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WITH CORRECTED AND ADDITIONAL POLLEN AND PHYTOLITH DATA

PILOT STUDY: ARCHAEOLOGY OF THE URBAN ENVIRONMENT IN 19TH CENTURY SAN JOSE, CA

POLLEN, PHYTOLITH, STARCH, PARASITE, AND MACROFLORAL ANALYSIS OF SOIL SAMPLES FROM THE MARKET STREET CHINATOWN ARCHAEOLOGY PROJECT

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NOTES ON THE RE-ISSUE OF MSCAP TECHNICAL REPORT 3

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In recent months, researchers on the Market Street Chinatown Archaeology Project have become aware of minor inaccuracies in the pollen and phytolith charts – Figures 1, 2, and 4 – included in the first issue of MSCAP Technical Report 3, "Pilot Study: Archaeology of the Urban Environment in 19th Century San Jose, CA – Pollen, Phytolith, Starch, Parasite, and Macrofloral Analysis of Soil Samples from the Market Street Chinatown Archaeology Project."

These errors were introduced through formatting procedures during figure rendering and during preparation of the report for printing, and were largely a result of file conversion errors that were not immediately apparent.

While these inaccuracies would make little difference to the casual reader, they might impede reanalysis of the archaeobotanical data in future studies. In order to ensure that the data presented herein has the greatest utility for future researchers, we decided to re-issue this technical report. Figures 1, 2, and 4 have been re-generated from the original data and are printed here in their correct form.

Additionally, we have added two new tables – Tables 7 and 8 – to Appendix A, so that future researchers will have direct access to the primary pollen and phytolith counts that were used to generate Figures 1, 2, and 4.

All other aspects of the report have remained unchanged.

We are grateful to Linda Scott Cummings and the research staff at PaleoResearch Institute for working closely with us to correct these errors so that the re-issued technical report will provide the most accurate information to current and future researchers.

Sincerely,

Dr. Barbara L. Voss, Associate Professor of Anthropology
Principal Investigator, Market Street Chinatown Archaeology Project

PREFACE
CONTRIBUTED BY BARBARA L. VOSS

The role of archaeology in the study of long-term environmental change is well-known. Less widely recognized are the contributions that archaeology can make to understanding more recent and localized environmental phenomena. This pilot study of San Jose's historic urban environment demonstrates the power of archaeology to provide new data about human-environment interactions in recent urban environments.

Block 1 in San Jose, California – the historic site of the Market Street Chinatown – underwent urban redevelopment during the mid 1980s. During 1985-1988, archaeologists associated with Archaeological Resource Services (ARS) were contracted to recover archaeological features exposed by building construction activities. In all, they identified and excavated 63 archaeological features, most of which were related to the Market Street Chinatown, which stood on Block 1 during 1862-1887.

With great foresight, ARS archaeologists saved bulk samples of soil from some of the features they excavated. Since excavation, these soil samples were stored under a variety of conditions until they were transferred to the Stanford University with the rest of the Block 1 archaeological collection for the Market Street Chinatown Archaeology Project (Project). In 2011-2012, these bulk soil samples were inventoried and cataloged under the leadership of Project collections manager Megan Kane. A total of 145 bulk soil samples were identified, each ranging in volume from approximately 2 to 12 liters. These samples were recovered from a range of features, including trash pits, wood-lined cesspools, wells, and open-air dumps. The majority date to the Chinatown period (1862-1887); however, a few date to the Spanish-colonial/Mexican (1776-1848), early statehood (1849-1861), and turn-of-the century (1887-1920) periods. Together, these samples provide an unprecedented physical archive of 19th century environmental transformation of the southern San Francisco Bay area and of human-environment interactions related to the rapid urbanization.

The primary goal of this pilot study was to assess the research potential of these samples. After twenty-plus years of storage under less-than-optimal conditions, do the samples retain constituents such as macrobotanicals, pollen, starch, phytoliths, and parasites? Do samples from specific periods or feature types have greater research potential than other samples?

To address this primary question, ten soil samples representing two wood-lined trash pits or privies, three unlined trash pits, a wood-lined cistern, and an unlined pit with pig bones were selected for analysis by archaeobotanists at PaleoResearch Institute in

Golden, Colorado. PaleoResearch Institute staff bring not only their general expertise in archaeobotany to this pilot study, but also specific extensive experience in analysis of Overseas Chinese sites in North America.

PaleoResearch Institute conducted pollen, starch, parasite, phytolith, and macrofloral analyses were conducted on each of the ten soil samples. They found that despite the long period that had elapsed since the original excavation of the soil samples (in some cases, over 27 years!) and the irregular storage conditions during that period, all ten soil samples contained a rich quantity and variety of archaeobotanical remains. Not only do these botanical remains provide valuable information about local environmental conditions, but they also provide a glimpse into the economic undertakings and culinary practices of those who lived and worked at the Market Street Chinatown.

This technical report presents the results of PaleoResearch Institute's analysis of the soil samples. The data described herein contain rich new information about vegetation communities and agricultural practices in historic San Jose. It traces the plant foods marketed to and consumed by residents of the Market Street Chinatown, including those grown locally and those imported from around the world. Parasitological remains from the samples provide a direct line of evidence related to residents' health and can be compared to parasitology analyses from early industrial urban contexts from throughout North America.

The Market Street Chinatown Archaeology Project is a community-based research and educational partnership between Stanford University, History San José, Chinese Historical and Cultural Project, and Environmental Science Associates. We are especially grateful to the Lang Fund for Environmental Anthropology and the Institute for Research in the Social Sciences, both based at Stanford University, for underwriting costs necessary for this pilot study. Megan Kane supervised the inventory and cataloging of all the archaeological samples in Market Street Chinatown collection, prepared contextual information that aided in selecting samples for analysis, and coordinated all aspects of preparing samples for transmittal to PaleoResearch Institute. Ryan Kennedy at Indiana University also assisted in selecting the soil samples for analysis in this pilot study, and Jen Kidwell in the Stanford University Department of Anthropology provided key logistical support. We give special thanks to Linda Scott Cummings, Kathryn Puseman, Chad Yost, Peter Kováčik, R.A. Varney, and their colleagues at PaleoResearch Institute for contributing their expertise to this exploratory research.

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1.0 INTRODUCTION

Ten soil samples were selected from a collection of 145 soil samples recovered during archaeological salvage excavations of the Market Street Chinatown in downtown San Jose, California, from 1985-1988. These ten soil samples were analyzed for pollen, starches, parasites, phytoliths, and macrofloral remains as part of a pilot study in the "Archaeology of the Urban Environment in 19th Century San Jose." Excavations revealed features such as trash pits, wood-lined cesspools, wells, and open-air dumps. Most of the features date to the Chinatown period (1862-1887), with a few dating to the Spanish-colonial/Mexican (1776-1848), early statehood (1849-1861), and turn-of-the century (1887-1920) periods (Voss 2011). The ten samples submitted for analysis represent two wood-lined trash pits or possible privies, three unlined trash pits, a wood-lined cistern, and an unlined pit containing pig bones (Map 1). Pollen, starch, phytolith, and macrofloral analyses provide information concerning plant resources utilized by the Market Street Chinatown occupants, as well as trash deposited in the features and plants growing in the area during the time period represented. Of particular interest for this project is the degree to which the Chinese immigrants relied on Asian imports or adapted diet and medicinal practices to incorporate locally-available resources. Did the Chinese introduce Asian species to the San Jose region, and what were the environmental consequences? Were edible and medicinal plants grown in the urban neighborhood, or were resources obtained from external sources? Parasite analysis provides some insight into the intestinal health of the Chinatown residents.

The Market Street Chinatown is located in Block 1 of downtown San Jose at the southern end of the San Francisco Bay. The Chinatown had its inception in 1866, but was destroyed by an accidental fire in 1870. The Chinese tenants began rebuilding almost immediately following the fire, and the second Market Street Chinatown grew to include most of the block. Internally, the Market Street Chinatown was subdivided into the Brick Chinatown on the north extent of the block, and the Wood Chinatown in the central and south parts of the block. At the height of its existence, the Market Street Chinatown was the largest Chinese community anywhere in the United States, outside of San Francisco. It was destroyed by a fire of "suspicious origin" in 1887 (Roop 1988:3). The burned out areas were leveled and cleared to make way for construction of the new San Jose city hall building in the plaza adjacent to Block 1. A post office and other businesses were built on the lots of Block 1 in subsequent years (Kane 2011).

Archaeological excavations of Block 1 were conducted by Archaeological Resources Service (ARS) during a major urban renewal project in downtown San Jose during 1985, 1986, and 1988. These excavations revealed 63 features including wood-lined trash pits, unlined trash pits, bone pits, three cisterns, two structures, and two segments of a drainage ditch (*acequia*). Ten soil samples representing two wood-lined trash pits or privies, three unlined trash pits, a wood-lined cistern, and an unlined pit with pig bones

were selected for analysis. Pollen, starch, parasite, phytolith, and macrofloral analyses were conducted on each of the ten samples (Map 1, Table 1).

2.0 METHODS

2.1 Pollen, Starch, and Parasite

A chemical extraction technique based on flotation is the standard preparation technique used in this laboratory for removing pollen grains from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extracting pollen from soils where preservation has been less than ideal and pollen density is lower than in peat. It is important to recognize that it is not the repetition of specific and individual steps in the laboratory but rather mastery of the concepts of extraction and how the desired result is best achieved, given different sediment matrices, that results in successful recovery of pollen for analysis.

The sample volume for pollen, starch, and parasites was determined according to the consistency and composition of the soil sample. A 10% solution of hydrochloric acid (HCl) was used to remove any calcium carbonates present in the soil, after which the samples were screened through 250-micron mesh. The samples were rinsed until neutral by adding water, letting the samples stand for two hours, and then pouring off the supernatant. A small quantity of sodium hexametaphosphate (SHMP) was added to each sample once it reached neutrality, then the samples were allowed to settle according to Stoke's Law in settling columns. This process was repeated with ethylenediaminetetraacetic acid (EDTA). These steps removed the clay prior to heavy liquid separation. The samples then were freeze dried using a vacuum system, which freezes out all moisture at -107 °C and < 10 millitorr. Sodium polytungstate (SPT), with a density of 1.8 g/ml, was used for the flotation process. The samples were 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. Sodium polytungstate 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. These samples were centrifuged at 3000 rpm to concentrate the organic fraction in the bottom of the tube. This pollen-rich organic fraction was rinsed, then all the samples received a short (20–30 minute) treatment in hot hydrofluoric acid (HF) to remove any remaining inorganic particles. The samples then were acetylated for 3–5 minutes to remove any extraneous organic matter.

A light microscope was used to count the pollen at a magnification of 500x. Pollen preservation in these samples generally was excellent. A few pollen were torn, crumpled, or otherwise mangled, making identification difficult. 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.

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. 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 sign (+) on the pollen diagram indicates that the pollen type was observed outside the regular count while scanning the remainder of the microscope slide. The pollen diagram was produced using Tilia 2.0 and TGView 2.0.2. Total pollen concentrations were 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.

“Indeterminate” pollen includes pollen grains that are folded, mutilated, or otherwise distorted beyond recognition. These grains were included in the total pollen count since they are part of the pollen record. The microscopic 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 microscopic charcoal fragments observed, normalized per 100 pollen grains.

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.

Parasite eggs were extracted using the pollen extraction technique. Parasite eggs were counted while examining the sample for pollen and any starches that might be present. Results of the parasite counts are presented on the pollen diagrams, when they occur.

2.2 Phytoliths

Extraction of phytoliths from these sediments was based on heavy liquid floatation. A 10% solution of hydrochloric acid (HCl) first was used to remove calcium carbonates and iron oxides from each 15 ml sediment sample placed in a 500 ml beaker. After this

reaction was complete, 70% nitric acid (HNO_3) was added to each sample to destroy the organic fraction of the sediment. After one hour of boiling, the samples were rinsed to neutral and a 10% solution of ethylenediaminetetraacetic acid (EDTA) was added to each sample and thoroughly mixed. EDTA aids in the removal of organic humic substances not removed during the nitric acid step. The samples were mixed and allowed to settle for two hours, after which, the humic fraction was decanted. Next, a 5% solution of sodium hexametaphosphate (SHMP) was added to each sediment sample to suspend the clays. The samples were mixed and allowed to settle for two hours, after which, the clay sized particles were decanted. This step was repeated until the decanted solution was clear. Once most of the clays were removed, the silt and sand size fractions were transferred to 50 ml centrifuge tubes and dried under vacuum. The dried silts and sands then were mixed with sodium polytungstate (SPT, 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 many silt-sized inorganic silicates were floated with SPT, each sample again was dried under vacuum, then mixed with potassium cadmium iodide (density 2.3 g/ml). The addition of potassium cadmium iodide greatly improved the recovery and concentration of the phytolith fraction. The samples then were rinsed with alcohol to remove any remaining water. After several alcohol rinses, the samples were mounted in optical immersion oil for counting with a light microscope at a magnification of 500x. An initial count of 200 taxonomically significant phytoliths first was conducted, followed by a scan of the remainder of the slide for rare phytolith types of ecological and economic significance. A phytolith diagram was produced using Tilia 2.0 and TGView 2.0.2.

2.3 Macrofloral

The macrofloral samples were floated using a modification of the procedures outlined by Matthews (1979). In all but two cases, 2.0L of soil was removed from the sample bag for flotation. For PRI Sample 3 and PRI Sample 4, a lesser amount of soil was floated (1.5L and 0.8L, respectively) because the original soil sample was less than 2.0L.

Each sample was added to approximately three gallons of water, then stirred until a strong vortex formed. The floating material (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 (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 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 fractions were scanned at a magnification of 2x for the presence of botanic remains. Estimates of frequencies were calculated from a portion of the total volume floated and are noted in the macrofloral table with an asterisk (*). 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.

3.0 RESULTS

3.1 Feature 86-36/5, PRI Samples 1, 2, and 3

Feature 86-36/5 is a wood-lined pit or possible privy with Chinese artifacts measuring 3.25 m in length, 1.25 m in width, and 2.2 m in depth. The fill consisted of nine natural layers, with Layers 8 and 6 containing most of the artifacts. Layer 8 was found at the base of the Feature 86-36/5 and consisted of a loose, brown, fine-grained silt with an abundance of Chinese artifacts. Sample 3 (catalog 86-36/5-1887) was recovered from Layer 8 fill. Layer 6 also was a loose, fine-grained brown silt containing pig remains and an abundance of Chinese artifacts. In the North Wall area of Feature 86-36/5, Layer 6 sloped down into Layer 8. Sample 2 (catalog 86-36/5-1886) was collected from Layer 6 fill. Layer 4 was a loose brown silt with bone, metal fragments, Chinese artifacts, crushed egg shells, and charcoal. This layer is represented by sample 1 (catalog 86-36/5-1884).

3.1.1 Pollen, Starch, Parasites

The pollen record for Feature 86-36/5 was varied. All three of the samples from this feature were dominated by Brassicaceae pollen (Figure 1, Table 2) , although sample 1 from Layer 4 did exhibit a rather large quantity of High-spine Asteraceae pollen. In light of the smaller quantities of Brassicaceae pollen observed in most of the other samples examined from this site, the large quantity of this pollen type in the samples from Feature 86-36/5 are interpreted to represent consumption and/or discard of members of this family, which can include foods such as hot mustard, broccoli, cauliflower, etc. Rape seed or leaves of this plant (*Brassica rapa*) are also a possibility, since both are edible. Oil is pressed from these seeds, which might contain pollen that is then distributed when the oil is used. Today oils are filtered, so checking modern canola oil will not provide information concerning the presence or absence of pollen in oils that might have been prepared from stands of rape seed in the past. Establishing boundaries between pollen that represents plants growing locally and pollen that represents economic activity often is difficult. Pollen that probably is associated with the local environment observed in one or more of the Feature 86-36/5 samples includes *Alnus*, *Abies*, *Pinus*, *Quercus*, *Artemisia*, *Cirsium*, High-spine Asteraceae, Low-spine Asteraceae, Liguliflorae, Caryophyllaceae, Cheno-am, Convolvulaceae, Cyperaceae, *Eriastrum*, *Erodium*, Fabaceae, *Trifolium pratense*, *Lonicera*, *Malva*, *Papaver*, Poaceae, *Eriogonum*, Rhamnaceae, and *Typha angustifolia*-type, representing alder, fir, pine, oak, sagebrush or wormwood, thistle, various members of the sunflower family including those of the marsh elder group and chicory tribe, members of the pink family, Cheno-ams, members of the bindweed family, sedges, woolly stars, filaree, members of the bean family

(legumes), clover, honeysuckle, mallow, weedy poppy, grasses, wild buckwheat, members of the buckthorn family, and cattails. These pollen types generally were observed in very small frequencies.

Pollen types noted in the three samples from Feature 86-36/5 that are attributed to economic activity are more visible on Figure 2 and include *Agave*-type, Brassicaceae, Cerealia, *Fragaria*, *Momordica*, *Oryza*-type, Sapindaceae-type, four types of legumes (*Canavalia*, *Phaseolus*, *Pisum*-type, and *Vicia*-type), and *Zea mays,* representing agave or a lily, members of the mustard family, cereal grains, strawberries, balsam pear/bitter melon, probable rice, possible lychee or longan fruit, four kinds of legumes (jack bean, common bean, probable common pea, and probable fava bean), and maize or corn. These pollen types represent a variety of foods and the potential for several types of economic activity. The *Agave*-type pollen matches exactly with agave pollen in the PRI reference collection. The only reason it has been left at an "*Agave*-type" identification level is that San Jose is well outside the current range for natural occurrence of agave, and recovery of large quantities of agave pollen are extremely rare. This suggests a unique use of this plant, if it was used. While the reference collection contains several types of pollen from members of the agave and lily families, none is a good match to the archaeological pollen other than agave. *Lilium* pollen also has large reticulations, but *Lillium* pollen grains are not as large as the archaeological *Agave*-type pollen recovered and the reticulations on *Lilium* pollen are fairly uniform, whereas those on agave are much coarser towards the middle of the grain and finer towards the poles. Therefore, at this writing, the *Agave*-type pollen is attributed to agave. The Sapindaceae-type pollen grain exhibits all of the characteristics of pollen from a member of the soapberry family, including small size. It is possible it represents *Litchi chinensis* (lychee) or *Dimocarpus longan* syn. *Euphoria longan* (longan), but acknowledging the absence of these pollen in our reference collection, the identification is temporarily left at the family level.

Although it is tempting to interpret recovery of *Agave*-type pollen (Figure 3C) in the lower two samples from this feature as suggesting use of a sweetener, this interpretation does not fit well with modern techniques of making the syrup. *Agave* syrup is common on the market today and is used similarly to sugar. Agave syrup, however, is not made by using flowers, which contain the pollen. Rather, the flowering stalk is cut and the exposed depression fills with sweet liquid, which is harvested and processed.

Brassicaceae pollen, accompanied by aggregates in samples 2 and 3, might well represent the use of mustard seeds in a variety of preparations, including a hot mustard sauce or horseradish. Alternatively, Brassicaceae pollen might reflect consumption of vegetables such as broccoli or cauliflower, which include the flowering heads, or possibly rape or turnip greens or other greens collected during or after flowering. The large quantities of Brassicaceae pollen suggest preparation of foods in the mustard family that contain or retain their pollen, so cabbage, kale, and brussel sprouts, which are vegetables harvested while the leaves are either still tightly packed and definitely harvested prior to flowering, can be excluded. Cerealia pollen represents one of the

cultivated Old World cereals, either wheat, barley, rye, or oats. This pollen is accompanied by aggregates and by the recovery of cells typical of the inflorescence structures of these cereal grains in both the pollen and phytolith records. *Fragaria* pollen represents consumption of strawberries or possibly discard of kitchen debris that included the remains of strawberries. *Momordica* (balsam pear, bittermelon), a member of the Cucurbitaceae (squash family), was represented by a few clusters or aggregates of this pollen type, which were noted only in sample 2 (Figure 3D). This suggests the retention of a withered flower on the blossom end of this fruit. Alternatively, the blossoms themselves might have been cooked.

Oryza-type pollen was never abundant in any of these samples. Indeed, its recovery was surprising since it is not anticipated that the pollen would be transported on processed rice. This suggests the possibility that rice was grown in the area and sold at the market as a local crop. As such, it is possible that it would not have undergone much processing prior to market. Pollen representing four types of legumes was noted only in the Feature 86-36/5 samples. The *Canavalia*, *Phaseolus*, *Pisum*-type, and *Vicia*-type pollen types represent jack beans, common beans, probable common peas, and probable fava/horse beans. It is not surprising to see this variety of legumes in the diet, although recovery of pollen from these cultivated beans often is rare. Once again, this suggests that the users of this feature shopped at a local market and purchased fresh legumes. *Zea mays* pollen, representing corn, was recovered only in the upper two samples from this feature. The presence of this pollen type indicates an integration of a North American agricultural crop into the diets of the Chinese who used this feature.

A variety of pollen types were recovered from the three Feature 86-36/5 fill samples that might or might not reflect economic activity but deserve special discussion. Two types of pollen remain unidentified. One type is best described as a slightly prolate pollen with elongated pores or very short furrows and a spiny exine (Figure 3A). This pollen type was observed in two of the three samples examined from Feature 86-36/5 and in another three samples for the project. The other unidentified type was a large pollen that exhibited three annulated pores and a slightly rough surface (Figure 3B). This pollen was observed only once as a single pollen grain in sample 1. Although *Benincasa* seeds were noted in the macrofloral record, the PRI reference collection does not contain *Benincasa* pollen nor have images of *Benincasa* pollen been found in published literature. This search continues.

Lenticular and spherical starches were noted in the Feature 86-36/5 samples. Lenticular starches are produced by Old World cereals such as wheat, barley, rye, and oats. The small spherical starch can be produced by any of the cereals or even many of the native grasses. Samples from Feature 86-36/5 were unusual in that they exhibited a wide variety of fern spores (Figure 3F and 3G). It is likely that ferns were used as an economic item, whether edible or medicinal, and/or that their remains were discarded in this feature.

The largest quantity of *Trichuris* parasite eggs noted in any of the Market Street Chinatown samples was observed in sample 3 from Layer 8. This indicates a user or users of this privy were infested with whipworm parasites. Either there was a change in use of the privy or the person who was infested was cured of the parasite infection, since *Trichuris* parasite eggs do not appear in the upper samples. The presence of parasite eggs in the lower deposits of this feature reflects initial use as a privy. The presence of a few *Thecaphora* fungal spores suggests the presence of a plant pathogen.

Total pollen concentrations varied considerably and were recorded as more than 15,500 pollen per cubic centimeter (cc) of sediment in the lowest sample, more than 20,000 pollen per cc of sediment in the middle sample, and more than 8600 pollen per cc of sediment in the uppermost sample. The upper sample displayed the largest quantity of microscopic charcoal observed in this feature.

3.1.2 Phytoliths

The phytolith record for Feature 86-36/5 varied by level, and discussion starts with Layer 8 (sample 3). The phytolith record from Layer 8 yielded a relatively high percentage of double peaked glume cells (Figures 4 and 5A) derived from the epidermis of domesticated brown or white rice (*Oryza sativa*) glumes (Pearsall, et al. 1995; Zhao, et al. 1998). Phytoliths derived from *Oryza sativa* leaf and stem material also were very numerous in this sample, suggesting that the rice was grown locally (Harvey and Fuller 2005). A single seed phytolith from dayflower (*Commelina diffusa*) was observed (Figures 4B and 4C). *Commelina diffusa* is a pantropical species that was introduced to the United States and mostly occurs in the southeast but can be found as far west as Texas (Faden 2000). Interestingly, *Commelina diffusa* is a major weed of rice fields. In 1969 and 1970, farmers surveyed in Texas reported that 55% of their rice fields were infested with *Commelina diffusa*; a separate study found *Commelina* seeds present at a rate of 20 seeds/kg in processed rice (Palmer 1972; Wilson 1981). Since *Commelina diffusa* is not found in California today, it is likely that this plant was extirpated along with the demise of the local rice paddy plots.

Dendriform phytoliths were numerous in sample 3. Dendriforms originate in the bract material (lemmas, paleas, and glumes) that surrounds the seed (caryopsis) of some wild and domesticated grasses. They are very common in the bract material of Pooideae grasses, some of which are domesticated cereals. The presence of these disarticulated dendriforms indicates that cereal grains were utilized for subsistence. This is because the dendriform-bearing plant material that encapsulates the grass seed is never entirely removed from all of the grains during the winnowing steps. These dendriforms can then be cooked, digested, and incorporated into the archaeological records. Disarticulated dendriforms cannot be reliably ascribed to a particular grass such as wheat (*Triticum* spp.) or barley (*Hordeum* spp.), so no such interpretation was made here; however, dendritic sheet elements that could be identified to wheat (*Triticum* spp.) were observed in Sample 5 from Feature 85-31/6.

Sample 3 also yielded a few globular echinate phytoliths diagnostic of the palm family (Arecaceae). Palm phytoliths are produced in all parts of the plant, including leaf, bark, and fruit material. Fan palms (*Washingtonia filifera*) are native to southern California and the fruits are edible; however, importation of dates (*Phoenix dactylifera*) and/or coconut (*Cocos nucifera*) is a possibility as well for the source of these phytoliths. Diatoms and sponge spicules were numerous in sample 8. These are organisms with silica "shells" that can live in a wide variety of moist habitats, from wet soils to open bodies of water. Their presence in this sample might indicate that conditions were fairly moist in this feature for prolonged periods of time. Diatoms also might have been introduced through drinking water and discard of rice stems that had grown in flooded paddies.

The phytolith record from sample 2 (Layer 6) is characterized by the absence of *Oryza sativa* double peaked glume phytoliths, a reduction in *Oryza sativa* leaf/stem phytoliths, an increase in cereal grain phytoliths, and the first appearance of corn (*Zea mays*) cob (glume) phytoliths, which echoes the appearance of *Zea mays* pollen in the same two samples. The diagnostic corn phytoliths observed here are called wavy-top rondels (Figure 5E). Palm family (Arecaceae) phytoliths peak in abundance in Layer 6. Diatoms and sponge spicules are much reduced, suggesting dryer conditions. A distinctive rondel phytolith that is produced in high quantities by maygrass (*Phalaris* spp.) peaks in abundance for this sample (Figure 5D). In general, species of *Phalaris* prefer somewhat moist soils and disturbed areas and can be considered a weed in some situations. Its peak in abundance here might reflect increased disturbance, possibly related to agricultural activities.

The phytolith record from sample 1 (Layer 4) is characterized by the continued decline in *Oryza sativa* phytoliths and the continued presence of cereal grain and corn phytoliths. There was also a dramatic rise in trapeziform sinuate phytoliths. These phytoliths are produced primarily in leaf material from cool season grasses such as cereal grains. The increase in this phytolith morphotype, in effect, decreased the relative abundance of the cereal grain phytoliths. Thus, it is likely that cereal grain (husk) phytoliths actually increased in absolute abundance for this sample. It is also interesting to note that diatoms and sponge spicules were completely absent in sample 1, indicating dry soil conditions.

3.1.3 Macrofloral Remains

Recovery of uncharred *Ficus*, *Fragaria*, *Rubus*, *Solanum lycopersicum*, *Benincasa*, *Cucurbita*, *Physalis*, and *Sambucus* seeds and seed fragments in Layers 8 and 6 are consistent with initial use of the feature as a privy and indicate consumption of figs, strawberries, raspberries/blackberries, tomatoes, Chinese winter melon, squash/pumpkin, groundcherry/tomatillo, and elderberries (Tables 3 and 4). Sample 3 from Layer 8 also contained uncharred Cucurbitaceae seed fragments, a few uncharred *Cucurbita maxima*-type seed fragments, several uncharred *Momordica* seed fragments,

and uncharred *Vitis* seeds and seed fragments, reflecting members of the squash family, including winter squash and balsam pear/bitter melon, and grapes. An uncharred *Leonurus* seed in this sample might reflect use of motherwort as a medicinal resource. A charred Poaceae rachilla reflects grasses and might indicate use of grass as tinder. Weedy plants likely are represented by a few uncharred *Portulaca* and unidentified seeds in both samples; a few uncharred *Calandrinia*, *Chenopodium*, and Fabaceae seeds in sample 3 from Layer 8; and by single uncharred *Malva* and *Trifolium* seeds in sample 2 from Layer 6.

The upper sample 1 from Layer 4 appears to represent use of Feature 86-36/5 only as a trash pit, as food plants are represented only by a single uncharred *Rubus* seed fragment. The sample also contained a charred *Adenostoma* seed fragment, a charred Fabaceae seed, a charred probable *Medicago sativa* seed, a charred probable *Trifolium* seed, an uncharred *Juncus* seed, charred periderm (bark) fragments, a charred Poaceae floret callus, a charred Bambusoideae (bamboo) stem fragment, and charred unidentified possible dehiscent fruit fragments.

A variety of charcoal types were present in the Feature 86-36/5 samples, with Layers 8 and 6 containing the greatest abundance of charcoal. All three samples from Feature 86-36/5 yielded *Quercus* charcoal, including *Quercus* - *Leucobalanus* group and *Quercus* - Live oak group, as well as Salicaceae and *Sequoia sempervirens* charcoal. These charcoal types reflect a member or members of the white oak group, the live oak group, a woody member of the willow family, and redwood. Pieces of *Arbutus* (madrone) and *Rhamnus* (buckthorn) charcoal were present in Layers 8 and 6. Fragments of uncharred *Sequoia sempervirens* wood in Layers 8 and 6 might reflect use of redwood to line the feature. Layer 8 also yielded a few fragments of *Adenostoma* twig, *Amelanchier*, *Juglans*, and unidentified hardwood charcoal, while a few pieces of *Acer* and *Ephedra* charcoal were present in Layer 6. A single *Baccharis* twig fragment was noted in Layer 4.

Feature 86-36/5 was the only feature examined to yield *Adenostoma*, *Cucurbita maxima*-type, and probable *Medicago sativa* seeds, as well as *Adenostoma*, *Amelanchier*, *Arbutus*, and *Ephedra* charcoal (Tables 5 and 6).

The three samples from Feature 86-36/5 contained an abundance of non-floral remains representing cultural trash. All three samples contained uncharred and calcined bone fragments, fish bone, cycloid and ctenoid fish scales, eggshell fragments, and a few pieces of clear glass and rusted metal. Bone fragments, fish bone, and fish scale were particularly numerous in Layers 8 and 6, with a *Sus scrofa* axis vertebrae exhibiting cut marks found in Layer 8. Sample 2 from Layer 6 contained a few pharyngeal fish teeth. Pharyngeal teeth are teeth in the pharyngeal arch in the throat of fish such as carp, koi, goldfish, other cyprinids, suckers, and others. Eggshell most likely reflects cooking with or eating eggs. Chicken eggshell is used in Chinese medicine to stop bleeding and to reduce stomach acid. Chicken egg whites were eaten to lubricate the lungs and counteract toxic effects, while egg yolks were used to tone up blood deficiency. Chicken eggs also were used to treat insomnia resulting from heart-spleen deficiency. Chicken

and duck eggs were used to lubricate the intestines and treat constipation (Chan 1996-2012; Lu 2005:62, 72, 281-282). Layer 6 also yielded fragments of woven material with a very tight weave, containing about 5 bundles of warp fibers in one millimeter. A few woven fibers in sample 3 and fibers with a "Z"-twist in sample 1 might also reflect woven material. In addition, Layers 8 and 6 contained a few animal vertebrae, tooth fragments, shell fragments, and ostracod shells. Ostracods are small, bivalved crustaceans widely distributed in fresh and saline water, normally under well oxygenated conditions in lakes, ponds, springs, and streams (Palacios-Fest 1994:145). Clinker fragments were present in Layers 8 and 4, while coal clinker was noted in Layers 6 and 4. Sample 3 from Layer 8 also contained a few fragments of copper and leather, as well as a piece of blue glass, while sample 2 from Layer 6 yielded a few pieces of brick/terra cotta and printed paper. A moderate amount of coal and several *Sessilia* (acorn shell barnacle) fragments were noted in sample 1 from Layer 4. Acorn barnacles are crustaceans with calcareous shells that attach themselves to submerged surfaces. They are edible, after a quick boiling or steaming, like mussels (The Nibble Editors 2009).

3.2 Feature 86-36/6, PRI Sample 4

Feature 86-36/6 is a circular, unlined Chinese trash pit measuring 1 m in length, 0.8 m in width, and 0.6 m in depth. The fill contained artifacts, pig bones, ash, and charcoal and was excavated in three natural layers. Sample 4 (catalog 86-36/6-303) was taken from Layer 2, which was a thick deposit of white and gray ash containing pig remains, Chinese artifacts, and charcoal. The pollen record for sample 4 was very simple, probably due, at least in part, to burning the contents of this trash pit. Open flames and high heat destroy pollen. The environmental portion of this pollen record is consistent with others from this site. Pollen that might represent economic activity includes Brassicaceae and Cerealia, representing members of the mustard family and the cereals wheat, barley, oat, or rye. No starches or parasite eggs were observed. A small quantity of *Spirogyra* algal spores were noted, indicating the presence of green algae, which might have grown in wet deposits. Alternatively, it might have been introduced with water discarded into the pit or with rice debris. This sample yielded the largest quantity of microscopic charcoal fragments observed for this study – approximately 71,000 pieces in the space that would have been required to count 100 pollen grains. This charcoal diluted the pollen record to approximately 1750 pollen per cc of sediment and made finding pollen very difficult.

The phytolith record from sample 4 is characterized by the overwhelming dominance of *Oryza sativa* leaf and stem phytoliths. Many of these phytoliths were large fragments of silicified epidermal sheet elements (see Figure 4F for an example of a papillate epidermal sheet element diagnostic of the Oryzeae), as well as disarticulated and articulated Oryzeae bilobate phytoliths (Figure 4H). Thus, it appears that this area might

have been a place where rice leaves and stems were discarded. Just a few cereal grain phytoliths and no corn phytoliths were observed in this sample.

The macrofloral record from sample 4 yielded few seeds. A charred *Rhus* seed might reflect use of sumac. A charred Poaceae A caryopsis reflects the presence of grasses with larger-sized seeds, such as *Agropyron* (wheatgrass), *Elymus* (ryegrass), or *Bromus* (brome grass), while a charred *Trifolium* seed fragments reflects clovers. One unidentified charred seed fragment and three pieces of charred vitrified tissue also were noted. Vitrified tissue has a shiny, glassy appearance due to fusion by heat and represents charcoal or other charred plant tissue too vitrified for identification. The charcoal record was dominated by fragments of *Quercus* - *Leucobalanus* group, indicating a member or members of the white oak group. Some of these charcoal fragments were vitrified. Fewer fragments of *Pseudotsuga*, *Sequoia sempervirens*, conifer, *Quercus*, *Quercus* -Live oak group, and hardwood charcoal too vitrified for identification also were noted. Sample 4 contained numerous non-floral remains representing cultural trash, dominated by uncharred, calcined, and charred bone fragments. A few fish vertebrae and a fish scale fragment also were present. In addition, the sample contained numerous charred eggshell fragments, a moderate amount of uncharred eggshell, several ceramic fragments, a small piece of clear glass and two small fragments of green glass, a possible lead ball measuring 4 mm in diameter, numerous fragments of probable burned leather, a moderate amount of rusted metal, a few shell fragments, a few Patellogastropoda (limpet) shell fragments, a snail shell, and a few tooth fragments. Limpets are edible mollusks with conical shells, most often eaten boiled (Lovell 1884).

3.3 Feature 85-31/6, PRI Sample 5

Feature 85-31/6 is a small, roughly circular, unlined trash pit measuring 17 cm in diameter and 5 to 9 cm in depth. Three layers were noted in the pit. Sample 5 (catalog 85-31/6-214) was recovered from Layer 2 fill, which consisted of an ash lens about 2.5 cm thick in the north half of the pit. Economic pollen noted in sample 5 was dominated by Cerealia, representing cultivated Old World cereals. A large quantity of charred cereal inflorescence fragments were observed in the pollen sample. In addition, moderate to small quantities of *Agave*-type, Brassicaceae, *Ipomoea*, and *Oryza*-type pollen represent the presence of agave or possibly lily, a member of the mustard family, morning glory, and rice. The *Ipomoea* pollen did not exhibit the appropriate surface structures to consider identification of this grain as sweet potato pollen. Two pollen grains remain unidentified in this sample. An unidentified pericolpate pollen with microspinules (Figure 3J) and an unidentified spiny triporate type first noted in sample 2 remain unidentified at this writing. No starch grains or parasite eggs were observed. Total pollen concentration was more than 5600 pollen per cc of sediment, and microscopic

charcoal was very abundant at more than 27000 fragments in the space required to count 100 pollen.

The phytolith record from Feature 85-31/6 (sample 5) is characterized by the highest relative abundance of *Oryza sativa* glume (husk) phytoliths and the second highest relative abundance of corn cob (glume) phytoliths. Also, this sample had the highest abundance of articulated dendritic sheet elements (Figure 5G) that could be ascribed to wheat (*Triticum* spp.). This sample also yielded several palm family (Arecaceae) phytoliths, possibly derived from dates or coconuts. Thus, the phytolith record suggests that this was a discard area for plant debris directly associated with edible plant material.

Sample 5 from Feature 85-31/6 yielded a variety of macrofloral remains from probable economic plants. This sample contained the greatest quantities of charred and uncharred *Oryza sativa* floret fragments, reflected in the phytolith record by the highest relative abundance of *Oryza sativa* glume phytoliths. Recovery of numerous *Oryza sativa* floret fragments and *Oryza sativa* glume (husk) phytoliths, as well as a small amount of *Oryza*-type pollen, in the Feature 85-31/6 sample point to growing rice locally, removal of the outer chaff, and discard of the chaff in Feature 85-31/6. One charred *Oryza sativa* caryopsis and three caryopsis fragments also were noted. A charred *Setaria* floret and a floret fragment might reflect local growth of bristlegrass or intentional use of millet, while a charred *Sorghum* floret represents an introduced sorghum, possibly the cultivated *Sorghum bicolor*. Two charred *Zea mays* kernel fragments indicate use of corn. Eight charred Bambusoidae stem fragments suggest use of woody bamboo. Six charred seed fragments might reflect either common pea or soybean. Several charred *Gaylussacia* seeds, a charred probable *Sambucus* seed fragment, a charred *Solanum melongena* seed, a few charred *Ziziphus zizyphus* seed fragments, a few charred *Vitis* seeds, several uncharred *Vitis* seed fragments, an uncharred *Solanum lycopersicum* seed, several uncharred *Rubus* seeds, a few uncharred *Ficus* seeds, a few uncharred Cucurbitaceae seed fragments, an uncharred *Cucurbita* seed fragment, and an uncharred *Momordica* seed and several seed fragments represent huckleberries, probable elderberry, eggplant, jujube, grapes, raspberries/blackberries, figs, squash, balsam pear/bitter melon, and possibly another member of the squash family.

Typical weedy plants are reflected by recovery of numerous uncharred *Calandrinia* seeds and seed fragments, an uncharred Fabaceae fruit fragment, a charred Fabaceae seed, and a charred Malvaceae seed. Three charred Poaceae A caryopses and caryopsis fragments reflect a grass with larger-sized seeds. A few charred seeds and seed fragments and a moderate amount of charred vitrified tissue also were noted. The charcoal record was dominated by *Quercus*, including *Quercus* - *Leucobalanus* group and *Quercus* - Live oak group charcoal. Oak wood appears to have been burned, including members of the white and live oak groups. Recovery of *Pseudotsuga*, *Rhamnus*, *Sequoia sempervirens*, and *Umbellularia californica* charcoal also note burning Douglas-fir,

buckthorn, redwood, and California laurel wood. A piece of hardwood charcoal was too vitrified for identification.

As is the case with most of the Market Street Chinatown macrofloral samples, a variety of non-floral remains were present. Uncharred bone fragments were numerous, with fewer pieces of charred, partially charred, and calcined bone. A moderate amount of fish bone was present, including fish vertebrae. A few cycloid, ctenoid, and unidentified fish scales; two mammal teeth and a tooth fragment; numerous charred and uncharred egg shell fragments; numerous hair/fiber fragments; two calcined shell fragments; and a few woven fibers also were noted. A *Sepia* cuttlebone fragment suggests use of cuttlefish. Cuttlefish are edible mollusks. They can be cooked like squid or calamari and are reported to be more flavorful than squid or calamari. Cuttlefish are low in fat , high in Omega-3 and protein, and rich in vitamins, phosphorus, calcium, and potassium. The internal "cuttlebone" of cuttlefish is made of calcium carbonate and has been used in modern times as a source of dietary calcium for caged birds and reptiles. Powdered cuttlebone has been used in Chinese medicine to stop bleeding and reduce stomach acid, while eating cuttlefish has been used to sharpen vision and to treat deficiencies of blood, energy, and yin. Cuttlefish is noted to act on the kidneys and liver (Chan 1996-2012; Lu 2005:60, 281, 478; The Italian Taste 2012). In addition, the sample yielded several pieces of brass/copper, a moderate amount of clinker, a few pieces of coal, a moderate amount of coal clinker, a few fragments of clear and green glass, numerous pieces of rusted metal, a few rusted probable nails, and pieces of porcelain.

3.4 Feature 86-36/7, PRI Sample 6

Feature 86-36/7 is a wood-lined cistern consisting of a circular shaft set within a rectangular pit. The pit measured 3 m in length, 2 m in width, and 1.5 m in depth. Wood panels were exposed at the south wall, west wall, and the base of the feature. Four layers were identified, although only Layer 3 was completely collected. This layer is believed to be the first possible cultural layer and the surface of the feature. It was a gray, moist, fine-grained clayey silt with charcoal fragments, pebbles, bones, and artifacts. Sample 6 (catalog 86-36/7-1034) was collected from the Layer 3 fill. Pollen analysis of sample 6 from Feature 86-36/7 yielded a typical general pollen signature. Pollen considered to be economic includes moderate quantities of Brassicaceae and Cerealia, as well as small quantities of *Lonicera*, Rosaceae striate, *Agave*, *Phoenix*-type Arecaceae (Figure 3I), *Fragaria*, *Oryza*-type, and *Zea mays* pollen representing members of the mustard family, cereals, honeysuckle, probably a fruit in the rose family, agave or possibly lily, probable dates, strawberries, rice, and corn. No starches were noted in the pollen sample. This sample yielded *Trichuris* parasite eggs, indicating the presence of fecal matter in this feature. Total pollen concentration was nearly 4000 pollen per cc of sediment. A moderately large quantity of microscopic charcoal was present in this

sample. This is the only sample that exhibited large masses of fungal hyphae, which probably are associated with rotting food.

The phytolith record from Feature 86-36/7 (sample 6) is characterized by the almost complete absence of *Oryza sativa* phytoliths and very few corn phytoliths. Cereal grain phytoliths were also much reduced. The phytolith record actually appears to represent a strong environmental signal, with *Phalaris*-type rondels and other Pooideae phytoliths possibly derived from *Phalaris* dominating the phytolith record.

Foods in the macrofloral portion of sample 6 are represented by several uncharred *Rubus* seeds and seed fragments, ten uncharred Cucurbitaceae seed fragments, two uncharred *Momordica* seed fragments, an uncharred *Ficus* seed fragment, five uncharred *Fragaria* seed fragments, and a few uncharred *Solanum lycopersicum* seeds and seed fragments. These seeds reflect raspberries/blackberries, balsam pear/bitter melon and other members of the squash family, fig, strawberry, and tomato. A *Melilotus* seed might reflect use of sweetclover, while single *Juncus* and *Malva* seeds suggest local growth of rush and cheeseweed.

A variety of charcoal types were present in sample 6, including *Baccharis*, Asteraceae, *Platanus*, *Pseudotsuga*, vitrified *Quercus*, *Quercus - Erythrobalanus* group, *Quercus - Leucobalanus* group, *Crataegus*, *Prunus*, Rosaceae, vitrified Rosaceae, Salicaceae, and *Sequoia sempervirens*. These charcoal types note burning baccharis and another woody member of the sunflower family; sycamore; Douglas-fir; oaks, including a member or members of the white oak group and the red oak group; woody members of the rose family including hawthorn and a member of the *Prunus* group such as cherry, plum, peach, etc.; a woody member of the willow family; and redwood. A small piece of unidentified hardwood twig charcoal and an uncharred piece of *Pinus* wood also were noted. Recovery of two charred termite fecal pellets suggests that some of the burned wood contained termites. Wood-dwelling termite fecal pellets are small, hard, oblong-shaped, and exhibit six surfaces. These distinctively-shaped fecal pellets have been noted in several archaeological contexts. 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).

Non-floral remains in sample 6 that likely reflect foods include a few calcined bone fragments, a moderate amount of uncharred bone fragments, two large/medium mammal bones (one with a cut mark), a moderate amount of fish bone, a fish tooth, a moderate amount of fish scales, a few charred eggshell fragments, a moderate amount of uncharred eggshell fragments, and possibly a few shell fragments. The sample also contained pieces of brass/copper, a moderate amount of brick/terra cotta, a few pieces of coal, a moderate amount of coal clinker, a few pieces of clear and green glass, a few rusted metal fragments, rusted nails, a few pieces of probable porcelain, and a possible tile fragment. A few insect chitin fragments, a few insect eggs, and a moderate amount of insect puparia reflect insect activity in this area.

3.5 Feature 85-31/11, PRI sample 7

Feature 85-31/11 is a small, unlined bone pit containing pig bones in a dark soil. The feature was lensatic, measuring less than one meter across and a few centimeters deep (Roop and Flynn 1993:8). Fill from this pit was collected as sample 7 (catalog 85-31/11-102). Pollen observed in sample 7 generally was typical of the record from Features 86-36/6, 86-36/7, and 85-31/6. Pollen representing economic plants was dominated by Brassicaceae, accompanied by aggregates, and also included Cerealia, *Oryza*-type, and *Zea mays*, representing members of the mustard family, cultivated Old World cereals, rice, and corn. A small quantity of charred cereal inflorescence material also was observed. A deteriorated large mammal hair fragment was noted while scanning this sample. Unfortunately, it was deteriorated beyond the point where identification was possible. No starches or parasite eggs were present.

The phytolith record from Feature 85-31/11 is characterized by the highest relative abundance of corn cob phytoliths for all of the samples analyzed. Many of these corn phytoliths were darkened from direct exposure to flames. In fact, several clusters of corn rondel phytoliths were partially "melted" together. This type of phenomena has been observed in prehistoric hearth features and burned habitation structures and indicates that the cob material was exposed to temperatures at or above 600 degrees Fahrenheit for a prolonged period of time. Sample 7 is also the first to yield a hooked hair phytolith most likely derived from bean (*Phaseolus* spp.) pods (Figure 4I). There are a number of plant structures that produce silicified hooked hairs, most notably leaf material from some members of the mulberry or fig family (Moraceae) and pods from some members of the legume family (Fabaceae). Given the fact that several charred *Phaseolus* seed fragments were recovered from this sample (discussed next), this phytolith most is likely derived from *Phaseolus*.

The macrofloral record for sample 7 contained numerous seeds and seed fragments, most of them charred. Seeds representing likely food remains include three charred *Benincasa hispida* seed fragments, six charred *Citrullus lanatus* seed fragments, four charred *Fragaria* seeds, four charred *Momordica* seed fragments, one charred *Phaseolus* seed (bean) and several charred seed fragments, five charred possible *Oryza* caryopsis fragments, several charred *Zea mays* cupules and numerous cupule fragments, numerous charred *Zea mays* cupule glume fragments, several charred *Zea mays* kernel fragments, three charred *Rubus* seeds, two uncharred *Sambucus* seed fragments, one charred *Solanum lycopersicum* seed, and one uncharred *Solanum lycopersicum* seed and four seed fragments, reflecting Chinese winter melon, watermelon, strawberries, balsam pear/bitter melon, beans, probable rice, corn, raspberries/blackberries, elderberries, and tomatoes. A charred *Juglans* nutshell fragment and a charred *Prunus dulcis* nutshell fragment reflect use of walnuts and almonds. A charred *Diospyros* seed fragment, a charred Lamiaceae seed fragment, a charred *Leonurus* seed, a charred

probable *Leonurus* seed fragment, and a several charred *Sorbus* seeds might indicate use of persimmons, motherwort, other members of the mint family, and mountain ash fruits. Numerous charred *Phleum* (Timothy grass) caryopses were noted in this sample. *Phleum pratense* is an introduced grass that has become an important hay grass for cattle and horses. It is possible that Timothy hay was fed to animals kept in the Chinatown area. Other grasses are represented by four charred Poaceae awn fragments, a charred Poaceae A caryopsis and four caryopsis fragments, and two charred Poaceae B caryopses. Poaceae B represents grasses with medium-sized caryopses such as *Festuca* (fescue), *Hordeum* (wild barley), and *Stipa* (needlegrass). Seeds from typical weedy plants include a charred Brassicaceae seed, a charred *Lepidium* seed, several charred *Calandrinia* seeds, several charred *Carex* seeds, a charred *Chenopodium* seed, four charred Malvaceae fruits and mericarps, numerous charred Malvaceae seeds and seed fragments, five uncharred *Malva* seeds, four uncharred *Portulaca* seeds and a seed fragment, a charred *Rumex* seed fragment, and five charred *Trifolium* seeds. Although these are common weedy plants, many of these plants also are edible and have been used as medicinal resources by native groups, as well as in western and traditional Chinese medicine. The sample contained one charred parenchymous tissue fragment. 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). Several pieces of incompletely charred periderm (bark) most likely reflect logs/branches that burned. The sample also contained charred unidentified seed fragments and a moderate amount of charred vitrified tissue.

The charcoal record for sample 7 yielded several fragments of Salicaceae charcoal, reflecting a member of the willow family such as willow, cottonwood, aspen, or poplar. Fewer fragments of *Acer*, Asteraceae, Conifer, *Platanus*, *Quercus*, *Quercus* - *Leucobalanus* group, and *Prunus* indicate burning maple/box elder, a woody member of the sunflower family, conifer, sycamore, oak, a member of the white oak group, and a member of the *Prunus* group such as cherry, plum, peach, etc. Unidentified hardwood charcoal also was present, including root and twig charcoal. Non-floral remains in Feature 85-31/11 include numerous calcined and charred bone fragments, several partially/incompletely charred and uncharred bone fragments, numerous hair/fiber fragments, a mammal tooth fragment, and one piece of glazed ceramic.

3.6 Feature 85-31/18, PRI Samples 8 and 9

Feature 85-31/18 is a redwood-lined pit or possible privy measuring 1.8 m in length, 1.2 m in width, and 0.9 m in depth. This feature exhibited a dark soil matrix and numerous artifacts, including pig mandibles, European and Asian ceramics, and opium pipes. Three layers were noted. Layer 1 was very disturbed, and no samples from this layer were

submitted. Layer 2 was less disturbed and contained large pieces of porcelain, earthenware, unglazed ceramics, cut bar nails, iron fragments, a small amount of glass, sprouted "soy pots," shoes, ceramic spoons, and a cut crystal rectangle with a star design. The eastern end of the feature contained an ash feature and a high frequency of eggshell, while wood fragments were noted in the south corner. Layer 2 also contained one large (2 quart?) whole green glass bottle with evidence of a wicker covering, and a briar pipe was found near a small jar and two shoes. An increase in the density of fish bones and a strong smell was noted in Layer 3, and the sidewall contained a stack of three earthenware bowls. Sample 8 (catalog 85-31/18-914) was taken from Layer 2 fill, while Layer 3 is represented by sample 9 (catalog 85-31/18-916).

The pollen record from these two samples exhibits differences suggestive of changing discard habits or use of the feature. The general pollen record includes a very small quantity of High-spine Asteraceae pollen in the lower sample and an elevated quantity, accompanied by aggregates, in the upper sample, representing plants in the sunflower family. The pollen record in the upper sample 8 is considerably more varied than the lower sample 9, which is dominated by economic pollen. The lower sample exhibits large quantities of both *Agave*-type and Brassicaceae pollen, indicating discard or consumption of agave (or possibly a lily) and members of the mustard family. At least two different types of mustard are present in this sample, as represented by larger and smaller Brassicaceae pollen, which were not separated while counting. The lower sample 9 also contained small quantities of *Lonicera*, Cerealia, Sapindaceae-type, and *Zea mays* pollen representing cultivated Old World cereals that probably were purchased at the market, possibly a member of the soapberry family such as lychee or longan, and corn. The upper sample 8 contained far less *Agave*-type pollen and less Brassicaceae pollen. Instead, the Cerealia pollen was slightly more abundant and accompanied by aggregates. This sample also contained small quantities of *Fragaria*, *Oryza*-type, Sapindaceae-type, and *Zea mays* pollen representing strawberries, rice, possibly a member of the soapberry family, and corn. The upper sample 8 also contained both *Ascaris* and *Trichuris* parasite eggs, indicating that these deposits probably represent a privy and that a user or users of the privy were infected with roundworm and whipworm parasites. This is the only evidence of *Ascaris* parasite eggs recovered from this project. No starches were observed in this sample. Total pollen concentrations were very high at more than 41,000 pollen per cc of sediment, and quantities of microscopic charcoal were small.

The phytolith record from Layer 3 of Feature 85-31/18 (sample 9) is characterized by a high relative abundance of cereal grain phytoliths. A few corn cob phytoliths and rice glume phytoliths also were observed. In addition, this sample yielded several palm family (Arecaceae) phytoliths, possibly derived from dates or coconuts. The presence of diatoms and sponge spicules indicates that soils here were moist to wet for prolonged periods of time. Sample 9 was interesting in that a centric marine-type of diatom was very abundant in this sample. This type of diatom does not occur in soil and must have been derived from brackish to saline water. A likely source for these diatoms would be the skin, gills, and/or stomach contents of fish.

The phytolith record from Layer 2 of Feature 85-31/18 (sample 8) is characterized by a very low relative abundance of cereal grain phytoliths, the almost complete absence of rice phytoliths, and the complete absence of corn phytoliths. Thus, the phytolith record appears to mostly reflect an environmental record. Also, only a few diatoms were observed, suggesting dryer soil conditions.

Similarities in the macrofloral records for samples 8 and 9 include recovery of uncharred Cucurbitaceae seed fragments, several uncharred *Ficus* seeds and seed fragments, several uncharred *Fragaria* seeds/seed fragments, a few uncharred *Sambucus* seeds, and pieces of charred, vitrified tissue. Both samples contained uncharred *Rubus* and *Vitis* seeds and seed fragments, although these remains were much more numerous in the lower sample 9. The lower sample 9 also contained single charred and uncharred *Oryza* floret fragments, while the upper sample 8 yielded an uncharred *Oryza* awn fragment and a charred *Oryza sativa* caryopsis. A few uncharred *Portulaca* seeds in these samples suggest that purslane was growing nearby.

Three uncharred *Momordica* seed fragments and a few uncharred *Opuntia* seed endosperm fragments only in the lower sample 9 suggest consumption of balsam pear/bitter melon and prickly pear fruits, while an uncharred *Physalis* seed fragment, six uncharred *Solanum lycopersicum* seeds, and an uncharred *Ziziphus zizyphus* seed fragment in the upper sample 8 reflect tomatillo/ground cherry, tomato, and jujube fruits. Other differences in the macrofloral records for the two samples include a few uncharred *Calandrinia* seeds and an uncharred unidentified seed fragment in the lower sample 9. The upper sample 8 yielded several remains not noted in the lower sample 9 including a charred *Chenopodium* seed and seed fragment, several uncharred *Chenopodium* seeds and seed fragments, five charred Cucurbitaceae seed fragments, a few uncharred *Cuscuta* seeds and seed fragments, a charred Cyperaceae seed fragment, two charred probable Fabaceae seeds, a charred Malvaceae seed, a piece of charred parenchymous tissue, four incompletely charred/partially charred periderm fragments, an uncharred Poaceae rachilla, a charred possible *Hordeum* rachilla fragment, a charred *Hordeum pusillum* caryopsis, and an uncharred *Polygonum* seed.

Samples 8 and 9 both yielded fragments of *Pseudotsuga*, *Quercus*, vitrified *Quercus*, *Quercus* - *Leucobalanus* group, Salicaceae, *Sequoia sempervirens*, and unidentified hardwood charcoal too vitrified for identification. In addition, the lower Layer 3 (sample 9) yielded pieces of *Aesculus*, *Acer*, vitrified conifer, *Juglans*, and *Quercus* - live oak charcoal, while the upper Layer 2 (sample 8) contained *Rhamnus*, *Crataegus*, Rosaceae, Rosaceae twig, *Salix*, *Umbellularia californica*, and charcoal too vitrified for identification. Uncharred *Sequoia sempervirens* wood also was noted in Sample 8. Two charred and two uncharred termite fecal pellets in sample 8 reflect the presence of wood-dwelling termites.

Like all of the other samples from the Market Street Chinatown, samples 8 and 9 contained a variety of non-floral remains. While both samples contained bone fragments, the bone was more abundant in the lower sample 9 and consisted mainly of

fish bone. An increase in fish bone was noted during excavation of Layer 3. Some of the bone in the upper sample 8 was calcined, while no calcined bone was noted in the lower sample 9. Both samples also contained a moderate amount of fish scale fragments, including both ctenoid and cycloid scales, as well as a few brick/terra cotta fragments, charred and uncharred eggshell fragments, a few clear glass fragments, and single pieces of green glass. The lower sample 9 also yielded a bird bone fragment, a few pieces of coal, and a cartilaginous shark/ray vertebra and vertebra fragment. By comparison, the upper sample 8 contained a few pieces of clinker, numerous hair/fiber fragments, several pieces of charred leather, a moderate amount of rusted metal, a rusted nail fragment, a piece of porcelain, two *Sepia* cuttlebone fragments, and a few shell fragments not noted in sample 9.

3.7 Feature 85-31/28, PRI Sample 10

Feature 85-31/28 is a small, unlined trash pit containing Chinese artifacts including a Chinese tea pot and several Chinese bowls. Clear and colored American ceramic marbles, glass lamp globes, a cathedral style bottle, and iron fragments also were noted. Sample 10 (catalog 85-31/28-113) was collected from fill in the southeast quarter of the feature.

The pollen record for sample 10 was dominated by High-spine Asteraceae pollen, probably reflecting local growth of weedy plants in the sunflower family locally. Pollen suggesting economic activity includes a moderate quantity of Brassicaceae pollen, accompanied by aggregates, and small quantities of *Lonicera*, *Agave*-type, Cerealia, *Fragaria*, *Oryza*-type, Sapindaceae-type, and *Zea mays* pollen, representing members of the mustard family, honeysuckle, agave or perhaps a lily, cultivated Old World cereals, strawberries, rice, possibly a member of the soapberry family, and corn. The probable Sapindaceae-type pollen might reflect lychee or longan fruits. No starches or parasite eggs were noted in this sample. Total pollen concentration was high at more than 29,000 pollen per cc of sediment, and very little microscopic charcoal was observed.

The phytolith record from Feature 85-31/28 is characterized by the high relative abundance of rice leaf and stem phytoliths. Rice glume phytoliths were almost completely absent from the record. Cereal grain husk phytoliths were numerous. This sample also yielded a few palm family (Arecaceae) phytoliths, possibly derived from dates or coconuts. Thus, the phytolith record indicates that this was a discard area for plant debris derived from edible and non-edible plant parts.

Macrofloral remains in sample 10 that most likely reflect foods include several uncharred Cucurbitaceae seed fragments, four uncharred *Cucurbita* seed fragments, eleven uncharred *Momordica* seed fragments, several uncharred *Ficus* seeds and seed fragments, numerous uncharred *Fragaria* seeds, two charred *Juglans* nutshell

fragments, a few small charred and uncharred *Oryza* floret fragments, three larger fragments of uncharred *Oryza sativa* florets, two charred *Triticum* caryopses and two caryopsis fragments, a charred Cereal-type caryopsis and caryopsis fragment that was similar to *Hordeum*, several uncharred *Rubus* seeds and seed fragments, an uncharred *Sambucus* seed fragment, an uncharred *Solanum lycopersicum* seed fragment, several uncharred *Vitis* seeds, and numerous uncharred *Vitis* seed fragments. These remains note use of squash/pumpkin, balsam pear/bitter melon, another member of the squash family, figs, strawberries, walnuts, rice, wheat, another type of cereal such as barley, raspberries/blackberries, elderberries, tomatoes, and grapes. An uncharred Unidentified G seed was similar to images of *Asparagus* seeds; however, the PRI seed reference collection does not currently contain *Asparagus* seeds, which are needed to make a positive identification. A few uncharred *Chenopodium*, *Datura stramonium*, and *Portulaca* seeds suggest that purslane, jimsonweed, and purslane grew in the vicinity of Feature 85-31/28. In addition, the sample contained an uncharred Fabaceae fruit fragment, a piece of charred parenchymous tissue, and five unidentified seed fragments.

Several large chunks of *Quercus* - *Leucobalanus* group charcoal were present in sample 10, including some vitrified fragments, reflecting a member of the white oak group. A few smaller fragments of *Quercus* - Live oak group also reflect a member of the live oak group. The presence of dentate ray tracheids seen in the radial view of the *Pinus* charcoal in this sample identify it as one of the hard pines, which includes species of southern yellow pine, red pine, Scots pine, ponderosa pine, and lodgepole pine. The sample also yielded a few pieces of Asteraceae, *Quercus*, Rhamnaceae, *Salix*, Salicaceae, and *Sequoia sempervirens* charcoal from burning a woody member of the sunflower family, oak, a member of the buckthorn family, willow, possibly another member of the willow family, and redwood. A few charred termite fecal pellets suggest that some of the burned wood contained termites. Pieces of uncharred *Sequoia sempervirens* and conifer wood also were noted.

Non-floral remains that likely reflect edible resources include calcined and uncharred bone fragments, including bird bone fragments and fish bone fragments; a few tooth fragments; a moderate amount of ctenoid and cycloid fish scales; several charred and uncharred eggshell fragments; single Sessilia (acorn barnacle) and Patellogastropoda (limpet) shell fragments; and possibly a moderate amount of hair/fiber fragments. In addition, the sample contained a few brass/copper fragments, a few pieces of green glass and clear glass, a moderate amount of rusted metal fragments, a few porcelain fragments, and a single woven fiber fragment.

4.0 SUMMARY AND CONCLUSIONS

Pollen, starch, parasite, phytolith, and macrofloral analyses were conducted on 10 samples selected from a collection of 145 samples recovered during archaeological salvage excavations of the 19th century Market Street Chinatown in downtown San Jose, California. These ten samples represent two wood-lined trash pits or possible privies, three unlined trash pits, a wood-lined cistern, and an unlined pit containing pig bones. Pollen, starch, phytolith, and macrofloral analyses indicate that a variety of foods were eaten by the Chinatown occupants, including both foods obtained locally and Asian imports. The Chinatown occupants appear to have eaten a variety of fruits and vegetables. Fruits appear to have included watermelon, figs, strawberries, raspberries/blackberries, elderberries, grapes, jujubes, possibly prickly pear fruits, possibly persimmon fruits, and possibly a member of the soapberry family such as lychee or longan fruits. Arecaceae phytoliths might reflect consumption of dates or coconuts. Plants typically considered to be vegetables include Chinese winter melon, winter squash, bitter melon, other members of the squash family, several types of beans, peas, tomatoes, and eggplant. Brassicaceae pollen might reflect consumption of vegetables such as broccoli or cauliflower or possibly greens collected during or after flowering. A variety of cereal grains were eaten at the Market Street Chinatown including rice, corn, barley, wheat, sorghum, and possibly millet. Nuts included walnuts and almonds.

Plants such as jujube, Chinese winter melon, bitter melon, jackbean, horse bean, and the possible lychee/longan fruit typically are not seen in western diets, suggesting that these remains reflect foods that the Chinese occupants were importing or were growing for their own local market. In addition, the *Agave*-type pollen represents something that was unique to the diets of the people living in Chinatown, since neither lilies nor members of the agave family such as agave are typical in the diets or medicinal cabinets of Anglos. The very high abundance of rice glume phytoliths indicates the presence of brown rice. There was a very high abundance of rice phytoliths derived from leaf and stem material in many of the samples, which suggests local production of rice. It is likely that rice was grown and processed locally. Recovery of a dayflower (*Commelina diffusa*) seed phytolith reflects a weed expected in the rice paddies. It is likely that this weedy plant was extirpated with the demise of the local rice paddy plots since it is not found in California today.

Recovery of pollen from a variety of edible plants suggests a thriving market where fresh produce was purchased. Pollen is not expected to be transported on beans unless they are fresh from the garden. The same can be said of strawberries. Recovery of pollen that appears to represent a member of the soapberry family, such as lychee or longan, suggests either local growth for market or import of fresh or dried fruits, rather than import of canned fruits. At present, lychee or longan is considered to be the most likely identification of the Sapindaceae pollen recovered in several samples. Work continues

on this identification. Although people living in Chinatown appear to have pursued a traditional diet, there is no evidence in either the pollen or phytolith record that long-term changes were introduced into the local vegetation communities as a result of local cultivation of plants. The Chinese living in this area might have had an intensive impact on the neighborhood or local landscape, but their footprint does not appear to have had a lasting effect with environmental consequences that changed the landscape over the long term.

Parasite analysis noted the presence of whipworm eggs in the lowest level of Feature 86-36/5, in Feature 86-36/7, and in the upper sample from Feature 85-31/18. The upper sample from Feature 85-31/18 also yielded roundworm eggs. Recovery of parasite eggs indicates the presence of fecal material and likely reflects use of the features as privies (Features 86-36/5 and 85-31/18) or to dispose of night soil (Feature 86-36/7). If night soil was discarded in any of the other features examined, the users appear not to have been infected with parasites.

The ten Market Street Chinatown samples examined in this pilot study contained an abundance of remains. Further analysis of additional samples from this collection also are expected to yield a rich record of foods eaten and trash deposited by the Chinese occupants of this area in the 19th century, as well as insight into plants growing in the area.

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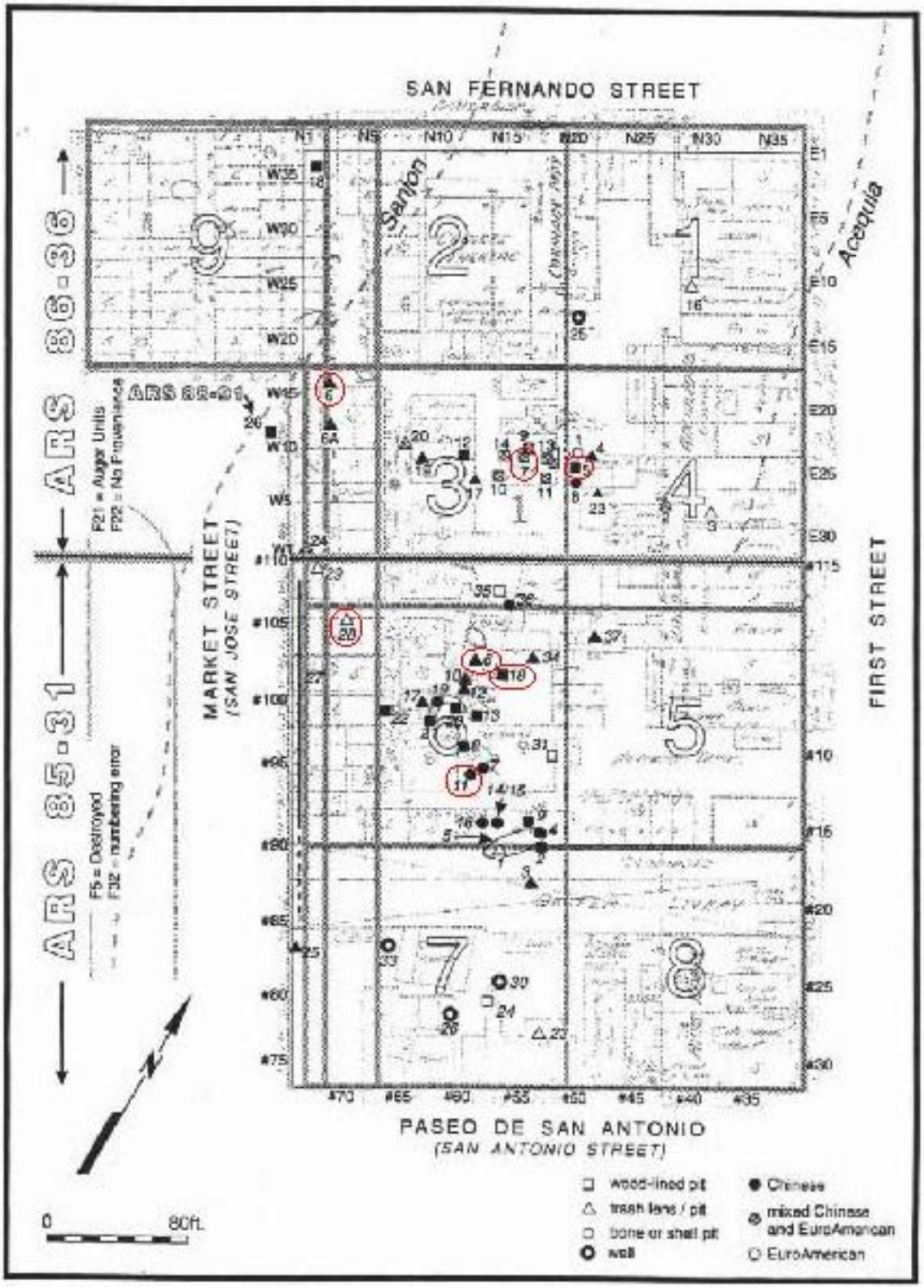

Map 1. Locations of archaeological features excavated by ARS on Block 1 in downtown San Jose, superimposed on the 1884 Sanborn map. Features selected for soil sample analysis are circled in red. The southern part of the block was designated Project 85-31, and the northern part, Project 86-36; hence features are designated by the project number prefix followed by the feature number (e.g., 86-36/6). Adapted from map provided by ARS; for list of sources see Kane 2011:A-17.

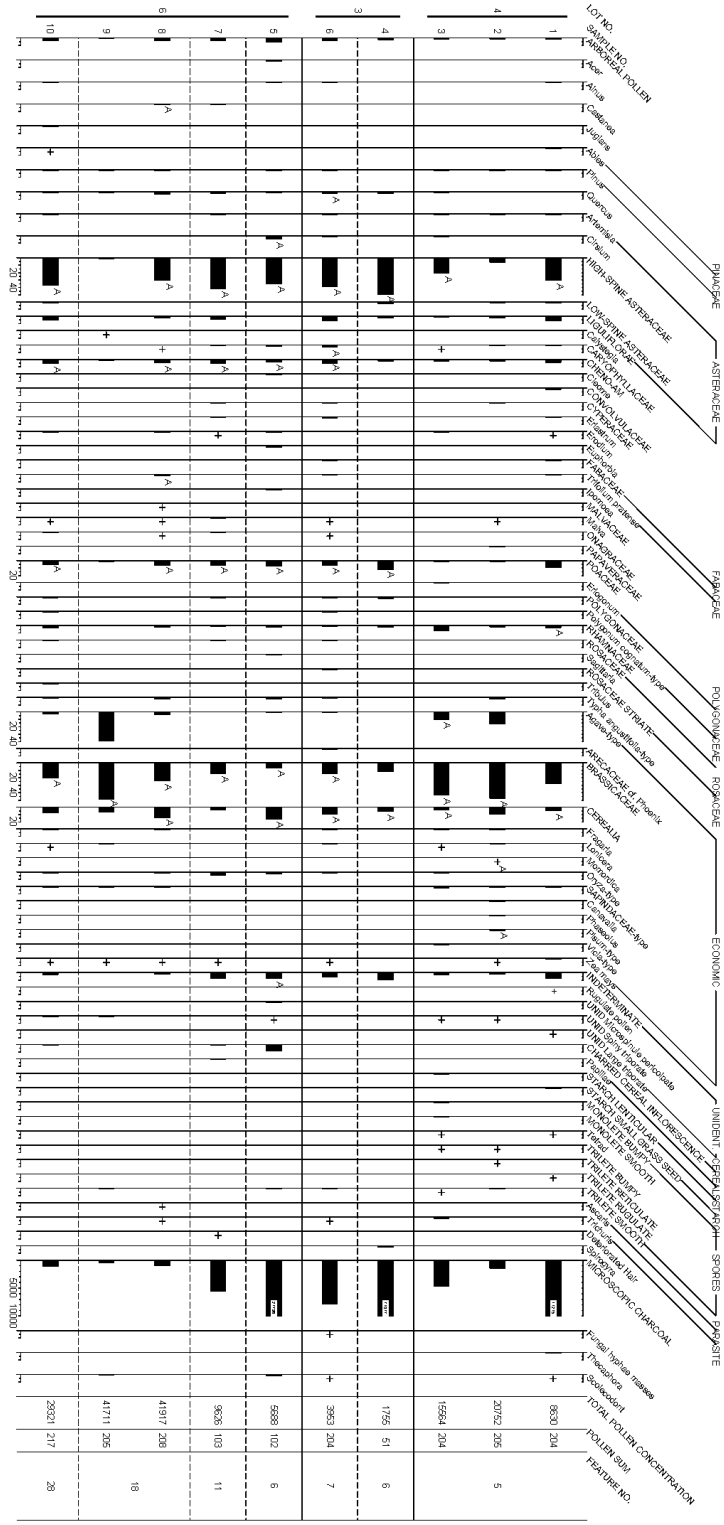

Figure 1. Pollen diagram for samples from the Market Street Chinatown site, San Jose, California. Abbreviated feature numbers on the uppermost line of the diagram refer to the following features (read from left to right): 86-36/5 (PRI Samples 1, 2, and 3); 86-36/6 (PRI Sample 4); 86-36/7 (PRI Sample 6); 85-31/6 (PRI Sample 5); 85-31/11 (PRI Sample 7), 85-31/18 (PRI Samples 8 and 9), and 85-31/28 (PRI Sample 10).

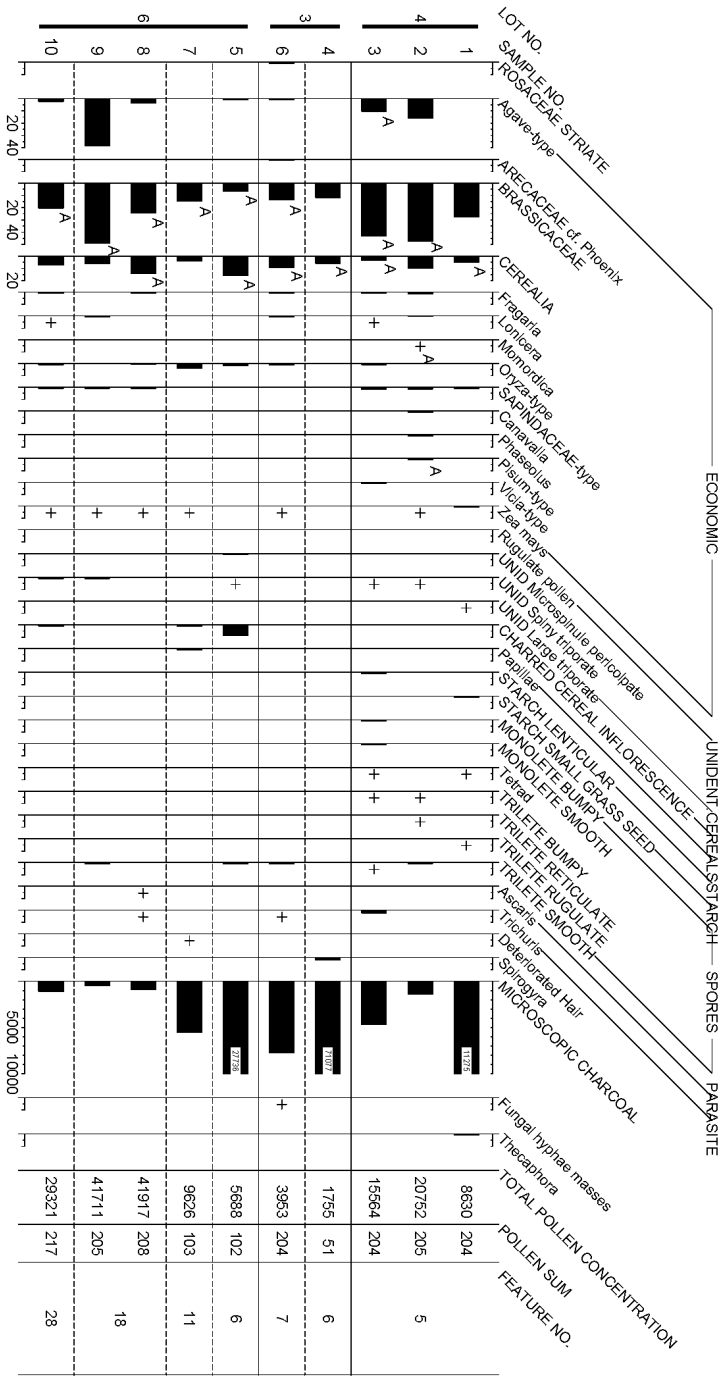

Figure 2. Pollen diagram emphasizing edible/economic types from the Market Street Chinatown site, San Jose, California. Abbreviated feature numbers on the uppermost line of the diagram refer to the following features (read from left to right): 86-36/5 (PRI Samples 1, 2, and 3); 86-36/6 (PRI Sample 4); 86-36/7 (PRI Sample 6); 85-31/6 (PRI Sample 5); 85-31/11 (PRI Sample 7), 85-31/18 (PRI Samples 8 and 9), and 85-31/28 (PRI Sample 10).

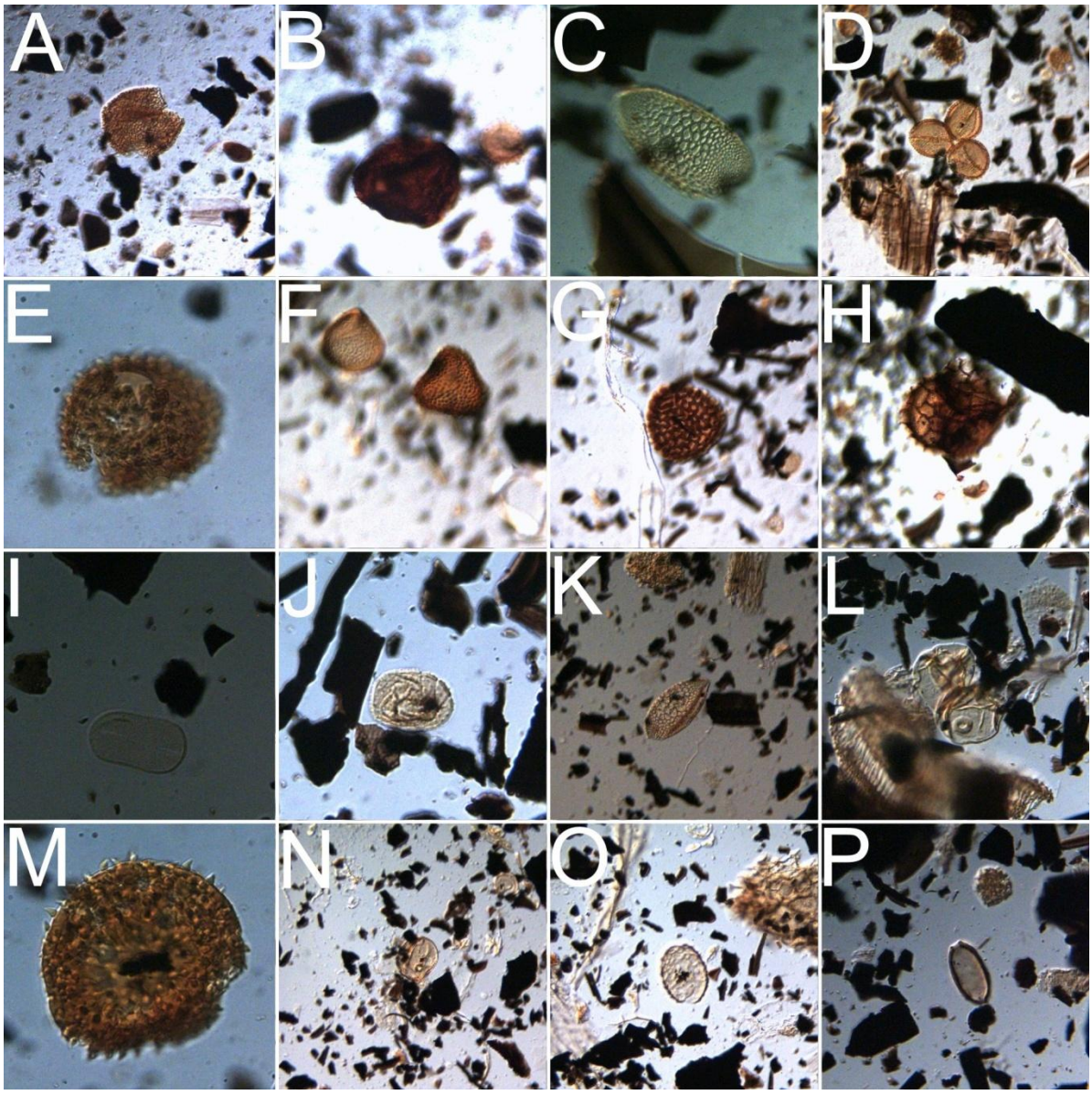

Figure 3. Selected pollen and parasites recovered in feature samples from the Market Street Chinatown site, San Jose, California. All micrographs taken at 500x magnification. A) Unidentified regulate pollen from Feature 86-36/5, Layer 4. B) Unidentified triporate pollen from Feature 86-36/5, layer 4. C) Agave-type pollen in Feature 86-36/5. D) Momordica pollen in feature 86-36/5, Layer 6. E) Unidentified spiny triporate pollen in Feature 86-36/5. F) Trilete bumpy and G) Trilete reticulate spores in Feature 86-36/5. H) Tetrad pollen in Feature 86-36/5. I) Phoenix-type arecaceae pollen in Feature 86-36/7. J) Unidentified microspinule pericolpate pollen in Feature 86-36/6. K) Agave-type pollen in Feature 85-31/18. L) Cerealia pollen. M) Malvaceae pollen in Feature 85-31/18. N) Zea mays pollen. O) Ascaris (roundworm) parasite egg. P) Trichuris (whipworm) parasite egg.

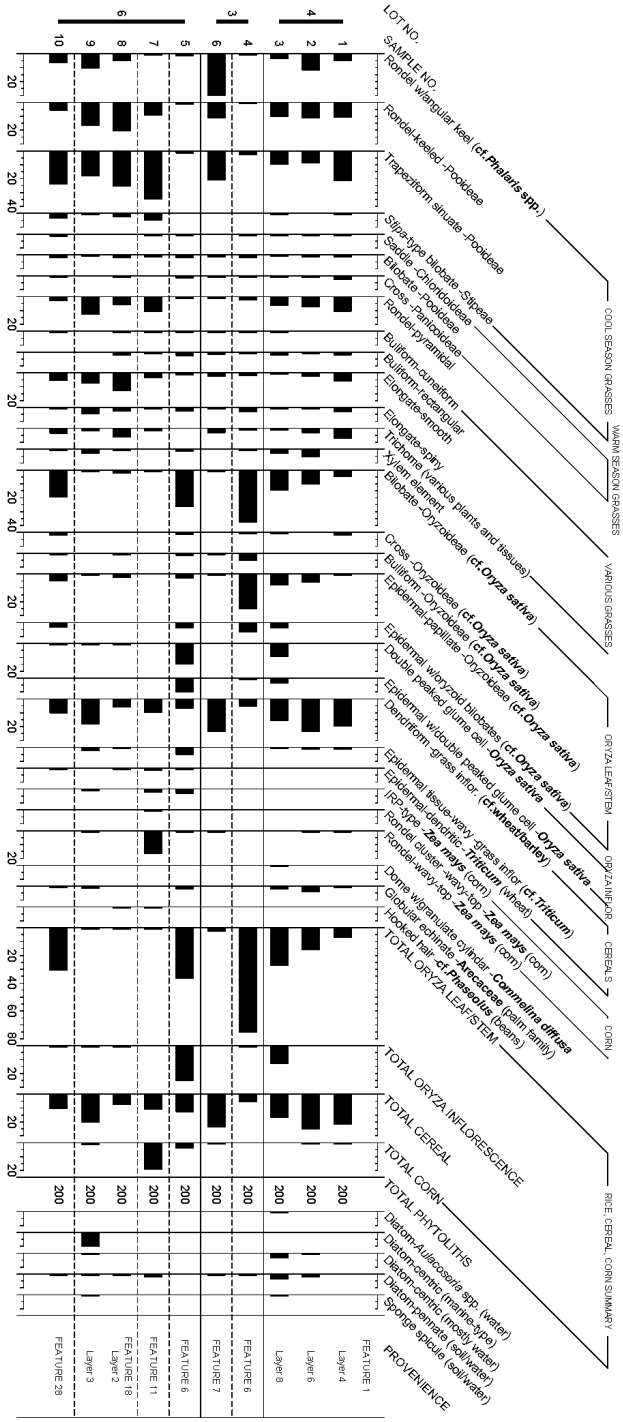

Figure 4. Phytolith diagram for samples from the Market Street Chinatown site, San Jose, California. Abbreviated feature numbers on the uppermost line of the diagram refer to the following features (read from left to right): 86-36/5 (PRI Samples 1, 2, and 3); 86-36/6 (PRI Sample 4); 86-36/7 (PRI Sample 6); 85-31/6 (PRI Sample 5); 85-31/11 (PRI Sample 7), 85-31/18 (PRI Samples 8 and 9), and 85-31/28 (PRI Sample 10).

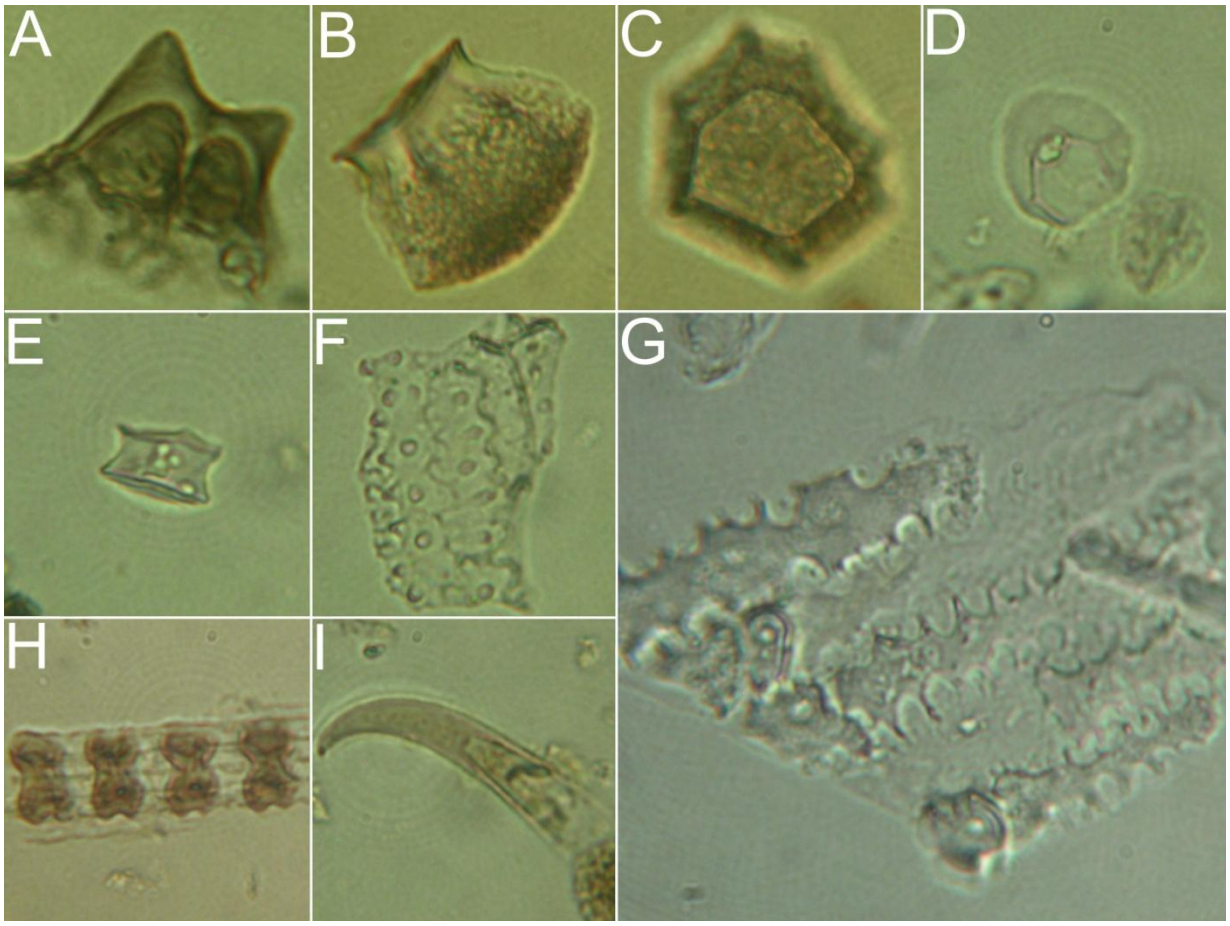

Figure 5. Selected phytoliths recovered In feature samples from the Market Street Chinatown site, San Jose, California. All micrographs taken at 500x magnification. A) Double peaked phytolith diagnostic of white rice (oryza sativa) glume (husk) material. B) Seed phytolith diagnostic of dayflower (commelina diffusa) in side view, and D) in top view. D) Rondel phytolith in top view with an angular keel or raised ridge along its upper surface. This phytolith is not diagnostic of maygrass (phalaris spp.); however, maygrass is a prolific producer of these rondels, and is the likely source for them here. E) Wavy-top rondel phytolith diagnostic of corn (zea mays) glume material. F) papillate epidermal sheet element diagnostic of oryzeae leaf material. G) Dendritic sheet element diagnostic of wheat (triticum spp.) spikelet (husk) material. H) Sequence of articulated bilobate phytoliths diagnostic of oryzeae leaf material. I) Hooked hair phytolith most likely derived from bean (phaseolus spp.) pods.

APPENDIX A
TABLES

This appendix provides the data tables generated through PaleoResearch Institute's analysis of the soil samples.

List of Tables

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample No.	Catalog No.	Feature No.	Level/ Layer	Provenience/ Description	Analysis
1	86-36/ 5-1884	86-36/5	4	Fill from a wood-lined trash pit or possible privy; Loose brown silt containing bone, metal fragments, Chinese artifacts, crushed egg shell, and charcoal	Pollen Parasite Phytolith Starch Macrofloral
2	86-36/ 5-1886		6	Fill from a wood-lined trash pit or possible privy; Loose, fine-grained brown silt with heavy deposit of Chinese artifacts and pig remains	Pollen Parasite Phytolith Starch Macrofloral
3	86-36/ 5-1887		8	Fill from a wood-lined trash pit or possible privy; Loose, fine-grained brown silt with high quantities of Chinese artifacts	Pollen Parasite Phytolith Starch Macrofloral
4	86-36/ 6-303	86-36/6	2	Fill from an unlined trash pit; Thick deposit of white and gray ash containing pig remains, Chinese artifacts, and charcoal	Pollen Parasite Phytolith Starch Macrofloral
5	85-31/ 6-214	86-31/6	2	N102 E 57.5; Fill from the ash lens of an unlined trash pit	Pollen Parasite Phytolith Starch Macrofloral
6	86-36/ 7-1034	86-36/7	3	Fill from a wood-lined cistern; Gray, moist, fine-grained clayey silt with charcoal, pebbles, faunal remains, and artifacts (believed to be surface of feature)	Pollen Parasite Phytolith Starch Macrofloral
7	85-31/ 11-102	85-31/11		N93.5 E58; Fill from an unlined pit containing pig bones in a dark soil	Pollen Parasite Phytolith Starch Macrofloral
8	85-31/ 18-914	85-31/18	2	N101 E55.5; Fill from wood-lined trash pit or possible privy; Level contained numerous artifacts throughout and egg shell in eastern end	Pollen Parasite Phytolith Starch Macrofloral

TABLE 1 (Continued)

PRI Sample No.	Catalog No.	Feature No.	Level/ Layer	Provenience/ Description	Analysis
9	85-31/ 18-916	85-31/18	3	N101 E55.5; Fill from wood-lined trash pit or possible privy; Increased quantities of fish bone and a stack of three earthenware bowls	Pollen Parasite Phytolith Starch Macrofloral
10	85-31/ 28-113	85-31/28		N101 E55.5; Fill from southeast quarter of an unlined trash pit containing Chinese and other artifacts	Pollen Parasite Phytolith Starch Macrofloral

TABLE 2
POLLEN TYPES OBSERVED IN SAMPLES FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

Scientific Name	Common Name
ARBOREAL POLLEN:	
Acer	Maple
Alnus	Alder
Castanea	Chestnut
Juglans	Walnut
Pinaceae:	Pine family
Abies	Fir
Pinus	Pine
Quercus	Oak
NON-ARBOREAL POLLEN:	
Asteraceae:	Sunflower family
Artemisia	Sagebrush
Cirsium	Thistle
Low-spine	Includes ragweed, cocklebur, sumpweed
High-spine	Includes aster, rabbitbrush, snakeweed, sunflower, etc.
Liguliflorae	Chicory tribe, includes dandelion and chicory
Caryophyllaceae	Pink family
Cheno-am	Includes the goosefoot family and amaranth
Cleome	Beeweed, Spiderflower
Convolvulaceae:	Bindweed family
Calystegia	Hedge bindweed
Ipomoea	Morning-glory
Cyperaceae	Sedge family
Eriastrum	Woollystar
Erodium	Storksbill, Heron-bill, Filaree
Euphorbia	Spurge
Fabaceae:	Bean or Legume family
Trifolium pratense	Red clover

Table 2 (Continued)

Scientific Name	Common Name
Malvaceae:	Mallow family
Malva	Mallow
Onagraceae	Evening primrose family
Papaveraceae	Poppy family
Poaceae	Grass family
Polygonaceae:	Knotweed/Smartweed family
Eriogonum	Wild buckwheat
Polygonum cognatum-type	Indian knotgrass
Rhamnaceae	Buckthorn family
Rosaceae	Rose family
Rosaceae - striate (includes *Purshia*, *Prunus*, *Coleogyne*, *Crataegus*, *Malus*, and *Pyrus*)	Rose family - includes bitterbrush, chokecherry, cherry, plum, peach/nectarine, apricot, almond, blackbrush, hawthorn, apple, and pear
Sagittaria	Arrowweed
Tribulus	Puncture vine
Typha angustifolia-type	Cattail
Rugulate	Slightly prolate pollen with elongated pores or very short furrows and a spiny exine
Microspinule pericolpate	Pericolpate pollen with microspinules
Spiny triporate	Pollen exhibiting three annulated pores and a spiny exine
Large triporate	Large pollen exhibiting three annulated pores and a slightly rough exine surface
Indeterminate	Too badly deteriorated to identify
EDIBLE/ECONOMIC:	
Agave-type	similar to Agave
Arecaceae	Palm family
Brassicaceae	Mustard or cabbage family
Cerealia	Economic members of the grass family including *Triticum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley), and *Secale cereale* (rye)

Table 2 (Continued)

Scientific Name	Common Name
Fabaceae:	Pea or Bean family (Legumes)
Canavalia	Jackbean, Sword bean, Horse bean
Phaseolus	Cultivated bean
Pisum-type	Pea
Vicia-type	Broad bean, Faba bean, Fava bean, Horse bean
Fragaria	Strawberry
Lonicera	Honeysuckle
Momordica	Balsampear, Bitter melon
Oryza-type	Rice
Sapindaceae	Soapberry family
Zea mays	Maize, Corn
STARCHES:	
Lenticular starch	Starches produced by Old World cereals such as wheat, barley, rye, and oats
Small grass seed starch	Typical of starches produced by small grass seeds
SPORES:	
Monolete	Fern
Trilete	Fern
FUNGAL SPORES:	
Thecaphora	Fungal spore
PARASITES:	
Ascaris	Roundworm
Trichuris	Whipworm
OTHER:	
Spirogyra	Algae
Microscopic charcoal	Microscopic charcoal fragments
Scolecodont	Worm jaw
Total pollen concentration	Quantity of pollen per cubic centimeter (cc) of sediment

TABLE 3
MACROFLORAL REMAINS FROM
THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
1	Liters Floated						2.00 L
Feature	Light Fraction Weight						29.154 g
86-36/5	FLORAL REMAINS:						
Layer 4	*Adenostoma*	Seed		1			0.0002 g
	Bambusoideae	Stem		1			0.0131 g
	Fabaceae	Seed	1				0.0005 g
	cf. *Medicago sativa*	Seed	1				0.0009 g
	cf. *Trifolium*	Seed	1				0.0003 g
	Juncus	Seed			1		< 0.0001 g
	Periderm			6			0.0362 g
	Oryza	Floret callus		1			0.0003 g
	Rubus	Seed				1	
	Unidentified	cf. Fruit		10			0.0055 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.5868 g
	Baccharis twig	Charcoal		1			0.0179 g
	Quercus	Charcoal		5			0.0881 g
	Quercus - *Leucobalanus* group	Charcoal		6			0.2514 g
	Quercus - Live oak	Charcoal		2			0.2593 g
	Salicaceae	Charcoal		1			0.0031 g
	Sequoia sempervirens	Charcoal		25			0.5323 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 1 mm			3			0.0063 g
	Bone ≥ 2 mm				1	58	0.9937 g
	Medium mammal ≥ 2 mm					6	1.8326 g
	Medium mammal ≥ 2 mm	Phalange			1		0.1973 g
	Fish mandible					1	0.0028 g
	Fish vertebra				6	2	0.1299 g
	Clinker					X	Moderate
	Coal ≥ 4 mm					27	3.699 g
	Coal < 4 mm					X	Moderate
	Coal clinker					X	Numerous

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
1	NON-FLORAL REMAINS (Continued):						
Feature	Eggshell ≥ 1 mm			3			0.0075 g
86-36/5	Eggshell ≥ 4 mm					14	0.3649 g
Layer 4	Eggshell < 4 mm					X	Numerous
	Fiber - Z twist			1			0.0001 g
	Fish scale - ctenoid					1	0.0029 g
	Fish scale - cycloid					6	0.0034 g
	Glass - clear					2	0.0489 g
	Gravel					X	Few
	Insect	Chitin				X	Few
	Insect	Puparia			X	X	Numerous
	Metal - rusted					X	Few
	Sessilia ≥ 1 mm					11	0.0631 g
2	Liters Floated						2.00 L
Feature	Light Fraction Weight						31.009 g
86-36/5	FLORAL REMAINS:						
Layer 6	*Benincasa hispida*	Seed			1	200*	
	Cucurbita	Seed				3	0.0049 g
	Ficus	Seed			136*	104*	
	Ficus/Fragaria	Seed				440*	
	Fragaria	Seed			24*		
	Malva	Seed			1		0.0010 g
	Physalis	Seed			1		0.0001 g
	Portulaca	Seed			16*		
	Rubus	Seed			1876*	1028*	
	Sambucus	Seed			1		0.0004 g
	Solanum lycopersicum	Seed			96*	32*	
	Trifolium	Seed			1		0.0007 g
	Unidentified A	Seed				32*	
	Unidentified	Seed		3			0.0091 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
2	CHARCOAL/WOOD:						
Feature	Total charcoal ≥ 2 mm						13.6902 g
86-36/5	*Acer*	Charcoal		5			0.5611 g
Layer 6	*Arbutus*	Charcoal		6			0.5674 g
	Ephedra	Charcoal		1			0.0405 g
	Quercus - Erythrobalanus group	Charcoal		1			0.0634 g
	Quercus - Leucobalanus group	Charcoal		12			0.6874 g
	Quercus - Leucobalanus group - vitrified	Charcoal		6			0.4887 g
	Quercus - Live oak	Charcoal		2			0.3070 g
	Rhamnus	Charcoal		4			0.6524 g
	Salicaceae	Charcoal		1			0.0697 g
	Sequoia sempervirens	Charcoal		13			0.4548 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			10			0.4010 g
	Bone - calcined < 2 mm			X			
	Bone < 4 mm			X			Few
	Bone ≥ 4 mm					506	16.9029 g
	Bone < 4 mm					X	Numerous
	Fish bone ≥ 2 mm					20	0.1647 g
	Fish bone < 2 m					X	Numerous
	Fish bone - green					2	0.0031 g
	Fish vertebra - calcined		1				0.0082 g
	Fish vertebra		1				0.0053 g
	Fish vertebra ≥ 2 mm				15	3	0.1481 g
	Fish vertebra < 2 mm				X	X	Moderate
	Pharyngeal fish tooth					6	0.0065 g
	Tooth					1	0.2880 g
	Tooth - small animal molar				1	1	0.0114 g
	Vertebra				3		0.1374 g
	Brick/Terra cotta ≥ 2 mm					1	0.0099 g
	Brick/Terra cotta < 2 mm					X	Few
	Coal clinker					2	0.0220 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
2	NON-FLORAL REMAINS (Continued):						
Feature	Eggshell ≥ 2 mm			3			
86-36/5	Eggshell < 2 mm			X			Few
Layer 6	Eggshell ≥ 4 mm					73	1.4695 g
	Eggshell < 4 mm					X	Numerous
	Fish scale ≥ 4 mm					50	0.1875 g
	Fish scale < 4 mm					X	Numerous
	Fish scale - ctenoid ≥ 4 mm					63	0.3138 g
	Fish scale - ctenoid < 4 mm					X	Numerous
	Fish scale - cycloid ≥ 4 mm					61	0.2088 g
	Fish scale - cycloid < 4 mm					X	Numerous
	Glass - clear, thin					1	0.1559 g
	Metal - rusted					3	12.9737 g
	Insect	Chitin				1	
	Insect	Larva				X	Few
	Ostracod shell					X	Few
	Printed paper					2	0.0101 g
	Shell, cf. Mollusk ≥ 4 mm					5	0.2194 g
	Shell, cf. Mollusk < 4 mm					X	Few
	Woven material					3	0.0016 g
3	Liters Floated						1.50 L
Feature	Light Fraction Weight						40.013 g
86-36/5	FLORAL REMAINS:						
Layer 8	*Calandrinia*	Seed			8		0.0005 g
	Chenopodium	Seed			2		< 0.0001 g
	Cucurbitaceae ≥ 1 mm	Seed				42	0.0131 g
	Cucurbitaceae < 1 mm	Seed				X	Moderate
	Benincasa hispida ≥ 1 mm	Seed			3	8	0.0456 g
	Cucurbita ≥ 1 mm	Seed				6	0.0199 g
	Cucurbita maxima-type	Seed				4	0.0014 g
	Momordica ≥ 1 mm	Seed				18	0.0118 g
	Fabaceae	Seed			1		0.0032 g
	Ficus ≥ 1 mm	Seed			47	14	0.0023 g
	Ficus ≥ 0.5 mm	Seed			76	157	
	Ficus/Fragaria < 0.5 mm	Seed				X	Moderate

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
3	FLORAL REMAINS (Continued):						
Feature	*Fragaria* ≥ 1 mm	Seed			5		0.0006 g
86-36/5	*Fragaria* ≥ 0.5 mm	Seed			619	414	
Layer 8	*Leonurus*	Seed			1		< 0.0001 g
	Oryza	Floret callus		1			0.0002 g
	Physalis	Seed			4		0.0005 g
	Portulaca	Seed			4		< 0.0001 g
	Rubus ≥ 1 mm	Seed			690	48	
	Rubus < 1 mm	Seed				X	Few
	Sambucus	Seed			2		
	Solanum lycopersicum	Seed			24	5	0.0093 g
	Vitis ≥ 2 mm	Seed			5	9	0.0452 g
	Vitis ≥ 1 mm	Seed				119	
	Vitis < 1 mm	Seed				X	Moderate
	Unidentified A	Seed				6	0.0005 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						9.2487 g
	Adenostoma twig	Charcoal		2			0.1109 g
	Amelanchier	Charcoal		1			0.0065 g
	Arbutus twig	Charcoal		3			0.0512 g
	Juglans	Charcoal		1			0.0465 g
	Quercus	Charcoal		1			0.0206 g
	Quercus - *Leucobalanus* group	Charcoal		12			0.4055 g
	Quercus - *Leucobalanus* group - vitrified	Charcoal		2			0.2912 g
	Quercus - Live oak	Charcoal		6			0.3811 g
	Rhamnus	Charcoal		2			0.1455 g
	Salicaceae	Charcoal		3			0.0951 g
	Sequoia sempervirens	Charcoal		6			0.2290 g
	Unidentified hardwood	Charcoal		1			0.0203 g
	Total wood ≥ 2 mm						0.6421 g
	Conifer - compressed	Wood				7	0.2871 g
	Sequoia sempervirens	Wood				2	0.0245 g
	Sequoia sempervirens	Wood				1 pc	0.3305 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
3	NON-FLORAL REMAINS:						
Feature	Bone - calcined ≥ 2 mm			22			0.3503 g
86-36/5	Fish vertebra - calcined ≥ 2 mm		1				0.0012 g
Layer 8	Medium mammal bone - calcined ≥ 2 mm			6			1.6845 g
	Bone ≥ 2 mm					137	6.4240 g
	Bone < 2 mm					X	Numerous
	Fish bone ≥ 2 mm					37	0.7146 g
	Fish bone < 2 mm					X	Numerous
	Fish jaw ≥ 2 mm					4	0.0386 g
	Fish vertebra ≥ 2 mm				26	2	0.1802 g
	Fish vertebra < 2 mm				X	X	Few
	Mammal tooth ≥ 2 mm				3	1	0.1174 g
	Large/medium mammal bone ≥ 2 mm					11	7.3080 g
	Large/medium mammal - phalange ≥ 2 mm				1		4.8730 g
	Sus scrofa axis vertebra with cut marks ≥ 2 mm				1		12.2367 g
	Small mammal phalange ≥ 2 mm				1		0.0609 g
	Vertebra ≥ 2 mm				3	1	0.2431 g
	Brass/Copper ≥ 4 mm					6	0.3023 g
	Clinker					X	Moderate
	Eggshell ≥ 2 mm			6			0.0853 g
	Eggshell ≥ 4 mm					55	1.2803 g
	Eggshell < 4 mm					X	Numerous
	Fish scale ≥ 4 mm					13	0.0669 g
	Fish scale < 4 mm					X	Numerous
	Fish scale - ctenoid ≥ 4 mm				38	5	0.1723 g
	Fish scale - ctenoid < 4 mm					X	Numerous
	Fish scale - cycloid ≥ 4 mm				36	22	0.1504 g
	Fish scale - cycloid < 4 mm					X	Numerous
	Glass - blue ≥ 2 mm					1	0.5052 g
	Glass - clear ≥ 2 mm					9	1.4087 g
	Glass - clear < 2 mm					1	

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
3	NON-FLORAL REMAINS (Continued):						
Feature	Gravel					X	Few
86-36/5	Insect	Chitin				X	Few
Layer 8	Insect	Puparia				1	
	Leather ≥ 2 mm					8	0.0276 g
	Metal - rusted					X	Few
	Ostracod shell ≥ 0.5 mm				2		
	Ostracod shell < 0.5 mm					X	Few
	Shell - calcined ≥ 2 mm			3			0.0237 g
	Snail shell - oblong				1		0.0049 g
	Woven fibers					X	Few
4	Liters Floated						0.80 L
Feature	Light Fraction Weight						10.058 g
86-36/6	FLORAL REMAINS:						
Layer 2	Poaceae A	Caryopsis	1				
	Rhus	Seed	1				0.0019 g
	Trifolium	Seed		1			< 0.0001 g
	Unidentified	Seed		1			< 0.0001 g
	Vitrified tissue			3			0.2063 g
	Root					X	Few
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						4.6960 g
	Conifer	Charcoal		1			0.0041 g
	Pseudotsuga	Charcoal		2			0.0064 g
	Sequoia sempervirens	Charcoal		3			0.0313 g
	Quercus	Charcoal		2			0.0087 g
	Quercus - Leucobalanus group	Charcoal		19			0.7750 g
	Quercus - Leucobalanus group - vitrified	Charcoal		4			0.3349 g
	Quercus - Live oak	Charcoal		5			0.1762 g
	Unidentified hardwood - vitrified	Charcoal		3			0.1970 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred		Uncharred		Weights/ Comments
			W	F	W	F	
4	NON-FLORAL REMAINS:						
Feature	Bone - calcined ≥ 4 mm			78			34.7783 g
86-36/6	Bone - calcined < 4 mm			X			Numerous
Layer 2	Fish vertebra - calcined ≥ 2 mm		1	2			0.0220 g
	Bone ≥ 4 mm			20			12.6570 g
	Bone < 4 mm			X			Moderate
	Fish vertebra ≥ 2 mm		1				0.0168 g
	Fish vertebra < 2 mm			X			Few
	Tooth < 2 mm			X			Few
	Bone ≥ 4 mm					87	20.1026 g
	Bone < 4 mm					X	Numerous
	Fish vertebra ≥ 1 mm				4	3	0.0394 g
	Fish vertebra < 1 mm					X	Few
	Tooth ≥ 2 mm					9	1.1449 g
	Ceramics ≥ 2 mm					18	20.3095 g
	Ceramics < 2 mm					X	Few
	Eggshell ≥ 2 mm			117			1.2131 g
	Eggshell < 2 mm			X			Moderate
	Eggshell ≥ 2 mm					20	0.1664 g
	Eggshell < 2 mm					X	Few
	Fish scale					1	0.0006 g
	Glass - clear					1	0.0218 g
	Glass - green					2	0.0118 g
	Insect	Chitin				536*	
	cf. Lead ball - 4 mm diam.				1		0.0571 g
	cf. Leather ≥ 2 mm			100			2.9336 g
	Metal ≥ 4 mm					51	42.6063 g
	Metal < 4 mm					X	Moderate
	Shell ≥ 4 mm					1	0.0229 g
	Shell < 4 mm					X	Few
	Patellogastropoda shell				4		0.3673 g
	Snail shell - depressed				1		

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
5	Liters Floated						2.00 L
Feature	Light Fraction Weight						38.156 g
85-31/6	FLORAL REMAINS:						
Level 2	*Calandrinia* ≥ 1 mm	Seed			25	4	0.0028 g
	Calandrinia < 1 mm	Seed			X	X	Numerous
	Cucurbitaceae	Seed				9	0.0028 g
	Cucurbita	Seed				1	0.0012 g
	Momordica	Seed			1	10	0.0389 g
	Fabaceae	Fruit			1		0.0077 g
	Fabaceae	Seed	1				0.0007 g
	Pisum/Glycine	Seed		6			0.3465 g
	Ficus ≥ 0.5 mm	Seed			5	6	0.0012 g
	Ficus < 0.5 mm	Seed				X	Few
	Gaylussacia	Seed	12	2			0.0101 g
	Malvaceae	Seed	1				0.0006 g
	Poaceae A	Caryopsis	3	3			0.0063 g
	Bambusoideae	Stem		8			0.0441 g
	Oryza sativa ≥ 2 mm	Floret		91			0.0397 g
	Oryza sativa < 2 mm	Floret		X			Numerous
	Oryza sativa ≥ 2 mm	Floret callus		3			0.0005 g
	Oryza sativa	Caryopsis	1	3			0.0091 g
	Oryza sativa ≥ 2 mm	Floret				22	0.0132 g
	Oryza sativa < 2 mm	Floret				X	Numerous
	Setaria	Caryopsis	1	1			0.0019 g
	Sorghum	Floret	1				0.0028 g
	Zea mays ≥ 2 mm	Kernel		2			0.0048 g
	Rubus	Seed			20		0.0083 g
	cf. *Sambucus*	Seed		1			0.0005 g
	Solanum lycopersicum	Seed			1		0.0003 g
	Solanum melongena	Seed	1				0.0004 g
	Vitis	Seed	2	1			0.0265 g
	Vitis	Seed				21	0.0160 g
	Vitrified tissue ≥ 4 mm			10			0.1523 g
	Vitrified tissue < 4 mm			X			Moderate
	Ziziphus zizyphus	Seed		5			0.3993 g
	Unidentified	Seed	6	2			0.0078 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
5	CHARCOAL/WOOD:						
Feature	Total charcoal ≥ 2 mm						7.0223 g
85-31/6	*Rhamnus*	Charcoal		1			0.0297 g
Level 2	*Pseudotsuga*	Charcoal		6			0.2051 g
	Quercus	Charcoal		1			0.0363 g
	Quercus - vitrified	Charcoal		2			0.2550 g
	Quercus - *Leucobalanus* group	Charcoal		6			0.4841 g
	Quercus - *Leucobalanus* group - vitrified	Charcoal		5			0.4652 g
	Quercus - Live oak	Charcoal		8			0.2944 g
	Sequoia sempervirens	Charcoal		7			0.1823 g
	Umbellularia californica	Charcoal		3			0.0442 g
	Unidentified hardwood - vitrified	Charcoal		1			0.0464 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 4 mm			3			0.3523 g
	Bone - calcined < 4 mm			X			Few
	Fish vertebra - calcined ≥ 2 mm			1			0.0033 g
	Bone ≥ 4 m			2 ic pc			0.4497 g
	Bone ≥ 4 mm				6	97	7.5974 g
	Bone < 4 mm					X	Numerous
	Mammal tooth ≥ 1 mm				2	1	0.0433 g
	Fish bone ≥ 4 mm					14	0.3839 g
	Fish bone < 4 mm					X	Moderate
	Fish vertebra ≥ 2 mm				15	5	0.5981 g
	Vertebra ≥ 4 mm				7		0.1878 g
	Brass/Copper ≥ 4 mm					4	1.2472 g
	Brass/Copper < 4 mm					15	
	Clinker					X	Moderate
	Coal					X	Few
	Coal clinker					X	Moderate
	Eggshell ≥ 4 mm			44			1.2367 g
	Eggshell < 4 mm			X		X	Numerous
	Eggshell ≥ 4 mm					104	3.7172 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
5	NON-FLORAL REMAINS (Continued):						
Feature	Fish scale < 4 mm				X	X	Few
85-31/6	Fish scale - ctenoid ≥ 4 mm				5	5	0.0425 g
Level 2	Fish scale - cycloid < 4 mm				1		0.0114 g
	Glass - clear ≥ 4 mm					2	0.3156 g
	Glass - clear < 4 mm					X	Few
	Glass - green ≥ 4 mm					1	0.3805 g
	Hair/Fiber					X	Numerous
	Insect	Chitin	1			X	Few
	Insect	Puparia			1	2	
	Metal - rusted					X	Numerous
	cf. Nail - rusted ≥ 4 mm					3	4.2058 g
	Porcelain ≥ 4 mm					6	0.9660 g
	Porcelain < 4 mm					X	Few
	Rock/Gravel					X	Few
	Sepia - cuttlebone ≥ 2 mm					2	0.0060 g
	Shell - calcined ≥ 4 mm			2			0.1989 g
	Woven fibers					5	0.0016 g
6	Liters Floated						2.00 L
Feature	Light Fraction Weight						34.301 g
86-36/7	FLORAL REMAINS:						
Layer 3	Cucurbitaceae	Seed				10	0.0009 g
	Momordica	Seed				2	0.0001 g
	Ficus	Seed				1	< 0.0001 g
	Fragaria	Seed				5	< 0.0001 g
	Juncus	Seed			1		< 0.0001 g
	Malva	Seed			1		0.0016 g
	Melilotus	Seed			1		0.0012 g
	Rubus ≥ 1 mm	Seed			98	11	0.0394 g
	Rubus < 1 mm	Seed			2	9	
	Solanum lycopersicum	Seed			3	2	0.0018 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
6	CHARCOAL/WOOD:						
Feature	Total charcoal ≥ 2 mm						3.0962 g
86-36/7	Asteraceae	Charcoal		1			0.0147 g
Layer 3	*Baccharis*	Charcoal		7			0.1291 g
	Platanus	Charcoal		1			0.0103 g
	Pseudotsuga	Charcoal		1			0.0141 g
	Quercus - vitrified	Charcoal		2			0.0312 g
	Quercus - Erythrobalanus group	Charcoal		1			0.0349 g
	Quercus - Leucobalanus group	Charcoal		1			0.0045 g
	Rosaceae	Charcoal		1			0.0281 g
	Rosaceae - vitrified	Charcoal		3			0.1767 g
	Crataegus	Charcoal		7			0.0582 g
	Prunus	Charcoal		5			0.3649 g
	Salicaceae	Charcoal		4			0.0338 g
	Sequoia sempervirens	Charcoal		5			0.0726 g
	Unidentified hardwood twig	Charcoal		1			0.0151 g
	Total wood ≥ 2 mm						0.0021 g
	Pinus	Wood				1	0.0021 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			3			0.0551 g
	Bone - calcined < 2 mm			X			Few
	Bone ≥ 2 mm					28	2.0591 g
	Bone < 2 mm					X	Moderate
	Large/medium mammal bone ≥ 4 mm					1	14.675 g
	Large/medium mammal bone with cut marks					1	4.9600 g
	Fish bone ≥ 2 mm					11	0.0911 g
	Fish bone < 2 mm					X	Moderate
	Fish vertebra ≥ 2 mm				5	1	0.0582 g
	Fish vertebra < 2 mm				5		
	Fish tooth ≥ 0.5 mm				1		0.0009 g
	Brass/Copper ≥ 4 mm					2	0.0976 g
	Brass/Copper < 4 mm					8	
	Brick/Terra cotta ≥ 4 mm					1	

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
6	NON-FLORAL REMAINS (Continued):						
Feature	Brick/Terra cotta < 4 mm					X	Moderate
86-36/7	Coal					X	Few
Layer 3	Coal clinker					X	Moderate
	Eggshell ≥ 2 mm			1			0.0063 g
	Eggshell < 2 mm			4			
	Eggshell ≥ 2 mm					31	0.2213 g
	Eggshell < 2 mm					X	Moderate
	Fish scale ≥ 2 mm					5	0.0061 g
	Fish scale < 2 mm					X	Moderate
	Fish scale - ctenoid ≥ 2 mm				2		0.0038 g
	Fish scale - cycloid ≥ 2 mm				7		0.0093 g
	Fish scale - cycloid < 2 mm				3		
	Glass - clear ≥ 2 mm					2	0.5542 g
	Glass - clear < 2 mm					2	
	Glass - green ≥ 2 mm					2	0.0360 g
	Glass - green < 2 mm					1	
	Insect	Chitin				X	Few
	Insect	Egg			X		Few
	Insect	Puparia			X	X	Moderate
	Metal - rusted					X	Few
	Nail - rusted ≥ 4 mm					12	13.7060 g
	Nail - rusted < 4 mm					1	
	Porcelain ≥ 4 mm					3	0.9273 g
	Rock/Gravel					X	Few
	Shell ≥ 4 mm					1	0.0611 g
	Shell < 4 mm					2	
	Termite fecal pellet		2				
	cf. Tile ≥ 4 mm					1	7.9130 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
7	Liters Floated						2.00 L
Feature	Light Fraction Weight						16.683 g
85-31/11	FLORAL REMAINS:						
	Benincasa hispida	Seed		3			0.0059 g
	Brassicaceae	Seed	1				0.0001 g
	Lepidium	Seed	1				0.0003 g
	Calandrinia	Seed	9	3			0.0020 g
	Carex	Seed	4				0.0012 g
	Carex	Endosperm	2				0.0004 g
	Carex	Seed			1		0.0002 g
	Carex - obovate	Seed	1				0.0001 g
	Chenopodium	Seed	1				0.0001 g
	Citrullus lanatus	Seed		6			0.0248 g
	Diospyros	Seed		1			0.0822 g
	Erodium	Seed	29	20			0.0129 g
	Fragaria	Seed	4				0.0014 g
	Juglans	Nutshell		1			0.0521 g
	Lamiaceae	Seed		1			0.0003 g
	Lamiaceae, cf. *Leonurus*	Seed	1				0.0012 g
	Leonurus	Seed			1		0.0002 g
	Malvaceae	Fruit		4			0.0019 g
	Malvaceae	Mericarp	5	4			0.0045 g
	Malvaceae	Seed	113	37			0.0760 g
	Malva	Seed			5		0.0111 g
	Momordica	Seed		4			0.0245 g
	Parenchymous tissue $\geq$ 2 mm			1			0.0013 g
	Periderm $\geq$ 2 mm			37 ic			0.3311 g
	Phaseolus	Seed	1	28			0.3245 g
	Poaceae	Awn		4			0.0003 g
	Poaceae A	Caryopsis	1	4			0.0026 g
	Poaceae A, cf. *Oryza*	Caryopsis		5			0.0032 g
	Poaceae B	Caryopsis	2				0.0003 g
	Phleum	Caryopsis	199	14			0.0222 g
	Zea mays $\geq$ 2 mm	Cupule	22	47			0.6644 g
	Zea mays > 1 mm	Cupule		123			

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
7	FLORAL REMAINS (Continued):						
Feature	*Zea mays* ≥ 2 mm	Cup. glume		14			0.0276 g
85-31/11	*Zea mays* ≥ 1 mm	Cup. glume		91			
	Zea mays ≥ 2 mm	Kernel		10			0.1014 g
	Zea mays ≥ 1 mm	Kernel		5			
	Zea mays ≥ 2 mm	Scutellum		1			0.0014 g
	Portulaca	Seed			4	1	< 0.0001 g
	Prunus dulcis	Shell		1			0.0107 g
	Rubus	Seed	3				0.0014 g
	Rumex	Seed		1			0.0001 g
	Sambucus	Seed				2	0.0003 g
	Solanum lycopersicum	Seed	1				0.0008 g
	Solanum lycopersicum	Seed			1	4	0.0004 g
	Sorbus	Seed	12	1			0.0055 g
	Trifolium	Seed	5				0.0019 g
	Vitrified tissue ≥ 4 mm			63			1.1743 g
	Vitrified tissue < 4 mm			X			Moderate
	Unidentified	Seed		1			0.0032 g
	Unidentified - vitrified	Seed		1			0.0006 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						0.5760 g
	Acer	Charcoal		5			0.0303 g
	Asteraceae	Charcoal		1			0.0031 g
	Conifer	Charcoal		1			0.0044 g
	Platanus	Charcoal		2			0.0075 g
	Prunus	Charcoal		1			0.0082 g
	Quercus	Charcoal		6			0.0610 g
	Quercus - Leucobalanus group	Charcoal		2			0.0095 g
	Salicaceae	Charcoal		15			0.0930 g
	Salicaceae twig	Charcoal		2			0.0131 g
	Unidentified hardwood	Charcoal		1			0.0058 g
	Unidentified hardwood root	Charcoal		1			0.0102 g
	Unidentified hardwood twig	Charcoal		3			0.0162 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
7	NON-FLORAL REMAINS:						
Feature	Bone - calcined ≥ 4 mm			1110			180.990 g
85-31/11	Bone - calcined < 4 mm			X			Numerous
	Bone ≥ 4 mm			131			22.3810 g
	Bone < 4 mm			X			Numerous
	Bone ≥ 4 mm					43	7.6780 g
	Bone < 4 mm					X	Few
	Mammal tooth					1	0.3712 g
	Vertebra ≥ 4 mm				2		0.1020 g
	Bone ≥ 4 mm					31 ic,pc	4.078 g
	Bone < 4 mm					X ic,pc	Few
	Ceramic - glazed					1	0.6546 g
	Gravel					X	Few
	Hair/Fiber					X	Numerous
	Insect	Chitin				2	0.0073 g
	Insect ≥ 2 mm	Larva				X	Few
	Insect < 2 mm	Larva				X	Few
8	Liters Floated						2.00 L
Feature	Light Fraction Weight						13.545 g
85-31/18	FLORAL REMAINS:						
Layer 2	Cheno-am	Endosperm	1				0.0005 g
	Chenopodium	Seed	1	1			0.0002 g
	Chenopodium	Seed			5	12	0.0021 g
	Cucurbitaceae	Seed		5			0.0183 g
	Cucurbitaceae	Seed				16	0.0088 g
	Cuscuta	Seed			6	5	0.0017 g
	Cyperaceae	Seed		1			0.0010 g
	cf. Fabaceae	Seed	2				0.0008 g
	Ficus ≥ 1 mm	Seed			11	5	0.0014 g
	Ficus < 1 mm	Seed				X	Few
	Fragaria ≥ 1 mm	Seed			10		0.0018 g
	Malvaceae	Seed	1				0.0004 g
	Parenchymous tissue ≥ 2 mm			1			0.0020 g
	Periderm ≥ 2 mm			4 ic,pc			0.0215 g
	Physalis	Seed				1	< 0.0001 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
8	FLORAL REMAINS (Continued):						
Feature	Poaceae	Rachilla				1	0.0001 g
85-31/18	cf. *Hordeum*	Rachilla		1			0.0009 g
Layer 2	*Hordeum pusillum*	Caryopsis	1				0.0013 g
	Oryza	Awn				1	0.0002 g
	Oryza sativa	Caryopsis	1				0.0015 g
	Polygonum - triangular	Seed			1		0.0003 g
	Portulaca	Seed			2		< 0.0001 g
	Rubus ≥ 1 mm	Seed			86	8	0.0644 g
	Rubus < 1 mm	Seed				X	Few
	Sambucus	Seed			2		
	Solanum lycopersicum	Seed			6		0.0024 g
	Vitis ≥ 1 mm	Seed			6	12	0.0932 g
	Vitis < 1 mm	Seed				X	Few
	Vitrified tissue ≥ 2 mm	Seed		6			1.0932 g
	Vitrified tissue < 2 mm	Seed		X			Moderate
	Ziziphus zizyphus	Seed				1	0.0581 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						1.1637 g
	Pseudotsuga	Charcoal		2			0.0097 g
	Quercus	Charcoal		10			0.0872 g
	Quercus - vitrified	Charcoal		2			0.0543 g
	Quercus - Leucobalanus group	Charcoal		8			0.1021 g
	Rhamnus	Charcoal		1			0.0222 g
	Rosaceae	Charcoal		1			0.0024 g
	Rosaceae twig	Charcoal		1			0.0299 g
	Crataegus	Charcoal		1			0.0397 g
	Salicaceae	Charcoal		1			0.0100 g
	Salix	Charcoal		2			0.0297 g
	Sequoia sempervirens	Charcoal		3			0.0747 g
	Umbellularia californica	Charcoal		1			0.1207 g
	Unidentified hardwood - vitrified	Charcoal		5			0.0799 g
	Unidentifiable - vitrified	Charcoal		2			0.0729 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
8	CHARCOAL/WOOD:						
Feature	Total wood ≥ 2 mm						0.1442 g
85-31/18	*Sequoia sempervirens*	Wood				2	0.1442 g
Layer 2	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			6			0.4576 g
	Bone - calcined < 2 mm			X			Few
	Fish vertebra - calcined ≥ 1 mm			1			0.0017 g
	Bone ≥ 2 mm			4			0.0620 g
	Bone ≥ 2 mm					44	1.4148 g
	Bone with cut marks ≥ 2 mm					1	3.5561 g
	Bone< 2 mm					X	Few
	Small mammal phalange ≥ 2 mm				1		0.1055 g
	Fish bone ≥ 2 mm					36	0.3074 g
	Fish bone < 2 mm					X	Moderate
	Fish vertebra ≥ 1 mm				8	5	0.0299 g
	Bone ≥ 2 mm					10 ic,pc	0.4707 g
	Brick/Terra cotta ≥ 2 mm					X	Few
	Clinker ≥ 2 mm					X	Few
	Eggshell ≥ 2 mm			7			0.0605 g
	Eggshell < 2 mm			X			Few
	Eggshell ≥ 2 mm					26	0.2258 g
	Eggshell < 2 mm					X	Moderate
	Fish scale ≥ 2 mm					5	0.0046 g
	Fish scale < 2 mm					X	Moderate
	Fish scale - ctenoid ≥ 2 mm				1	2	0.0051 g
	Fish scale - cycloid ≥ 2 mm				4	6	0.0123 g
	Glass - clear ≥ 2 mm					3	0.1984 g
	Glass - clear < 2 mm					X	Few
	Glass - green ≥ 2 mm					1	0.0843 g
	Hair/Fiber					X	Numerous
	Insect	Chitin				3	
	Insect	Puparia				1	
	Leather ≥ 2 mm			51			2.0739 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
8	NON-FLORAL REMAINS:						
Feature	Metal - rusted					X	Moderate
85-31/18	Nail - rusted ≥ 4 mm					1	1.5307 g
Layer 2	Porcelain ≥ 2 mm					1	0.0093 g
	Rock/Gravel					X	Few
	Sepia - cuttlebone ≥ 2 mm					2	0.0065 g
	Shell ≥ 2 mm			1			0.0095 g
	Shell ≥ 2 mm					5	0.0601 g
	Shell < 2 mm					X	Few
	Termite fecal pellet		2		2		
9	Liters Floated						2.00 L
Feature	Light Fraction Weight						60.800 g
85-31/18	FLORAL REMAINS:						
Layer 3	*Calandrinia*	Seed			4		0.0007 g
	Cucurbitaceae	Seed				1	< 0.0001 g
	Momordica	Seed				3	0.0013 g
	Ficus ≥ 0.5 mm	Seed			8	12	0.0024 g
	Ficus < 0.5 mm	Seed				X	Few
	Fragaria ≥ 0.5 mm	Seed			21	11	0.0052 g
	Fragaria < 0.5 mm	Seed				X	Few
	Opuntia	Endosperm			2	6	0.0065 g
	Oryza	Floret				1	0.0002 g
	Oryza	Floret callus		1			0.0003 g
	Portulaca	Seed			8	2	0.0006 g
	Rubus ≥ 2 mm	Seed			3		0.0025 g
	Rubus ≥ 1 mm	Seed			1338	478	
	Rubus < 1 mm	Seed				X	Numerous
	Sambucus	Seed			1		0.0004 g
	Vitis ≥ 2 mm	Seed			154	130	2.0669 g
	Vitis < 2 mm	Seed				X	Numerous
	Vitrified tissue ≥ 2 mm			8			0.0792 g
	Unidentified S	Seed				1	< 0.0001 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
9	CHARCOAL/WOOD:						
Feature	Total charcoal ≥ 2 mm						1.9906 g
85-31/18	*Aesculus*	Charcoal		1			0.1380 g
Layer 3	*Acer* - soft maple	Charcoal		1			0.0206 g
	Conifer - vitrified	Charcoal		1			0.0054 g
	Pseudotsuga	Charcoal		1			0.0078 g
	Sequoia sempervirens	Charcoal		7			0.0207 g
	Juglans	Charcoal		1			0.0071 g
	Quercus	Charcoal		3			0.0301 g
	Quercus - vitrified	Charcoal		1			0.0349 g
	Quercus - *Leucobalanus* group	Charcoal		8			0.1905 g
	Quercus - *Leucobalanus* group - vitrified	Charcoal		9			0.8153 g
	Quercus - Live oak	Charcoal		2			0.1575 g
	Salicaceae	Charcoal		1			0.0048 g
	Unidentified hardwood - vitrified	Charcoal		4			0.0781 g
	NON-FLORAL REMAINS:						
	Bone ≥ 4 mm					448	20.4045 g
	Bone < 4 mm					X	Numerous
	Bird bone ≥ 4 mm					1	0.0998 g
	Fish bone < 4 mm					X	Numerous
	Fish vertebra ≥ 2 mm				173	60	1.5472 g
	Fish vertebra < 2 mm				X	X	Numerous
	Brick/Terra cotta ≥ 4 mm					4	1.0407 g
	Brick/Terra cotta < 4 mm					X	Few
	Coal ≥ 2 mm					8	0.2028 g
	Coal < 2 mm					X	Few
	Eggshell ≥ 2 mm			2			0.0072 g
	Eggshell < 2 mm			3			
	Eggshell ≥ 2 mm					1	0.0120 g
	Eggshell < 2 mm					1	
	Fish scale ≥ 2 mm					7	0.0074 g
	Fish scale < 2 mm					X	Moderate

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
9	NON-FLORAL REMAINS:						
Feature	Fish scale - ctenoid ≥ 2 mm					3	0.0073 g
85-31/18	Fish scale - ctenoid < 2 mm					X	Moderate
Layer 3	Fish scale - cycloid ≥ 2 mm				11	1	0.0189 g
	Glass - clear ≥ 1 mm					3	0.0112 g
	Glass - green ≥ 2 mm					1	0.0308 g
	Insect	Chitin				X	Few
	Rock/Gravel					X	Few
	Shark/Ray vertebra				1	1	0.0193 g
10	Liters Floated						2.00 L
Feature	Light Fraction Weight						17.469 g
85-31/28	FLORAL REMAINS:						
	Cereal-type	Caryopsis	1	1			0.0084 g
	Oryza	Floret		2			< 0.0001 g
	Oryza	Floret				3	0.0004 g
	Oryza	Floret callus		1			0.0001 g
	Oryza sativa	Floret				3	0.0024 g
	Triticum	Caryopsis	2	2			0.0260 g
	Chenopodium	Seed			3		0.0004 g
	Cucurbitaceae	Seed				12	0.0025 g
	cf. Cucurbitaceae	Seed				9	0.0299 g
	Cucurbita	Seed				4	0.0043 g
	Momordica	Seed				11	0.0028 g
	Datura stramonium	Seed				1	0.0015 g
	Fabaceae	Fruit			1		0.0030 g
	Ficus ≥ 1 mm	Seed			6		0.0037 g
	Ficus < 1 mm	Seed			5	17	
	Fragaria ≥ 0.5 mm	Seed			85	38	0.0112 g
	Fragaria < 0.5 mm	Seed				X	Few
	Juglans	Nutshell		2			0.0113 g
	Parenchymous tissue ≥ 2 mm			1			0.0238 g
	Portulaca	Seed			10		0.0006 g
	Rubus ≥ 1 mm	Seed			27	6	0.0157 g
	Rubus < 1 mm	Seed				X	Numerous
	Sambucus	Seed				1	0.0002 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
10	FLORAL REMAINS (Continued):						
Feature	*Solanum lycopersicum*	Seed				1	0.0007 g
85-31/28	*Vitis* ≥ 1 mm	Seed			17	28	0.2309 g
	Vitis < 1 mm	Seed				X	Numerous
	Unidentified G	Seed			1		0.0024 g
	Unidentified S	Seed				5	0.0005 g
	CHARCOAL/WOOD:						
	Total charcoal ≥ 2 mm						6.8754 g
	Asteraceae	Charcoal		1			0.0310 g
	Pinus - hard pine	Charcoal		3			0.0571 g
	Quercus	Charcoal		7			0.1212 g
	Quercus - vitrified	Charcoal		1			0.0175 g
	Quercus - *Leucobalanus* group	Charcoal		13			1.1311 g
	Quercus - *Leucobalanus* group - vitrified	Charcoal		2			0.0858 g
	Quercus - Live oak	Charcoal		3			0.3207 g
	Rhamnaceae	Charcoal		1			0.0117 g
	Salicaceae	Charcoal		1			0.0074 g
	Salix	Charcoal		2			0.1793 g
	Sequoia sempervirens	Charcoal		6			0.0696 g
	Total wood ≥ 4 mm						0.2255 g
	Conifer	Wood				2	0.0143 g
	Sequoia sempervirens	Wood				8	0.2112 g
	NON-FLORAL REMAINS:						
	Bone - calcined ≥ 2 mm			8			0.2627 g
	Bone - calcined < 2 mm			X			Few
	Bone ≥ 2 mm					164	4.6026 g
	Bone < 2 mm					X	Moderate
	Bird bone ≥ 2 mm					4	0.8433 g
	Fish bone ≥ 2 mm					39	0.4173 g
	Fish bone < 2 mm					X	Moderate
	Fish vertebra ≥ 1 mm				19	1	0.0362 g
	Fish vertebra < 1 mm				4	3	
	Tooth				2	1	0.0460 g

TABLE 3 (Continued)

Sample No.	Identification	Part	Charred W	Charred F	Uncharred W	Uncharred F	Weights/ Comments
10	NON-FLORAL REMAINS (Continued):						
Feature	Bone ≥ 2 mm					4 ic,pc	0.0737 g
85-31/28	Brass/Copper ≥ 2 mm					2	0.0154 g
	Brass/Copper < 2 mm					1	
	Brick/Terra cotta					X	Few
	Eggshell ≥ 1 mm			2			0.0040 g
	Eggshell ≥ 2 mm					11	0.3708 g
	Fish scale - ctenoid ≥ 4 mm				2	2	0.0208 g
	Fish scale - ctenoid < 4 mm				X	X	Moderate
	Fish scale - cycloid ≥ 4 mm				5	2	0.0235 g
	Fish scale - cycloid < 4 mm				X	X	Moderate
	Glass - clear ≥ 2 mm					4	1.1924 g
	Glass - green ≥ 2 mm					2	0.2485 g
	Hair/Fiber					X	Moderate
	Insect	Chitin				X	Moderate
	Insect	Puparia				1	
	Patellogastropoda shell				1		0.0856 g
	Metal - rusted					X	Moderate
	Porcelain ≥ 2 mm					5	0.3515 g
	Porcelain < 2 mm					1	
	Rock/Gravel					X	Few
	Sessilia ≥ 1 mm					1	0.0015 g
	Termite fecal pellet		X				Few
	Woven fiber					1	0.0018 g

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

TABLE 4
INDEX OF MACROFLORAL REMAINS RECOVERED FROM
THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

Scientific Name	Common Name
FLORAL REMAINS:	
Adenostoma	Chamise
Brassicaceae	Mustard family
Lepidium	Pepperweed
Calandrinia	Calandrinia, Red maids
Cheno-am	Includes Goosefoot and Amaranth families
Chenopodium	Goosefoot, Pigweed
Cucurbitaceae	Cucumber, Gourd, Melon, or Pumpkin Family
Benincasa hispida	Wax gourd, Chinese winter melon, Chinese fuzzy gourd, Fuzzy squash, Mo-qua
Citrullus lanatus (Citrullus vulgaris)	Watermelon
Cucurbita	Squash, Pumpkin, Gourd
Cucurbita maxima-type	Similar to Winter squash, Japanese squash, Kabocha, Sweet-fleshed pumpkin, Sweet-fleshed squash, Giant pumpkin
Momordica	Balsampear, Bitter melon
Cuscuta	Dodder
Cyperaceae	Sedge family
Carex	Sedge
Carex - obovate	Sedge with an obovate-shaped seed
Datura stramonium	Jimsonweed
Diospyros	Diospyros
Erodium	Storksbill, Filaree
Fabaceae	Bean family
Glycine	Soybean
Melilotus	Sweetclover
Medicago sativa	Alfalfa
Phaseolus	Common bean, Navy bean, Field bean, Kidney bean, Pinto bean, Black bean, Tepary bean, Lima bean, Scarlet runner bean, etc
Pisum	Pea

TABLE 4 (Continued)

Scientific Name	Common Name
Trifolium	Clover
Ficus	Fig
Fragaria	Strawberry
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.
Gaylussacia	Huckleberry
Juglans	Walnut
Juncus	Rush
Lamiaceae	Mint family
Leonurus	Motherwort
Malvaceae	Mallow family
Malva	Mallow, Cheeseweed
Opuntia	Prickly pear cactus, Cholla
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
Physalis	Tomatillo, Ground cherry
Poaceae	Grass family
Poaceae A	Members of the grass family with larger-sized caryopses, such as *Agropyron* (wheatgrass), *Elymus* (ryegrass), *Bromus* (brome grass), etc..
Poaceae B	Members of the grass family with medium-sized caryopses, such as *Festuca* (fescue), *Hordeum* (wild barley), *Stipa* (needlegrass), etc.
Bambusoideae	Bamboo subfamily
Cereal-type	Economic members of the grass family including *Triticum* (Wheat), *Avena sativa* (Oat), *Hordeum vulgare* (Barley), *Oryza sativa* (Rice), and *Secale cereale* (Rye)
Hordeum	Barley
Hordeum pusillum	Little barley
Oryza	Rice
Oryza sativa	Rice
Phleum	Timothy

TABLE 4 (Continued)

Scientific Name	Common Name
Setaria	Bristlegrass, millet
Sorghum	Sorghum
Triticum	Wheat
Zea mays	Maize, Corn
Polygonum - triangular (includes *P. argyrocoleon*, *P. aviculare, P. cilinode, P. convolvulus, P. douglasii, P. dumetorum, P. erectum, P. hydropiper, P. hydropiperoides, P. punctatum, P. ramosissimum, P. sagittatum, P. scandens*)	Smartweed; Knotweed (seeds are triangular in cross-section)
Portulaca	Purslane
Prunus dulcis	Almond
Rhus	Sumac
Rubus	Raspberry, Blackberry, etc.
Rumex	Dock, Sorrel
Sambucus	Elderberry
Solanum lycopersicum (syn. *Lycoperiscon esculentum*)	Tomato
Solanum melongena	Eggplant
Sorbus	Mountain ash
Vitis	Grape
Ziziphus zizyphus	Common jujube
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.
Vitrified tissue	Charred material with a shiny, glassy appearance due to fusion by heat
CHARCOAL/WOOD:	
Acer	Maple, Box elder
Acer - Soft maple group	Soft maple group - The largest rays in species of the soft maple group are 7-8 seriate, but can also exhibit numerous uniseriate rays
Aesculus	Buckeye

TABLE 4 (Continued)

Scientific Name	Common Name
Asteraceae	Sunflower family
Baccharis	Baccharis
Conifer	Cone-bearing, gymnospermous trees and shrubs, mostly evergreens, including the pine, spruce, fir, juniper, cedar, yew, hemlock, redwood, and cypress
Pinus - Hard pine group	Hard pine group - Species in the hard pine group exhibit dentate ray tracheids and include the southern yellow pines, red pine, Scots pine, ponderosa pine, and lodgepole pine
Pseudotsuga	Douglas-fir
Sequoia sempervirens	Redwood
Ephedra	Ephedra, Mormon tea, Joint-fir
Juglans	Walnut
Platanus	Sycamore
Quercus	Oak
Quercus - *Erythrobalanus* group	Red oak group - Species in the red oak group exhibit open early-wood vessels and thick-walled, round late-wood vessels
Quercus - *Leucobalanus* group	White oak group - Species in the white oak group exhibit early-wood vessels occluded with tyloses, thin-walled and angular late-wood 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
Adenostoma	Chamise
Amelanchier	Juneberry, Serviceberry
Crataegus	Hawthorn
Prunus	Cherry, Plum
Salicaceae	Willow family
Salix	Willow
Umbellularia californica	California laurel, California bay, Pepperwood
Unidentified hardwood	Wood from a broad-leaved flowering tree or shrub

TABLE 4 (Continued)

Scientific Name	Common Name
Unidentified hardwood - vitrified	Wood from a broad-leaved flowering tree or shrub, exhibiting a shiny, glassy appearance due to fusion by heat
Unidentifiable - vitrified	Charcoal exhibiting a shiny, glassy appearance due to fusion by heat
NON-FLORAL REMAINS:	
Sessilia	Acorn barnacles; An order of barnacles without stalks
Clinker	Waste from industrial processes, particularly those that involve smelting metals, burning fossil fuels and using a blacksmith's forge, often forming a loose, black deposit that can consist of coke, coal, slag, charcoal, grit, and other waste materials
Coal Clinker	The incombustible residue, fused into an irregular lump, that remains after the combustion of coal
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.
Fish scale - cycloid	Circular fish scale with smooth edges; found on fish with soft fin rays such salmon, trout, herring, pike, minnow, 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
Ostracod	Small, bivalved crustaceans widely distributed in fresh and saline water, normally under well oxygenated conditions in lakes, ponds, springs, and streams
Patellogastropoda	A clade of the order Gastropoda (gastropods); True limpets consisting of dome-shaped molluscs with no spiralling of the shell
Pharyngeal fish tooth	A tooth from the pharyngeal arch in the throat of fish such as carp, koi, goldfish, other cyprinids, suckers, and others
Sepia	Cuttlefish
Snail shell - depressed	Snail shell with a depressed (flat) shape where the width is much bigger than the height
Sus	Pig
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 FROM INDIVIDUAL FEATURES AT THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
FLORAL REMAINS:							
Adenostoma seed, charred	1f						
Brassicaceae seed, charred					1w		
Lepidium seed, charred					1w		
Calandrinia seed, charred					9w 3f		
Calandrinia seed, uncharred	8w					4w	
Calandrinia seed, uncharred ≥ 1 mm			25w 4f				
Calandrinia seed, uncharred < 1 mm			Num Num				
Cheno-am endosperm, charred						1w	
Chenopodium seed, charred					1w	1w 1f	
Chenopodium seed, uncharred	2w					5w 12f	3w
Cucurbitaceae seed, charred						5f	
Cucurbitaceae seed, uncharred			9f	10f		17f	12f
Cucurbitaceae seed, uncharred ≥ 1 mm	42f						
Cucurbitaceae seed, uncharred < 1 mm	Mod						
cf. Cucurbitaceae seed, uncharred							9f
Benincasa hispida seed, charred					3f		
Benincasa hispida seed, uncharred	4w 208*f						
Citrullus lanatus (Citrullus vulgaris) seed, charred					6f		

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Cucurbita seed, uncharred	9f		1f				4f
Cucurbita maxima-type seed, uncharred	4f						
Momordica seed, charred					4f		
Momordica seed, uncharred	18f		1w 10f	2f		3f	11f
Cuscuta seed, uncharred						6w 5f	
Cyperaceae seed, charred						1f	
Carex seed, charred					4w		
Carex seed, uncharred					1w		
Carex endosperm, charred					2w		
Carex - obovate seed, charred					1w		
Datura stramonium seed, uncharred							1f
Diospyros seed, charred					1f		
Erodium seed, charred					29w 20f		
Fabaceae fruit, uncharred			1w				1w
Fabaceae seed, charred	1w		1w				
cf. Fabaceae seed, charred						2w	
Fabaceae seed, uncharred	1w						
Pisum/Glycine seed charred			6f				
Melilotus seed, uncharred				1w			
cf. *Medicago sativa*, seed charred	1w						

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Phaseolus seed, charred					1w 28f		
Trifolium seed, charred		1f			5w		
cf. *Trifolium* seed, charred	1w						
Trifolium seed, uncharred	1w						
Ficus seed, uncharred ≥ 1 mm	259*w 275*f					11w 5f	6w
Ficus seed, uncharred < 1 mm						Few	5w 17f
Ficus seed, uncharred ≥ 0.5 mm			5w 6f	1f		8w 12f	
Ficus seed, uncharred < 0.5 mm			Mod			Few	
Ficus/Fragaria seed, uncharred	440*f						
Ficus/Fragaria seed, uncharred < 0.5 mm	Mod						
Fragaria seed, charred					4w		
Fragaria seed, uncharred ≥ 0.5 mm	648*w 414f			5f		31w 11f	85w 38f
Fragaria seed, uncharred < 0.5 mm						Few	Few
Gaylussacia seed, charred			12w 2f				
Juglans nutshell, charred					1f		2f
Juncus seed, uncharred	1w			1w			
Lamiaceae seed, charred					1f		
Leonurus seed, uncharred	1w				1w		
cf. *Leonurus* seed, charred					1w		
Malvaceae fruit, charred					4f		

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Malvaceae mericarp, charred					5w 4f		
Malvaceae seed, charred			1w		113w 37f	1w	
Malvaceae seed, uncharred							
Malva seed, uncharred	1w			1w	5w		
Opuntia endosperm, uncharred						2w 6f	
Periderm charred	6f						
Periderm incompletely and/or partially charred $\geq$ 2 mm					37f	4f	
Physalis seed, uncharred	5w					1f	
Poaceae awn, charred					4f		
Poaceae rachilla, uncharred						1f	
Poaceae A caryopsis, charred		1w	3w 3f		1w 4f		
Poaceae B caryopsis, charred					2w		
Cereal-type caryopsis, charred							1w 1f
Hordeum							
cf. *Hordeum* rachilla, charred						1f	
Hordeum pusillum caryopsis, charred						1w	
Oryza awn, uncharred						1f	
Oryza floret, uncharred						1f	3f
Oryza floret, charred							2f
Oryza floret callus, charred	2f		3f			1f	1f

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
cf. *Oryza* caryopsis, charred					5f		
Oryza sativa floret, charred ≥ 2 mm			91f				
Oryza sativa floret, charred < 2 mm			Num				
Oryza sativa floret, uncharred							3f
Oryza sativa floret, uncharred ≥ 2 mm			22f				
Oryza sativa floret, uncharred < 2 mm			Num				
Oryza sativa caryopsis, charred			1w 3f			1w	
Triticum caryopsis, charred							2w 2f
Zea mays cupule, charred ≥ 1 mm					22w 170f		
Zea mays cupule, charred < 1 mm							
Zea mays cupule glume, charred ≥ 1 mm					105f		
Zea mays kernel, charred ≥ 1 mm			2f		15f		
Zea mays scutellum, charred ≥ 2 mm					1f		
Bambusoideae stem, charred	1f		8f				
Phleum caryopsis, charred					199w 14f		
Setaria caryopsis, charred			1w 1f				
Sorghum floret, charred			1w				
Polygonum - triangular seed, uncharred						1w	
Portulaca seed, uncharred	20*w				4w 1f	10w 2f	10w
Prunus dulcis shell, charred					1f		

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Rhus seed, charred		1w					
Rubus seed, charred					3w		
Rubus seed, uncharred	1876*w 1029 *f		20w				
Rubus seed, uncharred ≥ 1 mm	690w 48f			98w 11f		1427w 486f	27w 6f
Rubus seed, uncharred < 1 mm	Few			2w 9f		Num	Num
Rumex seed, charred					1f		
cf. *Sambucus* seed, charred			1f				
Sambucus seed, uncharred	3w				2f	3w	1f
Solanum lycopersicum seed, charred					1w		
Solanum lycopersicum seed, uncharred	120*w 37*f		1w	3w 2f	1w 4f	6w	1f
Solanum melongena seed, charred			1w				
Sorbus seed, charred					12w 1f		
Vitis seed, charred			2w 1f				
Vitis seed, uncharred ≥ 1 mm	5w 128f		21f			160w 142f	17w 28f
Vitis seed, uncharred < 1 mm	Mod					Num	Num
Ziziphus zizyphus seed, charred			5f				
Ziziphus zizyphus seed, uncharred						1f	
Parenchymous tissue ≥ 2 mm					1f	1f	1f

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Vitrified tissue ≥ 2 mm		3f	10f		63f	14f	
Vitrified tissue < 2 mm			Mod		Mod	Mod	
Unidentified cf. fruit, charred	10f						
Unidentified seed, charred	3f	1f	6w 2f		1f		
Unidentified seed, vitrified					1f		
Unidentified A seed, uncharred	38*f						
Unidentified G seed, uncharred							1w
Unidentified S seed, uncharred						1f	5f
Root, uncharred		Few					

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
CHARCOAL:							
Acer	5f				5f		
Acer - Soft maple group						1f	
Aesculus						1f	
Arbutus	6f						
Arbutus twig	3f						
Asteraceae				1f	1f		1f
Baccharis				7f			
Baccharis twig	1f						
Conifer		1f			1f		
Conifer, vitrified						1f	
Pinus - Hard pine group							3f
Pseudotsuga		2f	6f	1f		3f	
Sequoia sempervirens	44f	3f	7f	5f		10f	6f
Ephedra	1f						
Juglans	1f					1f	
Platanus				1f	2f		
Quercus	6f	2f	1f		6f	13f	7f
Quercus, vitrified			2f	2f		3f	1f
Quercus - Erythrobalanus group	1f			1f			
Quercus - Leucobalanus group	30f	19f	6f	1f	2f	16f	13f
Quercus - Leucobalanus group, vitrified	8f	4f	5f			9f	2f

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
Quercus - Live oak	10f	5f	8f			2f	3f
Rhamnaceae							1f
Rhamnus	6f		1f			1f	
Rosaceae				1f		1f	
Rosaceae, vitrified				3f			
Rosaceae twig						1f	
Adenostoma twig	2f						
Amelanchier	1f						
Crataegus				7f		1f	
Prunus				5f	1f		
Salicaceae	5f			4f	15f	2f	1f
Salicaceae twig					2f		
Salix						2f	2f
Umbellularia californica			3f			1f	
Unidentified hardwood	1f				1f		
Unidentified hardwood root					1f		
Unidentified hardwood twig				1f	3f		
Unidentified hardwood - vitrified		3f	1f			9f	
Unidentifiable - vitrified						2f	

TABLE 5 (Continued)

	F. 86-36/5 Sample 1, 2, 3	F. 86-36/6 Sample 4	F. 85-31/6 Sample 5	F. 86-36/7 Sample 6	F. 85-31/11 Sample 7	F. 85-31/18 Sample 8, 9	F. 85-31/28 Sample 10
WOOD:							
Conifer							2f
Conifer - compressed	7f						2f
Pinus				1f			
Sequoia sempervirens	2f					2f	8f
Sequoia sempervirens, partially charred	1f						

Mod = Moderate
Num = Numerous

TABLE 6
SUMMARY OF MACROFLORAL REMAINS BY FEATURE TYPE AT THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
FLORAL REMAINS:				
Adenostoma seed, charred	1f			
Brassicaceae seed, charred				1w
Lepidium seed, charred				1w
Calandrinia seed, charred				9w 3f
Calandrinia seed, uncharred	12w			
Calandrinia seed, uncharred ≥ 1 mm		25w 4f		
Calandrinia seed, uncharred < 1 mm		Num Num		
Cheno-am endosperm, charred	1w			
Chenopodium seed, charred	1w 1f			1w
Chenopodium seed, uncharred	7w 12f	3w		
Cucurbitaceae seed, charred	5f			
Cucurbitaceae seed, uncharred	17f	21f	10f	
Cucurbitaceae seed, uncharred ≥ 1 mm	42f			
Cucurbitaceae seed, uncharred < 1 mm	Mod			
cf. Cucurbitaceae seed, uncharred		9f		
Benincasa hispida seed, charred				3f
Benincasa hispida seed, uncharred	4w 208*f			
Citrullus lanatus seed, charred				6f

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Cucurbita seed, uncharred	9f	5f		
Cucurbita maxima-type seed, uncharred	4f	1w 21f		
Momordica seed, charred				4f
Momordica seed, uncharred	21f		2f	
Cuscuta seed, uncharred	6w 5f			
Cyperaceae seed, charred	1f			
Carex seed, charred				4w
Carex seed, uncharred				1w
Carex endosperm, charred				2w
Carex - obovate seed, charred				1w
Datura stramonium seed, uncharred		1f		
Diospyros seed, charred				1f
Erodium seed, charred				29w 20f
Fabaceae fruit, uncharred		2w		
Fabaceae seed, charred	1w	1w		
cf. Fabaceae seed, charred	2w			
Fabaceae seed, uncharred				
Pisum/Glycine seed charred		6f		
Melilotus seed, uncharred			1w	

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
cf. *Medicago sativa*, seed charred	1w			
Phaseolus seed, charred				1w 28f
Trifolium seed, charred		1f		5w
cf. *Trifolium* seed, charred	1w			
Trifolium seed, uncharred	1w			
Ficus seed, uncharred ≥ 1 mm	270*w 280*f	6w		
Ficus seed, uncharred < 1 mm	Few	5w 17f		
Ficus seed, uncharred ≥ 0.5 mm	8w 12f	5w 6f	1f	
Ficus seed, uncharred < 0.5 mm	Few	Mod		
Ficus/Fragaria seed, uncharred	440*f			
Ficus/Fragaria seed, uncharred < 0.5 mm	Mod			
Fragaria seed, charred				4w
Fragaria seed, uncharred ≥ 0.5 mm	679*w 425f	85w 38f	5f	
Fragaria seed, uncharred < 0.5 mm	Few	Few		
Gaylussacia seed, charred		12w 2f		
Juglans nutshell, charred		2f		1f
Juncus seed, uncharred	1w		1w	
Lamiaceae seed, charred				1f

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Leonurus seed, uncharred	1w			1w
cf. *Leonurus* seed, charred				1w
Malvaceae fruit, charred				4f
Malvaceae mericarp, charred				5w 4f
Malvaceae seed, charred	1w	1w		113w 37f
Malvaceae seed, uncharred				
Malva seed, charred				
Malva seed, uncharred	1w		1w	5w
Opuntia endosperm, uncharred	2w 6f			
Periderm charred	6f			
Periderm incompletely and/or partially charred $\geq$ 2 mm	4f			37f
Physalis seed, uncharred	5w 1f			
Poaceae awn, charred				4f
Poaceae rachilla, uncharred	1f			
Poaceae A caryopsis, charred		4w 3f		1w 4f
Poaceae B caryopsis, charred				2w
Cereal-type caryopsis, charred		1w 1f		
Hordeum				

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
cf. *Hordeum* rachilla, charred	1f			
Hordeum pusillum caryopsis, charred	1w			
Oryza awn, uncharred	1f			
Oryza floret, uncharred	1f	3f		
Oryza floret, charred		2f		
Oryza floret callus, charred	3f	4f		
cf. *Oryza* caryopsis, charred				5f
Oryza sativa floret, charred ≥ 2 mm		91f		
Oryza sativa floret, charred < 2 mm		Num		
Oryza sativa floret, uncharred		3f		
Oryza sativa floret, uncharred ≥ 2 mm		22f		
Oryza sativa floret, uncharred < 2 mm		Num		
Oryza sativa caryopsis, charred	1w	1w 3f		
Triticum caryopsis, charred		2w 2f		
Zea mays cupule, charred ≥ 1 mm				22w 170f
Zea mays cupule, charred < 1 mm				
Zea mays cupule glume, charred ≥ 1 mm				105f
Zea mays kernel, charred ≥ 1 mm		2f		15f

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Zea mays scutellum, charred ≥ 2 mm				1f
Bambusoideae stem, charred	1f	8f		
Phleum caryopsis, charred				199w 14f
Setaria caryopsis, charred		1w 1f		
Sorghum floret, charred		1w		
Polygonum - triangular seed, uncharred	1w			
Portulaca seed, uncharred	30*w 2f	10w		4w 1f
Prunus dulcis shell, charred				1f
Rhus seed, charred		1w		
Rubus seed, charred				3w
Rubus seed, uncharred	1876*w 1029*f	20w		
Rubus seed, uncharred ≥ 1 mm	2117w 534f	27w 6f	98w 11f	
Rubus seed, uncharred < 1 mm	Num	Num	2w 9f	
Rumex seed, charred				1f
cf. *Sambucus* seed, charred		1f		
Sambucus seed, uncharred	6w	1f		2f
Solanum lycopersicum seed, charred				1w
Solanum lycopersicum seed, uncharred	126*w 37*f	1w 1f	3w 2f	1w 4f

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Solanum melongena seed, charred		1w		
Sorbus seed, charred				12w 1f
Vitis seed, charred		2w 1f		
Vitis seed, uncharred ≥ 1 mm	165w 270f	17w 49f		
Vitis seed, uncharred < 1 mm	Num	Num		
Ziziphus zizyphus seed, charred		5f		
Ziziphus zizyphus seed, uncharred	1f			
Parenchymous tissue ≥ 2 mm	1f	1f		1f
Vitrified tissue ≥ 4 mm		10f		63f
Vitrified tissue < 4 mm		Mod		Mod
Vitrified tissue ≥ 2 mm	14f	3f		
Vitrified tissue < 2 mm	Mod			
Unidentified cf. fruit, charred	10f			
Unidentified seed, charred	3f	6w 3f		1f
Unidentified seed, vitrified				1f
Unidentified A seed, uncharred	38*f			
Unidentified G seed, uncharred		1w		
Unidentified S seed, uncharred	1f	5f		
Root, uncharred		Few		

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
CHARCOAL:				
Acer	5f			5f
Acer - Soft maple group	1f			
Aesculus	1f			
Arbutus	6f			
Arbutus twig	3f			
Asteraceae		1f	1f	1f
Baccharis			7f	
Baccharis twig	1f			
Conifer		1f		1f
Conifer, vitrified	1f			
Pinus - Hard pine group		3f		
Pseudotsuga	3f	8f	1f	
Sequoia sempervirens	54f	16f	5f	
Ephedra	1f			
Juglans	2f			
Platanus			1f	2f
Quercus	19f	10f		6f
Quercus, vitrified	3f	3f	2f	
Quercus - Erythrobalanus group	1f		1f	

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Quercus - *Leucobalanus* group	46f	38f	1f	2f
Quercus - *Leucobalanus* group, vitrified	17f	11f		
Quercus - Live oak	12f	16f		
Rhamnaceae		1f		
Rhamnus	7f	1f		
Rosaceae	1f		1f	
Rosaceae, vitrified			3f	
Rosaceae twig	1f			
Adenostoma twig	2f			
Amelanchier	1f			
Crataegus	1f		7f	
Prunus			5f	1f
Salicaceae	7f	1f	4f	15f
Salicaceae twig				2f
Salix	2f	2f		
Umbellularia californica	1f	3f		
Unidentified hardwood	1f			1f
Unidentified hardwood root				1f
Unidentified hardwood twig			1f	3f
Unidentified hardwood - vitrified	9f	4f		

TABLE 6 (Continued)

	Wood-lined trash pit/possible privy	Un-lined trash pit	Wood-lined cistern	Un-lined pit containing pig bones
	Feature 86-36/5 Feature 85-31/18	Feature 86-36/6 Feature 85-31/6 Feature 85-31/28	Feature 86-36/7	Feature 85-31/11
Unidentifiable - vitrified	2f			
WOOD:				
Conifer		2f		
Conifer compressed	7f	2f		
Pinus			1f	
Sequoia sempervirens	4f	8f		
Sequoia sempervirens partially charred	1f			

TABLE 7
POLLEN COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Arboreal	Acer	Alnus	Castanea	Juglans	Abies	Pinus	Quercus	Artemisia	Cirsium	HIGH-SPINE ASTERACEAE
1.0	3.0	0.0	1.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	61.0
2.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	12.0
3.0	3.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	1.0	1.0	42.0
4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	25.0
5.0	7.0	0.0	1.0	0.0	0.0	0.0	1.0	4.0	1.0	2.0	79.0
6.0	5.0	2.0	1.0	0.0	0.0	0.0	1.0	1.0	0.0	4.0	35.0
7.0	3.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	1.0	0.0	43.0
8.0	8.0	0.0	0.0	1.0	0.0	0.0	1.0	6.0	0.0	0.0	63.0
9.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	3.0
10.0	7.0	0.0	1.0	0.0	1.0	1.0	2.0	2.0	1.0	0.0	80.0

PRI Sample Number	LOW-SPINE ASTERACEAE	LIGULIFLORAE	BRASSICACEAE	Calystegia	CARYOPHYLLACEAE	CHENO-AM	Cleome	CONVOLVULACEAE	CYPERACEAE	Eriastrum	Erodium
1.0	1.0	12.0	56.0	0.0	1.0	8.0	0.0	3.0	0.0	2.0	1r
2.0	2.0	4.0	97.0	0.0	2.0	4.0	0.0	0.0	1.0	0.0	0.0
3.0	0.0	1.0	88.0	0.0	1r	5.0	0.0	0.0	0.0	0.0	1.0
4.0	1.0	1.0	6.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	11.0	28.0	0.0	5.0	10.0	0.0	0.0	1.0	3.0	0.0
6.0	0.0	0.0	7.0	0.0	2.0	3.0	1.0	0.0	0.0	0.0	1.0
7.0	0.0	4.0	15.0	0.0	1.0	5.0	0.0	0.0	1.0	1.0	1r
8.0	0.0	4.0	50.0	0.0	1r	9.0	0.0	0.0	0.0	0.0	3.0
9.0	0.0	0.0	100.0	1r	0.0	1.0	0.0	0.0	0.0	0.0	0.0
10.0	2.0	10.0	44.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	2.0

TABLE 7 (continued)
POLLEN COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Euphorbia	FABACEAE	Trifolium pratense	Ipomoea	MALVACEAE	Malva	ONAGRACEAE	PAPAVERACEAE	POACEAE	Eriogonum	POLYGONACEAE
1.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	19.0	0.0	0.0
2.0	0.0	0.0	0.0	0.0	0.0	1r	0.0	1.0	2.0	0.0	0.0
3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.0	0.0
4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	1.0
5.0	0.0	1.0	1.0	0.0	0.0	1r	1.0	0.0	13.0	0.0	1.0
6.0	2.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0
7.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	6.0	0.0	1.0
8.0	0.0	0.0	3.0	0.0	1r	1r	1r	0.0	13.0	0.0	0.0
9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	1r	1.0	0.0	11.0	0.0	2.0

PRI Sample Number	Polygonum cognatum-type	RHAMNACEAE	ROSACEAE	ROSACEAE STRIATE	Sagittaria	Tribulus	Typha angustifolia-type	Agave	ARECACEAE cf. Phoenix	CEREALIA	Fragaria
1.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0
2.0	0.0	3.0	0.0	0.0	0.0	0.0	4.0	33.0	0.0	20.0	3.0
3.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0	21.0	0.0	7.0	1.0
4.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
5.0	0.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0	19.0	1.0
6.0	0.0	2.0	0.0	0.0	1.0	0.0	2.0	1.0	0.0	16.0	0.0
7.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0
8.0	0.0	4.0	0.0	0.0	0.0	0.0	3.0	7.0	0.0	29.0	1.0
9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.0	0.0	13.0	0.0
10.0	1.0	6.0	1.0	0.0	0.0	1.0	1.0	5.0	0.0	16.0	1.0

TABLE 7 (continued)
POLLEN COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Lonicera	Momordica	Oryza-type	SAPINDACEAE-type	Canavalia	Phaseolus	Pisum-type	Vicia-type	Zea mays	INDETERMINATE	Rugulate pollen
1.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.0	15.0	1r
2.0	1.0	1r	0.0	3.0	1.0	1.0	1.0	0.0	1r	4.0	0.0
3.0	1r	0.0	2.0	4.0	0.0	0.0	0.0	1.0	0.0	5.0	0.0
4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
5.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1r	11.0	0.0
6.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0
7.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	1r	8.0	0.0
8.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	0.0	1r	3.0	0.0
9.0	1.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1r	0.0	0.0
10.0	1r	0.0	2.0	1.0	0.0	0.0	0.0	0.0	1r	5.0	0.0

PRI Sample Number	UNID Microspinule pericolpate	UNID Spiny lg pore	UNID TP large	CHARRED CEREAL INFLORESCENCE	Papillae	STARCH LENTICULAR	STARCH SMALL GRASS SEED	MONOLETE BUMPY	MONOLETE SMOOTH	Tetrad	TRILETE BUMPY
1.0	0.0	0.0	1r	0.0	0.0	0.0	1.0	0.0	0.0	1r	0.0
2.0	0.0	1r	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1r
3.0	0.0	1r	0.0	0.0	0.0	1.0	0.0	1.0	1.0	1r	1r
4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0	1.0	1r	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 7 (continued)
POLLEN COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	TRILETE RETICULATE	TRILETE RUGULATE	TRILETE SMOOTH	Ascaris	Trichuris	Deteriorated Hair	Spirogyra	MICROCHARCOAL	Fungal hyphae masses	Thecaphora	Scolecodont
1.0	0.0	1r	0.0	0.0	0.0	0.0	0.0	23000.0	0.0	1.0	1r
2.0	1r	0.0	1.0	0.0	0.0	0.0	0.0	2904.0	0.0	0.0	0.0
3.0	0.0	0.0	1r	0.0	5.0	0.0	0.0	9588.0	0.0	0.0	0.0
4.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	36249.0	0.0	0.0	0.0
5.0	0.0	0.0	2.0	0.0	1r	0.0	0.0	15841.0	1r	0.0	1r
6.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	28291.0	0.0	0.0	2.0
7.0	0.0	0.0	0.0	0.0	0.0	1r	0.0	5715.0	0.0	0.0	0.0
8.0	0.0	0.0	0.0	1r	1r	0.0	0.0	1844.0	0.0	0.0	0.0
9.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	998.0	0.0	0.0	1.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2348.0	0.0	0.0	0.0

TABLE 8
PHYTOLITH COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Rondel w/angular keel (cf.Phalaris spp.)	Rondel-keeled	Trapeziform sinuate - Pooideae	Stipa-type bilobate - Stipeae	Saddle - Chloridoideae	Bilobate - Panicoideae	Cross - Panicoideae	Rondel-pyramidal	Buliform-cuneiform
1.0	10.0	21.0	43.0	1.0	1.0	3.0	5.0	21.0	0.0
2.0	23.0	22.0	17.0	0.0	1.0	3.0	2.0	15.0	0.0
3.0	7.0	20.0	19.0	2.0	2.0	2.0	1.0	13.0	1.0
4.0	1.0	2.0	5.0	0.0	2.0	4.0	1.0	5.0	1.0
5.0	60.0	22.0	42.0	0.0	0.0	3.0	1.0	3.0	1.0
6.0	3.0	3.0	3.0	0.0	2.0	4.0	3.0	3.0	1.0
7.0	1.0	18.0	69.0	10.0	1.0	3.0	0.0	21.0	1.0
8.0	10.0	41.0	51.0	5.0	0.0	4.0	1.0	12.0	1.0
9.0	21.0	33.0	36.0	1.0	0.0	2.0	0.0	25.0	0.0
10.0	13.0	11.0	48.0	7.0	3.0	4.0	2.0	6.0	1.0

PRI Sample Number	Buliform-rectangular	Elongate-smooth	Elongate-spiny	Trichome	Xylem element	Bilobate-scooped end - Oryzoideae (cf.Oryza sativa)	Cross-scooped ends -Oryzoideae (cf.Oryza sativa)	Buliform - Oryzoideae-type	Epidermal papillae - grass inflor. (cf. wheat/barley)
1.0	4.0	12.0	6.0	14.0	0.0	9.0	4.0	0.0	2.0
2.0	1.0	5.0	2.0	6.0	11.0	20.0	0.0	0.0	12.0
3.0	4.0	1.0	2.0	2.0	6.0	28.0	2.0	0.0	16.0
4.0	2.0	4.0	6.0	2.0	2.0	75.0	2.0	10.0	50.0
5.0	3.0	5.0	1.0	6.0	0.0	2.0	0.0	2.0	1.0
6.0	5.0	3.0	5.0	0.0	3.0	53.0	3.0	3.0	6.0
7.0	2.0	7.0	2.0	3.0	0.0	1.0	0.0	0.0	0.0
8.0	4.0	25.0	5.0	12.0	2.0	4.0	0.0	1.0	5.0
9.0	0.0	15.0	9.0	3.0	6.0	1.0	0.0	0.0	1.0
10.0	0.0	11.0	1.0	7.0	1.0	39.0	4.0	1.0	10.0

TABLE 8 (continued)
PHYTOLITH COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Epidermal w/oryzoid bilobates	Double peaked glume cell -Oryza sativa	Epidermal w/double peaked glume cell	Dendriform - grass inflor. (cf.wheat/barley)	Epidermal tissue-wavy - grass inflor (cf. Triticum)	Epidermal-dendritic cf.Triticum (wheat)	IRP-type -Zea mays (corn)	Rondel cluster -wavy-top -Zea mays (corn)	Rondel-wavy-top Zea mays (Corn)
1.0	0.0	0.0	0.0	39.0	3.0	0.0	0.0	0.0	1.0
2.0	0.0	0.0	0.0	47.0	3.0	0.0	0.0	0.0	2.0
3.0	8.0	19.0	7.0	31.0	2.0	0.0	0.0	0.0	0.0
4.0	13.0	0.0	2.0	11.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	0.0	0.0	47.0	0.0	0.0	0.0	0.0	1.0
6.0	8.0	30.0	20.0	14.0	10.0	1.0	6.0	0.0	2.0
7.0	0.0	0.0	0.0	19.0	0.0	3.0	4.0	1.0	33.0
8.0	0.0	1.0	0.0	12.0	1.0	2.0	0.0	0.0	0.0
9.0	0.0	1.0	0.0	36.0	4.0	0.0	2.0	0.0	1.0
10.0	7.0	2.0	0.0	20.0	0.0	1.0	0.0	0.0	0.0

PRI Sample Number	Dome w/granulate cylindar - Commelina diffusa	Globular echinate - Arecaceae (palm family)	Hooked hair - cf.Phaseolus	TOTAL ORYZA LEAF	TOTAL ORYZA INFLORESCENCE	TOTAL CEREAL	TOTAL CORN	TOTAL PHYTOLITHS	Diatom-Alacoseria spp.
1.0	0.0	1.0	0.0	14.0	0.0	43.0	1.0	200.0	0.0
2.0	0.0	8.0	0.0	32.0	0.0	50.0	2.0	200.0	0.0
3.0	1.0	4.0	0.0	54.0	26.0	33.0	0.0	200.0	1.0
4.0	0.0	0.0	0.0	150.0	2.0	11.0	0.0	200.0	0.0
5.0	0.0	0.0	0.0	5.0	0.0	47.0	1.0	200.0	0.0
6.0	0.0	4.0	0.0	73.0	50.0	25.0	8.0	200.0	0.0
7.0	0.0	0.0	1.0	1.0	0.0	22.0	38.0	200.0	0.0
8.0	0.0	0.0	1.0	10.0	1.0	15.0	0.0	200.0	0.0
9.0	0.0	3.0	0.0	2.0	1.0	40.0	3.0	200.0	0.0
10.0	0.0	1.0	0.0	61.0	2.0	21.0	0.0	200.0	0.0

TABLE 8 (continued)
PHYTOLITH COUNTS FROM THE MARKET STREET CHINATOWN SITE, SAN JOSE, CALIFORNIA

PRI Sample Number	Diatom-centric marine	Diatom-centric	Diatom-pennate	Sponge spicule
1.0	0.0	0.0	0.0	0.0
2.0	0.0	2.0	4.0	0.0
3.0	0.0	7.0	7.0	1.0
4.0	0.0	0.0	2.0	0.0
5.0	0.0	0.0	1.0	0.0
6.0	0.0	0.0	0.0	0.0
7.0	0.0	0.0	4.0	0.0
8.0	0.0	0.0	2.0	0.0
9.0	20.0	1.0	2.0	2.0
10.0	0.0	0.0	2.0	0.0

APPENDIX B
REVIEW OF BOTANICAL AND PARASITE TAXA

This appendix provides descriptions of the botanical and parasite taxa discussed in this report, with particular attention to the historic context of the Market Street Chinatown. Works cited in this appendix are listed in Section 5.0, References Cited.

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B.1 BOTANIC REVIEW

Pollen, starch, phytolith, and macrofloral 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. The plants discussed in this technical report are described here in the following paragraphs to provide basic information concerning their origin and uses.

B.1.1 Edible and Economically Important Plants

Agave (Agave). Agave (agave, century plant) are perennial, succulent plants with a rosette of thick, fleshy leaves that are tipped with a sharp point. The plant lives for a long time, after which it sends up a large flower stalk containing many small, tubular flowers. After the plant flowers, the original plant dies. Suckers often are produced at the base of the plant that become new plants. Just before the agave flowers, there is an increase in sap at the base of the young flower stalk. Agave nectar is a sweetener derived from the sap, and tequila is a fermented beverage made from the sap. Agave was an important resource for many native Californian groups and was used for a wide variety of purposes including food, alcoholic and non-alcoholic beverages, syrup, fiber, cordage, nets, bags, basketry, mats, blankets, clothing, sandals, pottery rests, miscellaneous woven objects, hair brushes, paintbrushes, needle and thread, fish stringers, armor, lances, musical instruments, paint, a gum-like caulking material, soap, for smoking, medicine, and ceremonial objects. Fresh or dried agave blossoms or buds also were used to flavor food and water. Modern Indians in California still eat agave (Dozier 2003:18). Traditional agave usage and processing exists unbroken to modern times. “Agave in the southwest is essentially a plant of the lower mountain and foothill areas” and occurs in California only in the southeastern counties of Inyo, San Bernardino, Riverside, and San Diego (Castetter, et al. 1938:78-79; Coe 1994:78,84,94; Dozier 2003; USDA Natural Resources Conservation Service 2011).

Arecaceae (Palm Family). The Arecaceae (palm family) is comprised of about 212 genera of trees, subshrubs, or vines with very thick or fine fibrous roots. Palms are members of the Monocotyledonae class of Angiosperms. The vascular bundles of monocots are scattered throughout the stem, and the embryos possess only one cotyledon or seed leaf. Members of the palm family are distributed in nearly all tropical and subtropical regions worldwide, extending to some warm temperate areas (Tidwell 1998:19; Wagner, et al. 1990:1360-1361). Palms are an important part of the economy in tropical and subtropical areas. Palms are used for their fiber, for building and thatching, making baskets and mats, and for their edible fruits and oil content (Hickey and King 1981).

The coconut palm (Cocos nucifera) has a single trunk, about 20-30 meters tall, with smooth grey bark marked by ringed scars of fallen leaves. The pinnate leaves are 4-6 feet long. The fruit is a large drupe with a thin, smooth epicarp, a fibrous mesocarp 4-8 cm thick, and a woody endocarp. The coconut palm can live as long as 100 years. It grows best on the low coral islands, especially on sandy, saline soils, and will not live more than a few hundred feet above sea level. Sap can be collected from the flower clusters using bamboo tubes and made into "tuba", a coconut wine (Guglielmo, et al. 2006; Key 1968:29). In Chinese medicine, coconut meat tonifies energy (qi) and blood and expels wind. It is given to malnourished children. Coconut milk is used to promote urination and to treat diabetes (Lu 2005:282; Tierra 1998:114).

The most well known palms, those cultivated for their fruit, are the date palms (Phoenix spp.). The fruits can be eaten fresh or dried, and the dried fruits can be ground to produce a coarse sugar. The sap also can be boiled down to a syrup or a crystallized mass of sugar. Phoenix dactylifera (desert palm) can be found scattered throughout central and southern California. The first date palms in California were introduced by Franciscan and Jesuit missionaries around 1769 (McGee 2004:370,670; Morton 1987a).

The windmill palm or zong lu pi/tan (Trachycarpus fortunei) is a fan palm native to Asia. The fibrous sheath of the palm leaf is burned and used in a decoction in traditional Chinese medicine to stop bleeding and for a variety of hemorrhagic conditions, such as coughing accompanied by blood, vomiting accompanied by blood, bloody stools, and bleeding from the uterus (Acupuncture Today 2012b).

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 (white mustard), Nasturtium officinale syn. Rorippa nasturtium-aquaticum (watercress), Lepidium sativum (garden cress), and Armoracia rusticana (horseradish). In Chinese medicine, the main functions of Sinapsis alba seeds (bai jie ze) are to clear dampness and phlegm patterns; expel cold; warm the stomach, spleen, and lungs; regulate the flow of energy (qi); and disperse swelling. Seeds are used in Western medicine as an expectorant, carminative, and analgesic. 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 (Acupuncture Today 2012a; Britton and Brown 1970b:146; Hedrick 1972:100; Hickey and King 1981:150; King 1990:12; Kirk 1975:37; Martin 1972:64-65; McGee 1984:196; Moerman 1986:258; Muenscher 1987:229, 232-236; Peterson 1977:26; D. P. Reid 1987:140; Zomlefer 1994:125-129).

Lepidium (Peppergrass). Lepidium (peppergrass) are weedy annual or biennial plants. The leaves contain vitamins A and C, iron, and protein, and can be eaten fresh or cooked as potherbs. Seeds have a peppery taste and can be used to flavor salads and stews. Chinese medicine uses Lepidium (ting li zi) seeds as a treatment for excess phlegm, coughs, asthma, and water retention. It often is used with Ziziphus (jujube) and rhubarb. Lepidium can be found in dry or moist soil in fields, cultivated ground, and waste places . Lepidium and Descurainia (tansy mustard) 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).

Cucurbitaceae (Cucumber, Gourd, Melon, or Pumpkin Family). Members of the Cucurbitaceae (cucumber, gourd, melon, or pumpkin family) often are called cucurbits. The Cucurbitaceae consists of about 100 genera and 800 species of mostly prostrate or climbing herbaceous annuals, sometimes perennials, commonly with 5-angled stems, coiled tendrils, and rapid growth. The fruit is usually a type of berry called a pepo. Members of this family of economic importance include Benincasa hispida (wax gourd, Chinese winter melon), Citrullus lanatus syn. Citrullus vulgaris (watermelon), Cucumis melo (melon), Cucumis sativus (cucumber), species of Cucurbita (pumpkin, squash, gourd), Lagenaria (calabash), Luffa cylindrica (loofah), Momordica (balsam pear, bitter melon), and Sechium (chayote). Plants grown as ornamentals include Benincasa, Coccinea (ivy-gourd), Ecballium (squirting-cucumber), Lagenaria, Luffa, Sicana (cassabanana, musk-cucumber), Sicyos (burr-cucumber, bur cucumber), and Trichosanthes (snake gourd) (Hickey and King 1981:142; Zomlefer 1994:121-123).

Benincasa hispida (Wax gourd, Chinese Winter Melon, Fuzzy Melon). Benincasa hispida (wax gourd, Chinese winter melon, fuzzy melon) is a vigorous annual vine that can spread over the ground like pumpkin or squash vines; it also can be trellised and grown upright. Benincasa hispida is a native of Java and possibly also Japan, but it has been cultivated in China for several millennia. The young fruits are fuzzy, although the fruits lose their hairs and develop a waxy coating by maturity. As a result, the fruits can be stored for a long time. The fruits are cylindrical, 90–150 cm long, and up to 30 pounds in weight. They can be eaten raw or cooked and typically are used in stir-fry or to make winter melon soup, traditionally called Dong gua tang. The seeds are rich in oil and protein and can be eaten cooked or baked like pumpkin seeds. The shoots, tendrils, flower buds, and young leaves also can be eaten as greens or used to flavor soup. All parts of the plant are used medicinally. The rind is diuretic; the fruit is antiperiodic, aphrodisiac, diuretic, laxative, and tonic; the seeds are anthelmintic, anti-inflammatory, demulcent, diuretic, expectorant, febrifuge, laxative, tonic, and contain anti-cancer terpenes; the

fruit juice is used in the treatment of insanity, epilepsy, and other nervous diseases; and the root is demulcent, used as a salve, to facilitate pus drainage, and in the treatment of gonorrhea (Bown 1995; Brooklyn Botanic Garden 1986; Cantwell, et al. 1996; Chopra, et al. 1986; Duke and Ayensu 1985; Larkcom 1991; Ng 1993; Phillips and Rix 1993:199-200; Plants for a Future 1996-2003; Toussaint-Samat 1992:659; Yeung 1985).

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. It is a native 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, and the rinds can be 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. All parts of the watermelon (xi gua) are used in traditional Chinese medicine. Ground seeds contain citrulline and are used as a diuretic to promote urination and to treat urinary tract infections in women. The active ingredient cucurbocitrin might help reduce blood pressure. Watermelon is used to lubricate the intestines and promote urination (Ambler, et al. 1994:557; Lucas 1987:106; McGee 1984:184)(Hedrick, 1972 #214:169-172; Lu, 2005 #7189:282}.

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 (winter squash, turban squash, hubbard squash, Japanese 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). C. moschata (nan gua zi) is relatively new in Chinese medicine and is used to treat intestinal worms, as well as pain and swelling in the abdomen (Ambler, et al. 1994:551, 554-555; Cordell 1984:178; Hedrick 1972; McGee 1984:200; Phillips and Rix 1993:174; D. P. Reid 1987:159).

Cucurbita maxima (Winter squash, Japanese squash). Like other species of Cucurbita, winter squash are weak-stemmed, tender annual vines. They are natives of South America from Chile, Argentina, Bolivia, and Uruguay. The fruits have hard skins and are highly variable. They include edible varieties such as acorn, buttercup, hubbard, turban, and banana squashes, as well as ornamental gourds. Winter squashes most often are eaten boiled or roasted. Cucurbitine is a carboxypyrolidine that has been isolated from the seeds of C. maxima (Ambler, et al. 1994:555; Phillips and Rix 1993:174, 176).

Momordica (Balsampear, Bitter melon, Bitter Cucumber). The genus Momordica (balsampear, bitter melon, bitter cucumber) contains about 45 species native to Asia and Africa. The fruits are bitter due to the alkaloid momordicine. M. charantia (bitter melon, ku gua) is a vigorous climbing gourd that has long been cultivated in Asia for its fruits, which are eaten when very young and green. Immature fruits are less bitter and usually are soaked in saltwater or parboiled, then eaten stuffed, pickled, fried, sliced as a vegetable into various dishes, and in curries. The fruits are bright orange-yellow when ripe and vary in length from 10-25 cm. Chinese are noted to prefer the long variety. Fruits and seeds have been used to treat diabetes. M. cochinchinensis (spiny bitter cucumber) produces ovate fruits about 12 cm long covered with small conical spines. M. balsamina (southern balsampear, bitter apple) is closely related to M. charantia and is a native of eastern Asia. The fruit is ellipsoid, with the surface covered in protuberances or almost smooth (Cantwell, et al. 1996; Ng 1993; Phillips and Rix 1993:198; Raman and Lau 1996).

Diospyros (Persimmon). Diospyros virginiana (common persimmon) is native to the eastern and southern United States. The fruit can be eaten fresh when it is fully ripe and tastes best after a frost when it becomes sweet and mushy. Ripe persimmon fruits have been used to make beer or added to flour to make bread. The dried leaves

are high in vitamin C and can be used to make a tea. A tea made from the inner bark of the tree is highly astringent. Fruits usually are collected from late fall to midwinter, but they will stay on the tree all winter unless harvested. Persimmons grow in a variety of habitats. They often are found in dry, deciduous woods and will form dense thickets on dry, eroded slopes (Angell 1981:238; Foster and Duke 1990:284; Hedrick 1972:244; Peattie 1966:538-541; Peterson 1977:194). Diospyros khaki (Japanese persimmon, shi di) is native to China, Japan, Vietnam, and eastern India. The juice of fresh, unripe fruits is used in Chinese medicine to lower blood pressure and treat hypertension. It is noted to regulate stomach and spleen energy (qi), as well as to control hiccups and coughs (D. P. Reid 1987:128).

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 that enable the plant to take up more atmospheric nitrogen. This practice helps the soil, and many species are valuable as crops on poor soils. Members of this family are called legumes. Many species of legumes are desirable as a food source because they are major sources of proteins and calories. Legumes also are high in carbohydrates, have an ability to lower serum cholesterol, are high in fiber, low in fat, have a high concentration of polyunsaturated fatty acids, and contain B complex vitamins, minerals, and fiber (Hickey and King 1981:196; Sridhar and Seena 2006:267; Zomlefer 1994:160).

Canavalia (Jackbean, Sword bean, Horse bean). Canavalia (jackbean, sword bean, horse bean) are annual or perennial herbs, often vines. Several species are cultivated, including C. ensifoprmis (common jackbean), C. gladiata (sword bean), and C. cathartica (maunaloa). With a protein content of 22-25 percent, Canavalia seeds contain more protein than wheat, rice, or eggs. Common jackbean originated in Central America and the Caribbean, but it is now grown throughout much of the tropics and sub-tropics, including the southwestern United States. The pods are large, flat, sword-shaped, and measure nine inches long and more than an inch and a quarter wide. The young pods and seeds are eaten as a vegetable. Seeds also are dried for later use. C. gladiata has an Asian origin and is now cultivated in Asia, West Indies, Africa, and South America. In parts of Asia, seeds are soaked, boiled, and eaten, while roasted and ground beans are used as a substitute for coffee in Central America. In China, Canavalia is known as dao dou shu and has been used to treat skin rashes. Jackbeans grow well in sandy soils, dunes, and coastal areas (Hedrick 1972:131; Kay 1979; Kiple and Ornelas 2000:1790; Sridhar and Seena 2006).

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. Alfalfa also is grown throughout western Asia and eastern Europe. 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 protein and contains vitamins C, B1, B6, B12, E, and K1, as well as potassium, calcium, phosphorus, iron, zinc, chlorophyll, and amino acids. Alfalfa has been used medicinally to increase appetite and vitality; as a stimulant for digestion and bowel action; to treat rheumatoid arthritis, diabetes, and thyroid disease; and to help with blood clotting. Alfalfa leaves have been used in traditional Chinese medicine to treat digestive disorders and to help retain water. The seeds are ground into a poultice for treating rashes and insect bites. Medicago sativa is a deep-rooted herbaceous plant that commonly grows to a height of two to three feet (Foster 1996:2-3; Lucas 1987:21-27; McGee 1984:228; Phillips Petroleum Company 1963:93, 111; Phillips and Rix 1993:8).

Melilotus (Sweet Clover). Species of Melilotus (sweet clover) are annual or biennial herbs native to Europe, Africa, and Asia. The young leaves are rich in protein and can be added raw to salads or boiled as greens. Seeds can be used to flavor soups and stews. The leaves contain coumarin and can be used as a vanilla-like flavoring. Fermentation transforms the coumarin into dicoumarin, which stops blood from clotting. The flowers of Melilotus officinalis (yellow sweet clover, king's clover) can be brewed into a tea for neuralgic headaches, painful

urination, nervous stomach, colic, diarrhea, aching muscles, and painful menstruation. The plant can be poulticed for inflammation, ulcers, wounds, and rheumatism or smoked to treat asthma. Sweet clovers have been used to flavor cheese and tobacco, as well as in sachets and potpourri mixes. M. alba (white sweetclover) is important in honey production. M. arvensis (melilot, honey lotus) is burned by the Chinese as incense, used in cosmetics, and brewed into an herbal tea as a medicine for male impotence (Brill and Dean 1994:26; Britton and Brown 1970b:353; Foster and Duke 1990:116; Lucas 1987:130; Miller 1976:155, 204, 242; Peterson 1977:56, 80; Uchytil 1992).

Phaseolus (New World Beans). Phaseolus (New World beans) are members of the Fabaceae family. Four species of Phaseolus were domesticated in the Americas. P. coccineus (scarlet runner bean) originally was domesticated in Mexico, and it is now grown in the United States mainly as an ornamental. P. acutifolius (tepary bean) was an important crop for prehistoric groups. It is noted to be more drought-resistant and less gas-forming than other species of beans. P. lunatus (lima bean) and P. vulgaris (common bean) were domesticated first in Peru, well before 6,000 B.C., and later in Mexico. P. vulgaris has become the most widespread and commonly used bean and has been developed into hundreds of varieties, including navy, field, kidney, pinto, and black beans. Beans are high in proteins, carbohydrates, iron, and B vitamins and are low in fat. Immature green beans in the pod contain more vitamins A and C, but much less protein. Legume seeds, including beans, contain protease inhibitors and lectins, which are secondary compounds that interfere with the digestive process. These compounds are disabled by heat, however, and boiling is the most common method of cooking mature beans. Boiled beans can be eaten plain, in soups, or mashed and fried. Green beans are varieties of P. vulgaris whose pod is eaten when green and immature (Heiser 1990:124-125; McGee 1984:249-256, 262).

Pisum sativum (Pea)/Glycine (Soybean). A few charred seed fragments were present that might represent either Pisum sativum (pea) or Glycine (soybean).

Pisum sativum (pea) is a native of Europe and northern Asia that has been grown there for thousands of years and eaten either fresh as green peas when immature or as dried peas in soups or potage when ripe. Peas are believed to have been first cultivated in Turkey where pea seeds were found in deposits from around 5,700 B.C. Peas spread very early to India and China. Dried peas were an important alternate protein source in the Middle Ages. McGee (1984:201) notes that “fresh peas were not eaten in Europe until the 16th century, when they became a great delicacy and luxury.” Peas were some of the first plants to be used in the 1800s for genetic experiments, although the Czech monk Gregor Mendel had originally only “intended to improve the garden qualities of the peas grown in the monastery gardens” (Phillips and Rix 1993:83). Peas were brought to the United States with the colonists. The two main varieties cultivated today are a starchy, smooth-coated pea grown for dried and split peas and a wrinkly type with a higher sugar content (snow pea/sugar pea) that usually are eaten very underripe for their pods. Peas contain about 12 percent water, 24 percent protein, 60 percent carbohydrate, and 1 percent fat (Hedrick 1972:441-444; McGee 1984:250-251; Phillips and Rix 1993:82-85).

Glycine (soybeans) are a native legume of northern China believed to have first been cultivated in the eleventh century B.C. Soybeans have about 20 percent oil and 40 percent protein, and the protein approaches meat in its amino acid balance. They are reported to now be the largest cash crop in the United States. Soybeans are used mainly for margarine, soy sauce, and stock feed in the United States and are noted to be a significant human food only in the Far East. Bean curd (tofu) is a form of processed soybeans invented in China between A.D. 200 and 900. Soybeans also are left to germinate in the dark and produce the crisp sprouts often used in Chinese cooking (McGee 1984:252; Phillips and Rix 1993:110; Tannahill 1973:146).

Vicia faba (Broad bean, Faba bean, Fava bean, Horse bean). Vicia faba (broad bean, faba bean, fava bean, horse bean) is indigenous to southwestern Asia and the Mediterranean where it was cultivated by the Egyptians, Greeks, Hebrews, and Romans. It was the only bean known to Europe until the discovery of the New World, and they were used in making cassoulet, the famous bean dish of Languedoc. Explorers carried broad beans to the New World, and they now are popular in Mexico and Brazil, as well as Europe, the Middle East, and India. Broad beans are commonly shelled from the pod and eaten cooked. They contain 12 percent water, 25 percent protein, 58 percent carbohydrate, and 1 percent fat (Hedrick 1972 :593-595; McGee 1984:203, 252; Toussaint-Samat

1992:46, 51). In traditional Chinese medicine, horse beans are used to treat energy deficiency, constipation, diarrhea, and insomnia resulting from heart-spleen deficiency (Lu 2005:55, 57, 62, 70, 72-73).

Ficus carica (Fig). Ficus carica (common 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 are noted to have been introduced to North America around A.D. 1600, although they were not cultivated commercially until the 1900's. Like the date, the fig is valued for its sugar content. Figs are high in glucose, fructose, and sucrose, 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). Figs range in color from yellow-purple to purplish-brown and can be eaten raw, preserved, dried, and canned. Figs are mildly purgative and slightly expectorant and have been used to treat constipation and coughs (Hedrick 1972:268; McGee 1984:186-187; Thomson 1978:23, 64, 155). In the south of China, figs are noted to be added to many soups and stews because they are believed to be very nourishing for general fitness. A fig stew is made by lactating women to increase their breast milk. In Chinese medicine, figs are used to moisten lungs, treat coughs, lubricate the colon, relieve constipation, invigorate the spleen, and to treat joint pain. Unripe fig juice is applied to warts. The stems and leaves are used for fever, while the roots are used to treat bladder inflammations and increase urination (Newman 2000).

Gaylussacia (Huckleberry). Gaylussacia (huckleberry) is a native of North America. This small, deciduous shrub has blue or black berries that ripen from July through September. Black huckleberry (G. baccata) is the most widespread and common huckleberry, especially in the eastern United States. Huckleberries are often an important food for animals and are found in dry or moist woods, thickets, and clearings. Huckleberries can be eaten raw but often are cooked and strained because of their many hard seeds. Berries are used for pies, puddings, jams, jellies, muffins, and pancakes (Angell 1981:110, 198; Hedrick 1972:288; Kirk 1975; Schopmeyer 1974:427-428).

Juglans (Walnut). 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), J. cinerea (butternut), J. californica (Southern California walnut), J. hindsii (Northern California walnut), J. major (Arizona walnut), and J. microcarpa (little walnut) are natives of the United States. Walnuts can be eaten raw or roasted and often are 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. In traditional Chinese medicine, English walnuts (hu tao ren) function to tonify the kidneys, nourish the blood, warm the lungs, and lubricate the intestines, thus improving functioning of the colon. Walnuts also are eaten raw as a brain tonic and used to beautify the skin, treat male impotence, treat pain and weakness in the knees and back, aid in digestion, and relieve asthma. Ground walnuts can be mixed with honey for chronic cough and constipation (Lu 2005:282; Ody 1993:71; Peattie 1966:119-125; Tierra 1998:103).

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, bo he) is noted to be good for the stomach and has antispasmodic properties. In traditional Chinese medicine, Mentha arvensis has diaphoretic, carminative, stomachic, diaphoretic, analgesic, nervine, cooling, and stimulant effects. Peppermint (Mentha piperita) is useful for treating nausea and has been shown to inhibit and kill a variety of pathenogenic microbes. 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 Leonurus (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. Salvia (sage) is one of the primary herbs used in Chinese herbalism to prevent and treat heart disease. 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; D. P. Reid 1987:84; Reid 1995:156-157; Toussaint-Samat 1992:533).

Leonurus (Motherwort). Leonurus (motherwort, yi mu cao) is a perennial herb that was introduced from central Eurasia, although now it is found throughout most of the world's temperate zones. It is reported to have sedative, hypotensive, and antispasmodic effects and has been used to treat insomnia, neuralgia, spasms, fevers, and stomachaches. A leaf tea was used as an aid in childbirth, for asthma, and for heart palpitations. Motherwort is useful in both western and traditional Chinese medicine in the treatment of menstrual and uterine conditions, as well as heart and circulatory disorders. Leonurus often is found growing as a weed in pastures, waste places, and along roadsides (Fernald 1950:1228; Foster and Duke 1990:162; Hoffman 1988:200; Krochmal and Krochmal 1973:136; Lucas 1987:142-143).

Lonicera (Honeysuckle). Lonicera (honeysuckle) plants are erect shrubs or vines with tubular, trumpet-shaped flowers. Several species are grown as ornamentals. L. fragantissima (winter honeysuckle) has especially fragrant, creamy white flowers; L. sempervirens has red flowers; and L. periclymenum (woodbine honeysuckle) has purple to yellow flowers. Most of the species of Lonicera produce red or orange berries that are edible but not always palatable raw. L. villosa (northern honeysuckle) has blue berries, while L. involucrata has purple or black fruit. The berries of L. villosa, involucrata, cilosa, and utahensis can be eaten raw, dried for future use, or made into sauce, jelly, and jam. Cultivated honeysuckle plants prefer well-drained soils, while wild species in the western United States are found along streams and on wooded banks and slopes (Ambler, et al. 1994:383, 395; Angell 1981:74-76, 110-112; Harrington 1964:520; Kirk 1975:129-130; Weber 1976:96). A famous Chinese patent formula for colds contained Lonicera japonica (Japanese honeysuckle, jin yin hua) and Forsythia (weeping golden bell). Long-term use of Japanese honeysuckle flowers is said to enhance vitality and prolong life. An infusion of the flowers is used as a wash for sores, abscesses, and skin infections (Reid 1995:139-140, 190).

Poaceae (Grass Family). Grasses (Poaceae) are 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, providing 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 1981:436-437).

Bambusoideae (Bamboo). The Bambusoideae (bamboo) is a subfamily of the Poaceae (grass family) and includes perennial herbaceous forms or woody and arborescent bamboo (tribe Bambuseae). Some of the woody species are the fastest growing woody plants in the world, growing about 60 cm in a day. Bamboos are found throughout the world, although they are most often associated with Eastern cultures. In China, bamboo is a symbol of longevity. Seeds are eaten, and bamboo shoots are cooked as a vegetable. The woody stems or culms are used to make walking sticks, garden stakes, fishing poles, and some types of furniture. Arundinaria japonica is used orally in Chinese medicine for asthma, coughs, and gallbladder disorders. A decoction of bamboo leaf, gypsum, and other herbs called ju yeh shih gao tang is a frequently prescribed formula for diabetes. In general, bamboo is sweet and cold and is used to clear heat and transform phlegm. The shavings of Bambusae caulis (zhu ru) are mainly used for treating restlessness, palpitations, restless sleep, depression, and aproxia. It is effective for soothing the stomach and treating nausea and vomiting. The juice of Bambusae succus (zhu li) has a lubricating

nature and is noted to be effective for treating upper respiratory infections and coughs caused by phlegm that is difficult to expectorate, as well as epilepsy, hemiplagia, facial paralysis, mental disorders such as schizophrenia, and numbness, tingling, or cramping of the limbs. Bambusae concretio silicea (tian zhu huang) is used to treat fever, convulsions in infectious diseases, pneumonia, acute bronchitis, and influenza. Bamboos are found in warm temperate woodlands, tropical rain forests, in the shady understory of warm forests, and along streams, always in the shade of taller vegetation. Bamboo usually are dependant on shade, humidity, and warm temperatures, making them abundant in the tropics and subtropics. Some woody members can be found in the temperate-cold areas of both hemispheres (Calderon and Soderstrom 1980; Reid 1995:226)(Shied, et al. 2009:772; Traditional Chinese Medicine and Acupuncture Health Information Organization 2002; Yang 2010:105-106).

Cereals. The major cereal grains consist of economic members of the grass family including Triticum (wheat), Hordeum vulgare (barley), Oryza sativa (rice), Zea mays (maize), Avena sativa (oat), Secale cereale (rye), Setaria italica (foxtail millet), Panicum miliaceum (proso millet, common millet), and Sorghum bicolor (sorghum). These plants are part of the cereal grains that 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). These 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). As a pollen and phytolith type, the Cerealia group consists only of Triticum (wheat), Avena sativa (oat), Hordeum vulgare (barley), and Secale cereale (rye). Herbal porridges called yao jou are a traditional Chinese way of blending food and medicine. They are prepared using a base of brown rice, barley, or millet and typically served for breakfast, although they can be eaten any time of day or night (Reid 1995:37).

Hordeum (Barley). Species of Hordeum (barley) are annual or perennial grasses found widely distributed in the temperate regions of both hemispheres. Barley was a popular grain for Chinese herbal porridges. Native species of Hordeum include H. pusillum and H. jubatum. Hordeum pusillum (little barley) is a cool season, annual grass, while Hordeum jubatum (foxtail barley) is a perennial grass. Hordeum pusillum was cultivated in the Southwest as a winter/early spring crop. It rapidly invades disturbed ground, especially along roadsides, waste areas, and abandoned fields (Ebeling 1986:198; Moerman 1998:269; Phillips Petroleum Company 1963:44; Reid 1995:37).

Oryza sativa (Rice). Rice (Oryza sativa) is noted to be the principal food crop for about half of the world's population. "Rice is often thought to be a native of India, but probably originated in the warm, wet parts of southwestern China, Thailand or Malaya in about 7000 BC" (Phillips and Rix 1993:10). Today, there are about 2500 varieties of rice. Brown rice consists of the intact grain with the bran layers intact. White rice has been further milled and polished. About 15 percent of the protein in rice is lost in milling and polishing, as well as much of the amino acid lycine and the vitamin thiamine. Rice most often is cooked in water and consumed as individual grains. Sake is a fermented drink made from rice that was invented in the Far East. A mold (Aspergillus oryzae) that secretes a starch-digesting enzyme is used to prepare rice for fermentation (McGee 1984:237-239, 429).

Setaria (Bristlegrass, Foxtail, Millet). Setaria (bristlegrass, foxtail, millet) are native and introduced annual or perennial grasses. European species are especially troublesome weeds, although their seeds are important resources for wild birds. Millet is a name given to several genera, including Panicum, Setaria, Pennisetum, and Eleusine. These grasses all have small round seeds, about 1-2 mm in diameter. Millets have one of the lowest water requirements of any of the cereals. Millet grains have a high protein content of 16 to 22 percent and are eaten popped and made into porridge, breads, malts, and beer. S. italica (foxtail millet) has been grown in China since the sixth millennium B.C. and is the second-most widely planted species of millet. In the United States, it often is grown as a hay crop. S. palmifolia (palmgrass) is a native of India that often is grown in greenhouses as an ornamental plant. Setaria can be found in moist meadows, rich soils, dry ground, fields, gardens, pastures, lawns, and waste places (Hedrick 1972:533; Hitchcock 1971b:718-726; Martin 1972:26; McGee 2004:482).

Sorghum bicolor (Sorghum). Sorghum bicolor (sorghum) originated on the savannas and steppes of central and South Africa. It was domesticated around 2000 BCE, then was taken to India and China. Heat and drought-tolerant, sorghums have become well established in warm agricultural environments worldwide. The grains are boiled like rice, popped, or made into breads, porridges, and fermented drinks. Sorghum was grown historically in the United States as a source of sugary syrup (Devin 2012; McGee 2004:482).

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 and introduced it to visiting Europeans. 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. In traditional Chinese medicine, corn (yu shu shu) and corn silk are used to promote urination. A corn silk tea is used to treat bladder, kidney, and urinary tract infections. Corn also is used to treat weak heart and sexual weaknesses such as lack of libido, impotence, and infertility (Lu 2005:282; Lucas 1987:107; Rhoades 1993:92-117; Tierra 1998:114).

Phleum (Timothy). Timothy is a cool-season, perennial bunch grass found in the cool, humid areas of the United States and eastern Canada. Phleum is the most important hay grass in the United States. It commonly is found as an escaped cultivar along roadsides and in fields and waste places throughout the country (Hitchcock 1971a:367-368; Phillips Petroleum Company 1980:57).

Rhus (Sumac, Squawbush, Skunkbush). Rhus (sumac, skunkbush, squawbush) berries are native shrubs or small trees that usually grow in dense stands. R. trilobata (squawbush, skunkbush), R. glabra (smooth sumac), R. typhina (staghorn sumac), and R. integrifolia (lemonadeberry) are western species with small, dry, hairy, red fruits that can be eaten raw or made into lemonade. Berries ripen in September, then dry and remain on the bushes throughout the winter. Berries are high in vitamin C and were used to treat colds, fevers, and scurvy. Sumac is noted to be astringent, antiseptic, and tonic. It is used for diarrhea, dysentery, asthma, urinary infections and irritations, sore throats, gum problems, and cold sores. Species of Rhus are found on dry open sites, dry to mesic slopes, plains, canyons, openings, old fields, fence rows, and along creeks and rivers (Angell 1981; Brill and Dean 1994:115-119)(Harrington 1967:261; Kirk 1975:116; Peterson 1977:186).

Rosaceae (Rose Family). The Rosaceae family consists of thousands of species of trees, shrubs, and herbs. A number of genera provide fruits of economic importance including Malus (apple), Pyrus (pear), Prunus (plum, cherry, apricot, peach, almond), Rubus (blackberry, raspberry), and Fragaria (strawberry). Rosa (rose) is the most widely cultivated genus for ornamental purposes. Roses have been grown in gardens since ancient times, and now there are thousands of varieties (Hickey and King 1981:180). In traditional Chinese medicine, cherries are used to treat rheumatism, arthritis, lumbago, paralysis, numbness, and frostbite. Peach pits promote circulation, dissolve clots, and function as a laxative, emollient, and antitussive. They are effective against high blood pressure and chronic appendicitis. Apricot pits also are antitussive, laxative, and useful for treating asthma and bronchitis. The pits of Chinese plum (Prunus japonica) are diuretic and used to reduce swelling (D. P. Reid 1987:90, 129, 140; Tierra 1998:113).

Fragaria (Strawberry). Fragaria (strawberry) is found naturally in both Eurasia and the Americas, with the American varieties producing larger berries. In the 18th century, a French engineer named Frezier brought some of the large American species back to Europe and began breeding today's modern varieties. Wild strawberries are smaller and more flavorful than the domesticated ones. The leaves and berries are rich in vitamin C, and a leaf tea was used to prevent scurvy and to treat diarrhea. Crushed wild strawberries also once were used to whiten the complexion, remove freckles, and as a treatment for mild sunburn. Wild strawberries are perennial herbs found in meadows, fields, woods, on hillsides, and at forest edges. Strawberries commonly are eaten fresh or are cooked in pies, jams, jellies, and preserves (Angell 1981:20; Kirk 1975:90; McGee 1984:183-184; Ody 1993:60). In

traditional Chinese medicine, strawberries are used to produce fluids, lubricate the lungs, and relieve drunkenness (Lu 2005:81, 83, 97, 282).

Prunus dulcis syn. Prunus amygdalus (Almond). Almonds are noted to be the most popular common nut, although it actually is the seed of a plum-like fruit or drupe and not a true nut. Almonds are a native of western India and were first cultivated in Europe by the Greeks. There are several varieties, including sweet and bitter almonds. Almonds contain 5 percent water, 19 percent protein, 54 percent fat, and 20 percent carbohydrates. Sweet almonds commonly are eaten whole or used in pastries and candies (Hedrick 1972:456-457; McGee 1984:265-266). Almonds are one of the ingredients in the "little green dragon decoction" (hsiao ching lung tang) used to treat chronic asthma and related breathing difficulties caused by allergic reactions. Almonds also are used in the ephedra decoction (ma huang tang) for treating colds and flus (Reid 1995:203, 206-207).

Rubus (Raspberry Group). The Rubus (raspberry) group includes blackberry, cloudberry, dewberry, salmonberry, thimbleberry, wineberry, and yellowberry. All species of Rubus produce edible berries that can be eaten raw or made into cobblers, jams, jellies, and pies. The fruit also can be used in cold drinks, teas, and salads and is easily dried and preserved. The fruit of some species is even used to make a liquor. The dried leaves can be used to make tea, and tender blackberry shoots can be added fresh to salads. Rubus idaeus (raspberry) was noted to be a favorite household remedy. A leaf infusion was used to treat mild diarrhea, as a gargle for mouth ulcers and sore throats, as a wash for bathing varicose ulcers and sores, and as an eyewash. The berries are rich in vitamins and minerals and traditionally have been taken for indigestion and rheumatism. Rubus plants are commonly found in sunny thickets and mountainous areas, especially at higher altitudes (Angell 1981; Hedrick 1972; Medsger 1966; Peterson 1977). In traditional Chinese medicine, a red raspberry leaf tea is a recommended female tonic and restorative. It is used to help prevent miscarriage, relieve the pains of childbirth, and to treat urethral irritation and menstrual difficulties. Unripe berries are used to tonify the kidneys and to treat bed-wetting, urinal incontinence, sexual impotence, and premature ejaculation (Lucas 1987:137-143; D. P. Reid 1987:157; Reid 1995:168-169).

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. Elderberries are high in vitamins A and C, thiamine, calcium, and niacin, and they contain iron and potassium. The flowers of Sambucus canadensis sometimes are mixed with batter and baked into cakes. The bark 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. Sambucus plants are found in rich, damp soils along stream banks, in roadside ditches, in thickets and open woods, and on mountain slopes where there is adequate moisture (Angell 1981; Angier 1978:113-117; Kirk 1975; Krochmal and Krochmal 1973:198-199; Medsger 1966; Peterson 1977:172).

Sapindaceae (Soapberry Family). The Sapindaceae (soapberry family) contains trees, shrubs, or woody vines with tendrils and are found primarily in the tropics and sub-tropics. Plants in the Sapindaceae are especially abundant in Asia and America. The major economic plants in this family are Blighia sapida (ackee), Litchi chinensis (lychee, litchi), Dimocarpus longan syn. Euphoria longan (longan), Melicoccus bijugatus (genip, Spanish lime, mamoncillo), and Nephelium (rambutan). These species are cultivated for their fruits. Caffeine-rich beverages and herbal medicines are made from the seeds of Paulliinia cupuna (guarana). Many plants are grown as ornamentals including Cardiospermum (balloon vine), Dodonaea (hopbush), Koulreuteria (golden-rain tree), Sapindus (soapberry), and Xanthoceras (yellowhorn, Chinese flowering chestnut) (Zomlefer 1994:153-160).

Longan (Dimocarpus longan syn. Euphoria longan) is native to southern China. The fruits are globose, measuring one-half to one inch in diameter, with a thin, brittle rind; a whitish, mucilaginous, translucent flesh; and a large black seed. The fruits usually are eaten fresh. Longans are noted to be less important than lychees to the Chinese

as an edible fruit but more widely used medicinally. Dried fruits have cardiotonic, sedative, tonic to blood, and digestive effects. Seeds are dried, ground into a powder, and applied to abscesses, sores, and wounds (Morton 1987b:259-262; D. P. Reid 1987:151). Lychee (Litchi chinensis) also is native to southern China, especially along rivers and near the coast, where they have been cultivated for at least 2,000 years. Cultivation has spread to many other parts of the world. The fruit is a white berry (drupe) with a rough, leathery, spiky, red or pink outer skin. The pulp is sweet, high in vitamin C, and is eaten raw, preserved, or canned. In Asia, lychees are a common dessert fruit. The dried, raisin-like pulp (called litchi nuts) also are eaten for their smoky flavor. The outer skin and the central, glossy, brown, nut-like seed are noted to be inedible (Kiple and Ornelas 2000:1802-1803)Morton, 1987 #7213:249-259}. Karp (1997) notes that lychees have "long been important in the life of the Chinese people." Rambutans (Nephelium lappaceum) are native to Malaysia and commonly are cultivated throughout the archipelago and southeast Asia. The fruit is ovoid or ellipsoid and either pinkish-red, bright-or deep-red, orange-red, maroon or dark-purple, yellowish-red, all yellow, or orange-yellow in color. The fruits measure one and one-third to three and one-eighths inch long and have a thin, leathery rind covered in tubercles with a soft, fleshy, red, pinkish, or yellow spine one-fifth to three-fourths inch long. The white or rose-tinted, translucent, juicy flesh contains a single seed. Fruits most often are peeled and eaten fresh, although peeled fruits occasionally are stewed as a dessert or canned in syrup. In the Philippines, seeds are sometimes roasted and eaten (Morton 1987b:262-265).

Solanaceae (Potato Family). The Solanaceae (potato family) consists of herbs, shrubs, vines, or small trees found in tropical and temperate regions. This family contains 90 genera and 2,300 species of both edible foods and weedy plants. Food plants include Solanum lycopersicum syn. Lycopersicon esculentum (tomato), Solanum tuberosum (potato), Capsicum annuum (sweet pepper), Capsicum frutescens (cayenne pepper), Physalis ixocarpa (tomatillo, groundcherry), and Solanum melongena (eggplant, aubergine). Tobacco (Nicotiana) also is a member of this family. Many members provide drugs used in medicine such as Atropa belladonna (deadly nightshade), Hyscyamus niger (henbane), Datura stramonium (jimsonweed), and Scopolia carniolica (Russian belladonna). Ornamental plants include Physalis alkekengi (Chinese lantern) and Nicandra physalodes or Physalodes physalodes (apple-of-Peru), as well as popular annuals like Petunia (petunia), Salpiglossis (painted tongue), Schizanthus (buttterfly flower, poor man's orchid), and Browallia (amethyst flower, bush violet). Datura stramonium, species of Physalis (ground cherry), and species of Solanum (nightshade) are common weedy plants (Britton, 1970 #4103:154; Hickey, 1981 #224:330; Muenscher, 1987 #6283:383-391}.

Physalis (Ground Cherry, Tomatillo). There are about 100 species of wild Physalis (ground cherry), with P. ixocarpa (tomatillo) and P. pruninosa (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).

Solanum lycopersicum (Tomato). 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). Tomatoes are used in Chinese medicine to promote energy circulation (Lu 2005:282).

Solanum melongena (Eggplant, Aubergine). Solanum melongena (eggplant) is a perennial plant that is grown as an annual. It has large, hairy, grayish-green leaves and long, slender or round, egg-shaped fruits that can be creamy white, yellow, brown, purple, black, or variegated, depending on the variety. The eggplant is a native of India, and the earliest records of eggplant cultivation are from China during the fifth century B.C. Many varieties now exist. Typical home garden varieties produce rounded fruits with shiny, dark purple skins while Oriental varieties have slender, elongated fruits and dull purple skins. Eggplants often are eaten fried or cooked. In Chinese herbalogy, eggplant acts on the spleen (Ambler, et al. 1994:544; Hedrick 1972:541-543; McGee 1984:201; Phillips and Rix 1993:161-163). Eggplant has been used in traditional Chinese medicine to treat coronary heart disease. It also acts on the spleen and stomach (Lu 2005:97-98, 281).

Sorbus (Mountain Ash, Dogberry). Species of Sorbus (mountain ash, dogberry) are deciduous shrubs or trees and include both native and introduced European species. Some species of Sorbus are cultivated as fruit trees. The astringent, orange to bright red, pea-sized berries can be eaten raw, dried, or cooked into pies, compotes, jellies, and jams. A syrup can be made by extracting the juice and cooking it with sugar or honey. Sorbus berries contain vitamins A and C, sugars, pectin, malic acid, and tannin. Fruits of S. aucuparia (European rowan) have been fermented and distilled into wine. The berries were used medicinally as an antiscorbutic and to treat parasitic worms, while the bark was used to make a tea or tonic for treating colds, malarial fevers, nausea, biliousness, piles, urinary difficulty, indigestion, gall bladder ailments, and angina. The bark also yields a gray dye for wool, when used without a mordant. Some species are cultivated as ornamentals and are widely used in landscaping. Native species of North America are found in moist to wet habitats, or rocky hillsides, often in mountainous areas (Angell 1981:82) Angier, 1978 #13:111-113; Couplan, 1998 #4098; Foster, 1990 #4104:276; Hickman, 1993 #571:976; Kirk, 1975 #276:97; Millspaugh, 1974 #347:220-221}.

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 (common grape vine). American jelly, grape juice, and northeastern wines are made from Concord grapes, a variety of the American Vitis labrusca (McGee 1984:187). Many other species of Vitis are native to the United States and produce edible fruit which can be purple, blue, black, or amber. Wild grapes are often too tart to be eaten raw, but are used in jams, jellies, and juices (Angell 1981:156). Generally, wild grapes need more sweetening than cultivated grapes and contain plenty of pectin before fully ripe (Peterson 1977:198). 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. "In various parts of the world, including the West in pioneer times, grape leaves soaked in water were used as a poultice for wounds" (Kirk 1975:263). Vitis amurensis (amur grape) is an important Asian species named for the Amur Valley in Russia and China. It has been hybridized with Vitis vinifera to produce cultivars resistant to low temperatures (Wikipedia 2008). In traditional Chinese medicine, red grapes are tonifying to energy (qi) and blood, strengthen bones and tendons, promote urination, harmonizes the stomach, and relieve anger and irritability. Grapes are used to treat blood and qi deficiency, coughs, palpitations, night sweats, rheumatism, difficult urination, constipation, and edema. V. serianaefolia is used in a poultice for treating internal injuries, especially sprained joints, pulled muscles, twisted tendons, and inflamed nerves (Lu 2005:72, 281; Reid 1995:263-26)(Tierra 1998:116).

Ziziphus zizyphus (Common jujube, Chinese date). Ziziphus zizyphus (common jujube, Chinese date) is a spiny, deciduous, perennial shrub of the Rhamnaceae family native to China. The fruits are rich in vitamin C and are eaten fresh or dried. Fruits also are baked, boiled, stewed, or made into syrup. Jujube fruits often were cooked with millet or rice to make a sweet porridge in traditional Chinese households and used to flavor rice cakes. They are noted to be a natural complement to ginseng. Medicinally, the jujube is one of the most widely employed herbs in the Chinese pharmacopeia. It is recommended for insomnia, neurasthenia, liver problems, heart palpitations, cold sweats, coughs, and sore throats. Long-term use is reported to improve the complexion and cure skin infections. It is a blood and energy (qi) tonic, but also has an emotionally calming effect. The Chinese also believe that jujube will kill internal parasites and worms. Ziziphus shrubs were introduced to the United States in 1837 and are now cultivated in the Southwest where they thrive in the hot, dry climate. In California,

they are found in the central to southern parts of the state (Kiple and Ornelas 2000:1187,1794; D. P. Reid 1987:121; Reid 1995:78-80; USDA Natural Resources Conservation Service 2011).

B.1.2 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 typically are not eaten, although many of these plants are edible and can have medicinal properties.

Adenostoma (Chamise, Red shank). Species of Adenostoma found in California include A. fasciculatum (chamise) and A. sparsifolium (red shank). Adenostoma is found in the western half of California from San Diego to Humboldt counties on dry slopes, ridges, flats, and in chaparral (Hickman 1993:946; Mead 1972:4; Moerman 1998:49; USDA Natural Resources Conservation Service 2011).

Calandrinia (Calandrinia, Redmaids). Calandrinia (calandrinia, redmaids) are fleshy, annual herbs with small, brilliant reddish-pink or deep purplish-pink flowers. The leaves are edible and can be eaten as potherbs or in salads. Calandrinia plants can be common in sandy, loamy, or silty soil, as well as in grassy areas, cultivated fields, and disturbed areas (Hickman 1993:895-896)(Kirk 1975:193; Parsons 1966:218; Spellenberg 1979:680).

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 can 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).

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 that provide edible greens and pseudo-grains. Other species of Chenopodium and Salsola (Russian thistle) are common weedy plants. Genera that are grown as ornamentals include species of Amaranthus, Atriplex (saltbush), some species of Chenopodium, Kochia (summer-cypress), and Salicornia (glasswort) (Hickey and King 1981:82; Zomlefer 1994:65).

Chenopodium (Goosefoot, Lamb's-quarters). Chenopodium (goosefoot) is primarily an annual weed, often flowering in the late summer and autumn. The tiny flowers grow in clusters and can produce tens of thousands of seeds per plant. 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). Chenopodium commonly is found in cultivated fields, waste places, in open woods or thickets, and on stony hills (Fernald 1950:592-596; Martin 1972). Chenopodium is an opportunistic weed, often establishing itself rapidly in disturbed areas.

Cleome (Spiderflower, Beeweed). Cleome (spiderflower, beeweed) is a shrubby, branching, annual plant that grows in disturbed areas. In the fall, the plants are topped with open, fluffy clusters of pink, white, or lavender flowers with very long, protruding stamens. Plants can grow up to 4-6 feet tall and 4-5 feet wide. Native groups in the American Southwest utilized Cleome as food, pottery paint, and to yield a yellow-green dye. Cleome is found

in prairies and waste places, often on sandy ground, from Kansas west to the Pacific (Ambler, et al. 1994:150; Bryan and Young 1978:23; Editors of Sunset Magazine and Sunset Books 1967:234; Harrington 1967:72; Stevenson 1915:69, 82).

Convolvulaceae (Morning Glory Family). The Convolvulaceae (morning glory) family consists of about 55 genera of herbs, vines, shrubs, or small trees. The most important food plant is Ipomoea batatas (sweet potato). The blue, purple, pink, or white-flowered vines of Ipomoea (morning glory) are commonly seen growing on trellises and fences. Morning glories are found in fields, gardens, and waste places, especially on alluvial soils (Martin 1972:93; Muenscher 1987:352-353). Other plants grown as ornamentals include Convolvulus tricolor (dwarf morning glory), Convolvulus cneorum (bush morning glory), Calonyction aculeatum (moonflower), Calystegia (hedge bindweed), Dichondra, Porana (Christmas vine), Quamoclit coccinea (star glory), Quamoclit lobata (sternwinde, morning glory), and Stylisma (dawnflower). This family also contains several weedy plants, such as Convolvulus (bindweed) and Cuscuta (dodder) (Hickey and King 1981:334; Zomlefer 1994:215-217). Convolvulus arvensis is a European introduction that has become common in lawns, fields, waste places, and on roadsides. This creeping perennial has an extensive deep root system and brittle rhizomes that make it very difficult to eradicate (Agricultural Research Service of the United States Department of Agriculture 1971:290-293; Muenscher 1987:344-346).

Cuscuta (Dodder). Cuscuta (dodder) is an annual, leafless vine that is parasitic on various herbs and some shrubs and trees, depending on the species. Many are parasitic on members of the Fabaceae (legume family), especially alfalfa (Medicago sativa) and clover (Trifolium). Some species are native, while others have been introduced from Europe and South America. The various species can be found throughout the United States (Martin 1972:95; Muenscher 1987:346-352). The seeds are astringent, and in traditional Chinese medicine, Cuscuta japonica (tu si zi) seeds are popular ingredients in longevity formulas and sexual tonics to treat impotence and premature ejaculation. Cuscuta also is used to improve vision, strengthen the urinary tract, tonify the kidneys, and strengthen bone and sinew (Reid 1995:103-104).

Cyperaceae (Sedge Family). Members of the Cyperaceae (sedge) family are perennial or annual, grass-like herbs with creeping rhizomes and triangular stems. They grow in damp to marshy habitats, although some are adapted to drier habitats. Carex is a sedge that persists as a weed in grasslands and on recently-drained areas. Some species are used as ornamental plants for pools (Muenscher 1987; Zomlefer 1994:347). Cyperus rotundus (nut-grass) is a perennial sedge that often is noted to be a troublesome weed. It frequently grows in cultivated ground and along bottomlands. Cyperus esculentus (yellow nut-grass) also can be a troublesome weed in cultivated ground and also grows in sandy soil. Cyperus strigosus is perennial and grows in meadows, damp thickets, bogs, and marshes, as well as along wet shores (Fernald 1950:244-245). Dulichium arundinaceum (three-way sedge) is a perennial herb of North American origin, found at the margins of pools or streams or in open wet places such as marshes and swamps from Newfoundland to British Columbia and south to Florida, Texas, and California (Fernald 1950:248). Eleocharis (spikerush) has mainly leafless stems and seed clusters arising in a clump from a matted rootstalk. Spikerushes are found growing in marshes and along shores, and E. palustris (common spikerush) is a common weed of rice fields. The tuber of E. dulcis syn. E. tuberosa (Chinese water chestnut) is universally used as food. It is in greatest demand and largely cultivated all over China (Hedrick 1972:251-252; Muenscher 1987:46-47; G. K. Reid 1987:55). Species of Carex, Cyperus, and Eleocharis are grown as ornamental plants for pools (Zomlefer 1994:347). Fimbristylis (fimbry) are annual or perennial sedges with triangular stems and a flat leaf blade. Species of Fimbristylis are found in wet areas and sandy or barren soils of the eastern United States and southeastern Canada (Fernald 1950:260-262; Hickey and King 1981:448; Zomlefer 1994:347). Scirpus-type (bulrush, tule) plants are annual or 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; however, many of the species once assigned to this genus have been reassigned to the new genera, and the Scirpus genus now holds an estimated 120 species. In general, bulrushes have cylindrical, bullwhip-like stems, while threesquares have triangular stalks. 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; Martin 1972:31; Muenscher 1987:151).

Datura stramonium (Jimsonweed). Datura stramonium (jimsonweed) is a large, freely branching annual herb with stout stems and foul-smelling herbage growing three to five feet in height. The leaves are large and oval, four to six inches long, and with wavy margins. The plant flowers nearly all summer with large, white, trumpet-shaped, fragrant flowers. All parts of the plant are noted to be toxic, particularly the seeds and leaves, due to the presence of the alkaloids hyoscyamine, atropine, and scopolamine. Jimsonweed has been naturalized throughout North America and is a familiar weed in the United States found in cultivated areas, especially in barnyards, timber-yards, docks, and waste places, "frequenting dung-heaps, the roadsides and commons, and other places where a rank soil is created by the deposited refuse of towns and villages" (Grieve 1982b:802). The plant also has been cultivated and used in medicine for its narcotic, anti-spasmodic, and analgesic properties. Plants have been ingested for their hallucinogenic effects; however, other side effects can include dry mouth, redness of skin, disturbed vision, pupil dilation, nausea, vomiting, headache, excitement, rapid pulse, delirium, incoherent speech, apparent insanity, convulsions, elevated temperature, high blood pressure, coma, and even death (Grieve 1982b:802-807; Potterton 1983:191; Schmutz and Hamilton 1979:59).

Erodium (Filaree, Storksbill). Erodium (filaree, storksbill, heronbill, alfilaria) are annual or biennial plants that are often important forage for livestock on open range. Six species are native to the United States. Young plants can be used in salads or cooked as potherbs. E. cicutarium is an European introduction that has become widespread across North America. Erodium plants are found on dry soil in fields, pastures, lawns, and waste places (Kirk 1975:29; Martin 1972:74; Muenscher 1987:292-294).

Euphorbia (Spurge). Euphorbia (spurge) are typically considered to be common, poisonous weedy plants. They occur as annual or perennial herbs, and many species have an acrid milky sap that will irritate the skin and membranes of the eyes and mouth. Although most species are considered bothersome weeds, some species have been used in a variety of ways. Spurge has been used to treat snake bites, asthma, and bronchial congestion. The juice of E. marginata (snow-on-the-mountain) has been used in Texas to brand cattle. Other species, such as E. pulcherina (poinsettia), are grown as ornamentals. Euphorbia is found throughout the United States along roadsides and in fields, meadows, pastures, waste places, gardens, and yards (Kirk 1975:32; Muenscher 1987:298-305; Niering and Olmstead 1979).

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. In Chinese medicine, Juncus is known as deng xin cao. It is diuretic, and the soft, sponge-like center of the plant (pith) has been used to treat dysuria, other urinary conditions, and edema. Charred Juncus is used as a sedative to promote sleep and reduce insomnia (Chen and Chen 2004:399-400; Fernald 1950:397-416; G. K. Reid 1987:55; Salzman and Salzman 1992).

Malvaceae (Mallow Family). Native members of the Malvaceae (mallow family) found in California include Abutilon (Indian mallow), Eremalche (Malvastrum), Hibiscus (rose-mallow, hibiscus), Horsfordia, Malacothamnus (bush mallow), Malvella leprosa (alkali-mallow), Sidalcea (checker mallow, checkerbloom), and Sphaeralcea (globemallow), while introduced members of the family include Alcea rosea (hollyhock), Anoda cristata (violettas), Lavatera (tree-mallow), Malva (mallow), and Sida rhombifolia (Hickman 1993:746-762).

Malva (Mallow, Cheeseweed). Malva (mallow, cheeseweed) are biennial or annual weeds that were introduced from Europe and Asia 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, waste places, lawns, farmyards, and gardens (Britton and Brown 1970b:514-516; Kirk 1975:27; Martin 1972:83; Muenscher 1987:311-313; Peterson 1977:108).

Onagraceae (Evening Primrose Family). The Onagraceae (evening primrose or willow herb family) are annual, biennial, or perennial herbs, with only a few shrubs or trees. This family consists of 21 genera and 640 species in

temperate and tropical regions. Fuchsia (lady's-eardrops) is a shrubby plant with scarlet and purple flowers that is popular as a hedge or pot plant. Oenothera (evening primrose), Gaura, and Clarkia (clarkia, farewell-to-spring, godetia) are herbaceous plants often grown in gardens. Common weedy members of this family include Epilobium (fireweed, willow herb), Gaura (gaura), and Oenothera biennis (common evening primrose) (Britton and Brown 1970b:584; Hickey and King 1981:222; Muenscher 1987:319-321).

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. Fresh and stewed Opuntia fruits have even been seen in New York markets (Medsger 1966:61). The young stems or pads can be peeled and eaten raw, or prepared like green beans. Peeled stems also can be used as a dressing on wounds. The seeds can be eaten in soups, or dried, parched, and ground into a meal to be used in gruel or cakes. Cactus plants are found growing wild all over the southwest United States on arid, rocky, or sandy soils. They are occasionally found growing east to New York and Massachusetts, and west to British Columbia and Washington (Harrington 1964:382-384; Kavasch 1979:61; Kirk 1975:50-52; Medsger 1966:61; Muenscher 1987:317).

Papaveraceae (Poppy Family). The Papaveraceae (poppy family) includes mostly annual or perennial herbs, some vines, and occasional shrubs or trees. Plants in this family have an acrid sap containing various alkaloids. These alkaloids have been used for drugs (opium, morphine, heroin, and codeine). Many of the genera in this family have showy, conspicuous flowers and are popular ornamental plants, such as Argemone (argemony, pricklypoppy), Corydalis, Dendromecon (tree poppy), Dicentra (bleeding heart, dutchman's breeches), Eschscholzia (California poppy), Hunnemannia (Mexican tulip poppy), Macleaya (plune poppy), and Meconopsis (Asiatic poppy) (Hickey and King 1981:48; Zomlefer 1994:45-49). Papaver somniferum (common poppy, opium poppy) is a native of the Mediterranean region that has been cultivated for the drug opium and for its seeds. The small, kidney-shaped seeds are used mostly to season breads and sweets. An oil extracted from the seeds can be used as a substitute for olive oil, as well as in the manufacture of paints, varnishes, and soaps. Poppies are commercially cultivated for their seeds in northern France, southern Germany, and Holland (Hedrick 1972:407; Hickey and King 1981:48; McGee 1984:213). The dried empty seed capsules of Papaver somniferum (ying su ke) are used in Chinese medicine to treat chronic cough, chronic diarrhea and dysentery, stomach ache, prolapse of the rectum, stomach ache, and opium withdrawal (D. P. Reid 1987:156).

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).

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).

Polygonum (Smartweed, Knotweed). Polygonum (smartweed, knotweed) is a large genus of annual or perennial plants. Knotweeds are characterized by the angular joints of their stems that look like knots tied in the stem at the base of each alternate leaf. Smartweeds contain an acrid juice that causes smarting. The peppery leaves of certain species can be eaten raw in salads or cooked like spinach. Polygonum can become troublesome weeds but are important foods for song birds, gamebirds, and waterfowl. Polygonum aviculare (common knotweed) includes varieties that are native to both North America and Eurasia. The introduced plants have become

widespread across the United States. Polygonum species can be found in moist soils in pastures and cultivated fields, in disturbed areas, wet mountain meadows, dry meadows, open places, sagebrush plains, rocky areas, along ditches, shallow lakes, streams, shores, and on trampled ground about yards, paths, roadsides and waste places (Harrington 1964:198; Hickman 1993:886-891; Kirk 1975:56; Martin 1972:40-42; Muenscher 1987:164-166). In traditional Chinese medicine, the seeds of Polygonum multiflorum (tuber fleeceflower, he shou wu) and black sesame are ground together and mixed with honey, which is eaten with rice porridge for premature balding or gray hair. Polygonum stem is used in formulas, often with jujube (Ziziphus zizyphus) that calm the spirit, steady the mind, and promote sound sleep. Roots, stems, and leaves are used to tonify the liver and kidneys and to treat constipation due to dry intestines, swelling of lymph glands, abscesses, and ulcers (D. P. Reid 1987:150; Tierra 1998:103).

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. Purslane is used medicinally to treat dysentery, boils and sores, eczema, hemorrhoidal bleeding, and abnormal uterine bleeding. The plant is used in traditional Chinese medicine (ma chi xian) to stop bleeding and to remove toxic heat and substances. The Chinese also eat it as a vegetable. 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. P. grandiflora (rose moss) is planted as an ornamental. Portulaca is found in gardens, cultivated fields, lawns, and waste places, mostly on rich soils (Kirk 1975:46; Martin 1972:52; Muenscher 1987; Peterson 1977:72; D. P. Reid 1987:102; Reid 1995).

Rhamnaceae (Buckthorn Family). Members of the Rhamnaceae (buckthorn family) include trees, shrubs, or vines which can have thorns or spines. Species of Rhamnus (buckthorn) provide medicinal resources, as well as green and yellow dyes. Ziziphus zizyphus (lotebush, lotus, Chinese date, jujube) produces edible fruits. Many members of this family are ornamental plants such as Berchemia (rattan vine, supplejack), Ceanothus (California lilac, redroot), Colletia (rosea), Hovenia (hovenia, Japanese raisintree), Paliurus (Jerusalem-thorn), and Rhamnus. The small, inconspicuous flowers often are fragrant and produce much nectar, making them important honey plants. The Rhamnaceae are widespread in temperate to tropical regions (Zomlefer 1994:105-107).

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. 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 (Grieve 1982a:258-260; 1982b:752-754; Hedrick 1972:892-895; Kirk 1975:53-54; Martin 1972:38-39; Muenscher 1987:172-180).

Tribulus terrestris (Caltrop, Puncture Vine). Tribulus terrestris (caltrop, puncture-vine) is a prostrate, annual, 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). In traditional Chinese medicine, Tribulus (ji li zi) tonifies liver energy (qi) and kidney yang. Fruits are used to purify the blood, promote semen production, strengthen bone and sinew, improve vision, facilitate labor, and to treat profuse urination, lumbago, tinnitis, insufficient lactation, anemia, and malnutrition (D. P. Reid 1987:148; Reid 1995:186-187).

Sagittaria (Arrowhead). Species of Sagittaria (arrowhead) are annual and perennial plants found in the shallow water of streams and lake margins. The plants have large, arrow-shaped or ribbon-shaped leaves and edible

tubers borne at the end of long rootstocks. Sagittaria tubers were a popular dietary staple for Native groups, valued to the extent that they were used in trade. The edible tubers have been used by American Indians to make a medicinal tea. The common arrowhead (Sagittaria latifolia) is the most widespread species in North America (Couplan 1998:458; Harrington 1972:29-32; Medsger 1966:169).

Trifolium (Clover). 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. Clovers are high in protein and can be eaten raw, but they are best when boiled or soaked in salt water for several hours. 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 (Kirk 1975:100-101; Martin 1972:67; Niering and Olmstead 1979:540-542; Peterson 1977:56).

Typha (Cattail). Typha (cattail) are perennial marsh or aquatic plants with creeping rhizomes. Typha latifolia (common cattail) and Typha angustifolia (narrow-leaved cattail) are the two most widespread species in the United States. Every part of the cattail is edible, very tasty, and highly nutritious. The young shoots and stalks can be eaten in the spring before the flower forms. The male portions of the immature, green flower head are reported to taste vaguely like corn. The pollen can be gathered in the summer and used like flour. The rhizomes or rootstocks can be collected in the fall, winter, and early spring. These are peeled and the starchy core is crushed to obtain the starch, which can be used like flour. Cattails form dense stands in marshes, swamps, ponds, sloughs, ditches, and shallow stagnant water, and at the edges of streams (Brill and Dean 1994:67-71; Medsger 1966:196; Peterson 1977:158). In China, the leaves of Typha latifolia (xiang pu, pu huang) are used to make mats and fans. Young shoots are gathered in the spring and pickled or eaten steamed. Pollen is mixed with honey and eaten. The pollen is hemostatic, astringent, diuretic, promotes circulation, and dissolves clots. The plant dry-fried with lumps of charcoal also is highly hemostatic (D. P. Reid 1987:134)(Reid 1995:76).

B.2 PARASITE REVIEW

Ascaris lumbricoides (Intestinal Roundworm). Ascaris lumbricoides (intestinal roundworm) is a large parasite and commonly coexists in the intestine with Trichuris trichiura (whipworm) (Beck and Davies 1976:86). The adult female averages 30 centimeters (nearly 12 inches) in length, while the adult male averages 20 centimeters (8 inches) in length. Both are approximately 5 millimeters (nearly 1/4 inch) in diameter. Eggs produced by the female may be either fertile or infertile. The fertile eggs are rounder in shape than are the infertile eggs. Both types were noted in this study. Infertile eggs might be the result of faulty fertilization, egg laying prior to fertilization, or absence of males. An adult female intestinal roundworm can produce 200,000 eggs per day. These eggs are passed with the feces and thus can be introduced into soils.

Larvae appear within the eggs usually within three weeks if conditions are ideal. Hatching takes place only after ingestion of the eggs. Eggs hatch in the small intestine where they burrow into the intestine wall and enter the circulatory system. The small worms migrate to the heart and lungs, usually within seven days after infection. While in the lungs, the roundworms grow considerably in size and then are not able to pass back across the capillary walls. Instead, they migrate along the bronchial tree and trachea to the pharynx, where they are swallowed. Gravid females are noted in the intestine between five and eight weeks after initial infection. Both male and female roundworms have relatively short life cycles, surviving only a year, at most, before being passed from the intestinal tract. The eggs, which have heavy shell layers, are resistant to environmental changes within the soil. Both heat and desiccation, however, will kill roundworm ova. Careless defecation habits spread viable eggs to local soils, which can remain infective for five years. Children playing in areas of contaminated soil usually become infected through contact of invariably dirty hands with the mouth. If night soil is used as fertilizer, infections can be contracted through eating raw vegetables. Transmission through water can be caused by improper drainage of surface waters, thus polluting wells and local water sources, such as rivers. Use of privies or

indoor toilets, as opposed to promiscuous defecation close to the home, are important in preventing infections (Beck and Davies 1976:87-90).

Symptoms accompanying Ascaris (intestinal roundworm) infection include fever and cough, occasional bloody sputum, and pneumonitis, particularly with a heavy infection and during the stages when the larvae migrate from the intestinal tract into the lungs or through the lungs. The condition can be referred to as Ascaris pneumonia. No eggs are present in the stool at this point, since the worms are immature and have not yet reached the intestinal tract. Most symptoms are associated with the presence of the adult worms in the intestinal tract. Protein malnutrition can result from a heavy worm burden, particularly in growing children, if the diet is poor. Occasionally, worms can group and ball up, causing intestinal obstruction, again usually in children. Because roundworms have an affinity for small orifices, they can migrate into the common bile duct or pancreatic duct, or block the airway if they migrate into the larynx or trachea. Death can be caused by Ascaris infestation through severe pulmonary invasion or an unrecognized migration of worms that result in asphyxia or obstruction of an essential organ (Beck and Davies 1976:87-90).

Trichuris trichiura (Whipworm). Trichuris trichiura (whipworm) resembles a buggy whip and can average 40 millimeters (nearly 16 inches) in length for the female. Trichuris eggs have thinner walls than do Ascaris eggs. Unlike Ascaris (roundworm), which lives free and unattached in the small intestine, whipworm lives primarily in the cecum, where it attaches itself to the intestinal wall. In heavy infestations, however, they can be found along the entire colon including the rectum. Whipworms are longer lived than roundworms, living for several years and producing eggs for discharge in the feces. The eggs develop into an infective larval stage within the eggshell in three to six weeks. Adverse conditions can delay development for several months or even years. Once the embryos are ingested, the larvae hatch in the jejunum, penetrating the intestinal villus, where it will develop for three to ten days. The adolescent worm moves into the cecum, where it develops into an adult. Ninety days are required between ingestion and production of a gravid female (Beck and Davies 1976:84-86).

Infections are common in areas of high humidity and hard clay soils, which hold moisture. Dense shade and warm climate are both necessities. Infection usually is heaviest among children, since hand to mouth contact in areas of soil pollution is a common vector in spreading these parasites. Whipworm eggs are less resistant to environmental changes, so infection can be more spotty than with Ascaris (roundworm), with which it often co-occurs (Beck and Davies 1976:84-86).

Light infestations with whipworm usually produce no symptoms. Abdominal pain sometimes mimicking appendicitis, vomiting, constipation, fever, distension and flatulence, headache, backache, anorexia, and weight loss all have been associated with infestation by this parasite. If the infection is heavy, bloody diarrhea and emaciation can result. Prolapse of the rectum also can occur with heavy worm burdens. Fatalities are rare even in malnourished and neglected children. Whipworm is more difficult to treat than roundworm, since the worms are embedded in the intestine (Beck and Davies 1976:84-86; Boon and Hoh 1961).