*Supplemental Methods and Approaches*

*Sampling Tools and Teeth for Microfossil Residues.* The sampling of tools from Structure 20 is described in Pearsall and colleagues (2004). Briefly, tool surfaces were dry-brushed (producing Sediment 1), then wet-brushed with distilled water to remove surface material (producing Sediment 2), followed by sonication (producing Sediment 3). This approach produced three sub-samples (Sediments 1-3) per tool. The same approach was used for tools from Structures 1, 7, S-CHM-1, and 10, except that because these tools had been washed in the field, no Sediment 1s (dry brushed) were collected. Dental calculus was removed from a sample of teeth (about half) from each individual studied. A dental probe was used to remove obvious calculus. If teeth were loose, they were sonicated for 10 minutes. Scraped and sonicated components were combined as one sample. Calculus samples were pre-treated at room-temperature with 0.1% NaEDTA (dispersal agent) to soften calculus, then sonicated, followed by soaking in 10% hydrochloric acid, then in 5-6% hydrogen peroxide. Starch and phytoliths were recovered sequentially from tool and calculus samples as described in Pearsall and others (2004). Separate slide-mounts were made of starch and phytolith extracts.

*Interpretation of Marantaceae and Zingiberales Phytoliths*. Phytoliths identifiable at the level of Marantaceae family and Zingiberales order were considered to represent economic taxa in the context of interpreting microfossil assemblages from stone tools and dental calculus samples from Real Alto. Members of these groups do not occur naturally today in the xerophytic zone of southwest coastal Ecuador (refer to Figure 1 for location of vegetation zones). Svenson’s (1946a, 1946b) study and comparison of the vegetation of southwestern Ecuador, northwest Peru, and the Galapagos Islands lists no representative of the Marantaceae (arrowroot family) in the catalogue of plants. The Zingiberales order, comprised of the Cannaceae (canna family), Costaceae (costus family), Heliconiaceae (heliconia family), Marantaceae, Musaceae (banana family), Strelitziaceae (bird-of-paradise family), and Zingiberaceae (ginger family), is also lacking in the floras of northwest Peru, southwest Ecuador, and the Galapapos Islands.

Members of the Marantaceae and Zingiberales are documented in Guayas Province, i.e., in moister, inland forests (Jørgensen and León-Yánez 1999). Environmental coring in southwest Ecuador, including at the Chanduy estuary, identified a mixture of trees from xerophytic and deciduous (moister) forests, establishing that moister forest extended farther westward than today in the early mid-Holocene, but did not replace the drier formation (Pearsall et al. 2016). Elemental data from one core indicated that moisture levels were similar to the historic period during the early mid-Holocene. Taken together, results showed that the Santa Elena region was neither markedly wetter nor drier than today in the early mid-Holocene. We do not know how close deciduous forest may have grown to Real Alto during its occupation; it is possible that wild members of the Marantaceae and Zingiberales were available in the region in the past. Fuel wood identified at the site was collected from trees of the xerophytic zone, however (Pearsall 1979).

*Sources of Phytoliths, Starch, and Particulate Charcoal on Tools.* These issues were discussed in Pearsall and others (2004) in the context of investigating maize on Structure 20 stone tools and in floor sediments. Briefly, sonication (producing Sediment 3 samples) was the most effective way to recover maize starch from tools; gentle dry brushing (Sediment 1) or thorough wet brushing (Sediment 2) recovered many fewer granules. We concluded that aggressive recovery techniques were necessary to dislodge starch ground into stone tool surfaces, and hypothesized that starch was poorly preserved in site sediments. Unfortunately, we did not have data on the presence of maize starch in Structure 20 floor sediments not associated with tool surfaces. By contrast, gentle dry brushing and thorough wet brushing were more effective than sonication for recovering maize cob phytoliths from tools. It is likely that most cob debris from the grinding process would accumulate around rather than on tools, and become incorporated into floor sediments through the process of tissue decay. Furthermore, grinding may not have released phytoliths from soft and hard glume tissues very effectively. For Structure 20, the same range of cob phytoliths was found in floor sediments and in Sediment 1 and 2 samples. This suggests a common origin for phytoliths in the floor samples and sediments brushed and washed from the tools. We concluded that maize phytoliths in Sediments 1 and 2 likely originated from decay of maize cob debris deposited into floor sediments. In many cases, Sediment 1 (brushed) assemblages of non-economic, i.e., “background,” phytoliths were very similar to assemblages from Structure 20 floor sediments. In the case of tools from Structures 1, 7, S-CHM-1, and 10, field-washing of artifacts effectively removed most loose floor sediments, potentially reducing the contribution of phytoliths from this source. See also discussion and literature review of phytolith and starch formation processes in Pearsall (2015, 2019).

Data from the Structure 20 study also provide insight into deposition of particulate charcoal on stone tools. Charcoal abundance was estimated in 12 sediment samples and 16 Sediment 1, Sediment 2, and Sediment 3 tool samples (16 of each sediment) using a standardized scale (VA very abundant, A abundant, C common, M moderate, R rare, VR very rare; Table 4, Pearsall et al. 2004). Floor sediments, not directly associated with tools, contained common (C 33%) or abundant (A 67%) levels of particulate charcoal, presumably originating from various household activities involving fire. Sediment 1 tool samples (loose sediments brushed from tools), by contrast, contained highly variable quantities of charcoal (31% VA, 38% A, 25% C, and 6% M) indicating additional/different sources of charcoal than simple transfer from “background” floor sediments. Sediment 2 tool samples (sediments dislodged by vigorous brushing) were less variable (88% A, 12% C), and Sediment 3 tool samples (sonicated) contained uniformly abundant levels of charcoal (100% A). These results show that particulate charcoal was a component of in situ microfossil deposition on tool surfaces, and that processing of cooked foods on tools likely contributed to charcoal in floor deposits as well. The uniform levels of particulate charcoal on tool surfaces suggests that these tools were repeatedly exposed to cooked foods.

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