ANCIENT MESOAMERICAN MORTARS, PLASTERS, AND STUCCOS: COMALCALCO, PART I

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THE USE of lime mortar in the New World appears to be confined to the area of Mesoamerica. It is, in fact, one of the most important of the several traits characteristic of this area which have given rise to the concept of Mesoamerica as a distinct cultural unit. The extensive use of lime mortar within Mesoamerica probably played a significant role in the development of more advanced forms of architecture within this area than in other parts of the New World, especially since it was employed ornamentally as well as functionally.

On the assumption that the use of lime in the form of mortar as a building material is a Mesoamerican invention, such an invention plus the development of its varied uses represents a complex technical achievement about which very little is known. The present paper is the initial one in a series dealing with mortars and similar building elements of Mesoamerica. It is hoped ultimately to describe and characterize the techniques of the major cultural groups and possibly to provide evidence of the diffusion of knowledge within and between them.

The reports of archaeological investigations at ancient Mexican sites frequently refer to mortars, plasters, or stuccos used in the building of the structures. Beyond such observations little or no attention has been paid to the technical aspects of these building elements. The available information on Mexican mortars, plasters, or stuccos appears to be quite scarce and has been reported, in general, incidentally to other investigations. Morris, Charlot, and Morris (1931, Vol. 1: 220-4) report that lime mortar was made with the juice of the chocom (chucum) tree (*Agave ixtli, Agave silvestris, or Pithicolobium albicans*), and E. H. Thompson (1932: 174) records the use of sascab in place of sand in making mortar. (Sascab is an unconsolidated form of calcium carbonate found in pockets in limestone.) J. E. S. Thompson (1954: 75)

describes briefly the use of adobe for the construction of pyramids and of a facing of pumice set in mud. The use of sascab is also reported by E. H. Thompson (1897: 18) and Villa R. (1934). Of the few references found on this subject, only two refer to actual compositions of the mortar or plaster. Ruppert, Thompson, and Proskouriakoff (1955: 67) state there was no evidence of the use of sand or ground limestone in the mortar at Bonampak. Foster (1935: 577), however, presents the chemical analysis of a mortar from the Monjas Complex at Chichén Itzá. Of itself, this analysis gives no clue as to the original composition of the mortar or the technique used in its manufacture.

Since current practices are often based on traditional methods, clues were sought to ancient procedures by questioning workmen engaged in restoration work under the direction of Alberto Ruz L. at Uxmal. These men stated that honey was traditionally mixed with mortar and plaster. They further reported that an extract of chucum bark is still used to wet plaster before troweling, a procedure also reported by J. E. S. Thompson (1954: 75). Similar questioning at Chichén Itzá led to the statement that in the smaller villages an extract of the bark of the chacte tree (*Caesalpinia platyloba*) is still mixed with plaster to give added strength. Since mortars, plasters, and stuccos are actually elements of construction, it appeared that their systematic examination might throw some light on ancient building techniques.

In order to study ancient mortars, plasters, and stuccos, it is necessary first to define the terms which will be used throughout this investigation. The definitions are based upon the probable function of the material and those given below will be used until better ones are developed.

Mortar. A bonding material, usually found between courses of stone or brick, as a matrix for loose stones, or as a leveling coat on the outside of the mass where it is used as a base for decorative or protective plaster. It is often soft, white or gray, and generally has a limey appearance. It may also contain an aggregate, such as sand, earth, ground stone, or sascab, and shell or limestone fragments. Mortar as used in this paper is comparable to the term cement used in earlier descriptions.

Plaster. An essentially flat, external coat over a monolithic mass, used primarily as a protective medium or as a surface for mural painting. It is often denser than mortar and contains less visible and smaller shell or limestone fragments. Plaster may also contain an aggregate.

Stucco. A cast or modeled surface used solely for decorative or symbolic purposes, generally similar to plaster in density and appearance.

Lime-aggregate. A mixture of lime and aggregate or grit used in the erection of a monolithic mass without the use of brick or stone. When damp, it may have the appearance of packed earth. When dry, it is generally harder than packed earth with little or no tendency to crumble in the hand. This material is described later; it was used in the earlier, nonbrick structures at Comalcalco.

Wash Coat. A coat of plaster which, because of its thinness, was probably applied by means other than troweling. Wash coats may have been applied by brushing on vertical or horizontal surfaces or by pouring a thin slurry of plaster over horizontal surfaces. Such coats are usually less than 1 mm. in thickness.

The structural elements defined above perrain to single layers of material and do not, by themselves, yield information showing their methods of use in building a structure. This information can be obtained only through a study of the profile of the several elements in situ. This point will be illustrated by the results obtained from a study at Comalcalco, described below. The techniques of using the building elements as defined include also the processes by which the materials were made. It is, therefore, the objective of this study to develop the following points as they apply to ancient Mesoamerican structures.

1. Type of building element.
2. Function of each type of element.
3. Composition of each type of element and source of the raw materials, including:
   a. Source of lime.
   b. Type and source of aggregate or grit.
   c. Proportion of lime and aggregate or grit.
   d. Type of organic additive (plant extract) used, if any.

Except for the on-site observations, the approach to the characterization of mortars, plasters, and stuccos will be through chemical and physical examinations which, it is believed, will yield information of sufficient precision to reduce the