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Flot Procedure: Proyecto Arqueológico Calchaquí, 1990

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Collecting Samples

Flotation soil samples of approximately 6 l. were collected from each level and locus of an excavated unit. A plastic bag inside a cloth bag held the samples. Two tags were made for each flot sample: one was put inside the plastic bag with the soil, another was attached to the outside with a string which tied it shut. Two types of soil samples were made: **bulk** and **scatter**.

Bulk flot samples were collected from a specified location in each unit, unit level and unit locus. Thus, they were treated as point-provenienced items. Tags labeled "bulk" also recorded the date of excavation, excavators, context (if known), and a provenience number. Since bulk flots were point-provenienced, the last number of the provenience was a slash number which designated it as having a unique horizontal and vertical location. On each level form, slash numbers were recorded with their exact location and collection type. As well the sample area was mapped.

Scatter flots were taken from chosen cultural features (i.e. occupation surfaces, hearths) in addition to a bulk flot. A scatter flot was collected by taking a sample of soil from several parts of the feature to be representative of the locus as a whole and, as such, were not point-provenienced. Tags labeled "scatter" recorded the date of excavation, excavators, context, and provenience. If the sample was much larger than 6 liters, it was divided into several bags which were numbered "1 of 3", "2 of 3", "3 of 3".

Recording: Before flotation

Once soil samples were at the field laboratory, they were randomly chosen and given a unique flotation number which was written on the sample's outside tag. The numbering system began with 6000 and continued to 6447. These numbers were recorded sequentially in the flot log along with the provenience number, slash number (bulk flots), date excavated, type of flot, and recorder's initials. One flot sample was randomly chosen from that days group of about 20 samples, and 50 poppy seeds were placed in that sample's matrix. A column in the flot log labeled "poppy seeds" was checked for the chosen flot sample.

Flotation

To prepare for a day of floting, flour sacks used for heavy fractions were labeled with the flotation and provenience numbers using a sharpie pen, the samples were organized sequentially by number and the flotation apparatus (pump, tank, etc.) were set up. The system used was a SMAP mechanized flotation machine. The bottom of the inner tank was a 0.5 mm brass screen supported underneath by a ¼ inch brass screen. Even with this support, the brass screen tore or wore out almost weekly. After each of the screens had been mended 2 times with brass wire and showed serious wear and weakness, they were replaced with a stainless-steel screen of 0.6 mm.

In preparation for each flotation the following procedure was followed: 1) The sample was emptied into a measured bucket, and the volume recorded in the flot log, 2) the numbers on the flour sack for heavy fractions were compared with the inside tag for accuracy; the flour sack was placed onto a screen (with the tag) where the heavy fractions could later quickly drain, 3) the inner bucket was placed into the large flot tank with water running, and 4) a 5 gal. bucket, its bottom replaced with geological screens, was lined with chiffon ready to be used to catch the overflowing light fractions.

For the first 105 samples, one person slowly emptied the flot sample into the inner bucket while the second person watched the light fractions for overflow while at the same time carefully stirred the water. Because much of the very dry dirt formed little floating clumps on contact with the water, causing the light fractions to be very dirty, a different strategy was used for the remaining 342 samples. With the water flowing into the tank turned on high and the inside bucket turned so that light fractions could not overflow, samples were gently poured into the water and then gently stirred for about 30 seconds. At this time the water flow was decreased and the inside bucket turned so that the light fractions would gradually overflow into the chiffon-lined bucket.

After the initial floating matter poured off into the chiffon, the inside bucket was shaken up and down and then side to side to agitate the sample. It was then floted two more times or until the heavy fractions were clean and no more organics were released into the water by agitation. If the sample clogged the screen on the bottom of the bucket, the soil was hand stirred to loosen material clogging the screen. The water surface was also gently stirred to help materials float out of the internal bucket into the chiffon-lined bucket.

After the majority of organic materials floating on the water surface had been removed, the water was turned off. The charred matter still suspended in the water was siphoned into the light fraction bucket. If the siphoning produced a lot of carbon, the process was repeated. If, on the other hand, siphoning produced more mineral than organic material, the process was terminated.[1] After siphoning was completed, the hose was rinsed out into the chiffon with clean water, the water was turned back on, and the buckets were put back into place for floting. Floting was continued until no more carbon was suspended in the water (unusual), nothing more was flowing over into the chiffon, or the proportion of floating sand and/or tiny flat rocks were grater than charred organics.

At this point the inner bucket was removed from the tank and the heavy fractions emptied, with the help of spraying water, onto the flour sack which was then placed nearby to dry. This inner bucket was thoroughly rinsed and replaced into the tank. Because tiny stones and wood carbon could get trapped in the crack where the screen wrapped around the edge of the

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[1] Ica had a special technique for siphoning which seemed to work well. He stirred the water in a circular motion which caused the heavier stones to sink to the outside perimeter but raised water logged carbon to the surface concentrating them in the center of the bucket. some of the wood carbon especially form Valdéz, was so heavy that without doing this, the charred material was unrecoverable by flotation.

bucket's bottom, it sometimes helped to rinse the bucket with water then pour it in the tank and shake it to release trapped fragments. The bucket was rinsed again while it was placed sideways with 3-4 cm of the screen submerged and the water running. The water that flowed out of the tank functioned in so far that the flowing water carried the particles that would otherwise sink down and collect in the crack of the bucket.

While still in the light fraction bucket, the chiffon was gently sprayed so that the light fractions would collect near the center. Then, using the original outside flot bag tag, the light fractions were tied closed and dried.

Recording: During flotation

During the flotation process, the date, information concerning the sample volume, special treatments or comments (such as overflows), the weather conditions, and the people who floted were recorded in the flot log.

Light Fractions: Lab treatment and recording

After the collected light fractions were totally dry, the samples were emptied into a pre-weighed zip-lock bag. The original outside tag used to tie the chiffon closed (minus the string) was placed inside the bag and a sticky label with the flot number, type of flot, and provenience number was placed on the outside. Next, each sample was weighed to the nearest tenth of a gram on a balance scale and the weight recorded on the bag's outside label. The weight was also recorded in the flot log's "light fraction weight" column corresponding to the matching flot number. At this point, the plastic bags were placed inside a numbered cardboard box. The contents of the box were then inventoried--a list which included a record of each bag's flot number and weight.

Heavy Fractions: Lab treatment and recording

Heavy fractions were hand sorted when dry. First, the flot number was recorded on a heavy fractions sheet which had columns for different types of archaeological remains, ceramic, lithics, bones, botanicals, etc. The sample was poured through three geological screens to facilitate sorting. The heavy fractions smaller than the second screen were very difficult to see so they were sorted as well as possible and a weighed sample (the size of the smallest ziploc bag) was kept for future reference. The different types of recovered remains were bagged separately; each bag was given a label with the flot number, provenience number, date excavated, and type of artifact; and then the sample was placed into the appropriate artifact-type box.

Botanical remains from heavy fractions were placed in pre-weighed ziploc bags and weighed to the nearest tenth of a gram. Because the scale was not sensitive enough to measure the weights of the many smaller samples, the weight was recorded in the flot log as "<0.1 g". Some flot numbers had two heavy fraction samples which must have been a result of the heavy fractions being bagged after each size from the geological screens was sorted. Other flot numbers had no weight, presumably because there were no botanical remains in those heavy fractions.

The bags were then placed into numbered boxes which, in turn, were inventoried by it contents' flot numbers and sample weights.

Problems:

The most worrisome and re-occurring trouble was the tearing of the inner bucket's screen. We constantly worked on making modifications to halt the wearing down of the screen. However, we were only successful in delaying--not preventing it. First, rubber was wrapped around the supports in the tank which held up the bucket. Second, the ring clamp which holds the screen onto the inner bucket was lowered ¼ inch closer to the bucket bottom to protect the screen as it curved around these lower edges. This adjustment reduced wear from the outside, but, the weight of the heavy fractions was still great enough to stretch and tear the screen. (Some of the sterile samples from Potrero were at least 60% bedrock, so heavy that it took two people to lift the bucket out of the tank.) The addition of the ¼-inch brass screen to the outside of the fine screen greatly reduced this wear but did not stop it. This addition also loosened the screen's fit around the bottom of the bucket in general so that materials were more likely to get trapped in the crack where the screen was secured with the ring clamp. finally, the stainless steel screen bought in Salta, costing about $45.00, seemed more durable than the brass screen.

There were few *bona fide* problems in the actual flotation process. It should be noted, however, that the (wood?) charred fragments from Valdéz were often very dense and when it had been in the water for more than a few minutes they sank. Because of this, and because the samples were sandy and did not seem to trap carbon, our response was to try and move through the flotation process as quickly as possible before the sample got waterlogged. The big chunks of wood carbon, which often sank to the bottom with the heavy fractions, were sometimes picked off and put with the "light" fractions.

Drying the light fractions also posed a problem. In the last weeks of July the temperatures during the night were below freezing and even some daytime temperatures stayed below 32° F. Thus, during the first few days of flotation the light fractions were in danger of freezing at various times. When we noticed that this was happening, the samples were hung up inside when we returned to the lab at night and later put outside only during the warm part of the day. During the cold, damp weeks at the beginning of August, the lab was filled with drying samples, and procuring chiffon for flotation was problematic, especially since the samples refused to dry--often related to the fact that many of the samples were large and contained modern cardón (cactus) root which acted like a sponge. In fact, we took one day off partly because all 60+ chiffon bags contained drying samples even though we were only floting about 15 samples a day. Due to the shortage of bags, some samples were unintentionally bagged before they were completely dry. If we noticed dampness or condensation on the insides of the bag, the samples were either returned to the chiffon or left open to dry out. In the future, more chiffon could be used and damp samples could be transferred to other cloth to dry.