	Seed		1			
	Physalis	Seed			1	1	
	Pinus	Seed				2	
	Sambucus nigra	Seed				5	
	Trifolium	Seed			1		
	Zea mays	Kernel		1			0.0065 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.2217 g
	Asteraceae	Charcoal		2			0.0105 g
	Platanus racemosa	Charcoal		4			0.0028 g
	Pseudotsuga	Charcoal		2			0.0089 g
	Quercus	Charcoal		18			0.0441 g
	Quercus - Leucobalanus group	Charcoal		7			0.0762 g
	Rhamnus	Charcoal		2			0.0027 g
	Salicaceae twig	Charcoal		1			0.0052 g
	Unidentified hardwood	Charcoal		4			0.0085 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Numerous
	Bone ≥ 2 mm					3	0.0505 g
	Bone < 2 mm					X	Few
	Brick/Tile					X	Moderate
	Insect	Chitin				X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X	1		Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18814	Liters Floated						2.80 L
260-265	Light Fraction Weight						3.383 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	Pinus ≥ 1 mm	Seed				4	0.0016 g
	Pinus < 1 mm	Seed				X	Few
	Sambucus nigra	Seed			1	1	
	Solanaceae	Seed				1	
	Zea mays	Kernel		1			0.0056 g
	Unidentified G	Fruit		1			< 0.0001 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.0977 g
	Quercus	Charcoal		17			0.0656 g
	Quercus - vitrified	Charcoal		5			0.0305 g
	Quercus - *Leucobalanus* group	Charcoal		5			0.0478 g
	Quercus - Live oak	Charcoal		4			0.0247 g
	Quercus knot	Charcoal		3			0.8954 g
	Rosaceae - vitrified	Charcoal		1			0.0078 g
	Salicaceae	Charcoal		2			0.0038 g
	Unidentified hardwood	Charcoal		3			0.0067 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					37	0.5533 g
	Asphaltum < 2 mm					X	Moderate
	Brick/Tile					X	Few
	Insect	Chitin				2	
	Lime ≥ 2 mm					1	0.0075 g
	Lime < 2 mm					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20857	Liters Floated						2.70 L
265-270	Light Fraction Weight						3.507 g
cmbd	FLORAL REMAINS:						
	Datura wrightii-type	Seed		1			
	Erodium	Awn		1			
	Malva	Seed			2		
	Pinus ≥ 1 mm	Seed				2	0.0011 g
	Pinus < 1 mm	Seed				X	Few
	Sambucus nigra	Seed			1	3	
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.4119 g
	Betulaceae	Charcoal		1			0.0059 g
	Chrysothamnus	Charcoal		3			0.0059 g
	Quercus	Charcoal		14			0.0419 g
	Quercus - Leucobalanus group	Charcoal		11			0.1868 g
	Quercus - Live oak	Charcoal		2			0.0605 g
	Rhamnus	Charcoal		1			0.0025 g
	Salicaceae	Charcoal		1			0.0013 g
	Salix	Charcoal		4			0.0320 g
	Schinus molle	Charcoal		1			0.0095 g
	Unidentified hardwood	Charcoal		2			0.0051 g
	Total wood ≥ 2 mm						0.0133 g
	Conifer	Wood				2	0.0133 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					28	0.5709 g
	Asphaltum < 2 mm					X	Numerous
	Bone ≥ 2 mm					1	0.0485 g
	Bone < 2 mm					X	Few
	Bone - calcined ≥ 2 mm			1			0.0318 g
	Brick/Tile					X	Few
	Clinker ≥ 2 mm					1	0.0030 g
	Lime ≥ 2 mm					1	0.0101 g
	Lime < 2 mm					X	Few
	Muscovite					X	Few
	Porcelain ≥ 2 mm					1	0.3440 g
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X	1		Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18818	Liters Floated						4.00 L
270-280	Light Fraction Weight						10.276 g
cmbd	FLORAL REMAINS:						
	Cereal-type	Caryopsis		2			0.0060 g
	Malva	Seed			1		
	Pinus	Seed				1	
	Sambucus nigra	Seed				1	
	Vitrified tissue			5			0.0062 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.4875 g
	Quercus	Charcoal		20			0.1273 g
	Quercus - *Erythrobalanus* group	Charcoal		2			0.0646 g
	Quercus - *Leucobalanus* group	Charcoal		3			0.0136 g
	Quercus - Live oak	Charcoal		3			0.0363 g
	Rhamnus	Charcoal		9			0.0809 g
	Salicaceae twig	Charcoal		1			0.0132 g
	Salix	Charcoal		2			0.0068 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					X	4.068 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					2	0.4912 g
	Brick/Tile					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X		1		Few
18813	Liters Floated						3.00 L
280-286	Light Fraction Weight						0.606 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed		1			
	Cheno-am	Perisperm			1	1	
	Malvaceae	Seed		1			
	Malva	Seed			2		0.0031 g
	Periderm			1			0.0030 g
	Unidentified A	Seed	1				0.0053 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18813	CHARCOAL/WOOD:						
280-286	Total charcoal ≥ 2 mm						0.0561 g
cmbd	*Acer*	Charcoal		1			0.0033 g
	Quercus	Charcoal		8			0.0213 g
	Quercus - Leucobalanus group	Charcoal		3			0.0110 g
	Quercus - Leucobalanus group - vitrified	Charcoal		1			0.0029 g
	Salicaceae	Charcoal		4			0.0076 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm		1				0.0167 g
	Bone < 2 mm			X		X	Few
	Insect	Chitin				12	
	Insect	Egg			X	X	Few
	Muscovite					X	Few
	Mortar ≥ 2 mm			4pc		5	3.8186 g
	Mortar < 2 mm			Xpc		X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Few
18817	Liters Floated						2.00 L
286-290	Light Fraction Weight						0.386 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	Malva	Seed	1		1		
	Poaceae	Awn		1			
	Solanum	Seed				1	
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.5 mm						0.0072 g
	Quercus	Charcoal		15			0.0069 g
	Unidentified hardwood - small	Charcoal		3			0.0003 g
	Total wood ≥ 0.5 mm						0.0011 g
	Conifer	Wood				1	0.0011 g

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18817	NON-FLORAL REMAINS:						
286-290 cmbd	Asphaltum					X	Few
	Brick/Tile					X	Few
	Daub with plant impressions					1	0.1655 g
	Insect	Chitin				2	
	Insect	Egg			X		Few
	Muscovite					X	Numerous
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X				Few
20853	Liters Floated						5.00 L
290-300 cmbd	Light Fraction Weight						0.445 g
	FLORAL REMAINS:						
	Chenopodium	Seed			1		
	Poaceae	Awn		3			0.0001 g
	Sambucus nigra	Seed				1	
	Sclerotia				X		Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0094 g
	Quercus	Charcoal		16			0.0066 g
	Quercus - *Leucobalanus* group	Charcoal		1			0.0008 g
	Unidentified hardwood -small	Charcoal		5			0.0020 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					1	0.0209 g
	Brick/Tile ≥ 2 mm					3	1.9724 g
	Insect	Chitin				27	
	Insect	Egg			X	X	Moderate
	Muscovite					X	Numerous
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X				Few

TABLE 9 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20856	Liters Floated						5.60 L
300-310	Light Fraction Weight						1.042 g
cmbd	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.5 mm						0.0040 g
	Unidentified hardwood - small	Charcoal		9			0.0013 g
	Unidentified hardwood - vitrified	Charcoal		2			0.0027 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 2 mm					X	0.1030 g
	Asphaltum < 2 mm					X	Few
	Muscovite					X	Numerous
	Rock/Gravel					X	Numerous

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters
pc = partially charred
ic = incompletely charred
* = Estimated frequency

TABLE 10
MACROFLORAL REMAINS FROM UNIT 267 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20835	Liters Floated						2.60 L
90-100	Light Fraction Weight						6.361 g
cmbd	FLORAL REMAINS:						
	Chenopodium berlandieri-type	Seed		1			
	Nicotiana	Seed			4		
	Opuntia	Seed		1			
	Parenchymous tissue ≥ 2 mm			2			0.0053 g
	Pinus ≥ 0.5 mm	Seed				5	0.0003 g
	Sambucus nigra	Seed				1	
	Zea mays ≥ 2 mm	Stem		122			0.6503 g
	Zea mays < 2 mm	Stem		X			Numerous
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.3737 g
	Betulaceae	Charcoal		1			0.0023 g
	Betula	Charcoal		8			0.0390 g
	Pseudotsuga	Charcoal		4			0.0096 g
	Quercus - vitrified	Charcoal		3			0.0139 g
	Quercus - Live oak	Charcoal		14			0.2496 g
	Unidentified hardwood	Charcoal		9			0.0302 g
	Unidentified hardwood twig	Charcoal		1			0.0060 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					1	0.0813 g
	Bone - calcined ≥ 2 mm			6			0.1825 g
	Bone - calcined < 2 mm			X			Few
	Brick/Tile					X	Moderate
	Eggshell ≥ 2 mm					1	0.0045 g
	Glass - clear ≥ 2 mm					2	0.3028 g
	Glass - opaque ≥ 2 mm					3	0.1313 g
	Insect	Chitin				X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Numerous
	Termite fecal pellet				X	X	Moderate

TABLE 10 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20852	Liters Floated						0.40 L
106-110	Light Fraction Weight						1.200 g
cmbd	FLORAL REMAINS:						
	Datura	Seed				2	
	Datura	Endosperm	1				
	Malvaceae	Seed	2				
	Nicotiana	Seed			1	2	
	Pinus ≥ 2 mm	Seed				1	0.0008 g
	Pinus < 2 mm	Seed				X	Few
	Vitrified tissue ≥ 2 mm			1			0.0474 g
	Vitrified tissue < 2 mm			X			Few
	Zea mays ≥ 2 mm	Kernel		27			0.1239 g
	Zea mays < 2 mm	Kernel		X			Moderate
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0661 g
	Pseudotsuga	Charcoal		14			0.0154 g
	Quercus	Charcoal		6			0.0053 g
	Rosaceae	Charcoal		4			0.0045 g
	Salicaceae	Charcoal		9			0.0068 g
	Unidentified hardwood	Charcoal		7			0.0122 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			5			0.2394 g
	Brick					X	Few
	Eggshell ≥ 2 mm					3	0.0210 g
	Eggshell < 2 mm					X	Few
	Rock/Gravel					X	Few
	Termite fecal pellet		X	X			Moderate

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters

TABLE 11
MACROFLORAL REMAINS FROM A BRICK (FEATURE 4) AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
02477	Sample Weight						723.00 g
Feat. 4	FLORAL IMPRESSIONS:						
Brick	Poaceae	Stem				X	
	Poaceae	Leaf				X	
	Poaceae A	Floret			X	X	
	Poaceae A	Caryopsis			X		
	Cerealia	Spike				2	
	Cerealia	Floret			X	X	
	Cerealia	Caryopsis			X	X	
	NON-FLORAL REMAINS:						
	Muscovite					X	
	Rock/Gravel					X	
	Quartz					X	

W = Whole
F = Fragment
X = Presence noted in sample
g = grams

TABLE 12
POSITIVE PROTEIN RESIDUE RESULTS FOR ARTIFACTS FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Description	Positive Result (Antiserum Type)	Possible Animal(s) Represented
8049	Granitic mano/pestle found ≈ 50 cm east of the southern most corner of the Feature 9 floor	Grasshopper	Various grasshoppers including: migratory grasshopper (*Melanoplus sanguinipes*), field cricket (*Gryllus* sp.), Mormon cricket (*Anabrus simplex*), Jerusalem cricket (*Stenopelmatus fuscus*)
		Yucca	*Yucca*, *Agave*, and some members of the lily family
11588	Steatite ground stone bowl fragment from unit in featureless area north of the train tracks	Bay anchovy	Engraulidae family (Anchovies)
		Trout	Members of the trout/salmon family (Salmonidae)

TABLE 13
FTIR PEAK SUMMARY TABLE FOR SAMPLES FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Peak Range	Represents	06785 Olla	06787 Groundstone bowl	07951 Biface
Fats, oils, lipids, waxes:				
3000-2800	Aldehydes: fats, oils, lipids, waxes	2955/54, 2915, 2871, 2849/48	2955/54, 2915/14, 2872/71, 2849/48	2953/52, 2922, 2852/51
2974, 2968, 2965, 2962, 2956, 2872	CH_3 Asymmetric Stretch	2955/54	2955/54	2953
2959, 2938, 2936, 2934,2931, 2930, 2926,2924, 2922	CH_2 Asymmetric stretch			2922
2879, 2875, 2873, 2871, 2870	CH_3 Symmetric stretch	2871	2872/71	
2876, 2872, 2863, 2858, 2855	CH_2 Symmetric stretch			2852
1377	Fats, oils, lipids, humates (CH_3 symmetric bend)			1377
1170	Lipids		1177	
	Lipids: Saturated Esters:			
1750-1730	Saturated esters (C=O Stretch)	1736	1736	1736/35
1737	Lipids (Phospholipids, C=O Stretch)	1736	1736	1736/35
1188	Saturated ester C-C-O	1186	1195,1186	
1100-1030	Saturated esters		1088,1061	
	Lipids: Aromatic Esters:			
1730-1705	Aromatic esters (C=O Stretch)	1701	1729,1701	
1130-1100	Aromatic esters		1116/15	
750	Out-of-plane C-H bend	746		

TABLE 13 (Continued)

Peak Range	Represents	06785 Olla	06787 Groundstone bowl	07951 Biface
	Lipids: Aromatic Esters (Continued):			
750-700	Aromatic esters	746,727,720/19, 717	728,717	
763, 760, 745, 737, 736	Aromatic out-of-plane C-H bend	746		
692	Aromatic ring bend (phenyl ether)	688	688	
Proteins:				
1700-1500	Protein, incl. 1650 protein	1700, 1578/77,1540		1654
1653	Proteins (Amide bands, 80% C=O Stretch, 10% C-N Stretch, 10% N-H Bend)			1654
1660-1655	Proteins, Nucleic acids			1654
1500-1400	Protein	1472/71,1463, 1432/31,1411	1472/71,1463, 1430,1416,1413	1459/58
1465-1455	Protein/lipids	1463	1463	1459/58
1490-1350	Protein	1472/71,1463, 1432/31,1411, 1390,1347	1472/71,1463, 1430,1416,1413, 1391/90,1348	1459/58
1394, 1379, 1366	Split CH3 umbrella mode, 1:2 intensity	1390	1391	
	Proteins: Amino Acids:			
1640-1610, 1550-1485	Lysine (amino acid) NH_3^+ bending	1540		
1415	Glutamate (amino acid) CO_2^- symmetric stretching	1411	1416,1413	
1465	Alanine (amino acid) CH_2 bending	1463	1463	

TABLE 13 (Continued)

Peak Range	Represents	06785 Olla	06787 Groundstone bowl	07951 Biface
	Proteins: Amino Acids (Continued):			
1350-1250	Serine (amino acid) O-H bending	1347, 1296	1348,1331, 1304, 1296,1286,1270, 1267,1259,1256, 1249	
Carbohydrates (General):				
1028-1000	Cellulose Carbohydrates	1004/03,1000	1015	
	Polysaccharides (Specific):			
1100	Pectin	1098	1100	
1097	Arabinan	1098		
941	Glucomannan	941		
910, 869, 850	β-D-sucrose	912		
Minerals:				
1315	Calcium oxalate		1311	
Other:				
1243	Amide C-N stretch		1246	
1202	Tertiary alcohol C-O stretch	1205	1206	
722-719	CH_2 Rock (methylene)	720/19		

TABLE 14
INDEX OF ORGANIC COMPOUNDS NOTED IN THE SAMPLES FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Compound	Description	Source
LIPIDS:		
Aldehydes	• Organic compounds that contain the carbonyl group (〉C=O) (Davis, et al. 1984:851). • Ubiquitous in nature (O'Brien, et al. 2006).	• Compounds naturally emitted by plants (O'Brien, et al. 2006). • Formed by the oxidation of alcohols (e.g. formaldehyde (methanol), acetaldehyde (ethanol), propionaldehyde (propanol) (Davis, et al. 1984:851).
Phospholipids	• Fats and/or lipids + phosphorus.	• Plants and animals. • Present in shells of freshwater and seawater crustaceans, the chitinous exoskeleton of insects (Ignatyuk and Isai 1993). • Milk fat (Crane and Horrall 1943). • Essential components of oils present in nuts and seeds (Salas 2006a), including acorns (Bonner and Vozzo 1987), pine nuts (Shahidi and Tan 2008:146; Yu and Slavin 2008), sunflower seeds (Salas 2006a, b), and pumpkin seeds (Yoshida 2005). • Concentrated in the cotyledon embryo of plants (Salas 2006a).
ESTERS: (Components of fats, oils, and lipids)		
Aliphatic esters (saturated and unsaturated)	• Esters of fatty acids (more saturated from fats, less saturated from oils) (Davis, et al. 1984:844).	• Common in plants and animals (Davis, et al. 1984:845).
Aromatic esters	• Responsible for flavors and smells (Davis, et al. 1984:843).	• Plant parts (fruits, flowers, bark, etc.) (e.g. cinnamon, mint) (Davis, et al. 1984:843).

TABLE 14 (Continued)

Compound	Description	Source
PROTEINS:		
Amino Acids: (Organic compounds that contain both an amino group and a carboxyl group)		
Essential Amino Acids: (Necessary to build protein, but cannot be synthesized in human body)		
Lysine	• Important for calcium absorption, building muscle, recovering from injuries or illnesses, and the production of hormones, enzymes, and antibodies (Nelson and Cox 2005).	• Legumes, gourds/squash, spinach, amaranth, quinoa, and buckwheat (Wardlaw and Insel 1996:158). • Beef, poultry, pork, fish, eggs, and dairy products.
Non-Essential Amino Acids: (Necessary to build protein, can be synthesized in human body)		
Alanine	• Plays an important role in the glucose-alanine cycle between tissues and liver (Nelson and Cox 2005).	• Common sources of alanine in the diet include such diverse things as meat, eggs, fish, legumes, nuts and seeds, and maize.
Glutamate (syn. glutamic acid)	• Important molecule in cellular metabolism (animals) (Nelson and Cox 2005). • Recent research suggests glutamate plays a role in plant nitrogen metabolism; however, its absence in many plants has prompted speculation (Forde and Lea 2007).	• All animal products (e.g. dairy, eggs, meat (beef, pork, poultry, wild meats, and fish) (Reeds, et al. 2000). Distribution of glutamate in the plant kingdom is limited to protein-rich plants (e.g. whole grains and beans) (Forde and Lea 2007).
Serine	• Important in metabolic function (Nelson and Cox 2005). • Neuronal signal by activating N-methyl-D-aspartate (NMDA) receptors in the brain and helps to build muscle tissue (Mothet, et al. 2000).	• Beef, eggs, nuts and seeds, legumes, and milk.
Nucleic Acids (Contains genetic instructions for proper development and functioning of living organisms, and plays a role in copying genetic information to proteins (Saenger 1984). No specific identifications possible using FTIR.		
CARBOHYDRATES:		
Disaccharides:		
Sucrose (syn. Saccharose)	• Table sugar (one molecule of fructose and one molecule of glucose).	• Plants (contained in sugar cane, sugar beets, sorghum, and maple syrup).

TABLE 14 (Continued)

Compound	Description	Source
Polysaccharides (structural):		
Cellulose	• Straight-chain glucose polymer linked by beta bonds (Wardlaw and Insel 1996:82).	• Plants.
Hemicelluloses:		
Glucomannan	• Soluble fiber used to treat constipation by decreasing fecal transit time (Bochicchio and Reicher 2003; Marzio 1989).	• Roots or corms and in the wood of conifers and dicotyledons (dicots) (Bochicchio and Reicher 2003).
Pectin, Gums, and Mucilages:		
Arabinan	• Essential for the function of guard cells, which play a key role in the ability of plants to survive on dry land (Jones, et al. 2003:11783).	• Terrestrial plants.
Pectin	• Composed of linear or branched forms of simple sugars, primarily rhamnose. • Often used for its gelling or thickening action.	• Apples, plums, gooseberries, and citrus.
MINERALS:		
Calcium Oxalate (abbreviated CaOx)	• CaC_2O_4 or $Ca(COO)_2$ • Crystal forms include styloids, raphids, pyramids, or rosettes. • Primary function of calcium oxalate formation in plants is to regulate high-capacity calcium and protect against herbivory (Franceschi and Nakata 2005:41). • Poisonous when ingested by animals, including humans.	• Most abundant in plant leaves and roots (Patnaik 2003:765). • *Populus* (cottonwood), *Salix* (willow), *Agave*, *Yucca*, Cactaceae (cacti), *Nicotiana* (tobacco), *Datura*, all members of the Fabaceae or legume family, and various plants in the Chenopodiaceae such as *Atriplex* (saltbush), *Chenopodium* (goosefoot); *Oxalis* and Araceae, and roots and leaves of rhubarb and buckwheat (Streitweiser 1976).

TABLE 15
MATCHES SUMMARY TABLE FOR FTIR RESULTS FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Match (Scientific Name)	Match (Common Name)	Part	06785 Olla (Range)	06787 GS bowl (Range)
ECONOMIC:				
Sagittaria latifolia	Arrowroot, Wapato	Drippings in sand from baked root	1162-809	
	Plant	Oil		1750-1721 1422-1407 1404-1362 1248-1234 1204-1153 1072-1048 732-705
	Mammal	Fat from long bone marrow		1422-1407 1293-1278 1228-1204
	Duck	Skin		1422-1407 1204-1153
ENVIRONMENTAL:				
Deteriorated Cellulose	Deteriorated cellulose		1144-917	
Typha	Cattail	Root (raw)	1732-1664 1210-1195 959-920 735-714	1753-1658 1213-1192 1192-1180
	Plant	Seed (raw)	1712-1682	
		Nutshell (raw)	1732-1664 1470-1455 1422-1401	
		Stem (raw)	1479-1449	
		Needles (raw)		1476-1464 1422-1407 1248-1234

GS = Groundstone

TABLE 16
MACROFLORAL REMAINS FROM UNIT 291 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18155	Liters Floated						4.00 L
39-50	Light Fraction Weight						34.523 g
cmbd	FLORAL REMAINS:						
	Apiaceae	Seed			150*		
	Cereal-type	Caryopsis		2			0.0011 g
	Chamaesyce	Fruit				1	
	Chamaesyce	Seed				1	
	Cheno-am ≥ 0.5 mm	Perisperm			27	8	
	Amaranthus ≥ 0.5 mm	Seed			44	27	
	Chenopodium ≥ 0.5 mm	Seed		1	25	32	
	Datura wrightii-type	Seed				25	
	Erodium	Awn		1			
	Erodium	Seed		1			
	Leaf bud					X	Moderate
	Malvaceae	Fruit		1			
	Malvaceae	Seed	1		2		
	Malva	Seed			2		
	Nicotiana	Seed			120*	18*	
	Parenchymous tissue			1			
	Pinus ≥ 2 mm	Seed				112	0.4438 g
	Pinus < 2 mm	Seed				X	Numerous
	Pinus ≥ 1 mm	Seed		3			0.0015 g
	Pinus < 1 mm	Seed		X			Moderate
	Portulaca	Seed				1	
	Sambucus nigra	Seed				5	
	Scrophulariaceae-type	Seed			4		
	Solanum	Seed			1		
	Tribulus terrestris	Seed				2	
	Verbesina	Seed			1		
	Unidentified ≥ 2 mm	Leaf				20	0.0562 g
	Unidentified	Fruit			2		
	Unidentified G	Fruit		2			0.0008 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18155	CHARCOAL/WOOD:						
39-50 cmbd	Total charcoal ≥ 1 mm						0.1558 g
	Conifer	Charcoal		4			0.0140 g
	Pseudotsuga	Charcoal		20			0.0197 g
	Sequoia sempervirens	Charcoal		1			0.0018 g
	Quercus	Charcoal		7			0.0260 g
	Umbellularia californica	Charcoal		1			0.0203 g
	Unidentified hardwood	Charcoal		5			0.0241 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0043 g
	Unidentified hardwood twig	Charcoal		1			0.0014 g
	Total wood ≥ 2 mm						0.0148 g
	Unidentified hardwood twig	Wood				4	0.0148 g
	NON-FLORAL REMAINS:						
	Aluminium/Tin foil ≥ 2 mm					2	0.0534 g
	Asphaltum					X	Numerous
	Bone ≥ 4 mm					7	0.9514 g
	Bone ≥ 4 mm					2 ic,pc	0.5385 g
	Bone < 4 mm					X	Numerous
	Tooth ≥ 2 mm					1	0.0377 g
	Bone - calcined ≥ 4 mm			2			0.4647 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile ≥ 4 mm					X	175.523 g
	Brick/Tile < 4 mm					X	Numerous
	Ceramic - glazed ≥ 4 mm					1	0.1625 g
	Clinker ≥ 4 mm					6	0.5045 g
	Clinker < 4 mm					X	Numerous
	Coal < 2 mm					X	Few
	Glass - clear ≥ 4 mm					7	4.0630 g
	Glass - clear < 4 mm					X	Moderate
	Glass - brown ≥ 4 mm					2	0.2026 g
	Glass - brown < 4 mm					1	
	Insect	Chitin				X	Moderate
	cf. Leather					1	0.1227 g
	Metal - flat, rusted ≥ 4 mm					4	0.698 g
	Metal - flat, rusted < 4 mm					X	Moderate
	Wire - rusted ≥ 4 mm					6	11.897 g
	Wire - rusted < 4 mm					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X		X		Few

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20863	Liters Floated						4.00 L
50-60 cmbd	Light Fraction Weight						52.420 g
	FLORAL REMAINS:						
	Apiaceae	Seed			2		
	Datura wrightii-type	Seed				4	
	Erodium	Awn		11			
	Erodium	Seed	4	1			
	cf. Fabaceae	Endosperm	1				
	Malvaceae	Seed	3				
	Monocot	Stem		2			0.0062 g
	Nicotiana	Seed			17	13	
	Pinus ≥ 2 mm	Seed				48	0.1584 g
	Pinus < 2 mm	Seed				X	Numerous
	Pinus ≥ 1 mm	Seed		3			0.0012 g
	Poaceae ≥ 0.5 mm	Awn		21			
	Poaceae < 0.5 mm	Awn		X			Moderate
	Poaceae A	Caryopsis		4			0.0014 g
	Cereal-type	Caryopsis		5			0.0043 g
	Salvia	Seed	1				
	Sambucus nigra	Seed				3	
	Schinus molle	Seed		3			0.0051 g
	Scrophulariaceae-type	Seed			1		
	Solanum douglasii-type	Seed	1				
	Unidentified ≥ 2 mm	Leaf				1	
	Unidentified G	Fruit		8			0.0023 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.2693 g
	Conifer - vitrified	Charcoal		1			0.0031 g
	Pinus	Charcoal		14			0.0389 g
	Pseudotsuga	Charcoal		1			0.0004 g
	Quercus	Charcoal		9			0.0531 g
	Quercus - Live oak	Charcoal		7			0.0350 g
	Salicaceae	Charcoal		1			0.0056 g
	Schinus molle	Charcoal		1			0.0180 g
	Umbellularia californica - vitrified	Charcoal		4			0.0218 g
	Unidentified hardwood - central pith	Charcoal		1			0.0029 g
	Unidentified hardwood twig	Charcoal		1			0.0030 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20863	Total wood ≥ 2 mm						0.0753 g
50-60 cmbd	Conifer	Wood				4	0.0753 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					27	12.002 g
	Asphaltum < 4 mm					X	Numerous
	Bone ≥ 4 mm					20	2.7379 g
	Bone ≥ 4 mm					3 ic,pc	0.2519 g
	Bone < 4 mm					X	Moderate
	Bone - calcined ≥ 4 mm			3			0.3108 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile					X	Moderate
	Ceramic - white ≥ 4 mm					1	1.3607 g
	Clinker					X	Moderate
	Glass - clear ≥ 4 mm					5	3.7258 g
	Glass - brown ≥ 4 mm					1	0.0701 g
	Glass - opaque ≥ 4 mm					3	6.2696 g
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					3	0.6241 g
	Lime < 4 mm					X	Few
	Metal - flat, rusted					X	Few
	Wire - rusted					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X	1		Few
	Woven fibers			1			0.0009 g
20862	Liters Floated						3.00 L
60-70 cmbd	Light Fraction Weight						32.767 g
	FLORAL REMAINS:						
	Asteraceae	Seed		2			
	Brassicaceae	Seed			1		
	cf. Brassicaceae	Endosperm	1				
	Carya illinoinensis	Nutshell		1			0.0019 g
	Chenopodium	Seed	1	1			
	Erodium	Awn		2			
	Erodium	Seed	1	2			
	Malvaceae	Seed		2			
	Malva	Seed			1		

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20862	FLORAL REMAINS (Continued):						
60-70	Parenchymous tissue			1			0.0031 g
cmbd	*Pinus* ≥ 2 mm	Seed				24	0.0813 g
	Pinus < 2 mm	Seed				X	Moderate
	Pinus ≥ 1 mm	Seed		1			0.0001 g
	Poaceae	Awn		4			
	Poaceae	Caryopsis	1	22			0.0093 g
	Cereal-type	Caryopsis		5			0.0113 g
	Salvia	Seed	1				
	Sambucus nigra	Seed				6	
	Schinus molle	Seed		1			0.0035 g
	Solanaceae	Seed				1	
	Datura wrightii-type	Seed		1			
	Nicotiana	Seed			10	4	
	Solanum douglasii-type	Seed	1				
	Trifolium	Seed	1		1		
	Unidentified G	Fruit		7			0.0019 g
	Unidentified	Seed	1				
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.2069 g
	Asteraceae	Charcoal		2			0.0139 g
	Pseudotsuga	Charcoal		12			0.0335 g
	Quercus	Charcoal		8			0.0799 g
	Quercus - *Leucobalanus* group	Charcoal		4			0.0368 g
	Quercus - Live oak	Charcoal		2			0.0113 g
	Salicaceae	Charcoal		4			0.0100 g
	Umbellularia californica	Charcoal		3			0.0084 g
	Unidentified hardwood	Charcoal		6			0.0131 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Moderate
	Bone ≥ 4 mm					13	4.9449 g
	Bone < 4 mm					X	Moderate
	Bone ≥ 4 mm			1			0.1091 g
	Bone - calcined ≥ 4 mm			2			0.6732 g
	Bone - calcined < 4 mm			X			Few
	Brick/Tile					X	Moderate

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20862	NON-FLORAL REMAINS (Continued):						
60-70	Clinker					X	Few
cmbd	Glass - clear ≥ 2 mm					3	0.935 g
	Glass - light purple ≥ 2 mm					1	2.725 g
	Insect	Chitin				X	Few
	cf. Leather			2			0.022 g
	Lime					X	Few
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Moderate
18170	Liters Floated						4.00 L
70-80	Light Fraction Weight						25.599 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm		2			
	Crataegus	Seed		2			0.0010 g
	Datura wrightii-type ≥ 1 mm	Seed			1		0.0009 g
	Datura wrightii-type < 1 mm	Seed				1	
	Erodium	Awn		7			
	Malva	Seed			1		
	Monocot	Stem		4			0.0125 g
	Nicotiana	Seed			3	9	
	Pinus ≥ 1 mm	Seed				54	0.1126 g
	Pinus < 1 mm	Seed				X	Moderate
	Poaceae A	Caryopsis		10			0.0026 g
	Avena sativa	Caryopsis		1			0.0046 g
	Zea mays	Cupule		1			0.0016
	Portulacaceae	Seed				1	
	Sambucus nigra	Seed				4	
	Schinus molle - vitrified	Seed		1			0.0013 g
	Unidentified	Seed		2			0.0003 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.1780 g
	Pseudotsuga	Charcoal		16			0.1220 g
	Quercus	Charcoal		4			0.0168 g
	Quercus - vitrified	Charcoal		2			0.0129 g
	Quercus - Live oak	Charcoal		1			0.0048 g
	Rhamnus	Charcoal		3			0.0147 g
	Sambucus	Charcoal		1			0.0028 g
	Unidentified hardwood twig	Charcoal		2			0.0040 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18170	NON-FLORAL REMAINS:						
70-80 cmbd	Asphaltum					X	Moderate
	Bone ≥ 4 mm					14	1.1103 g
	Bone ≥ 4 mm					1 ic,pc	0.0716 g
	Bone < 4 mm					X	Numerous
	Mammal tooth ≥ 2 mm					2	0.1813 g
	Rodent incisor tooth ≥ 2 mm					1	0.0098 g
	Bone ≥ 4 mm			2			0.3662 g
	Bone < 4 mm			X			Few
	Bone - calcined ≥ 4 mm			3			0.6332 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile ≥ 4 mm					X	Numerous
	Brick/Tile < 4 mm					X	Moderate
	Clinker ≥ 2 mm					8	0.1970 g
	Clinker < 2 mm					X	Moderate
	Glass - clear ≥ 2 mm					2	0.0115 g
	Glass - clear < 2 mm					1	
	Insect	Chitin				X	Few
	Metal - flat, rusted ≥ 4 mm					1	0.1988 g
	Metal - flat, rusted < 4 mm					X	Few
	Nail - rusted ≥ 4 mm					1	0.2652 g
	Porcelain					1	0.1508 g
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X		1		Moderate
20089	Liters Floated						4.00 L
80-90	Light Fraction Weight						19.600 g
cmbd	FLORAL REMAINS:						
	Cheno-am	Perisperm	2	1			
	Amaranthus	Seed		2			
	Chenopodium	Seed	1		1		
	Erodium	Awn		29			
	Erodium	Seed	2				
	Leaf			1			
	Monocot	Stem		3			0.0227 g
	Oxalis	Seed	1				
	Pinus ≥ 1 mm	Seed				245	0.5476 g
	Pinus < 1 mm	Seed		16*		154*	

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20089	FLORAL REMAINS (Continued):						
80-90	Poaceae A	Caryopsis	4	2			0.0062 g
cmbd	Poaceae B	Caryopsis	2	2			0.0009 g
	Cereal-type	Caryopsis		1			0.0017 g
	Zea mays	Kernel		1			
	Portulaca	Seed				1	
	Quercus	Acorn shell		3			
	Sambucus nigra	Seed				6	
	Schinus molle	Seed		3			0.0007 g
	Solanaceae	Seed				1	
	Datura	Seed				15	
	Nicotiana	Seed			10	10	
	Unidentified C	Seed		2			
	Unidentified	Seed		5			
	Unidentified	Endosperm	4				
	Vitrified tissue			X			Few
	CHARCOAL/WOOD:						
	Total charcoal $\geq$ 2 mm						0.5550 g
	Asteraceae	Charcoal		1			0.0065 g
	Conifer	Charcoal		2			0.0054 g
	Pseudotsuga	Charcoal		8			0.1011 g
	Quercus - Leucobalanus group	Charcoal		6			0.0792 g
	Quercus - Live oak	Charcoal		2			0.0101 g
	Rosa	Charcoal		1			0.0265 g
	Salicaceae	Charcoal		2			0.0113 g
	Salix	Charcoal		1			0.0040 g
	Umbellularia californica	Charcoal		3			0.0436 g
	Unidentified hardwood	Charcoal		1			0.0042 g
	Unidentified hardwood Y	Charcoal		1			0.0359 g
	NON-FLORAL REMAINS:						
	Aluminium/Tin foil					4	0.0026 g
	Asphaltum					X	Few
	Bone $\geq$ 4 mm					44	9.5608 g
	Bone < 4 mm					X	Moderate
	Sacrum					1	27.7884 g
	Small animal vertebra				1		0.0016 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20089	NON-FLORAL REMAINS (Continued):						
80-90	Tooth enamel					1	0.0155 g
cmbd	Bone < 4 mm			X			Few
	Bone - calcined ≥ 4 mm			5			0.4162 g
	Bone - calcined < 4 mm			X			Few
	Brick/Tile					X	Moderate
	Clinker ≥ 2 mm					95	0.7343 g
	Clinker < 2 mm					X	Moderate
	Coal ≥ 2 mm					11	0.4970 g
	Coal < 2 mm					X	Few
	Feather					1	
	Glass - clear					1	0.0277 g
	Glass - green					1	0.1131 g
	Insect	Chitin				124*	
	Insect	Egg			X		Few
	Metal - flat, rusted ≥ 2 mm					1	0.0338 g
	Metal - flat, rusted < 2 mm					X	Few
	Nail - rusted					1	1.3413 g
	Nail/Pin - rusted					1	0.0085 g
	Termite fecal pellet		X	X			Moderate
18819	Liters Floated						4.40 L
90-100	Light Fraction Weight						39.910 g
cmbd	FLORAL REMAINS:						
	Chenopodium	Seed		2			
	Chenopodium berlandieri-type	Seed		1			
	Datura wrightii-type	Seed				7	
	Erodium	Awn		4			
	Erodium	Seed	1	1			
	Juglandaceae	Nutshell		1			0.0109 g
	Malvaceae	Seed		2			
	Nicotiana	Seed			23	17	
	Pinus ≥ 2 mm	Seed				102	0.4205 g
	Pinus < 2 mm	Seed				X	Moderate
	Pinus ≥ 0.5 mm	Seed		7			0.0016 g
	Poaceae	Awn		5			
	Poaceae A	Caryopsis		2			0.0010 g
	Cereal-type	Rachis		1			< 0.0001 g
	Cereal-type	Caryopsis		4			0.0059 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18819	FLORAL REMAINS (Continued):						
90-100 cmbd	*Sambucus nigra*	Seed				9	
	Schinus molle	Seed		2			0.0010 g
	Trifolium	Seed			2		
	Vitrified tissue ≥ 2 mm			1			0.0119 g
	Unidentified	Leaf		1			
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.5644 g
	Conifer	Charcoal		2			0.0128 g
	Pseudotsuga	Charcoal		12			0.0641 g
	Sequoia sempervirens	Charcoal		2			0.0080 g
	Platanus racemosa	Charcoal		1			0.0067 g
	Quercus	Charcoal		5			0.1072 g
	Quercus - vitrified	Charcoal		1			0.0091 g
	Quercus - *Leucobalanus* group	Charcoal		1			0.0066 g
	Quercus - Live oak	Charcoal		6			0.0838 g
	Rhamnus	Charcoal		2			0.0152 g
	Rhamnus - vitrified	Charcoal		1			0.0156 g
	Salicaceae	Charcoal		1			0.0058 g
	Umbellularia californica - vitrified	Charcoal		2			0.0211 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0090 g
	Unidentified hardwood - central pith	Charcoal		1			0.0067 g
	Unidentified hardwood twig	Charcoal		2			0.0078 g
	NON-FLORAL REMAINS:						
	Asphaltum ≥ 4 mm					7	0.792 g
	Asphaltum < 4 mm					X	Moderate
	Bone ≥ 4 mm					35	10.890 g
	Bone ≥ 4 mm					3 ic,pc	3.6763 g
	Bone < 4 mm					X	Numerous
	Large mammal scapula - cut, ~ 1 cm					1	6.863 g
	Bone - calcined ≥ 4 mm			19			2.3863 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile					X	Moderate
	Clinker ≥ 4 mm					8	0.403 g
	Clinker < 4 mm					X	Moderate

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18819	NON-FLORAL REMAINS (Continued):						
90-100	Glass - brown ≥ 2 mm					1	0.4133 g
cmbd	Glass - opaque ≥ 2 mm					1	0.1508 g
	Insect	Chitin				X	Few
	Lime ≥ 4 mm					3	0.1094 g
	Lime < 4 mm					X	Moderate
	Metal - flat, rusted ≥ 2 mm					1	0.0985 g
	Nail - rusted					1	0.528 g
	Muscovite					X	Few
	Porcelain ≥ 2 mm					1	0.0116 g
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Moderate
20861	Liters Floated						4.00 L
100-110	Light Fraction Weight						31.513 g
cmbd	FLORAL REMAINS:						
	Chenopodium	Seed		4		1	
	Datura wrightii-type	Seed				3	
	Erodium	Seed	2	1			
	Malvaceae	Seed	2				
	Malva	Fruit			2	1	
	Malva	Seed			1		
	Nicotiana	Seed			24	66	
	Parenchymous tissue			1			
	Pinus ≥ 2 mm	Seed			1	131	0.7119 g
	Pinus < 2 mm	Seed				X	Numerous
	Pinus ≥ 0.5 mm	Seed		15			0.0031 g
	Poaceae A	Caryopsis	1	1			0.0006 g
	Poaceae C	Caryopsis	1				
	Cereal-type	Caryopsis	5	6			0.0083 g
	Zea mays	Kernel		1			0.0071 g
	cf. *Salvia*	Endosperm	1				
	Sambucus nigra	Seed			1	1	
	Schinus molle	Seed	1	2			0.0059 g
	Trifolium	Seed	1		1		
	Unidentified G	Fruit		3			0.0011 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20861	CHARCOAL/WOOD:						
100-110	Total charcoal ≥ 2 mm						0.3341 g
cmbd	*Aesculus californica*	Charcoal		1			0.0052 g
	Conifer	Charcoal		2			0.0081 g
	Pseudotsuga	Charcoal		15			0.0464 g
	Sequoia sempervirens	Charcoal		2			0.0346 g
	Platanus racemosa	Charcoal		1			0.0024 g
	Quercus	Charcoal		4			0.0161 g
	Quercus - vitrified	Charcoal		2			0.0102 g
	Quercus - Live oak	Charcoal		3			0.0486 g
	Rhamnus	Charcoal		2			0.0064 g
	Salicaceae	Charcoal		5			0.0197 g
	Schinus molle	Charcoal		2			0.0106 g
	Umbellularia californica	Charcoal		1			0.0099 g
	Total wood ≥ 2 mm						0.0033 g
	Pseudotsuga	Wood				2	0.0033 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Moderate
	Bone ≥ 4 mm					14	10.060 g
	Bone < 4 mm					X	Moderate
	Bone - calcined ≥ 4 mm			6			1.5088 g
	Brick/Tile					X	Moderate
	Clinker					X	Numerous
	Coal					X	Few
	Glass - clear ≥ 2 mm					5	1.6093 g
	Glass - brown ≥ 2 mm					1	0.1982 g
	Insect	Chitin				X	Moderate
	Metal - flat, rusted					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		X	X			Numerous

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18812	Liters Floated						4.00 L
110-120	Light Fraction Weight						15.798 g
cmbd	FLORAL REMAINS:						
	Chenopodium	Seed	1			2	
	Cyperaceae	Seed		1			
	Datura wrightii-type	Seed				9	
	Erodium	Awn		2			
	Erodium	Seed	2	1			
	Malvaceae	Seed		1			
	Malva	Seed			2		
	Monocot	Stem		5			0.0166 g
	Nicotiana	Seed			31	9	
	Pinus ≥ 2 mm	Seed				38	0.1692 g
	Pinus < 2 mm	Seed				X	Numerous
	Poaceae	Awn		1			
	Poaceae A	Caryopsis		7			0.0025 g
	Cereal-type	Caryopsis		4			0.0076 g
	Zea mays	Cupule		1			0.0069 g
	Zea mays	Kernel		1			0.0042 g
	Sambucus nigra ≥ 0.5 mm	Seed				5	
	Sambucus nigra < 0.5 mm	Seed				X	Moderate
	Schinus molle	Seed		1			0.0002 g
	Unidentified G	Fruit		1			0.0005 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.4147 g
	Conifer	Charcoal		1			0.0056 g
	Pseudotsuga	Charcoal		10			0.1282 g
	Sequoia sempervirens	Charcoal		1			0.0023 g
	Quercus	Charcoal		8			0.0617 g
	Quercus - vitrified	Charcoal		2			0.0403 g
	Quercus - Leucobalanus group	Charcoal		4			0.0359 g
	Quercus - Live oak	Charcoal		2			0.0258 g
	Rhamnus	Charcoal		2			0.0089 g
	Salicaceae	Charcoal		6			0.0164 g
	Umbellularia californica	Charcoal		2			0.0136 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0038 g
	Unidentified hardwood E	Charcoal		1			0.0188 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18812	NON-FLORAL REMAINS:						
110-120	Asphaltum					X	Few
cmbd	Bead				1		0.0581 g
	Bone ≥ 4 mm					34	7.7304 g
	Bone ≥ 4 mm					1 ic,pc	0.2714 g
	Bone < 4 mm					X	Numerous
	Bone ≥ 4 mm			1			0.0910 g
	Bone < 4 mm			X			Few
	Bone - calcined ≥ 4 mm			5			1.8095 g
	Bone - calcined < 4 mm			X			Moderate
	Brick/Tile					X	Moderate
	Clinker					X	Few
	Coal					X	Moderate
	Insect	Chitin				X	Few
	Metal - flat, rusted					X	Few
	Pin					1	0.0548 g
	Rock/Gravel					X	Moderate
	Termite fecal pellet		X	X			Moderate
18609	Liters Floated						3.00 L
120-125	Light Fraction Weight						1.027 g
cmbd	FLORAL REMAINS:						
	Apiaceae	Seed			1		
	Chenopodium berlandieri-type	Seed		1			
	Leaf bud					1	
	Nicotiana	Seed			1		
	Pinus ≥ 2 mm	Seed				5	0.0092 g
	Pinus < 2 mm	Seed				X	Few
	Sambucus nigra	Seed				2	
	Unidentified	Leaf				2	
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0576 g
	Conifer	Charcoal		1			0.0012 g
	Pseudotsuga	Charcoal		6			0.0388 g
	Quercus	Charcoal		14			0.0105 g
	Quercus - *Leucobalanus* group	Charcoal		1			0.0020 g
	Unidentified hardwood - small	Charcoal		3			0.0051 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18609	NON-FLORAL REMAINS:						
120-125	Asphaltum ≥ 2 mm					6	0.0556 g
cmbd	Asphaltum < 2 mm					X	Few
	Bone ≥ 4 mm					17	5.640 g
	Bone < 4 mm					X	Few
	Brick/Tile					X	Moderate
	Clinker ≥ 2 mm					9	0.0390 g
	Clinker < 2 mm					X	Few
	Insect	Chitin				X	Few
	Lime					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
18583	Liters Floated						1.50 L
125-130	Light Fraction Weight						0.175 g
cmbd	FLORAL REMAINS:						
	Cereal-type	Caryopsis		1			0.0003 g
	Parenchymous tissue ≥ 2 mm			2			0.0012 g
	Vitrified tissue ≥ 2 mm			1			0.0297 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0237 g
	Conifer	Charcoal		1			< 0.0001 g
	Quercus	Charcoal		13			0.0237 g
	NON-FLORAL REMAINS:						
	Bone ≥ 4 mm					2	0.7415 g
	Bone ≥ 4 mm					1 ic,pc	0.5015 g
	Bone < 4 mm					X	Few
	Brick/Tile ≥ 4 mm					7	69.850 g
	Brick/Tile < 4 mm					X	Few
	Clinker					X	Few
	Lime ≥ 1 mm					2	0.0015 g
	Lime < 1 mm					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Numerous

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
18690	Liters Floated						2.50 L
130-137	Light Fraction Weight						1.888 g
cmbd	FLORAL REMAINS:						
	Amaranthus	Seed			1		
	Erodium	Seed		1			
	Pinus	Seed				2	0.0063 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0371 g
	Pseudotsuga	Charcoal		5			0.0051 g
	Quercus	Charcoal		26			0.0301 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0019 g
	NON-FLORAL REMAINS:						
	Bone ≥ 4 mm					4	0.8503 g
	Bone < 4 mm					X	Few
	Large/medium mammal vertebra					1	8.6549 g
	Brick/Tile ≥ 4 mm					5	2.6921 g
	Brick/Tile < 4 mm					X	Few
	Clinker					X	Few
	Insect	Chitin				1	
	Muscovite					X	Few
	Rock/Gravel					X	Numerous
17821	Liters Floated						1.30 L
137-140	Light Fraction Weight						0.222 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	Malvaceae	Fruit	1				
	Monocot	Stem		1			0.0013 g
	Pinus	Seed				1	
	Unidentified - immature	Seed	1				
	CHARCOAL/WOOD:						
	Total charcoal ≥ 1 mm						0.0091 g
	Pseudotsuga	Charcoal		2			0.0001 g
	Quercus	Charcoal		7			0.0034 g
	Unidentified hardwood - small	Charcoal		6			0.0032 g
	Unidentified hardwood - vitrified	Charcoal		2			0.0024 g

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
17821	NON-FLORAL REMAINS:						
137-140 cmbd	Brick/Tile > 4 mm					1	1.1826 g
	Clinker > 2 mm					2	0.0330 g
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
17812	Liters Floated						2.50 L
140-150	Light Fraction Weight						0.525 g
cmbd	CHARCOAL/WOOD:						
	Total charcoal > 0.5 m						0.0040 g
	Quercus	Charcoal		5			0.0004 g
	Quercus - Leucobalanus group	Charcoal		1			0.0036 g
	NON-FLORAL REMAINS:						
	Bone > 4 mm					1	1.6310 g
	Bone < 4 mm					X	Few
	Rock/Gravel					X	Numerous
	Termite fecal pellet		2				
18150	Liters Floated						2.60 L
150-160	Light Fraction Weight						0.656 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed	1				
	cf. Poaceae	Stem		1			0.0001 g
	Unidentified E	Epidermis		8			0.0015 g
	CHARCOAL/WOOD:						
	Total charcoal > 0.5 mm						0.0071 g
	Quercus - Leucobalanus group	Charcoal		5			0.0041 g
	Unidentified hardwood twig	Charcoal		1			0.0030 g
	NON-FLORAL REMAINS:						
	Bone > 2 mm					5	0.0298 g
	Bone < 2 mm					X	Few
	Rodent tooth					3	0.0694 g
	Clinker					X	Few
	Insect fecal pellet		X				Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Sediment with metal (rust) staining					X	Moderate
	Termite fecal pellet		1				

TABLE 16 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
20093	Liters Floated						3.30 L
160-170	Light Fraction Weight						0.570 g
cmbd	FLORAL REMAINS:						
	Calandrinia	Seed				1	
	CHARCOAL/WOOD:						
	Total charcoal ≥ 0.5 mm						0.0015 g
	Pseudotsuga	Charcoal		2			0.0001 g
	Quercus	Charcoal		2			0.0013 g
	Sequoia sempervirens	Charcoal		1			0.0001 g
	NON-FLORAL REMAINS:						
	Asphaltum					X	Few
	Bone ≥ 2 mm					3	0.0139 g
	Bone < 2 mm					X	Moderate
	Rodent tooth ≥ 2 mm					2	0.0439 g
	Clinker					X	Few
	Muscovite					X	Few
	Rock/Gravel					X	Moderate
	Sediment with metal (rust) staining					X	Moderate

W = Whole
F = Fragment
X = Presence noted in sample
L = Liter
g = grams
mm = millimeters
pc = partially charred
ic = incompletely charred
* = Estimated frequency

FIGURES

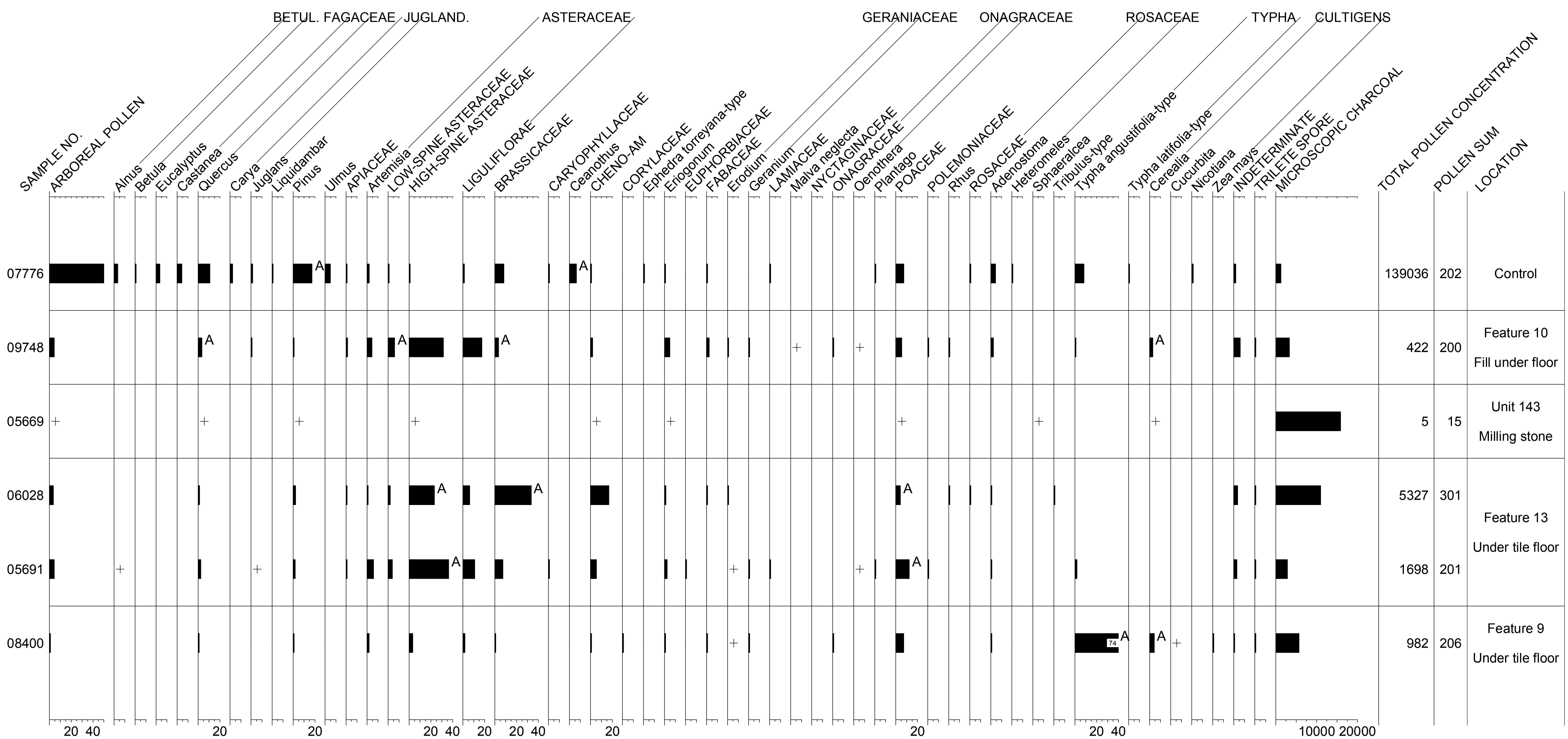

FIGURE 1. POLLEN DIAGRAM FOR THE MISSION, SAN GABRIEL GARDEN COMPLEX, CA-LAN-184H, CALIFORNIA.

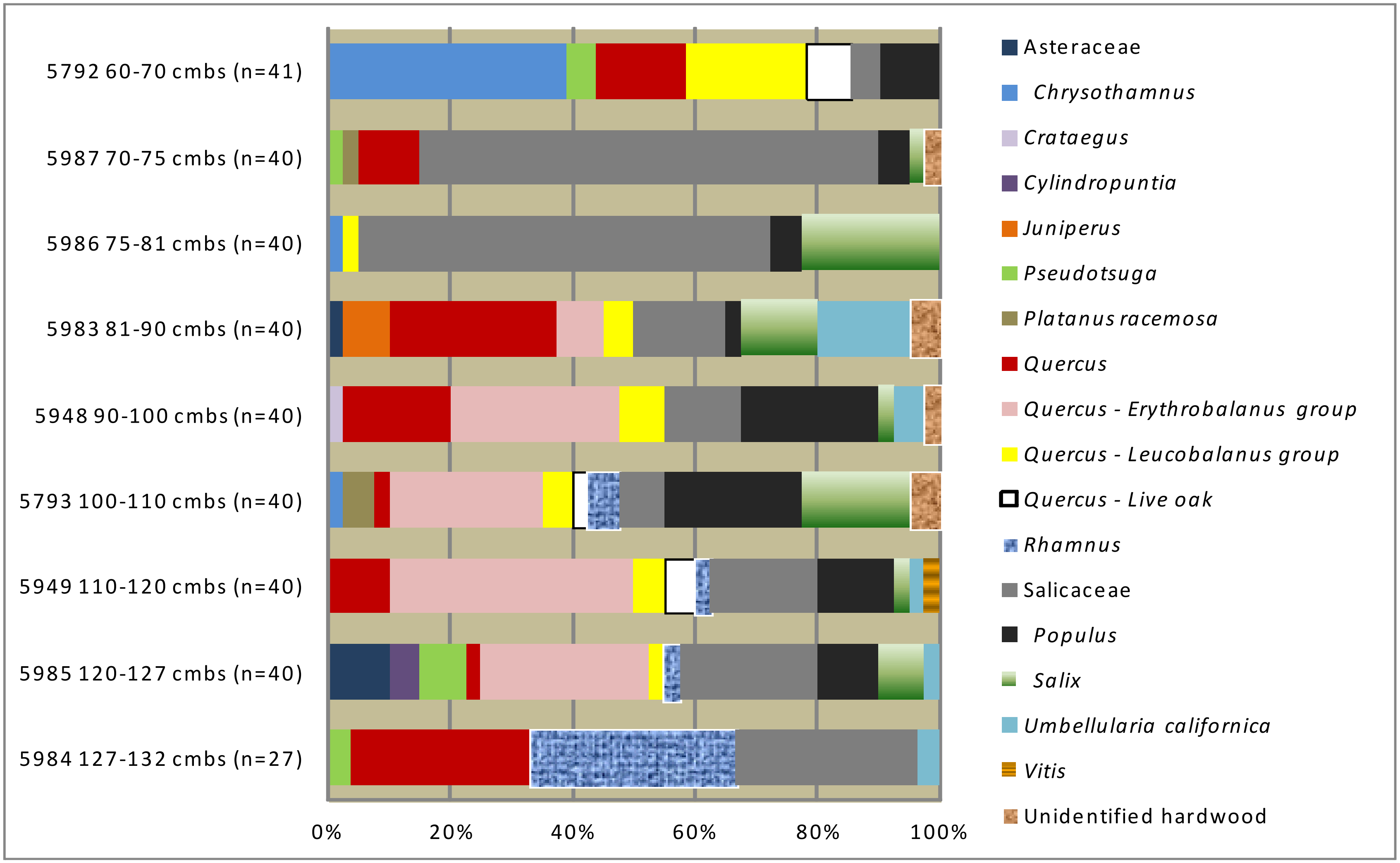

FIGURE 2. CHARCOAL TYPES IN SAMPLES FROM UNIT 104 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

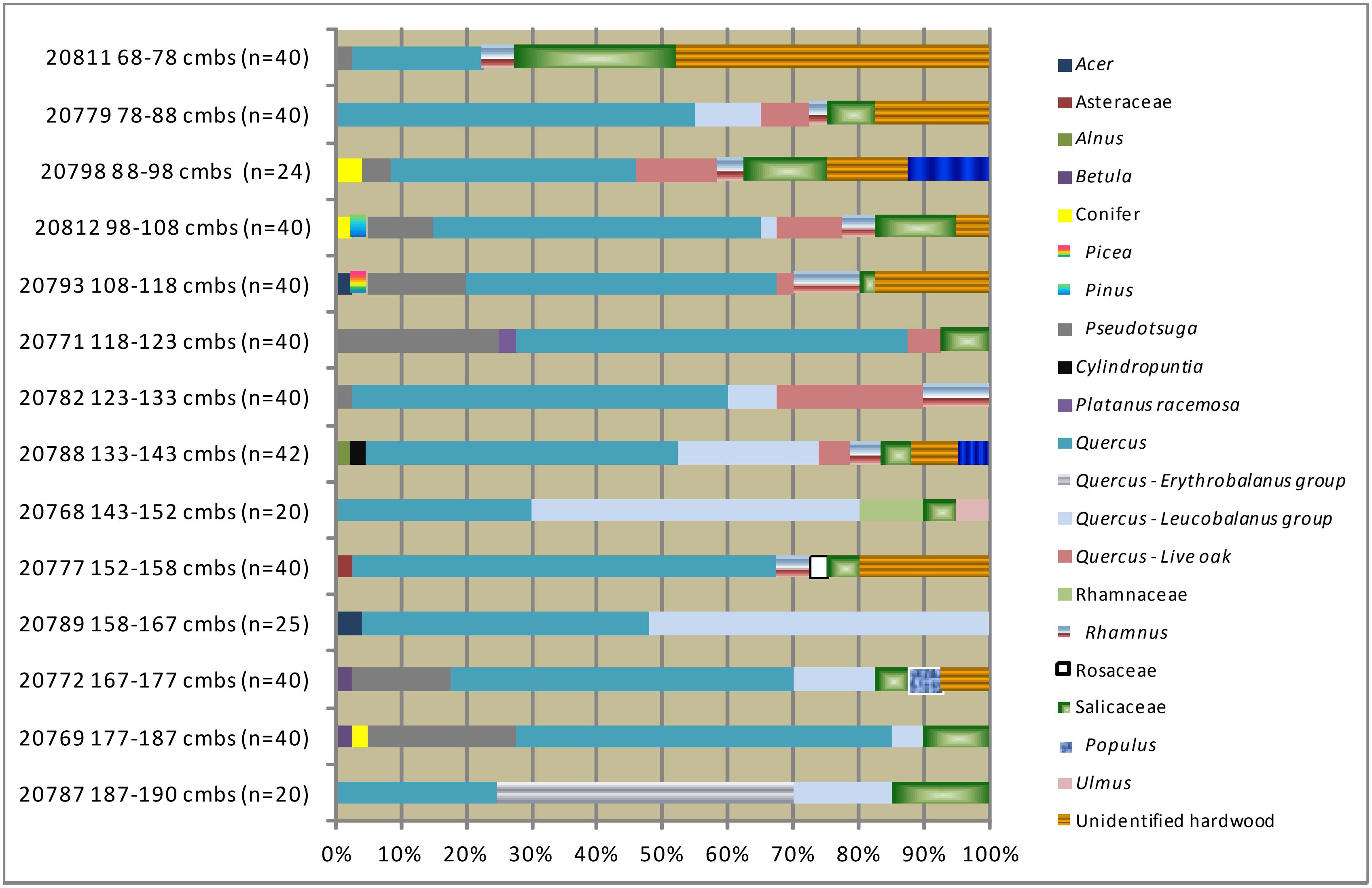

FIGURE 3. CHARCOAL TYPES IN SAMPLES FROM UNIT 145 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

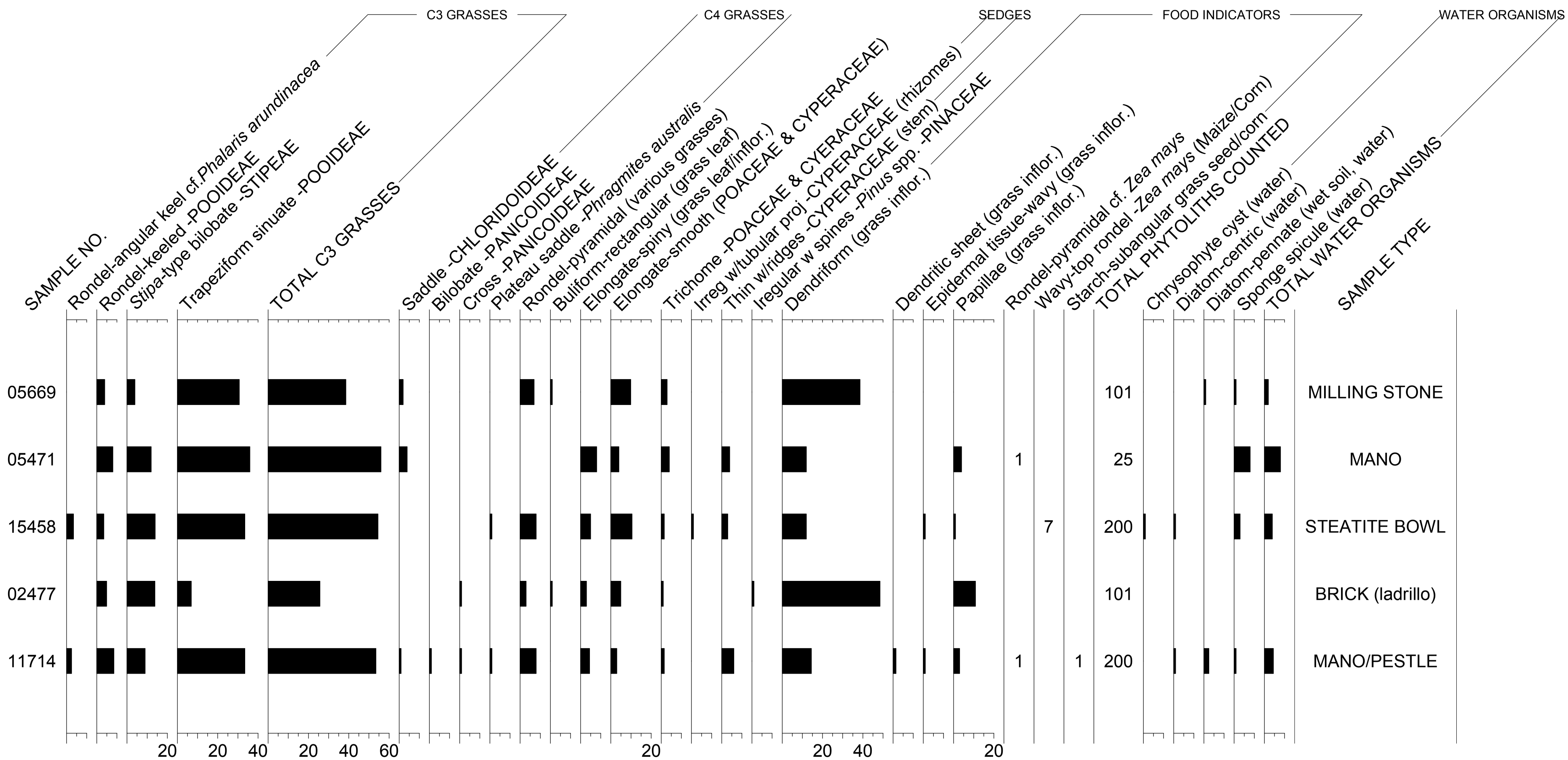

FIGURE 4. PHYTOLITH AND STARCH DIAGRAM FOR SAMPLES FROM SITE CA-LAN-184H, SAN GABRIEL MISSION, CALIFORNIA.

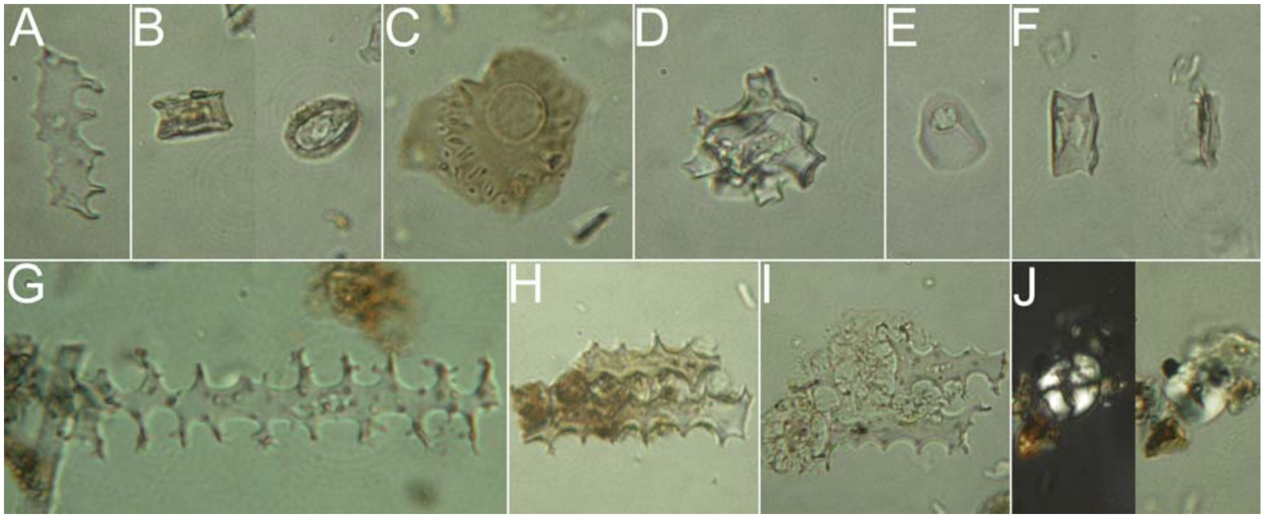

FIGURE 5. MICROGRAPHS OF SELECTED PHYTOLITH AND STARCH GRAINS FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

Micrographs taken at approximately 500x magnification.

A) Fragmented dendriform phytolith diagnostic of grass (Poaceae) chaff material, recovered from milling stone sample 05669.

B) Maize cob-type rondel phytolith from mono sample 05471. This phytolith lacks some characteristics that would make it unequivocally diagnostic of maize; however, this particular morphotype is well within the range of variation observed from modern *Zea mays* cob reference material.

C) Large papillae phytolith recovered from mano sample 05471. The size of the papillae observed in this sample is consistent with the size of those found in species of wheat (*Triticum*), suggesting that wheat may have been processed with this tool.

D) Sedge root phytolith recovered from steatite bowl fragment 15458 that most likely is derived from *Scirpus*, *Schoenoplectus*, or *Cyperus*.

E) Rondel with angular keel derived from canarygrass (Phalaris spp.), recovered from steatite bowl fragment 15458.

F) Wavy-top rondel phytolith diagnostic of maize (Zea mays) cob material, recovered from steatite bowl fragment 15458.

G) Unbroken dendriform phytolith with ornamentation consistent with those produced by wheat (Triticum) and barley (Hordeum), recovered from brick (ladrillo) sample 02477.

H-I) Dendritic epidermal sheet elements diagnostic of grass chaff, recovered from burned granitic mano sample 11714.

J) Starch recovered from the burned granitic mano sample 11714. This grain is consistent with starches produced by many native grass seeds, as well as some of the starches found in maize kernels.

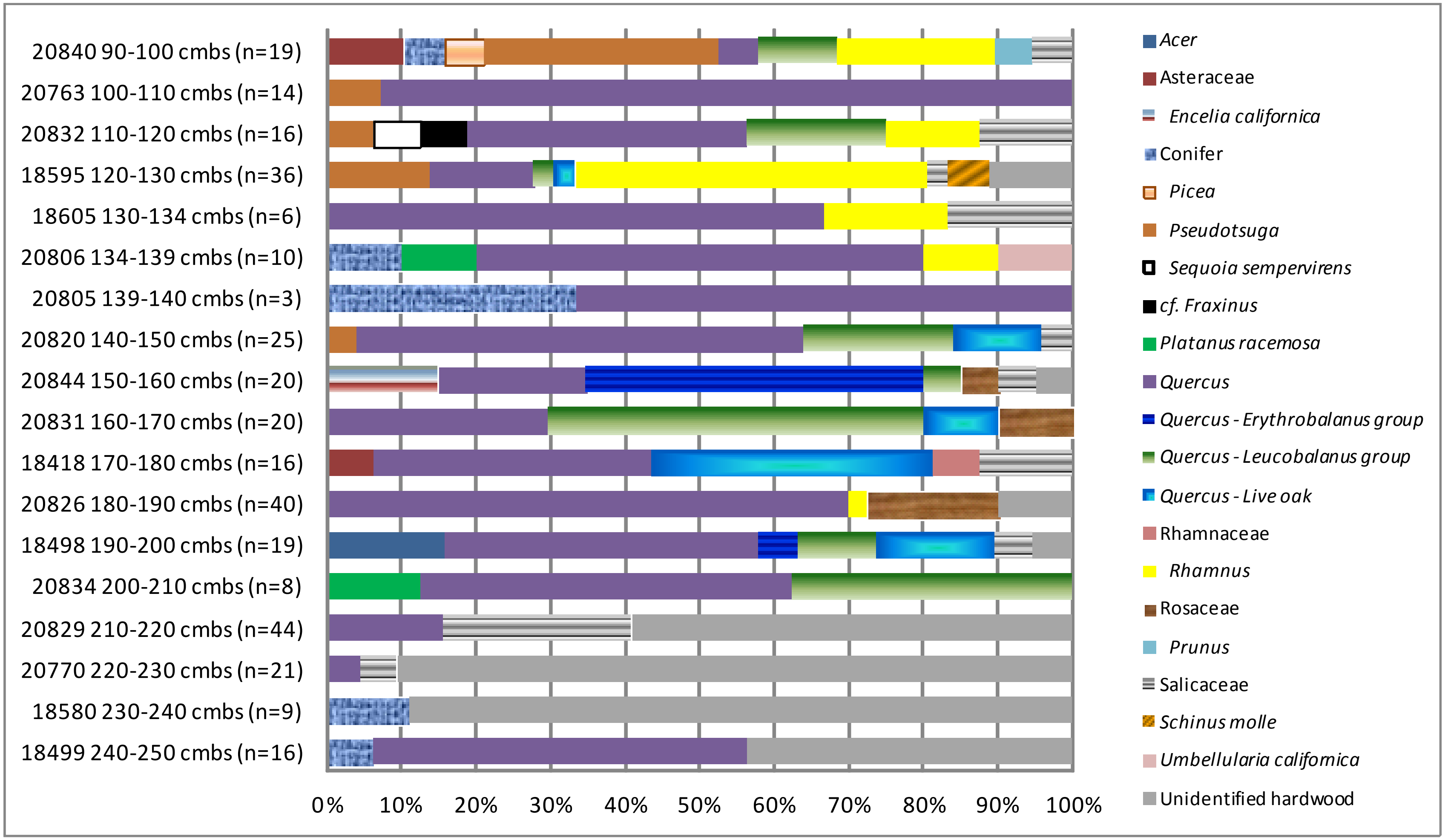

FIGURE 6. CHARCOAL TYPES IN SAMPLES FROM UNIT 263 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

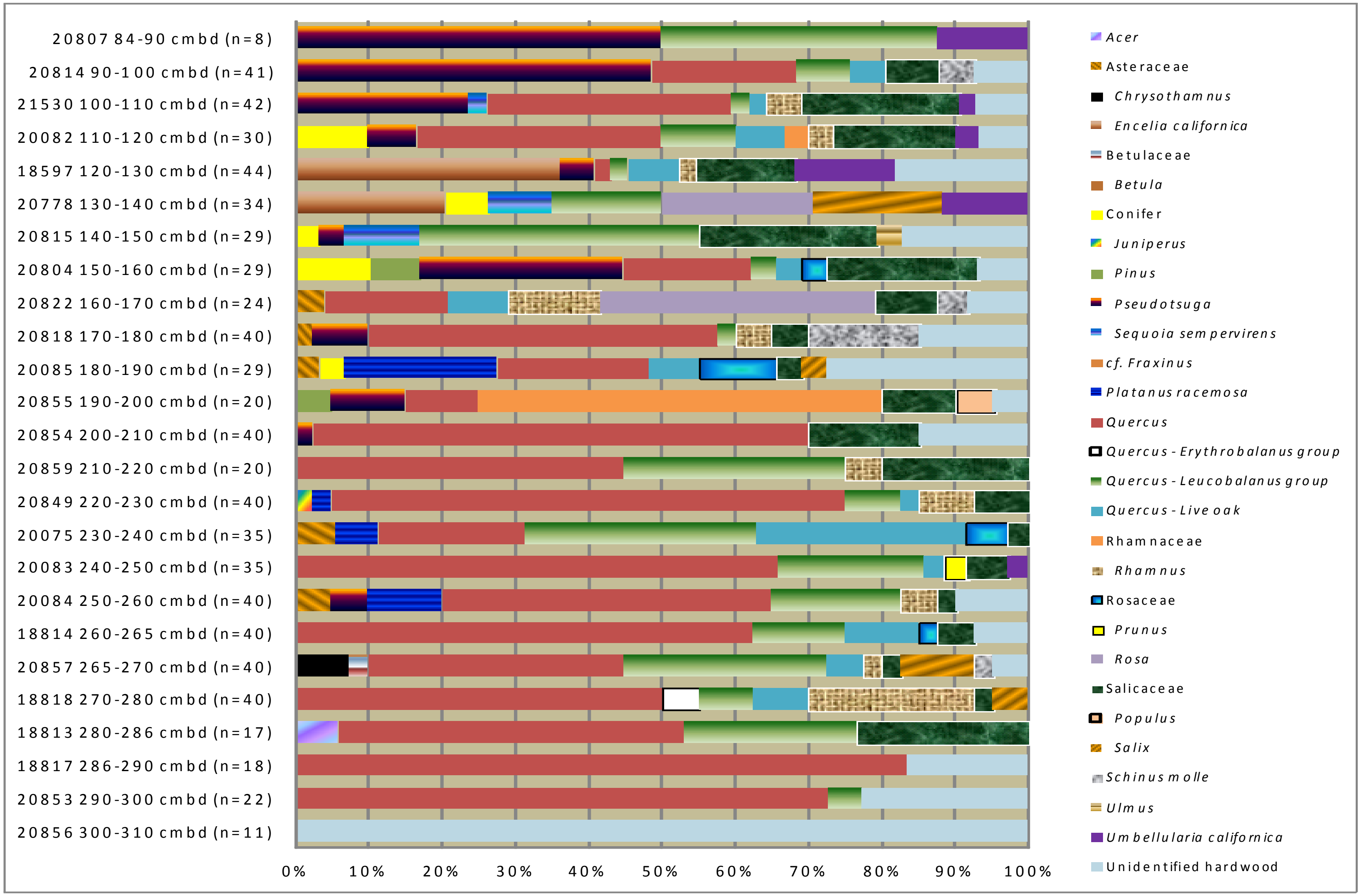

FIGURE 7. CHARCOAL TYPES IN SAMPLES FROM UNIT 258 AT THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

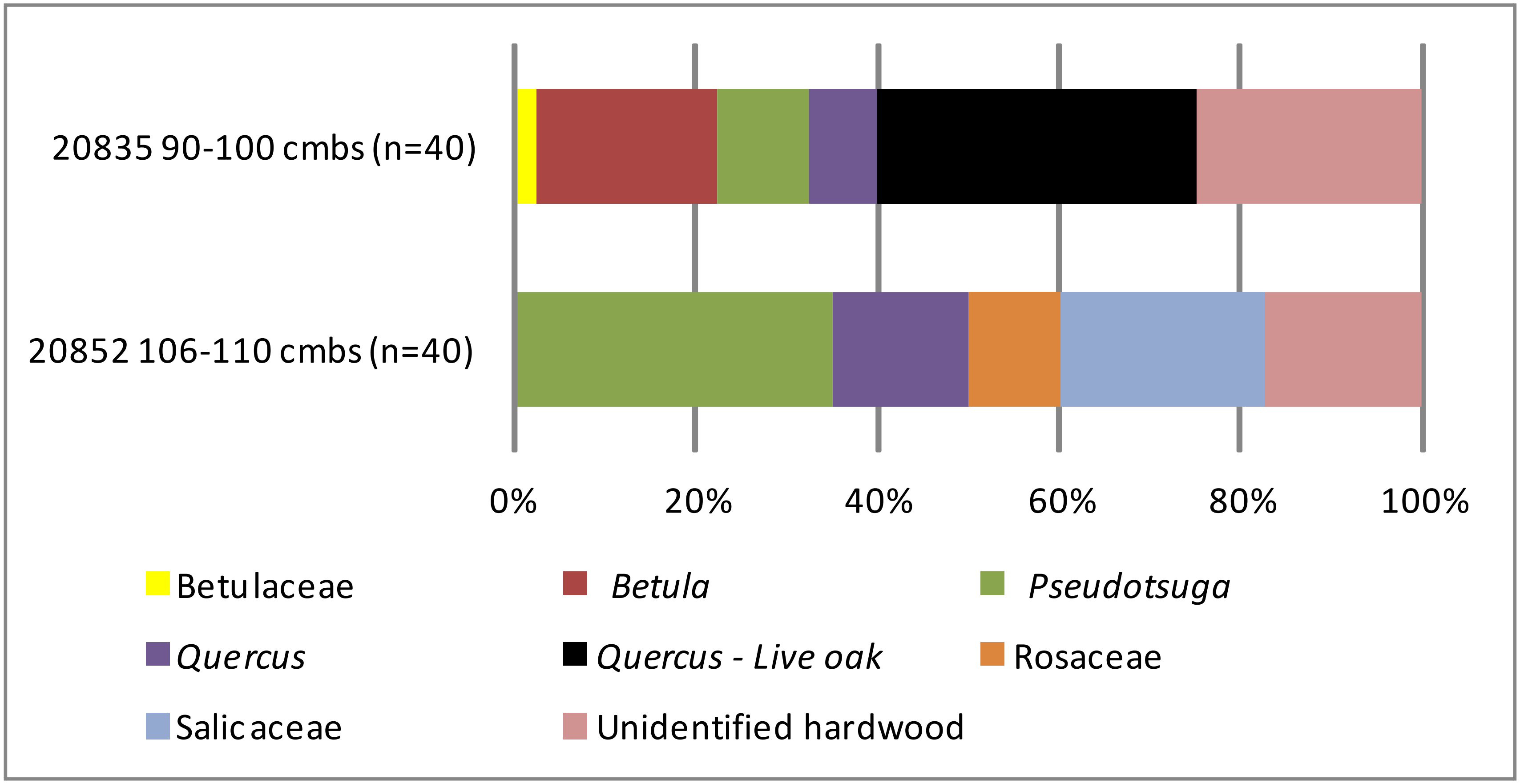

FIGURE 8. CHARCOAL TYPES IN SAMPLES FROM UNIT 267 AT THE MISSION SAN GABRIEL GARDEN COMPLEX SITE CA-LAN-184H, CALIFORNIA.

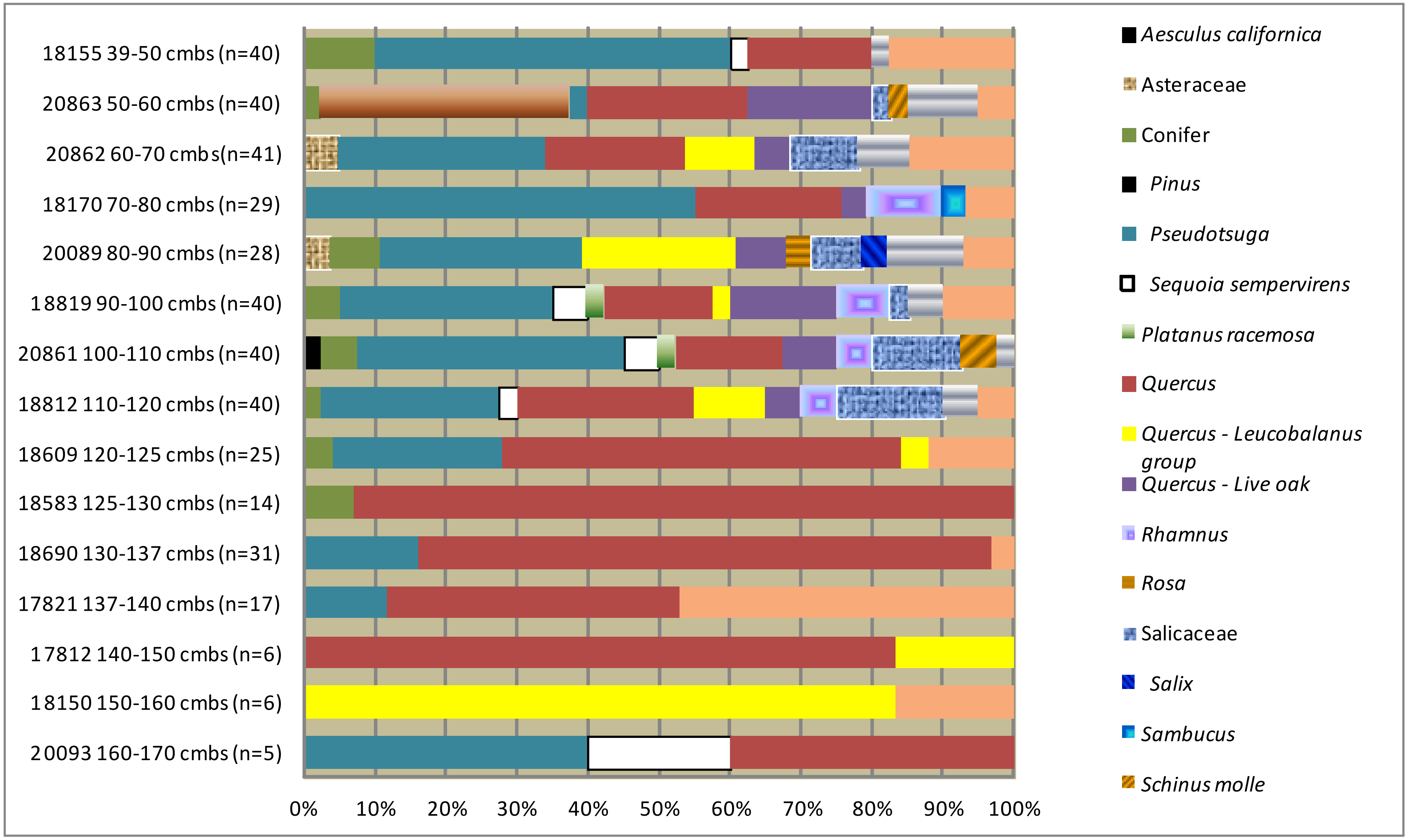

FIGURE 9. CHARCOAL TYPES IN SAMPLES FROM UNIT 291 AT THE MISSION SAN GABRIEL GARDEN COMPLEX SITE CA-LAN-184H, CALIFORNIA.

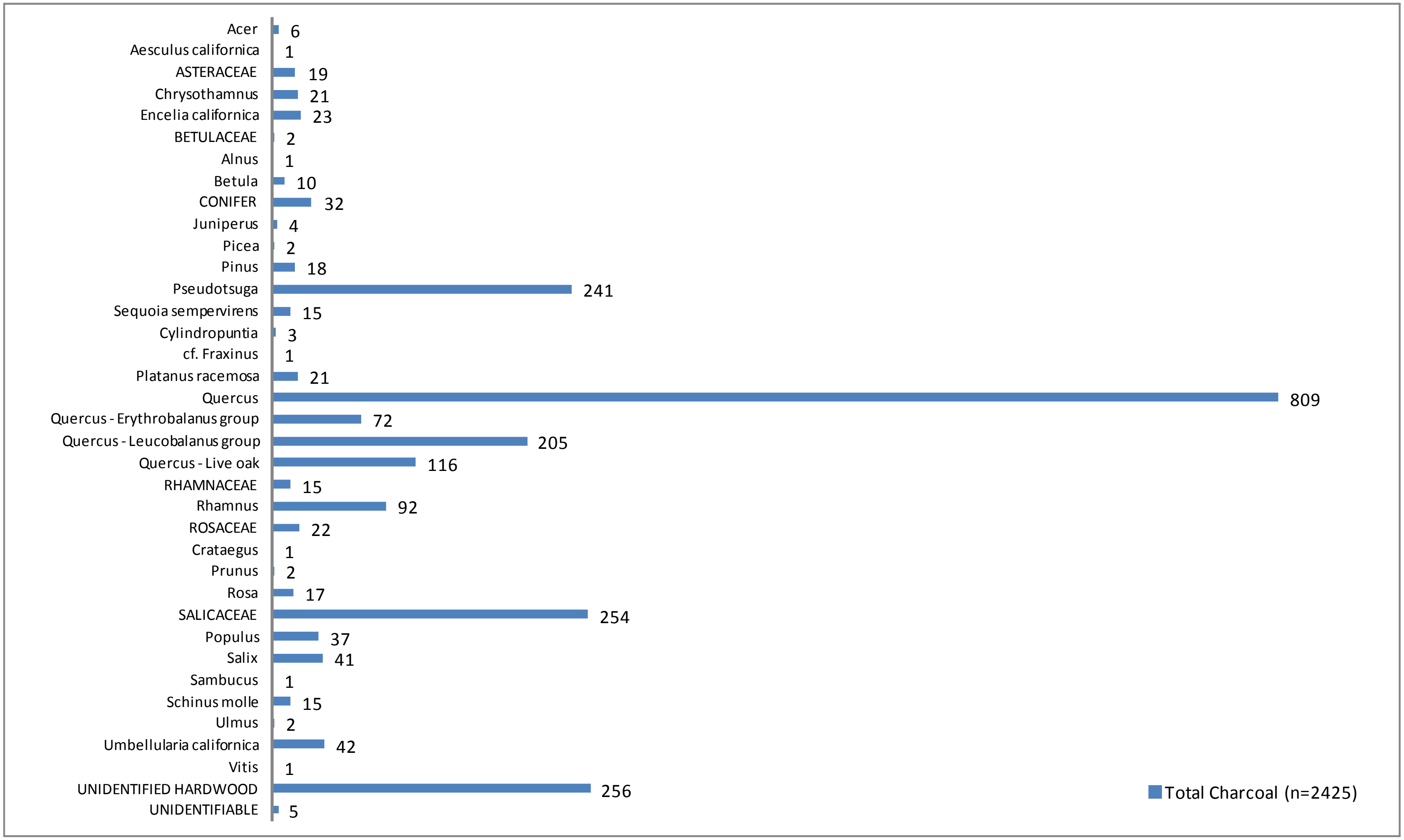

FIGURE 10. SUMMARY OF TOTAL CHARCOAL TYPES RECOVERED FROM THE MISSION SAN GABRIEL GARDEN COMPLEX, SITE CA-LAN-184H, CALIFORNIA.

REFERENCES CITED

Adams, Karen R.
1984 Evidence of Wood-Dwelling Termites in Archaeological Sites in the Southwestern United States. *Journal of Ethnobiology* 4(1):29-43.

Agricultural Research Service of the United States Department of Agriculture
1971 *Common Weeds of the United States*. Dover Publications, Inc., New York.

Ambler, Wayne, Carol Landa Christensen, Larry Hodgson, Peter Loewer and Ted Marston
1994 *Treasury of Gardening*. Publications International Ltd., Lincolnwood, Illinois.

Anderson, M. Kat
2005 *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources.* University of California Press, Berkeley, Los Angeles, London.

Angell, Madeline
1981 *A Field Guide to Berries and Berrylike Fruits*. The Bobbs-Merrill Company, Inc., New York, New York.

Angier, Bradford
1978 *Field Guide to Medicinal Wild Plants*. Stackpole Books, Harrisburg, Pennsylvania.

Arnow, Lois A., Beverly J. Albee and Ann M. Wyckoff
1980 *Flora of the Central Wasatch Front, Utah*. University of Utah Printing Service, Salt Lake City, Utah.

Bailey, Liberty Hyde and Ethel Zoe Bailey
1976 *Hortus Third, A Concise Dictionary of Plants Cultivated in the United States and Canada*. Barnes and Noble Books, New York, New York.

Barkworth, Mary
2007 Phalaris. In *Flora of North America vol. 24,*, edited by M. Barkworth, K.M. Capels, S. Long, L.K. Anderton and M.B. Piep. Viewed at http://herbarium.usu.edu/webmanual on July 19, 2012.

Barrows, David Prescott
1900 *The Ethnobotany of the Coahuilla Indians of Southern California*. AMS edition ed. University of Chicago Press, Chicago, Illinois.

Bean, Lowell John
1978 Cahuilla. In *California*, edited by R. F. Heizer, pp. 575-587. Handbook of American Indians. vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D. C.

Bean, Lowell John and Katherine Siva Saubel
1972 *Temalpakh (From the Earth): Cahuilla Indian Knowledge and Usage of Plants*. Malki Museum Press, Banning, California.

Bean, Lowell John and Florence C. Shipek
1978 Luiseno. In *California*, edited by R.F. Heizer, pp. 550-563. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Bean, Lowell John and Charles R. Smith

1978a Gabrielino. In *California*, edited by R.F. Heizer, pp. 538-549. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

1978b Serrano. In *California*, edited by R. F. Heizer, pp. 570-574. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

Bochicchio, R. and F. Reicher

2003 Are Hemicelluloses from Podocarpus Lambertii Typical of Gymnosperms? *Carbohydrate Polymers* 53(2):127-136.

Bog-Hansen, T. C.

1990 Immunoelectrophoresis. In *Gel Electrophoresis of Proteins*, edited by D. Rickwood and B.D. Hames, pp. 273-300. Oxford University Press, Oxford.

Bonner, F. T. and J. A. Vozzo

1987 *Seed Biology and Technology of Quercus*. U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. General Technical Report SO-66.

Boschung, Herbert T., Jr.

1983 *The Audubon Society Field Guide to North American Fishes, Whales, and Dolphins*. Audubon Field Guides. Alfred A. Knopf, New York, New York.

Brand, J., B. Snow, G. Nabhan and A. Truswell

1990 Plasma Glucose and Insulin Responses to Traditional Pima Indian Meals. *American Journal for Clinical Nutrition* 51:416-420.

Brill, Steve and Evelyn Dean

1994 *Identifying and Harvesting Edible and Medicinal Plants in Wild (and Not So Wild) Places*. Hearst Books, New York, New York.

Britton, Nathaniel Lord and Hon. Addison Brown

1970a *An Illustrated Flora of the Northern United States and Canada, Vol. 1*. 3 vols. Dover Publications, Inc., New York, New York.

1970b *An Illustrated Flora of the Northern United States and Canada, Vol. 2*. 3 vols. Dover Publications, Inc., New York, New York.

1970c *An Illustrated Flora of the Northern United States and Canada, Vol. 3*. 3 vols. Dover Publications, Inc., New York, New York.

Bryan, Nonabah G. and Stella Young

1978 *Navajo Native Dyes: Their Preparation and Use*. Chilocco Agricultural School, Chilocco, Oklahoma.

California Invasive Plant Council

2006 *California Invasive Plant Inventory*. Cal-IPC Publication 2006-02, California Invasive Plant Council, Berkeley.

Carlquist, Sherwin

2001 *Comparative Wood Anatomy: Systematic, Ecological, and Evolutionary Aspects of Dicotyledon Wood*. Springer Series in Wood Science. Springer, Berlin.

Clayton, W. D. and S. A. Renvoize
1986 *Genera Graminium: Grasses of the World*. Kew Bulletin Additional Series XIII, Royal Botanic Gardens, Kew.

Clements, Edith S.
1927 Wild Flowers of the West. *The National Geographic Magazine* L1(5):566-622.

Cohen, Andrew S.
2003 *Paleolimnology: The History and Evolution of Lake Systems*. Oxford.

Cook, Sherburne F.
1960 *Colonial Expeditions to the Interior of California: Central Valley, 1800-1820*. University of California Anthropological Records 16(6). University of California, Berkeley, California.

Cordell, Linda S.
1984 *Prehistory of the Southwest*. Harcourt Brace, New York, New York.

Costello, Julia G.
1985 Ceramics. In *Excavations at Mission San Antonia 1976-1978*, pp. 20-56. Monograph XXVI Institute of Archaeology, University of California, Los Angeles.

Crane, J. C. and B. E. Horrall
1943 Phospholipids in Dairy Products. II. Determination of Phospholipids and Lecithin in Lipids Extracted from Dairy Products. *Journal of Dairy Science* 26(10):935-942.

Creighton, Thomas E.
1993 *Proteins: Structures and Molecular Properties*. 2nd ed. W. H. Freeman and Company, Ltd., San Francisco.

Culliford, Brian J.
1964 Precipitation Reactions in Forensic Problems. *Nature* 201:1092-1094.

1971 *The Examination and Typing of Bloodstains in the Crime Laboratory*. United States Department of Justice, U.S. Government Printing Office, Stock 2700-0083, Washington D.C.

Davis, Raymond E., Kenneth D. Gailey and Kenneth W. Whitten
1984 *Principles of Chemistry*. CBS College Publishing, Philadelphia.

DeFoliart, G. R.
1975 Insects as a Source of Protein. *Bulletin of the Entomological Society of America* 21:161-163.

1994 Some Insect Foods of the American Indian: And How the Early Whites Reacted to Them. *The Food Insects Newsletter* 7(3).

Dietler, John, Ph.D., RPA, Caprice "Kip" Harper, M.A., RPA, Linda Akyüz, B.A., Virginia Austerman, M.A., RPA, and Charles Cisneros, M.A.
2010 Archaeological Evaluation Report (Phase II) for the San Gabriel Trench Grade Separation Project, Cities of San Gabriel, Alhambra, and Rosemead, Los Angeles County, California. Prepared for the California Department of Transportation - District 7, Los Angeles, California, and the Alameda Corridor - East Construction Authority, Irwindale, California.

Dobkin de Rios, Marlene
1990 *Hallucinogens: Cross-Cultural Perspectives*. Prism-Unity Press, Dorset, England and Lindfield, Australia.

Driscoll, D. and P. Copeland
2003 Mechanism and Regulation of Selenoprotein Synthesis. *Annual Review of Nutrition* 23:17-40.

Ebeling, Walter
1986 *Handbook of Indian Foods and Fibers of Arid America*. University of California Press, Berkeley, California.

Egan, W. M.
1917 *Pioneering the West 1846-1878: Major Howard Egan's Diary*. Howard Egan Estate, Richmond, Utah.

Elmore, Francis H.
1944 *Ethnobotany of the Navajo*. University of New Mexico with the School of American Research, Santa Fe, New Mexico.

Fernald, M. L.
1950 *Gray's Manual of Botany*. 8 ed. American Book Company, New York, New York.

Food and Agriculture Organization of the United Nations
2009 Effects of Stress and Injury on Meat and By-product Quality. Electronic document, www.fao.org/docrep/003/X6909E/x6909e04.htm, accessed November 17, 2009.

Forde, Brian G. and Peter J. Lea
2007 Glutamate in Plants: Metabolism, Regulation, and Signaling. *Journal of Experimental Botany* 58(9):2339-2358.

Foster, Steven and James A. Duke
1990 *A Field Guide to Medicinal Plants: Eastern and Central North America*. Houghton Mifflin Company, Boston.

Franceschi, V. R. and P. A. Nakata
2005 Calcium Oxalate in Plants: Formation and Function. *Annual Review of Plant Biology* 56:41-71.

Furst, P. and P. Stehle
2004 What are the Essential Elements Needed for the Determination of Amino Acid Requirements in Humans? *Journal of Nutrition* 134(6):1558S-1565S.

Gaensslen, R. E.
1983 *Sourcebook in Forensic Serology, Immunology, and Biochemistry*. United States Department of Justice, Washington D.C.

Gardiner, Paula
1999 Chamomile (*Matricaria recuita, Anthemis nobilis*). Electronic document, Longwood Herbal Task Force: http://www.mcp.edu/herbal/default.htm, accessed November 28, 2012.

Garrison, Robert , Jr. and Elizabeth Somer
1985 *The Nutrition Desk Reference*. Keats Publishing, Inc., New Canaan.

Gerlach, S. C., Margaret Newman, Edward J. Knell and Edwin S. Hall
1996 Blood Protein Residues on Lithic Artifacts from Two Archaeological Sites in the De Long Mountains, Northwestern Alaska. *Arctic* 49(1):1-10.

Green, N. P. O., G. W. Stout and D. J. Taylor
2006 *Biological Science 1 & 2*. 3rd ed. Cambridge University Press, Cambridge.

Grieve, M.
1982a *A Modern Herbal, Vol. 1*. 2 vols. Dover Publications, New York, New York.

1982b *A Modern Herbal, Vol. 2*. 2 vols. Dover Publications, Inc., New York.

Gurfinkel, D. M. and U. M. Franklin
1988 A Study of the Feasibility of Detecting Blood Residue on Artifacts. *Journal of Archeological Science* 15:83-97.

Hanumantha Rao, K. and K.S.E. Forssberg
1991 Mechanism of Fatty Acid Absorption in Salt-Type Mineral Flotation. *Minerals Engineering* 4(7-11):879-890.

Harrington, H. D.
1964 *Manual of the Plants of Colorado*. Sage Books, Chicago.

1967 *Edible Native Plants of the Rocky Mountains*. University of New Mexico Press, Albuquerque, New Mexico.

Harrison, Frederick W.
1988 Utilization of Freshwater Sponges in Paleolimnological Studies. *Palaeogeography, Palaeoclimatology, Palaeoecology* 62(1-4):387-397.

Hather, Jon G.
2000 *Archaeological Parenchyma*. Archetype Publications Ltd., London.

Hedges, Ken and Christina Beresford
1986 *Santa Ysabel Ethnobotany*. San Diego Museum of Man, Ethnic Technology Notes No. 20. San Diego Museum of Man, San Diego, California.

Hedrick, U. P. (editor)
1972 *Sturtevant's Edible Plants of the World*. Dover Publications, Inc., New York, New York.

Heinerman, John
1983 *The Complete Book of Spices*. Keats Publishing, Inc., New Canaan, Connecticut.

Heiser, Charles B., Jr.
1990 *Seed to Civilization: The Story of Food*. Harvard University Press, Cambridge.

Heizer, Robert F. and A.B. Elsasser
1980 *The Natural World of the Californian Indians*. California Natural History Guides: 46. University of California Press, Berkeley, Los Angeles and London.

Henn, Jayne
2012 The True Life of *Schinus Molle*. Electronic document, http://blog.wellsfargo.com/guidedbyhistory/2012/02/the_true_life_of_schinus_molle.html, accessed October 29, 2012.

Hickey, Michael and Clive J. King
1981 *100 Families of Flowering Plants*. Cambridge University Press, Cambridge.

Hickman, James C. (editor)
1993 *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley, Los Angeles, London.

Hight, S. D, J. P. Cuda and J. C. Medal
2002 Brazilian Peppertree. In *Biological Control of Invasive Plants in the Eastern United States*. Co-authored by R. Van Driesche, Bernd Blossey, Mark Hoddle, Suzanne Lyon, and Richard Reardon. USDA Forest Service Publication FHTET-2002-04.

Hitchcock, A.S.
1971 *Manual of the Grasses of the United States, Vol. 2*. 2nd ed. 2 vols. Dover Publications, Inc., New York, New York.

Hitchcock, C. Leo and Arthur Cronquist
1973 *Flora of the Pacific Northwest*. University of Washington Press, Seattle, Washington and London.

Hoadley, 900XR. Bruce
1990 *Identifying Wood: Accurate Results with Simple Tools*. The Taunton Press, Inc., Newtown, Connecticut.

Hodgson, Wendy C.
2001 *Food Plants of the Sonoran Desert*. The University of Arizona Press, Tucson, Arizona.

Hoffman, David
1988 *The Holistic Herbal*. Element Books Ltd., Longmead, Shaftesbury, Dorset.

Hogberg, Anders, Kathryn Puseman and Chad Yost
2009 Integration of Use-wear with Protein Residue Analysis - A Study of Tool Use and Function in the Scandinavian Early Neolithic. *Journal of Archaeological Science* 36:1725-1737.

Hoover, Robert L.
1973 *Chumash Fishing Equipment*. San Diego Museum of Man, Ethnic Technology Notes No. 9. San Diego Museum of Man, San Diego, California.

Hyland, D. C., J. M. Tersak, J. M. Adovasio and M. I. Siegel
1990 Identification of the Species of Origin of Residual Blood on Lithic Material. *American Antiquity* 55(1):104-111.

Ignatyuk, L. N. and S. V. Isai
1993 The Lipid Component of Chitin and Chitosan Structures. *Chemistry of Natural Compounds* 29(4):539.

Isaksson, Sven
1999 Guided By Light: The Swift Characterization of Ancient Organic Matter by FTIR, IR-Fingerprinting and Hierarchical Cluster Analysis. *Laborativ Arkeologi* 12:35-43.

Johnson, Patti J.
1978 Patwin. In *California*, edited by Robert F. Heizer, pp. 350-360. Handbook of North American Indians. vol. 8, W. C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

Jones, Louise, Jennifer L. Milne, David Ashford and Simon J. McQueen-Mason
2003 Cell Wall Arabinan is Essential for Guard Cell Function. *Proceedings of the National Academy of Sciences of the United States of America* 100(20):11783-11788.

Kavasch, Barrie
1979 *Native Harvests*. Vintage Books, a division of Random House, Inc., New York, New York.

Kearney, Thomas H. and Robert H. Peebles
1960 *Arizona Flora*. University of California Press, Berkeley.

Kelly, Isabel T.
1964 *Southern Paiute Ethnography*. Anthropological Papers Number 69 ed. Glen Canyon Series No. 21. University of Utah Press, Salt Lake, Utah.

1978 Coast Miwok. In *California*, edited by Robert F. Heizer, pp. 414-425. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

King, Chester
1990 *Ethnohistoric Reconstruction of Subsistence-Settlement Systems in the Vicinity of Burton Mesa*. Ms. on file with Unocal Corporation.

King, Chester and Teresa P. Rudolph
1991 Ethnohistoric Resource Use. In *Western Chumash Prehistory: Resource Use and Settlement in the Santa Ynez River Valley*, edited by Craig R. Woodman, James L. Rudolph and Teresa P. Rudolph, pp. 103-136. Science Applications International Corporation, California.

Kiple, Kenneth F. and Kriemhild Conee Ornelas (editors)
2000a *The Cambridge World History of Food, Vol. 1*. 2 vols. Cambridge University Press, Cambridge, U.K.

2000b *The Cambridge World History of Food, Vol. 2*. 2 vols. Cambridge University Press, Cambridge.

Kirk, Donald R.
1975 *Wild Edible Plants of Western North America*. Naturegraph Publishers, Happy Camp, California.

Kooyman, B., Margaret E. Newman, Christine Cluney, Murray Lobb and Shayne Tolman
2001 Identification of Horse Exploitation by Clovis Hunters Based on Protein Analysis. *American Antiquity* 66(4):686-691.

Kramer, Fritz L.
1957 The Pepper Tree, *Schinus Molle* L. *Economic Botany* 11(4):322-326.

Kricher, John C. and Gordon Morrison
1988 *A Field Guide to Ecology of Eastern Forests*. Houghton Mifflin Company, Boston and New York.

Krochmal, Arnold and Connie Krochmal
1973 *A Guide to the Medicinal Plants of the United States*. Quadrangle, the New York Times Book Co., New York, New York.

Kruger, Anna
1993 *An Illustrated Guide to Herbs, Their Medicine and Magic*. Dragon's World, Lts., Limpsfield, Great Britian.

Lanner, Ronald M.
1983 *Trees of the Great Basin*. University of Nevada Press, Reno, Nevada.

Lehane, Brendan
1977 *The Power of Plants*. McGraw-Hill Book Co., Ltd., Maidenhead, England.

Levy, Richard
1978a Costanoan. In *California*, edited by Robert F. Heizer, pp. 485-495. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

1978b Eastern Miwok. In *California*, edited by Robert F. Heizer, pp. 398-413. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

Light, S. F.
1946 Habitat and Habitat Types of Termites and their Economic Significance. In *Termites and Termite Control*, edited by Charles A. Kofoid, pp. 136-149. University of California Press, California.

Loy, T. H.
1983 Prehistoric Blood Residues: Detection on Tool Surfaces and Identification of Species of Origin. *Science* 220:1269-1271.

Luomala, Katharine
1978 Tipai and Ipai. In *California*, edited by Robert F. Heizer, pp. 592-609. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

Mangelsdorf, Paul C.
1974 *Corn Its Origin, Evolution, and Improvement*. The Belknap Press of Harvard University Press, Cambridge.

Marlar, R. A., Kathryn Puseman and Linda Scott Cummings
1995 Protein Residue Analysis of Archaeological Materials: Comments on Criticisms and Methods. *Southwestern Lore* 61(2):27-37.

Martin, Alexander C.
1972 *Weeds*. Golden Press, Western Publishing Company, Inc., New York, New York.

Martin, Alexander C. and William D. Barkley
1961 *Seed Identification Manual*. University of California, Berkeley.

Marzio, L., R. Del Bianco, M.D. Donne, O. Pieramico, and F. Cuccurullo
1989 Mouth-to-Cecum Transit Time in Patients Affected by Chronic Constipation: Effect of Glucomannan. *The American Journal of Gastroenterology* 84(8):888-891.

Matthews, Meredith H.
1979 Soil Sample Analysis of 5MT2148: Dominguez Ruin, Dolores, Colorado. Appendix B. In *The Dominguez Ruin: A McElmo Phase Pueblo in Southwestern Colorado*, edited by Alan D. Reed. Bureau of Land Management Cultural Resource Series. vol. 7. Bureau of Land Management, Denver, Colorado.

Mauseth, James D.
1988 Parenchyma. Chapter 3. In *Plant Anatomy*, pp. 43-51. The Benjamin/Cummings Publishing Company, Inc., Menlo Park, California.

McCawley, William
1996 *The First Angelinos: The Gabrielino Indians of Los Angeles*. Malki Museum/Ballena Press Cooperative Publication, Banning or Novoto, California.

McGee, Harold
1984 *On Food and Cooking*. Charles Scribner's Sons, New York, New York.

McKelvey, S.D.
1947 *Yuccas of the Southwestern United States, Part 2*. Arnold Arboretum of Harvard University, Jamaica Plain, Massachusetts.

McWeeney, Lucinda
1989 What Lies Lurking Below the Soil: Beyond the Archaeobotanical View of Flotation Samples. *North American Archaeologist* 10(3):227-230.

Mead, George R.
1972 *The Ethnobotany of the California Indians: A Compendium of the Plants, Their Users, and Their Uses*. University of Northern Colorado Museum of Anthropology, Greeley, Colorado.

2003 *The Ethnobotany of the California Indians*. E-Cat Worlds, La Grande, Oregon.

Medsger, Oliver Perry
1966 *Edible Wild Plants*. MacMillan Publishing Company, Inc., Racine, Wisconsin.

Merriam, C.H.
1918 The Acorn, a Possibly Neglected Source of Food. *National Geographic Magazine* 34(2):129-137.

Millspaugh, Charles F.
1974 *American Medicinal Plants: An Illustrated and Descriptive Guide to Plants Indigenous to and Naturalized in the Unites States Which are Used in Medicine*. Dover Publications, Inc., New York, New York.

Moerman, Daniel E.
1986 *Medicinal Plants of Native America*. University of Michigan Museum of Anthropology Technical Reports No. 19, 1 and 2. University of Michigan Press, Ann Arbor, Michigan.

1998 *Native American Ethnobotany*. Timber Press, Portland, Oregon.

Moore, Michael
1979 *Medicinal Plants of the Mountain West*. The Museum of New Mexico Press, Santa Fe, New Mexico.

Mothet, Jean-Pierre, Angele T. Parent, Herman Wolosker, Roscoe O. Brady, Jr., David J. Linden, Christopher D. Ferris, Michael A. Rogawski and Solomon H. Snyder
2000 D-serine is an Endogenous Ligand for the Glycine Site of the N-methl-D-aspartate Receptor. *Proceedings of the National Academy of Sciences* 97(9):4926-4931.

Muenscher, Walter Conrad
1987 *Weeds*. 2nd ed. Cornell University Press, Ithaca, New York.

Munz, Philip A.
1974 *A Flora of Southern California and Supplement*. University of California, Berkeley, California.

Murray, Robert K., Daryl K. Granner, Peter A. Mayes and Victor W. Rodwell
2000 *Harper's Biochemistry*. 25th Edition ed. McGraw-Hill, New York.

Musil, Albina F.
1963 *Identification of Crop and Weed Seeds*. Agricultural Handbook no. 219. U.S. Department of Agriculture, Washington D.C.

Nelson, D. L. and M. M. Cox
2005 *Lehninger Principles of Biochemistry*. 4th ed. W. H. Freeman and Company, New York.

Newman, M. and P. Julig
1989 The Identification of Protein Residues on Lithic Artifacts from a Stratified Boreal Forest Site. *Canadian Journal of Archaeology* 13:119-132.

Niering, William A. and Nancy C. Olmstead
1979 *The Audubon Society Field Guide to North American Wildflowers, Eastern Region*. Alfred A. Knopf, Inc., New York, New York.

Niethammer, Carolyn
1974 *American Indian Food and Lore*. Collier Brooks, New York, New York.

O'Brien, Peter J., Arno G. Siraki and Nandita Shangari
2006 Aldehyde Sources, Metabolism, Molecular Toxicity Mechanisms, and Possible Effects on Human Health. Electronic document, http://www.redorbit.com/news/science/351996/aldehyde_sources_metabolism_molecular_toxicity_mechanisms_and_possible_effects_on/, accessed September 14, 2012.

Ody, Penelope
1993 *The Complete Medicinal Herbal*. Dorling Kindersley, New York.

Parsons, Mary Elizabeth
1966 *The Wildflowers of California*. Dover Publications, Inc., New York, New York.

Patnaik, Pradyot
2003 *Handbook of Inorganic Chemicals*. McGraw-Hill, New York.

Pearsall, Deborah M., Karol Chandler-Ezell and Alex Chandler-Ezell
2003 Identifying Maize in Neotropical Sediments and Soils Using Cob Phytoliths. *Journal of Archaeological Science* 30:611-627.

Peattie, Donald Culross
1966 *A Natural History of Trees of Eastern and Central North America*. Bonanza Books, New York, New York.

Peterson, Lee A.
1977 *Edible Wild Plants*. Collier Books, New York, New York.

Phillips Petroleum Company (editor)
1963 *Pasture and Range Plants*. Phillips Petroleum Company, Bartlesville, Oklahoma.

Phillips, Roger and Martyn Rix
1993 *The Random House Book of Vegetables*. Random House, Inc., New York, New York.

Priestley, Herbert I.
1972 *Franciscan Explorations in California*. The Arthur H. Clark Company.

Reeds, P. J.
2000 Dispensable and Indispensable Amino Acids for Humans. *Journal of Nutrition* 130(7):1835S-1840S.

Reeds, Peter J., Douglas G. Burrin, Barbara Stoll and Farook Jahoor
2000 Intestinal Glutamate Metabolism. *Journal of Nutrition* 130(4):978S-982S.

Reid, George K.
1987 *Pond Life. A Guide to Common Plants and Animals of North American Ponds and Lakes*. Golden Press, New York, New York.

Reid, Hugo
1926 *The Indians of Los Angeles County*. Privately printed, Los Angeles.

Rhoades, Robert E.
1993 The Golden Grain: Corn. *National Geographic Magazine* 183(6):92-117.

Robinson, Peggy
1979 *Profiles of Northwest Plants*. Far West Book Service, Portland, Oregon.

Rodnina, M. V., M. Beringer, and W. Wintermeyer
2007 How Ribosomes Make Peptide Bonds. *Trends in Biochemical Sciences* 32(1):20-26.

Saenger, Wolfram
1984 *Principles of Nucleic Acid Structure.* Springer, New York.

Salas, Joaquin, Enrique Martinez-Force, and Rafael Garces
2006a Accumulation of Phospholipids and Glycolipids in Seed Kernels of Different Sunflower Mutants (Helianthus annuus). *Journal of the American Oil Chemists Society* 83(6):539-545.

2006b Phospholipid Molecular Profiles in the Seed Kernel from Different Sunflower (Helianthus annuus) Mutants. *Lipids* 41(8):805-811.

Schmutz, Ervin M. and Lucretia Breazeale Hamilton
1979 *Plants that Poison*. Northland Publishing, Flagstaff, Arizona.

Schopmeyer, C. S.
1974 *Seeds of Woody Plants in the United States*. Agricultural Handbook No. 450. United States Department of Agriculture, Washington, D.C.

Seeman, Mark F., Nils E. Nilsson, Garry L. Summers, Larry L. Morris, Paul J. Barans, Elaine Dowd and Margaret Newman
2008 Evaluating Protein Residues on Gainey Phase Paleoindian Stone Tools. *Journal of Archaeological Science* 35:2742-2750.

Sensabaugh, G. F., A. C. Wilson and P. L. Kirk
1971 Protein Stability in Preserved Archaeological Remains, Parts I and II. *International Journal of Biochemistry* 2:545-568.

Shahidi, Fereidoon and Zhuliang Tan
2008 Bioactives and Health Benefits of Brazil Nut. In *Tree Nuts: Composition, Phytochemicals, and Health Effects*, edited by Cesarettin Alasalvar, pp. 143-156. CRC Press, Boca Raton.

Sheeler, Phillip and Donald E. Bianchi
2004 *Cell and Molecular Biology*. 3rd ed. John Wiley and Sons, New York.

Shields, Helen
1984 *Desert Plants: Recipes and Remedies*. Okesa Publications, Tularosa, New Mexico.

Skinner, A.
1910 The Use of Insects and Other Invertebrates as Food by the North American Indians. *Journal of the New York Entomological Society* 18(4):264-267.

Smith, Brian
1999 *Infrared Spectral Interpretation, A Systematic Approach*. CRC Press, New York.

Spellenberg, Richard
1979 *The Audubon Society Field Guide to North American Wildflowers, Western Region*. Alfred A. Knopf, Inc., New York, New York.

Spier, Robert F.G.
1978 Foothills Yokuts. In *California*, edited by R.F. Heizer, pp. 471-484. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington, D.C.

Stevenson, Matilda Coxe
1915 *Ethnobotany of the Zuni Indians*. Thirtieth Annual Report of the Bureau of American Ethnology. Government Printing Office, Washington, D.C.

Streitweiser, Andrew Jr. and Clayton H. Heathcock
1976 *Introduction to Organic Chemistry*. Macmillan, New York.

Stuart, Barbara H.
2004 *Infrared Spectroscopy: Fundamentals and Applications*. Wiley & Sons, Ltd.

Sweet, Muriel
1976 *Common and Useful Plants of the West*. Naturegraph Company, Healdsburg, California.

Talalay, Laurie, Donald R. Keller and Patrick J. Munson
1984 Hickory Nuts, Walnuts, Butternuts, and Hazelnuts: Observations and Experiments Relevant to their Aboriginal Exploitation in Eastern North America. In *Experiments and Observations on Aboriginal Wild Plant Food Utilization in Eastern North America*, edited by Patrick J. Munson, pp. 338-359. Prehistory Research Series. vol. VI (2). Indiana Historical Society, Indianapolis, Indiana.

Taylor, Leslie
2005 *The Healing Power of Rainforest Herbs*. Square One Publishers, Inc., Garden City Park, New Jersey.

Thomson, William A. R. (editor)
1978 *Medicines From the Earth, A Guide to Healing Plants*. Harper & Row, San Francisco, California.

Tilford, Gregory L.
1997 *Edible and Medicinal Plants of the West*. Mountain Press Publishing Company, Missoula, Montana.

Timbrook, Jan
1984 Chumash Ethnobotany: A Preliminary Report. *Journal of Ethnobotany* 4:141-169.

Tomanova, Eliska
1986 *The Wild Flowers Book*. Galley Press, England.

Toussaint-Samat, Maguelonne
1992 *A History of Food*. Blackwell Publishers, Cambridge.

Trappe, James M.
1962 Fungus Associates of Ectotrophic Mycorrhizae. In *The Botanical Review*. U.S. Department of Agriculture, Washington D.C.

Tubb, Helen J., Martin J. Hodson and Gregory C. Hodson
1993 The Inflorescence Papillae of the Triticeae: A New Tool for Taxonomic and Archaeological Research. *Annals of Botany* 72:537-545.

Turner, Raymond M., Janice E. Bowers and Tony L. Burgess
1995 *Sonoran Desert Plants: an Ecological Atlas*. The University of Arizona Press, Tucson, Arizona.

Underhill, Ruth, Ph.D.
1941 *Indians of Southern California*. Department of the Interior, Bureau of Indian Affairs, Branch of Education, Lawrence.

USDA Natural Resources Conservation Service
2011 The PLANTS Database. Electronic Document, http://plants.usda.gov. Accessed 2007-2012. National Plant Data Center, Baton Rouge.

Vestal, Paul A.
1952 *The Ethnobotany of the Ramah Navaho*. Papers of the Peabody Museum of American Archaeology and Ethnology 40(4). Harvard University, Cambridge, Massachusetts.

Wallace, William J.
1978 Northern Valley Yokuts. In *California*, edited by R.F. Heizer, pp. 462-470. Handbook of North American Indians. vol. 8, W.C. Sturtevant, general editor. Smithsonian Institute, Washington D.C.

Wang, Yonglei, Wumanjiang Eli, Yuanfeng Liu and Laizao Long
2008 Synthesis of Environmentally Friendly Calcium Oleate. *Industrial & Engineering Chemistry Research* 47:8561-8565.

Wardlaw, Gordon M. and Paul M. Insel
1996 *Perspectives in Nutrition*. Mosby-Year Book, Inc., St. Louis, Missouri.

Williams, Jack S. and Nicole A. Newlands
1996 *The Center for Spanish Colonial Archaeology Handbook*, third edition. The Center for Spanish Colonial Archaeology, San Diego.

Weber, William A.
1976 *Rocky Mountain Flora*. Colorado Associate University Press, Boulder, Colorado.

Weiner, Michael A.
1990 *Wiener's Herbal*. Quantum Books, Mill Valley, California.

Westrich, Lolo
1989 *California Herbal Remedies*. Gulf Publishing Company, Houston, Texas.

Yanovsky, E.
1936 Food Plants of the North American Indians. In *U.S. Department of Agriculture Miscellaneous Publication No. 237*, pp. 1-83.

Yoshida, H., Y. Tomiyana, S. Kita, and Y. Mizushina
2005 Roasting Effects on Fatty Acid Distribution of Triacylglycerols and Phospholipids in the Kernels of Pumpkin (Cucurbita spp) Seeds. *Journal of the Science of Food and Agriculture* 85(12):2061-2066.

Yost, Chad and Linda Scott Cummings
2008 Pollen, Starch, Phytolith, Protein Residue, and Organic Residue Analysis of Artifacts from Northeastern Alberta, Canada.

Young, V. R.
1994 Adult Amino Acid Requirements: The Case for a Major Revision in Current Recommendations. *Journal of Nutrition* 124(8):1517S-1523S.

Yu, Liangli and Margaret Slavin
2008 Nutraceutical Potential of Pine Nut. In *Tree Nuts: Composition, Phytochemicals, and Health Effects*, edited by Cesarettin Alasalvar, pp. 285-294. CRC Press, Boca Raton.

Zigmond, Maurice L.
1981 *Kawaiisu Ethnobotany*. University of Utah Press, Salt Lake City, Utah.

Zomlefer, Wendy B.
1994 *Guide to Flowering Plants Families*. The University of North Carolina Press, Chapel Hill and London.