

EXPLORING PARASITISM IN ANTIQUITY
THROUGH THE ANALYSIS OF COPROLITES AND QUIDS FROM
LA CUEVA DE LOS MUERTOS CHIQUITOS, RIO ZAPE, DURANGO, MEXICO

by

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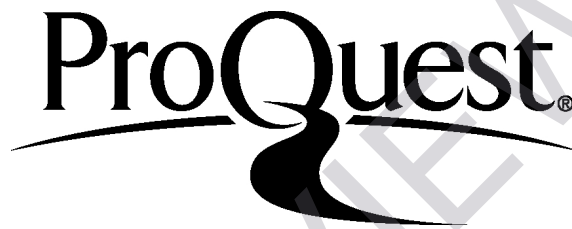
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University of Nebraska, 2016

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Coprolites excavated from La Cueva de los Muertos Chiquitos (CMC) were examined for evidence of parasitism utilizing both standard coprolite processing procedures and molecular techniques. A total of 100 coprolites were processed for microfossil examination via light microscopy. These coprolites contained the eggs of seven different genera of parasitic helminths (*Echinostoma*, *Enterobius*, *Physaloptera*, *Taenia*, *Toxascaris*, and *Trichuris*). These included members of three different taxonomic classes, Cestoda, Trematoda, and Nematoda, representing two taxonomic phyla, Platyhelminthes and Nemata. Of the coprolites, 90 were deemed suitable for enzyme-linked immunosorbent assay (ELISA) analysis. A gram of each coprolite was extracted for analysis and tested for the presence of coproantigens specific to three diarrhea-inducing protozoan parasite species, *Entamoeba histolytica*, *Giardia duodenalis*, and *Cryptosporidium parvum*. All coprolites tested negative for *E. histolytica* and *G. duodenalis*; however, 73% of coprolites tested positive or likely positive for *C. parvum*. A total of 45 quids were also examined using ELISA analysis to test for human-produced antibodies made in response to *Toxoplasma gondii* and *Trypanosoma cruzi* infections.

Though antibodies were not detected, additional testing of quids from this site suggest that taphonomic issues related to the recovery of human antibodies from archaeological materials likely played a role. The potential for future archaeoparasitological studies utilizing quids as source materials is discussed. The pathoecology of CMC is discussed in light of the new parasite data presented herein.

PREVIEW

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Dedication

I dedicate this work to archaeoparasitologists of the past, present, and future. It has been a privilege to stand on the shoulders of giants while growing into my own as a researcher in this field. Without the hard work and dedication of so many others who came before me, I would have had no place to begin. I challenge my contemporary colleagues to carry on rigorous investigations of parasitism in the past built upon the work of these giants and to pave the way for the next generation of scientists. To budding archaeoparasitologists, I hold you to the standards of excellence laid before you and look forward to watching you shape the field. Thank you all for your past and future contributions to the archaeoparasitological community.

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Chapter 1

La Cueva de los Muertos Chiquitos (CMC)

1.1 The Loma San Gabriel

There are two cultural perspectives from which archaeologists view the regions of the American Southwest and Mesoamerica. The first perspective divides these regions into cultural areas. This concept originated from the work of 19th Century ethnologists from Germany, most notably Freidrich Ratzel (McGuire, 2011). These early studies described cultural variability as emerging through a process of invention followed by diffusion, which created noticeable groups of related cultures. The groups of related cultures formed geographic cultural areas that were centered around invention and had boundaries. The idea of the culture area became the center of debates regarding the display of archaeological collections in museums during the early 1900s. Franz Boas and Clark Wissler pushed for such displays as opposed to displaying collections using evolutionary stages or the three-age system used in Europe (McGuire, 2011).

The second perspective, outlined by McGuire (2011), defines culture areas as “dynamic web[s] of relations between social groups” rather than as geographic regions with sharp, physical boundaries. McGuire asserts that the first perspective of the culture area concept no longer fits within current theory and developments in the archaeology of Mexico and the Southwestern United States. The fact that culture areas focus on a geographic region rather than on content is a fundamental problem with the first perspective. This problem was noted by A. L. Kroeber, who did some of the most influential work on the cultural area concept in 1934 (McGuire, 2011). Kroeber saw defining cultural areas as more of a means than as an end and disliked the term because it

emphasized borders and space as opposed to content. Kroeber argued that culture area borders should be considered fuzzy. By thinking about the archaeology of the Southwestern USA and Mesoamerica as a relational web connecting social groups, researchers are no longer restricted by the static nature of the first perspective.

Traditionally, the Mogollon culture area extended out of the Southwestern USA and through the Northeastern state of Chihuahua in Mexico. The boundary for this region touched the present-day northern border of Durango, Mexico. The Loma San Gabriel culture was defined by the field work of J. Charles Kelley and his colleagues beginning in the late 1950s (Kelley, 1956, 1971; Foster, 1985). The culture was named for the type site of Loma (or Cerro) San Gabriel in the northern region of present-day Durango, Mexico. Other Loma San Gabriel sites extend as far north as the Rio Conchos in the state of Chihuahua, as far west as the Sierra Madre, and southeast to the western regions of the state of Zacatecas. According Kelley and Foster's work, the Chalchihuites culture area to the south seems to have bled into that of the Loma San Gabriel. Chalchihuites sites can be found as far north as El Zape (Durango), where the Loma San Gabriel continued to live despite the expansion of their neighbors into their territories. The Loma San Gabriel were known to adopt some Chalchihuites practices. Larger sites in overlapping regions were typically designated as being part of the Chalchihuites culture, while smaller sites were part of the Loma San Gabriel culture under the Kelley-Foster model for the development of these cultures. Hers (1989) disagreed with this model suggesting that rather than two distinct cultures, the size disparity among these sites was a factor of social class division. Using McGuire's perspective, these cultures can be seen as having a relational web that connected them to one another through cultural exchange of practices

while maintaining a class distinction between the elite, residing in prominent cultural centers attributed to the Chalchihuities culture, and the common folk, residing in the small hamlets and habitations typically attributed to the Loma San Gabriel culture. Keeping this perspective in mind, the archaeological records regarding the culture of the people who utilized La Cueva de los Muertos Chiquitos (CMC) is discussed herein as “the Loma San Gabriel”.

The Loma San Gabriel culture emerged during the Ceramic period in Mesoamerica between 1,200 and 1,400 years ago (Brooks et al., 1962; Foster, 1986). The culture occupied the present-day states of northwestern Durango and western Zacatecas in Mexico. This culture derived from the Los Caracoles culture that inhabited Durango during the archaic period (Spence, 1971; Phillips, 1989). The Loma San Gabriel culture was principally defined by J. Charles Kelley and his students following excavations of sites in northern Durango near Villa Ocampo and in the El Zape area (Kelley 1956, 1971; Foster, 1985). The culture has been described as a frontier group that relied on a mixed pattern of hunting-gathering and early agricultural production (primarily beans and maize) for their subsistence. The culture emerged at the end of the archaic period and persisted into the early protohistoric period (Riley and Winters, 1963; Kelley, 1971; Foster, 1985).

The Loma San Gabriel existed as a distinct culture before the intrusion of the Mesoamerican Chalchihuities around A.D. 200 (Kelley, 1971). Kelley describes Guadiana Branch Chalchihuities sites that were established within Loma San Gabriel territories sometime between A.D. 900 and 1,000 (Phillips, 1989). As suggested by Hers (1989), a cultural dichotomy between the Loma San Gabriel and the Chalchihuities as defined by

the Kelley-Foster model could have existed between the commoners (formerly identified as the Loma San Gabriel) and the ruling elite (formerly identified as the Chalchihuites). Whether distinguished as their own, separate culture or as the lower class of a larger culture, the Loma San Gabriel (as defined by the Kelley-Foster model) disappear as a distinct culture within the archaeological record around A.D. 1450; however, it is possible that they were ancestral to the historic Tepehuan and Zacatecos (Riley and Winters, 1963; Kelley, 1971, Foster, 1986).

Loma San Gabriel sites are most frequently small villages and hamlets found on mesa tops, benches, or other elevated areas above permanent water sources and arable land, though some sites exist as rock shelters and cliff dwellings (caves). The preference for habitations that exist in elevated locations indicates that the Loma San Gabriel may have taken defensive positions into consideration when selecting occupation sites (Brand 1943; Brooks et al., 1962; Brooks and Brooks, 1978). The foundations of Loma San Gabriel houses were often comprised of cobble and slab stones that were either rectangular or sometimes circular in shape. The foundations are thought to have supported either wattle-and-daub or jacal superstructures (Foster, 2000). Some sites were constructed from large boulders, which may have had defensive functions, and some small-scale terracing has been observed in other sites. Structures such as altars and raised foundations are sometimes present, which may have had communal functions. Generally speaking, more formalized site structures are found in western Zacatecas, which is a core area of the Chalchihuite intrusions (Foster, 2000).

The material culture of the Loma San Gabriel consists of items produced within individual households for local uses. Foster (1984, 1985, 1986, 2000) reported that the

ceramic assemblage of the Loma San Gabriel is dominated by a type ranging in color from brown to orange to buff known as “Loma Plain”. Most of this culture’s ceramics are ollas with a variety of shapes and sizes, though bowls have also been infrequently recovered from Loma San Gabriel sites (Foster, 1984, 1985, 1986, 2000). There are several ceramic variants of Loma Plain, including Loma Textured, Loma Red, Loma White, and Chico Red-on-brown (Kelley, 1971).

The ground stone assemblage of the Loma San Gabriel includes stone balls, mauls, abrading stones, pestles, axes, manos, and matates. The chipped stone assemblage contains scrapers, bifaces, projectile points, and knives made from local rhyolites as well as cherts and obsidian. These tools seem to have been developed from influences of the Chalchihuites and of the Los Caracoles complex (Spence, 1971). Most implements exhibit little evidence of curation and likely didn’t cost the Loma San Gabriel a great deal of energy for production. The tools seem to have been made as they were needed and then quickly discarded. Loma San Gabriel sites have also revealed various beads and figurine fragments in addition to spindle whorls and sherd disks (Foster, 2000).

The Loma San Gabriel relied on both a hunting-gathering subsistence strategy and on agricultural production (Brooks et al., 1962; Foster, 1984, 2000). Archaeological evidence shows that these people grew various cultigens (beans, squash, and corn), while relying on seeds, succulents (yucca, agave, and cacti), mushrooms, berries, and hunted animals (including an array of small mammals, fish, deer, coyote, and mountain sheep) to supplement their diets (Brooks et al., 1962; Foster, 1986, 2000;). Hunting-gathering likely became especially prominent among these people during seasonal food shortages or at times with agricultural production was limited by environmental stresses, such as

drought (Foster, 2000). The most commonly recovered grinding implements from Loma San Gabriel sites are handstones and basin metates. Bedrock mortars have also been reported from several sites, though large pestles have yet to be recovered (Foster, 1986).

1.2 La Cueva de los Muertos Chiquitos

La Cueva de los Muertos Chiquitos (CMC) lies on the Río Sestín and is one of the most studied sites within the Rio Zape Valley of northern Durango, Mexico (Brooks and Brooks, 1978; Brooks et al., 1962; Foster 1984) (Figure 1.1). The Rio Zape Valley is located about 18.0 km SE of Guanaceví in Durango, Mexico. It houses a series of caves that were once home to the indigenous Loma San Gabriel (Brooks et al., 1962; Foster, 1986). The CMC site lies within a region that exists as a transition zone between the northern most edge of Mesoamerica, and the greater Southwest (Kelley, 1956, 1971; Brooks and Brooks, 1980).

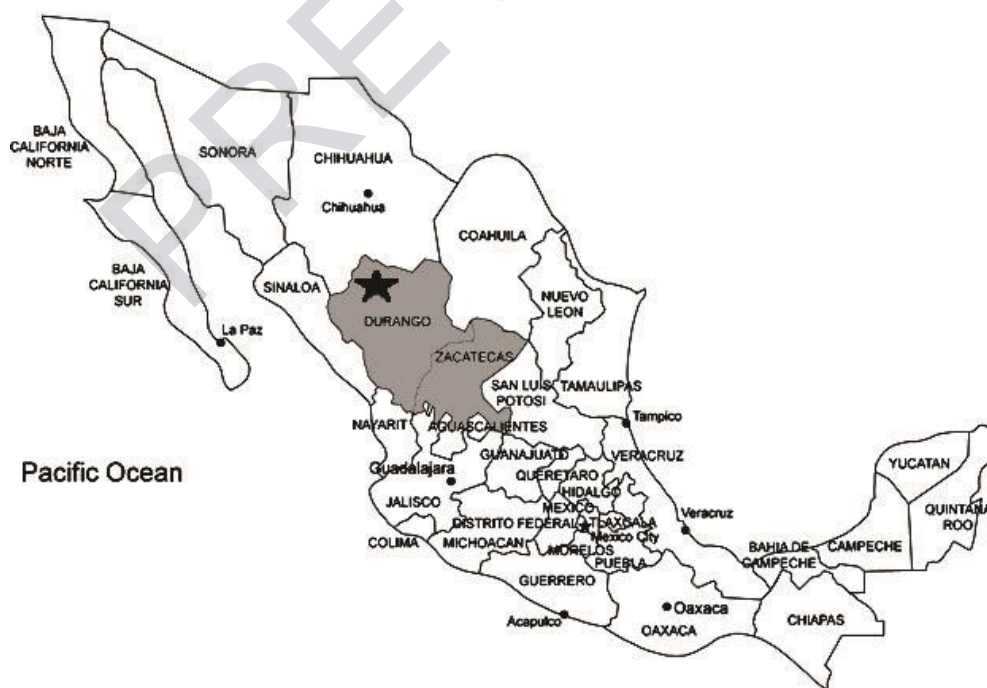


Figure 1.1. Map of present-day Mexico with shaded areas showing states containing Loma San Gabriel sites. Black star represents the region where CMC is located.

Excavations of CMC revealed the complete remains of 16 individuals as well as fragments of other individuals and coprolites (Brooks et al., 1962; Brooks and Brooks, 1978; Foster, 2000). Two adobe floors (Floor A and Floor B) covered multiple burials within the site. Archaeologists are unsure as to whether these floors were placed purposely to seal the burials or whether the floors were simply a result of later occupation within the site (Foster, 2000).

Floor A held the complete skeletons of six children that seem to have died close to the same time and were buried together. Fragments of an adult individual were also found beneath Floor A. Researchers speculate that these individuals may have been victims of an epidemic. Floor B housed the complete remains of eight children and a single adult alongside fragments of additional individuals. The children within this burial ranged in age from three months to one year in age. Stratigraphic positions indicate that Floor A and Floor B were created at different points in time (Foster, 2000).

Because the human remains were sealed beneath adobe floors, the site is ideal for the study of human parasites. In fact, CMC displays the highest recorded prevalence and greatest diversity of endoparasites ever recovered from an archaeological site (Jiménez et al., 2012). While bioturbation via small rodents and subterranean invertebrates could have disturbed these remains, the materials sealed beneath these floors were protected from larger scavengers, aerial insects, and other non-burrowing invertebrates.

1.3 The Known Pathoecology of CMC Parasitism

Jiménez and colleagues (2012) examined 36 coprolites from CMC and found evidence of *Echinostoma* sp., Hymenolepididae, *Dipylidium caninum*, *Enterobius vermicularis*, *Ancylostoma duodenale*, and *Trichuris trichiura*. The presence of these