Archaeobotany - *William Whitehead 1996*

In the Field

Water flotation, to collect a systematic sub-sample of fragile charred plants, micro-faunal bones, and other small artifact types, was implemented at Chiripa as an integral part of our research. Our standard excavation methodology included the collection of at least one standard sized soil sample from every locus that would be processed in water to extract out the artifacts. Field excavators were instructed to sample each locus by collecting one 10 liter "bulk" flot sample, and in certain contexts, like use-surfaces or middens, we also collected a second 10 liter "scatter", or average soil sample. In addition, across certain surfaces, many bulk soil samples were taken, usually one sample every 50 centimeters. A "bulk" soil sample is a single 10 liter block of soil, with a recorded x, y, z provenience. A "scatter" sample is a collection of soil distributed from throughout the locus matrix to create an average view of what was deposited within the soil. These two strategies are implemented together to provide a fuller view of the artifactual material from a specific locations.

These procedures required that the excavator label each bulk soil flotation sample with a unique point provenience number and note this on the on the locus form. A tyvek tag with the provenience information was filled out and placed in the interior of the flot sample bag, and the bag tied with a second labeled tag. In small loci, especially from the mound excavations, the entire soil matrix from certain loci was floted to provide enough charred plant material to do an appropriate paleoethnobotanical analysis. Tables 2a and 2b display the total amounts of soil floated and the sampling strategy we used at each excavated locus. We have chosen to use 10 liters of soil as our standard volume based on the range of charred pant densities that we have had in the past from floated samples both at Chiripa and at Tiwanaku.

The Flotation System
The mechanized water flotation system used at Chiripa is a modified SMAP setup (Watson 1976), with several additional processing techniques to increase the speed and amount of charred plant material recovered from each flot sample. This machiine was built in 1989 for the Wila Jawira project by Chiristine Hastorf. We gratefully acknowledge the permission to use this machine by Alan Kolata. This flotation machine consists of a 50 gallon oil drum, 1.5 inch pipes, support bars, and an inner bucket with a .5 mm stainless steel mesh at its bottom and a pour spout on the topside. A shower head mounted in the 50 gallon drum is attached to pipes to bring fresh water into the oil drum and gently circulate it through the bottom of the inner bucket mesh. This motion loosens the soil, allows the finer silts and clays to sink to the bottom of the oil drum, and permits the lighter than water material within the soil to float to the surface. Charred plant remains have a lighter specific gravity that water and thus they tend to float if unattached to soil. The floating charred plant material pours out of the oil drum and into a light fraction catching bucket. This is suspended from the oil drum spout where it catches all material coming out of the inner flotation bucket spout. This bucket is lined with a fine .17mm mesh cloth.

The flotation team in 1996 was William Whitehead, Genaro Callisaya, Franz Choqu, and Emeterio Choquewanka. The flotation machine was operated by at least two individuals every day, and by three during training. At the beginning of a flotation day 18-24 samples were selected for processing, given a unique flotation number, and all provenience information for each soil sample was recorded in the flot log (see Appendix VI). The 1996 season flotation numbers began with 11,000 and proceeded sequentially. The flotation samples, the flotation machine, and all accessories were taken to the flotation area, an open fresh water pond, replenished by spring water. The flotation machine was set up and the soil samples were arranged by their flotation number. Floting began with each bag of soil being transferred to a clean bucket, measured for volume, nd recording all information. All flotation samples were then pre-soaked with fresh water in the buckets for at least 20 minutes, usually the time it took

to process the previous soil sample. For especially clayey soils, one quarter to one half liter of 3% solution hydrogen peroxide was added to the soaking soil sample to help loosen the soil peds before processing.

Every day one sample was selected at random to receive a vial of 50 charred modern poppy seeds. These poppy seeds were added to the soil and recorded in the flotation log. This procedure is done to test the efficiency of flotation by introducing a foreign seed of known count, which were can be counted and a percentage of flot efficiency calculated (Wagner 1982).

From 25% of the poppy seeded samples we were able to recover 90-95% of the poppy seeds we placed in the samples, this recovery rate is sufficient to feel confident in the recovery rate of all charred materials processed in the field.

Floating began with one floter gradually pouring the soil sample into the inner bucket that was nestled inside the oil drum filled with flowing water. The other attendant would spray the soil gently with water to minimize splashing and too rapid a transfer. The water level and water flow was also monitored by the second floater to insure no charred plant material was being lost out of the catching bucket by overflow or splashing. The person who transferred the soil then began agitating the inner bucket up and down to increase soil movement and clay loss through the bottom screen of the inner bucket. Meanwhile the second floater sprayed the charred plant material in the catching bucket to keep the fine meshed cloth clean of clogging dirt.
When no more charred plant material could be seen on the water surface, a fish-tank filter siphon was used to suck up all remaining charred plant material that was floating in the water but not on the surface (Gumerman and Umento 1978). This was done by holding the siphon tube six inches above the bottom of the inner flotation bucket, draining the water into the charred plant material catching bucket. When no more charred plant material could be seen in the transfer tube, siphoning was stopped. At this point the water pressure was turned off to let any thing left to float to the surface. Once this was done, the water was then turned on to full force and let run for several minutes to aid any heavier items remaining in the water. A flotation sample was completed when no more charred plant material could be seen after a tea strainer was drawn through the water. The light fraction fabric was then removed from the charred plant material catching bucket and tied up to dry with the original labeled tag. The heavy fraction was transferred from the inner flot bucket to a large cloth laid on the ground with its samples tyvek tag placed with the sample. These heavy fraction samples were left in the sun to dry until the end of the day.

In The Lab
Once dry, the light fractions were transferred to clean plastic bags with the original sample tag and further labeled on the outside of the bag with a sticky label. These have been exported to the University of California-Berkeley to be analyzed, with permission from INAR.
The dry heavy fractions were sorted in the on-site laboratory to remove cultural and ecological artifacts by a rotating crew of Chiripaño workers, supervised by one of the before mentioned flotation crew. Each heavy fraction was sieved through a series of brass geological sieves with meshes of 4mm, 2mm, and .5mm., with the remaining fraction caught in a pan. All fractions were sorted for bones, fish scales, charred plant material, lithics, metals, and all other artifacts. Cermaics were removed only from the 4mm fraction and burned earth and adobe was removed from the 4 and the 2mm sieves. Artifact and ecofact finds from all fractions were combinedby type and placed in labeled plastic bags. These artifact bags were labeled with the provenience information from the tyvek tag that accompanied the heavy fractions. Each artifact type from each flotation heavy fraction was recorded in our heavy fraction log. The artifact bags were given to the appropriate artifact specialists on site. Bags with charred plant material from the heavy fractions were attached

The results from this year's 1996 flotation will be prepared over the next year as part of William Whitehead's disseration work and Christine Hastorf's continuing research on the paleoethnobotany of the Formative at Chiripa. A list of identified species from these samples is given in Table 3.

Table 2a : Summary of Flot Samples by Area

Area	Data	Total
Llusco	Number of Samples	44.00
	Min volume	8.00L
	Max Volume	11.00L
	Average Volume	10.00L
	Total Liters Floted	440.00L
Mound	Number of Samples	99.00
	Min volume	0.30L
	Max Volume	10.00L
	Average Volume	6.24L
	Total Liters Floted	617.60L
Controls	Number of Samples	2.00
	Min volume	10.00L
	Max Volume	10.00L
	Average Volume	10.00L
	Total Liters Floted	20.00L
Santiago	Number of Samples	237.00
	Min volume	2.00L
	Max Volume	12.00L
	Average Volume	9.58L
	Total Liters Floted	2270.00L
Yujra	Number of Samples	8.00
	Min volume	10.00L
	Max Volume	12.00L
	Average Volume	10.50L
	Total Liters Floted	84.00L
Site Totals	Number of Samples	390
	Min Volume	.3L
	Max Volume	12L
	Average Volume	8.78L
	Total Liters Floted	3432L

Table 2b: Summary of Flot Samples by Number per Loci

Sampling Strategy	
# of Samples per Loci	# of Loci
1	129
2	40
3	10
4	18
5	8
6	4
7	1
8	1
Grand Total	211

Table 3. List of Plant Taxa from 1992 Flot Samples

Chenopodium quinoa	
Chenopodium spp.	unidentified tubers
Verbena sp.	
Plantago sp.	Wira Cola leaf fragments
Relbunium sp.	Kiana seed
Rubus sp.	Kochia
Lepidium sp.	Wood fragments
Cereus sp.	Dung fragments
Galium sp.	
Nicotiana sp.	Cruciferae
Portulaca sp.	Malvaceae
Amaranthus spp.	Cyperaceae
Conopus sp.	Solanaceae
Oxalis spp.	Asteraceae
Salvia sp.	Boraginaceae
Opuntia spp.	Labiate
Potomageton spp.	
Grass seeds	
Stipa spp.	Unidentifiable plant remain types
Hordea tribe	Starchy cell lumps not descernable to tuber or
Panicoid tribe	woody plant types
Three general size ranges of grass seeds	7 unidentified seed types
Large, medium, and small	