UCB Paleoethnobotany Lab Report #63 (INCOMPLETE—pending context info)
Analysis of Macrobotanical Remains from Cerro Palenque, Site CR-157

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Introduction:

This report summarizes the results of the macrobotanical analysis of flotation samples recovered from excavation at the archaeological site CR-157, Cerro Palenque, Honduras. The samples analyzed include several taken from various loci during excavations carried out during the 1998 and 2002 field seasons. Bulk sediment samples were recovered from the excavation units and floated during the 2002 field season. The floated ("Light Fraction") materials were sorted at the University of California at Berkeley Paleoethnobotany Lab. Unfortunately, few taxa were recovered in the sorting process, and many of these could not be identified, due to the generally poor preservation of the macrobotanical materials. Botanical materials were classified into general categories of Wood, Lumps (mostly parenchymous tissue), Seeds, Other, and Unidentifiable. Taxa in the *Arecaceae, Asteraceae, Boraginaceae, Cactaceae, Chenopodiaceae, Poaceae, Fabaceae, Solanaceae,* and *Cyperaceae* families were tentatively identified at the family, genus, or species level. The counts and weights of the suite of recovered botanical materials are here analyzed in relation to their various loci.

The following pages summarize the field methods, laboratory methods, results, and conclusions of the paleoethnobotanical analysis.

Methods:

Field methods:

Excavations at each locus proceeded according to the standard methodology employed by the Cerro Palenque Project, and were conducted under the direction of Professor Julia Hendon and Kira Blaisdell-Sloan. Sediment samples were taken from each excavated locus and bagged. The volume of each of these sediment samples varied from 4.0 to 6.0 liters.

After excavations, the bulk sediment samples were floated in a modified SMAP machine during the 2002 field season, under the direction of **Kirsten Triplett?**. In the course of this process, each sample was divided into Light and Heavy Fractions. A Flotation Log was maintained for this procedure. After flotation, each sample was thoroughly dried, then labeled and inserted into a plastic bag. The bags were labeled with provenance information and the contents (Heavy Fraction or Light Fraction).

The Light and Heavy Fractions were eventually removed to the University of California at Berkeley Paleoethnobotany Lab. Only the Light Fraction has been analyzed at this time.

Laboratory methods:

Once in the laboratory, the Light Fraction samples were weighed. The samples varied in weight from 1.29 to 15.46 grams. Each of the nine Light Fraction samples was then assigned a flotation and sort number, in each case as a single Site-Flotation Number string. The Light Fraction samples (hereafter simply referred to as the "samples") were divided with the use of brass geological screens into four particle sizes: >2mm, 1-2 mm, 0.5-1 mm, and <0.5 mm. This partitioning of the samples allowed for faster sorting, through the need for only a single magnification setting for the entirety of a fraction.

The samples were sorted under a low-power boom-mounted stereo microscope with a fiber optic illuminator. Only charred botanical remains were considered to be archaeological, and these carbonized materials were removed and classified as Wood, Lumps (mostly parenchymous tissue), Seeds, or Other. Wood fragments smaller than 2.0 mm at largest dimension were not removed, and Lumps smaller than 1.0 mm at largest dimension, and without visible surfaces, were not removed, as fragments of materials smaller than these sizes are virtually impossible to identify even by specialists. Non-archaeological or botanical materials such as snails, bone, modern macrobotanical materials, ceramic, shell, other non-botanical charred materials, and other miscellaneous materials were not removed. All materials, however, were recorded as present or absent in each fraction size on the sorting form. Recorded as well were comments regarding the condition and contents of the sample as a whole.

Once removed, the carbonized materials were further divided into similar subclasses, where possible. Wood and Lumps were counted and weighed, and seeds and other materials were identified to the smallest possible subset. All of the recovered carbonized materials were counted, weighed, and recorded on the identification form, along with comments specific to the class or sub-class. Each class of carbonized materials was then placed in a gelcap containing a label with the class and sample number, and the combined gelcaps were placed in a larger clear plastic box. All of the remaining non-carbonized sorted materials were placed in plastic bags containing provenance information. The sorted samples were then stored in a larger cardboard box with visibly marked provenance information.

The data from the flotation, sorting, and recording forms were transferred to an Access database spreadsheet. The information from this database was then imported into Excel, for ease of analysis and visual presentation.

Results:

The sediment samples contained seeds, wood, "lumps", and various other non-botanical remains. Recovery rates of seeds were fairly meager, overall, although a fair amount of wood emerged in the sorting process. The identification of various taxa proved difficult due to the poor preservation of the materials and in many cases the lack of identifiable morphology or surface features. However, taxa in the *Arecaceae, Asteraceae, Boraginaceae, Cactaceae, Chenopodiaceae, Poaceae, Fabaceae, Solanaceae,* and *Cyperaceae* families were tentatively identified to the family, genus, or species level. Chart 1 visually details the total numbers of recovered items, Chart 2 details the total number of each taxon recovered, and Chart 3 details the seed taxa recovered at each locus.

All of the surviving botanical materials appear to have been charred at medium-high temperatures in dry contexts, as they are uniformly carbonized with fairly clear morphology where the surfaces have not been distorted. Very few carbonized remains were rendered completely unidentifiable due to mechanical or biochemical processes after carbonization, which would have distorted surface features and eroded distinguishing morphological characteristics.

Chart 4 visually details the total item recovery rates by locus, and Chart 5 compares the loci by recovery rates. The recovery rates of carbonized materials appeared to vary less by the volume of soil recovered and more by the corresponding locus context. The loci with the greatest initial sample volumes (41-E-10, 42-E-07, and 41-Q-09) and the smallest initial sample volumes (41-K-05 and 41-Q-11) did have recovery rates that corresponded relative to the initial volume of soil floated. Similarly, the rest of the loci, all of mid-range volume (between 4.5 and 5.0 L) had recovery rates in the middle range. However, the recovery rates were vastly disproportionate (from 3 to 163 items per Liter), considering the small (2 L) difference between the greatest and smallest initial sample volumes. For this reason, it is apparent that the recovery rates of archaeobotanical materials did not correspond with pre-floated volume alone.

Recovery rates calculated by weight of the floated sample further support a hypothesis that other factors more directly affected the rate of recovery in each level. The lowest recovery rate (3 items per gram) was from loci 41-K-02, which had the highest total sample weight (15.46 g). The highest recovery rates (162 and 108 items per gram) were from loci 41-E-10 and 42-E-07, which had mid-range total sample weights (2.10 g and 3.73 g). The samples with the lowest initial weights (41-S-04, 41-K-06, and 41-Q-11) had mid-range recovery rates (between 10 and 21 items per gram). In short, it is likely that the rate of recovery at each location had more to do with varying densities of the actual cultural deposits, rather than the pre-flotation volume or post-flotation weight of the sample.

Wood was 100% ubiquitous, and wood fragments were the most commonly recovered items at every locus. There were 858 wood fragments recovered from the combined loci (80% of the total recovery), with a combined weight of 2.74 g. Seeds were the second most commonly-recovered item, and were 89% ubiquitous across the site. 189 seeds were recovered in total (18% of the total recovery), for a combined weight of 7.62 g. The recovery rates of wood and lumps did not covary, except at locus 41-E-10, where high numbers of both of these classes were recovered. Lumps numbered 13 total (1% of the total recovery), and were only 50% ubiquitous. Other carbonized remains (1% of the total recovery) were extracted, but were identifiable only as charred botanical materials due to the poor preservation of their surfaces and morphology. Charts 6 and 7 visually detail the weight and counts of archaeobotanical classes by locus. Chart 8 details the total percentage of wood, lumps, seeds, and other charred botanical items recovered, as a percentage of the combined archaeobotanical assemblage.

Analysis:

Taxa information:

What follows is a summary of the archaeobotanical taxa recovered, their corresponding family with typical representatives, the known uses for the smallest identified subset, the areas where the taxa are found, the known archaeological recoveries of the taxa, the specific number recovered at Cerro Palenque, select literature where the taxa are referenced, and the type of location from where the taxa were likely obtained. Chart 9 details the seed taxa recovered and the relative contribution of each taxon.

1. *Asteraceae* spp.: unknown genera
Large family of various weedy species. Family of *Helianthus annus* (sunflower).
Found throughout the Americas.
Recorded uses for other species in this family include digestive tranquilizer (*Artemesia sp.*) and edible seed (*Helianthus annus).*
Species from this family have not previously been recorded and/or recovered archaeologically in the Maya area, aside from Rancho Ires. 4 representatives of the *Asteraceae* family were recovered from the Rancho Ires samples, all of the same species. One of the species in the Cerro Palenque samples (labeled "Asteraceae sp. 1") matched this species. The other two species ("Asteraceae sp. 2" and "Asteraceae sp. 3") do not match other recovered species.
Referenced in Lentz 2001 and at the CICY Jardin Botanico.
The *Asteraceae* spp. recovered from Cerro Palenque did not match either of the aforementioned species *(Artemesia, Helianthus)*, nor any *Asteraceae* species currently housed in the UCB reference collection. But as it is a very large family, comprised of thousands of species (with new ones occasionally recorded), this is unsurprising.
Asteraceae species grow in almost every sort of ecological condition.

2. *Attalea cohune*: cohune or *corozo* palm
Arecaceae family.
Found throughout Mexico and Central America.
Recorded uses for *Attalea cohune* include food (edible endosperm and oil extraction), construction (leaves used in thatching), and beverage.
Archaeologically recovered from Actun Nak Beh (endocarps-- Morehart 2002); Wild Cane Cay (seed), Pelican One Pot, and Tiger Mound (seed) (McKillop 1994 &2002); Pulltrouser (seed- Miksicek 1983); and potentially other sites where *Arecaceae* taxa were identified only to the family level. 35 *Attalea cohune* endocarp fragments were recovered from the Cerro Palenque samples.
Referenced in Fouqué, 1972; Henderson et al., 1995; Villachica et al., 1996; Morehart 2002; Lentz 2001; McKillop 1994; Miksicek 1983; McKillop 2002; and Sutherland 1986.
Attalea cohune trees are both a wild species and are commonly grown in house gardens.

3. *Boraginaceae*: unknown genus
Family of *Cordia dodecandra* (*cericote)* and the *Cordia alliodora* (*bojon).*
Found throughout Mexico and Central America.
Recorded uses for *Boraginaceae* species include food, medicine, timber, and apiculture.
Species from this family have not previously been recorded and/or recovered archaeologically in the Maya area. 5 *Boraginaceae* sp. seeds were recovered from a single Cerro Palenque sample. These seeds may match one of the five economically-utilized species, however, none of these species is currently housed in the UCB reference collection.
Species of this family are referenced in Atran 1993; Rico-Gray 1991; and Roys 1965.
Boraginaceae species grow wild in a wide variety of ecological conditions.

4. cf. Chenopodiaceae: unknown genus

Chenopodiaceae or *Amaranthaceae* family. Families of goosefoot and amaranth.
Found throughout Mesoamerica.
Leaves used for condiment, and sometimes used as vermifuge when mixed with a garlic infusion; also used as an edible grain.
The seeds of the *Chenopodiaceae* and *Amaranthaceae* families are almost indistinguishable morphologically.
Archaeologically recovered from Copan (*Chenopodium* sp. seed) and T'isil (seeds).
Only one seed was recovered from the Cerro Palenque samples.
Referenced in Lentz 1991; Lentz 2001 (Chenopodiaceae); Lentz 2001; and Atran 1993 (Amaranthaceae).
Species of both families are found wild throughout Mexico and Central America in a variety of ecological conditions.

5. *Cyperaceae* sp.: unknown genus
Family of *Carex* spp. (sedges).
Found throughout Mesoamerica.
Lentz (1991) notes a possible use of *Scleria* species as bedding or matting.
Seeds of a *Scleria* species were recovered at Copan (Lentz 1991). Three tentatively identified *Carex sp.* seeds were recovered from Rancho Ires samples. Only one seed was recovered from Cerro Palenque samples, though not of either of these genera or any genus currently housed in the UCB reference collection.
Referenced in Lentz 1991.
This is a fairly common family of wild species that generally prefer wetlands.

6. *Eleusine* sp.: goosegrass
Poaceae family.
Found throughout the Americas.
Recorded uses include medicine for dysentery and intestinal disorders.
Species from this genus have not previously been recorded and/or recovered archaeologically in the Maya area. One *Eleusine* sp. seed was recovered from the Cerro Palenque samples. May be *Eleusine indica* (*pasto burro*), recorded in Sutherland (1986).
Referenced in Sutherland 1986.
Species of *Eleusine* are found wild throughout the Americas.

7. *Fabaceae* spp.: unknown genera
Large family of *Phaseolus vulgaris* (domesticated beans) and various woody leguminous species and weedy alfalfa.
Recorded uses for various species of the family include wood, medicine, edible fruit, edible seed, adhesive, and edible root.
Archaeologically recovered from Actun Chapat (legumes), Copan (seed), El Salvador (*Phaseolus sp.);* Copan (charcoal) (*Dalbergia* sp. and *Pterocarpus* sp.); Copan (seed) (*Cassia* sp., *Crotalaria* sp., *Vigna* sp.) and T'isil (UNKN). 4 *Fabaceae* seeds were recovered from the Cerro Palenque samples.
The two *Fabaceae* species recovered from samples at Cerro Palenque are not domesticated species, and did not match any of the aforementioned species, nor any *Fabaceae* species currently housed in reference collection. They appear most similar to

taxa from the subtribe *Papiloinoidae* of the family (i.e. such as alfalfa). This is a very large family, comprised of thousands of species (with new ones occasionally recorded). Various genera are referenced in Atran 1993; Lentz 1991; Lentz 2001, Morehart 2002, Lentz 1989; and Zier 1980.
Species of *Fabaceae* are found wild throughout the Americas in a wide variety of ecological conditions.

8. cf. *Mammillaria sp.:* coyotillo
Cactaceae family.
Found throughout Mesoamerica.
Recorded uses for various species of *Mammillaria* include food (edible fresh and dried fruits).
There is only one previously recorded instance of archaeological recovery of *Mammillaria* in the Maya area-- a fragment recovered from Rancho Ires samples. Only one potential *Mammillaria* seed was recovered from the Cerro Palenque samples. This may perhaps be *Mammillaria ruestii*, the only *Mammillaria* noted in Honduras by Sutherland (1986).
Referenced in Sutherland 1986 and Casas and Barbera 2002.
Economic species of cacti are commonly grown in house gardens. *Mammillaria* spp.are also found wild throughout Mesoamerica.

9. *Nicotiana sp.*: tobacco
Solanaceae family.
Found throughout Mesoamerica.
Recorded uses include smoke, snake repellent, and medicine for ticks and "colmoyote" worm. Noted in the *Ritual of the Bacabs* as medicine for asthma, bites and stings, bowel complaints, chills, fever, seizures, sore eyes, skin diseases, and urinary complaints; also cited in incantations for eruptions, fever, snake in the abdomen, a worm in the tooth, and the placenta.
Only one seed of *Nicotiana* has been previously published in the greater Maya area, also from Honduras (Rachel Cane). One fragment of a *Nicotiana* seed was also recovered from Rancho Ires samples. 4 *Nicotiana* seeds were recovered from the Cerro Palenque samples.
Referenced in Lentz 2001; Carlson (2006 lecture); Cane (unpublished lab report); Atran 1993; Heiser 1992; Goodspeed 1954; Pickersgill 1977; Roys 1965.
Nicotiana taxa are commonly grown in house gardens and orchard areas.

10. *Poaceae* spp.*:* unknown genera
Large family of grasses and grains. Family of *Zea mays* (maize).
Found throughout the Americas.
Paspalum spp. and *Setaria* spp. are other weedy species in this family, recorded as used for matting, bedding, and other purposes.
Archaeologically recovered from everywhere that *Zea mays* has been found, among other species. One *Poaceae* seed was recovered from the Rancho Ires samples which also did not match *Zea mays*. 10 *Poaceae* seeds were recovered from the Cerro Palenque samples.

The *Poaceae* spp. recovered from samples at Cerro Palenque did not match any of the aforementioned species (*Zea, Paspalum, Setaria)*, nor any *Poaceae* species currently housed in the UCB reference collection. But as *Poaceae* is a very large family, comprised of thousands of species (with new ones occasionally recorded), this is unsurprising.
Poaceae species grow in almost every sort of ecological condition.

11. UNKN seeds: various unknown species
These appear to be predominantly weedy non-domesticate species. They may have been used in everything from medicine to animal fodder to fuel, but do not match any seeds currently contained in the UCB reference collection. They have been numbered to differentiate between distinct species. (e.g.: UNKN 1, UNKN 25, etc.)

12. Lumps: various unknown species
These are large lumps of parenchymous root or tuber tissue, or stem storage tissue. They may be from *Manioc esculenta* (manioc), *Ipomoea batatas* (sweet potato), or similar, but remain unidentified at this time.

13. Wood: various unknown species
These are charred wood fragments. They may be from a large variety of wood species, or a narrow range of species, but remain unidentified at this time.

Contextual information:

This section details the recovered remains, by context. Summarized are the notes about each context, and the taxa recovered from within each locus. **AMS dating & temporal context?**

1. **41-K-01**
2. **41-K-02**
3. **41-K-05**
4. **41-K-08**
5. **41-N-06**
6. **41-Q-09**
7. **41-Q-11**
8. **41-S-04**
9. **42-E-07**
10. **41-E-10**

Conclusions:

Although many taxa were recovered from the excavations at Cerro Palenque, the exact uses of various botanical remains in many cases are difficult to ascertain. The recovered archaeobotanical materials indicate the use of several typical economic species, as well as several other species that may have been weeds, or also may have been used for various purposes. Although there are many unknown species present in the assemblage, as these species are not currently known to have specific economic uses, it is likely that they simply served as tinder or fuel. A few general statements are here made about the particular taxa recovered.

Various palm (*Arecaceae)* species are recorded as being used for food, medicine, construction, roofing, beverage, and utensils. As *Arecaceae* species have been recovered from many other archaeological sites, have a multitude of recorded uses, and present an extremely durable endocarp, it is no surprise that fragments were recovered from the flotation samples. The presence of cohune palm *(Attalea cohune)* endocarp fragments, in particular, comes as no surprise, as this particular species has an edible endosperm similar to coconut, leaves often used for thatching, and sap used in beverage-making. The durability of this taxon's endocarp no doubt also explains the abundance of the species in the overall assemblage.

The tobacco *(Nicotiana* sp.) seeds are an intriguing element of the archaeobotanical assemblage. The range of common uses for this species, from medicine to repellent, render it a common and beneficial taxon. Moreover, its recorded use in ritual activity mark it as an unusually special plant. Although recorded as having fewer uses, the coyotillo cactus (*Mammillaria* sp.) seed is an equally interesting element of the assemblage. It is likely the fruits of this cactus were consumed, although the presence of this species in the assemblage may indicate other as-yet-unknown activities. Neither of these taxa is likely to have arrived in the assemblage through purely natural processes.

It is surprising that no *Zea mays* material appeared in the archaeobotanical assemblage, as this is considered the staple crop of the Maya area. It is also significant that no bean *(Fabaceae spp.*), chile *(Capsicum spp.)* or squash *(Cucurbita spp.)* remains were recovered from any of the samples. These species, considered common crops throughout Mesoamerica, have been recovered from flotation samples at other sites in Mexico, Guatemala, Belize, and El Salvador. Their absence in the samples here may indicate different processing or cooking areas, different cooking methods, or simply unusually poor preservational conditions. **Need more context info—maybe just non-food areas or kilns sampled.**

The *Poaceae, Asteraceae, Boraginaceae* and *Cyperaceae* species recovered at Cerro Palenque do not match known economic species of the greater Maya area. Although it is possible that these taxa served unknown ritual, medicinal, dietary, or other purposes, any assignation beyond "fuel" would be pure speculation. All other recovered seed species are unknown at this time, and do not match examples in the botanical reference collection at UCB.

In terms of procurement, three of the positively-identified taxa may have come from a house garden—the cactus fruit seed (*Mamillaria sp.*), tobacco fruit seed *(Nicotiana sp.)*, and the cohune palm fruit seeds (*Attalea cohune*). The presence of cactus fruits and palm fruits suggest a concordance with ethnographically and ethnohistorically recorded common food species. The presence of tobacco fruits suggests the use of the tobacco plant, though not likely the fruit itself. The rest of the species may have been obtained from almost any location, and either opportunistically gathered or deliberately grown. Overall, the various taxa represented may represent the exploitation of a wide range of ecological niches, but the wide range of ecological conditions in which many of the recovered taxa survive makes this statement difficult to verify.

As charred wood fragments were recovered from all analyzed Light Fraction samples, it is likely that disposal of this material often occurred in undesignated areas. The high counts of charred wood in a few particular contexts, however, point to possible *in situ* activities at these locations, whether through the use of cooking or hearth features, or the use of specified hearth ash disposal areas. In particular, loci 42-E-07, 41-E-10, and 41-Q-09 are distinguished by their high numbers of archaeobotanical materials, particularly wood. The assemblage of locus 41-E-10 is particularly noteworthy, containing as it does a large number and variety of seeds, in addition to a high count of charred wood fragments.

The previous results suggest a few potential directions for future research. First, although sediment sample volume is not an exact indicator of eventual recovery rates, in general a greater volume of sediment would lead to a much higher recovery rate of archaeobotanical remains. Second, the flotation method may be improved through the heavy use of a deflocculant such as sodium bicarbonate, or, in the case of materials with strong potential for dating, the deflocculant sodium hexametaphosphate. Third, the current results would be much improved by an analysis of the recovered wood fragments by a specialist in this field, as the large quantities of wood recovered would likely have much to say about local ecology and use of tree species. Finally, a micro analysis of the starch grains, phytoliths, and/or oxalic crystals potentially present in the charred "lumps" could serve to elucidate the role of root species in the cuisine of the Prehispanic occupants of this site.