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ARCHAEOBOTANICAL LAB REPORT # 17

FLOT PROCEDURE : 1990 PROYECTO WILAJAWIRA
October 1990 Melanie F. Wright

This is an account of procedures for flotation followed during the 1990 season at Tiwanaku, Bolivia. This was the second season that a systematic sampling procedure was employed. During the summer of 1990, over the course of 10 weeks, 801 soil samples were processed with the use of a slightly modified SMAP flotation machine, which was built under the supervision of Prof. Christine Hastorf last season.

Selection Procedure

Samples were selected for flotation based on the prioritization of provenience : samples from outlying sites excavated by Juan Alberricin and Jim Matthews, and the two domestic areas east of the Akapana had highest priority; then K'karana (a domestic area nearer the river), then Putuni, and then the non-domestic (probable ceramic workshop) area of Chiji Jawira. Consequently most of the flots processed in 1990 were from the first five locations. Additionally, the revised sampling strategy called for larger samples (8 liter as opposed to 6.3 liter) but rather than taking both pinch and bulk samples from every provenience, a bulk was taken from each excavation unit (each cuad, rasgo and nivel), and a pinch sample was taken when it was deemed by the excavator that a more average representation of remains present might be useful (ie undifferentiated midden fills or across floor surfaces). No distinction between pinch and bulk samples was made in the selection of samples to be processed.

Recording

Upon selection, the samples were each given a unique flotation number which was written (with indelible Sharpie pen) on the sturdy outer tag ("ficha") which had a reinforced hole and string at one end. For those lacking fichas, tags were made for them and tied on the bag. The 8-liter plastic bags lacked string closures, so lengths of string had to be cut for them, and the tags tied onto the bags. Total information was then recorded in the flot log : flot#, site, cuad, nivel, rasgo, unidad, specimen (bag) number, excavator and date excavated. Any additional information from the ficha was noted under "comments" in the flot log.

use measured standard bucket 8 liters
The volume of each sample was estimated as a fraction of a full bag by comparison with a marked, graduated example of a full bag. There were 3 bag sizes in use in 1990: 6.3 liter and 2.6 liter cloth bags, coded as "L" (large) and "S" (small) respectively, were used in the outlying valley sites, and 8.0 liter plastic bag, coded as "P" were used in the different areas within Tiwanaku proper. So volumes would be noted in the flot log as ".8L" or ".6S", etc.

pour flots gently using water to help.
Flour sacks, which had been cut in half, were marked (again with indeible Sharpie) with the flot number, site, and bag number; one sack for each sample. These would be used to dry and contain the heavy fractions.

All of this preparation was done at the end of the day, before the next day of floating.

Processing Control

(previously coated)

One sample was selected at random each day and fifty burnt poppy seeds (precounted in gelatin capsules) emptied into it, to test for recovery rates. On days when the local workers (Alejo Patty and Hugo Avales) were floating by themselves for part of the day, often a double poppy seed test was taken -- one in a sample processed while I was working with them, and one when they worked alone. Once they began floating whole days alone, I occasionally slipped a poppy seed test into a sample without their knowledge, to make sure they were not treating the samples they knew to be test ones differently than the others. The number of the selected sample was noted in the flot log.

Flot Procedure

In the morning, the flot machine, pump, and ancillary equipment were wheelbarrowed out to the flot site, along with 15-25 samples, with their flour sacks for the heavy fractions and pieces of chiffon for the light fractions. Oil in the pump was changed twice weekly. The air filter was checked once a week and washed when necessary. The pump was filled up with gasoline approximately after every 8 samples; on an average day, we used 5 liters of gas.

Samples would be evaluated by look and feel, and if necessary set to soak in buckets either with plain water or a mixture of water and hydrogen peroxide. Soaking in water was for those samples with large, non-friable clumps of non-clayey soil; water and hydrogen peroxide were used to break up clumps with a high clay content. Samples without large clumps, or ones that broke apart easily, were not soaked. The method of soaking, if any, was noted under the "comments" column of the flot log for each sample. Not all the samples were set to soaking at once, to avoid waterlogging the samples. Optimum soaking time depends on the particular soil, but was never more than an hour, and usually closer to 20-30 minutes.

The small bucket for catching the light fraction had carburetor screen in the bottom and 2 stacked geological sieves inside. A square of chiffon, size approximately 50cm X 50cm, was draped in the bucket, resting on the screens, and the edges clothes-pinned to the bucket sides to secure it. This way the light fraction spilled directly into the chiffon, which was also used to hang the samples to dry.

Once the machine was filled with water, and inner barrel and outer bucket in place, the sample was poured SLOWLY into the machine. The inner tag from the sample bag, if any, was placed on the waiting flour sack; the outer tag ("ficha") placed to the side to await the light fraction. If a soaked sample, the sludge was sprayed from the bucket into the flot machine with a hose. The rate of water flow was constantly adjusted and readjusted throughout the floation process.

The silt was encouraged to pass through the screen at the bottom of the inner barrel, and lumps encouraged to break up, by gentle handling. As soon as enough silt had passed to make it practicable, the inner barrel was agitated using a few short up-and-down strokes, followed by lateral shaking. Most samples required only one agitation, but some required two, and a few 3 or 4 times.

When the sample was relatively clean and no more carbon was floating to the surface, the water flow was shut off and the light fraction bucket removed and put on the ground next to the machine. The

gravel siphon was then utilized, "vacuuming" up carbon floating just above the bottom of the inner barrel and spewing it into the light fraction bucket. During the siphoning, one of us stood by with a tea strainer and scooped up any carbon which rose to the top. The siphon broke at one point during the season (it was later repaired with super glue). Samples 5289-5295 were siphoned not very thoroughly with a jury-rigged siphon, and samples 5296-5314 and 5359-5393 were not siphoned at all. The siphoning process was ended when no more carbon was coming out (or the siphon was starting to pick up too much small gravel), and the water level brought back up to the top. The water was stopped again, and we waited to see if any more carbon would levitate. Any that did was scooped with the tea strainer.

When no more carbon was rising, the bucket was replaced and the water turned on again. After emptying previously collected carbon into the light fraction, the tea strainer was passed through the water in the inner barrel (while it was running) to test for any additional carbon left in the sample. When the strainer came up clean, the sample was done, the water turned off, and the light fraction bucket and inner barrel removed.

The light fraction in the chiffon was gently rinsed from the outside to encourage everything to congregate in the middle of the chiffon; it was then removed from the bucket and tied shut with the ficha and placed out of the sun. Later it would be hung on a clothesline in the patio to dry. A new chiffon was draped on the bucket, secured with pins, and dampened to encourage it to be securely attached to the bucket, ready for the next sample.

The heavy fraction from the bottom of the inner barrel was carefully emptied onto the properly numbered flour sack, using a hose to clean the barrel and capture everything. The heavy fractions were laid out to dry in the sun, and the inner barrel thoroughly rinsed and replaced in the machine for the next sample.

Problems

On some occasions the light fraction bucket would become clogged with paja and/or silt and threaten to overflow. When this happened, the water flow was cut, the bucket removed, the the light fraction gently rinsed to encourage the silt to pass. If there was too much paja, often a second, or even third, chiffon was required. Generally I would rinse once, and if it threatened to overflow again, I would get a fresh chiffon.

Post-flotation Processing

At the end of the day, the machine was taken apart, the light fractions collected, the heavy fractions tied up into little bundles, and the whole kit-and-caboodle wheelbarrowed back to the house. The heavy fractions were piled (sometimes not carefully enough) in the patio for the sorters to work on, and the light fractions hung to dry. At night the light fractions were brought inside if not yet dry. Those samples that were dry were carefully emptied into ziplock bags. On the outside of the bag was put a sticky label with (minimally) the flot#, site, cuad, unidad, and nivel or rasgo. When Simon Limachi (one of the heavy fraction sorters -- the other was Juan Patty) began processing the light fractions on his own, he did not fill out sticky labels. Inside the ziplock with the sample was put the ficha. The samples were then placed in a cardboard box (which, when full, were mailed home) and

a check was made in the "lt frac" column of the flot log. The heavy fraction sorters kept their own log, which was periodically cross-checked with the flot log, and the samples sorted were checked off under "hvy frac". The "carbon" category of the heavy fractions (if any) was collected, as was the <2mm portion of the heavy fraction. Of the latter, only the <2mm heavy fractions of samples containing poppy seeds were sent back to the States. The rest were stored at Tiwanaku.