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PRELIMINARY STUDY OF ANIMAL UTILIZATION DURING THE LATE PRECLASSIC AT EL MIRADOR, PETÉN

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This investigation presents the results of an analysis of almost 4000 remains of vertebrate and invertebrate animals at the site of El Mirador. This is a preliminary analysis and has been divided into three categories: the identification of species, the relative abundance among the various taxonomical groups in the collection, and the evaluation of the preservation impact together with the partiality in the collection of remains. However, although this information is of a preliminary character, it is possible to advance intriguing evidence about the patterns of subsistence and commerce during the Preclassic period. Results suggest that the residents of El Mirador made good use of the local habitat as well as of the terrestrial fauna of large size, instead of consuming middle-sized water animals, which were the main focus of the diets of the first inhabitants in many other Preclassic sites. Even more interestingly, the analysis of artifacts and food products points to a wide extension of commerce of ornaments and foods since the earliest occupations in the Maya area. The animal remains of El Mirador were collected by Ray Matheny between 1980 and 1982, and have ever since been stored at the Museum of Peoples and Cultures at Brigham Young University. We were requested to examine these remains in 2001, and this is the first presentation of the results obtained.

The early excavations at El Mirador were focused on elite structures, particularly those of a monumental and ritual character. Even though a number of the special deposits were sifted through a sieve of 4mm of an inch, no finer sieves were used. Animal remains were hand-sorted and identified, by using the specimen collection of modern animals of the Environmental Archaeology Program of the Florida Museum of Natural History. More specialized identifications were accomplished by means of the Ornithology and Malacology collections present in that museum. The primary information collected from the sample includes quantification of specimens (known as Number of Identified Specimens, or NISP), quantification of Minimum Number of Individuals, or MNI, and total weights per taxonomical category. The information regarding characteristics of age and modification were also documented.

The results of both estimates (NISP and MNI) will be presented, because none of the two methods is the ideal one to quantify the amounts of relative abundance (Grayson 1984). The MNI estimates are based on the presence of paired or unique features related to age, sex and size of the features (Reitz and Wing 1999: 194-197). The MNI results are favored at the time of quantifying the relative abundance of animals

of different taxonomic categories that have different numbers of skeletal features (when comparing bivalves and turtles, for example).

TAPHONOMY AND BIAS

It is important to initiate this discussion about the fauna of El Mirador going over the possible sources of bias in these interpretations. Such bias sources include the process of preservation and storage of the collection, and the collecting methods used during the excavations. As we shall see now, the relatively small size of the sample reflects the bias imposed by the methods of collection used, and shows no bias for the degradation of the materials caused by time.

The remains of the vertebrate animals recovered at El Mirador are relatively well preserved, considering the condition of the highly acid deposits found in the Maya Lowlands. The absence of extreme erosion, of burning and rodents in the remains of these proveniences (Table 1), suggests that the majority of the remains at El Mirador were quickly buried after being deposited, perhaps through their incorporation in burial refills or in structures. However, preservation was not the same for all proveniences, and there where preservation was poor, the identification rates were limited. Over two thirds of the unidentified vertebrates came from deposits with a degree of erosion and fragmentation considerably higher than the one shown in the general average.

Modifications for the use of remains as artifacts were very rarely observed. However, many of the remains were heavily fragmented (be it for the intentional manufacture of artifacts and the extraction of marrow from the bones, or otherwise during the depositing process). This fragmentation means that many animal features in the sample could not be identified per taxonomic class. At the same time, large frequencies of long bones of mammals proved highly fragmented in all proveniences, and this hindered the identification of many of the fragments, no matter their class level. For this reason, despite the fact that in general terms the condition of preservation was good there was some bias, due to the heavily fragmented condition of the long bones, particularly of the long bones of mammals.

COLLECTION

The taxonomic composition of the faunal collection may have also been affected by the techniques used in collection, which involved the use of a trowel and of a thick-mesh strainer during the excavations. The absence of a methodology to sift with a fine-mesh strainer (1 or 2 mm), generally results in the absence or poor representation of young individuals or of animals of a smaller size, like fish, for example. This problem was stressed by Wing and Quitmyer (1985), who proved that the number of identified specimens was up to seven times higher at the time of comparing samples obtained through sifting with a fine-mesh strainer, as opposed to those recovered with the use of a thicker strainer.

This problem is emphasized with the comparison of flotation effects and the use of the fine-mesh strainer in three Maya sites of the Lowlands (Figure 1). This comparison between the remains collected with a trowel *versus* deposits recovered with a thin-mesh strainer clearly illustrates an improved quality of over 50% in the remains recovered using fine-mesh sieves (Emery 2004). 60% to 90% of the small taxonomic classifications of these collections resulted from the samples that were sifted with thin-mesh strainers and/or were obtained through flotation. Therefore, should this methodology not have been used in these three sites, the remains would not have been found. Thus, it is possible that the largest source of bias in the zoo-archaeological sample of El Mirador was the result of the collecting methods and not of the methods used for preservation.

RESULTS

Despite the biases previously shown, several significant conclusions may be made based on this preliminary analysis of the animal remains recovered at El Mirador. Particularly, and in the first place, emphasis at El Mirador in regard to terrestrial fauna of a large size and local resources should be discussed, to further explore the economy and commerce of animal products at the site.

TAXONOMIC COMPOSITION OF THE COLLECTION

We shall now describe the collection of El Mirador in terms of the species represented. The collection includes 3958 identifiable specimens which represent a minimum of 134 individuals and 42 taxonomic classifications. At the time of estimating the amount per number of specimens, it is possible to observe that mammals are the most frequently identified animals of the collection (Table 2). They are followed in frequency by reptiles and birds, and the last place corresponds to fresh water and sea mollusks. However, in re-estimating by number of individuals, and although mammals are still the more frequent ones, fresh water and sea mollusks are almost as common as reptiles and birds.

However, the interesting data come from a detailed discussion of the species in the collection. In overall terms, the animals more commonly identified at El Mirador (once again through the use of NISP), are white-tailed deer *(Odocoileus virginianus)*, goats *(Mazama Americana)*, peccaries *(Tayassu spp.)*, domestic dogs *(Canis familiares)* and several turtle species. Other animal remains, specifically reptiles, include an alligator and a colubrid snake. Bird remains are not too common in the collection of El Mirador, probably because their fragile bones do not preserve adequately in archaeological collections. However, all bird species identified were chicken of a considerable size and included turkeys *(Maleagris* spp.), pheasants *(Crax rubra)* and chachalacas *(Ortalis vetula)*.

In general, mammals were the most represented species, and besides deer, peccaries and dogs, remains of tacuacines *(Didelphis* spp.), armadillos *(Dasypus novemcinctus)*, rabbits *(Silvilagus* spp.), squirrels *(Sciuridae)*, pacas *(Agouti paca*), agoutis *(Dasyproctca punctata)* and big cats were also collected. The well preserved

remains of two rats *(Oyotylomy phyllotis)* are also present in the sample, but this species is probably an intrusive one.

Dogs were an animal resource that deserves to be underlined. In El Mirador, domestic dogs are represented in the sample mainly by their teeth and mandible fragments, though several long bones were also collected. The occurrence of a cut mark on the distal end of a tibia indicates slaughtering activities and probably consumption, suggesting that the residents of El Mirador enjoyed dog meat, just like the rest of the Preclassic Maya (Clutton-Brock and Hammond 1994).

The predominance of artiodactyls of a large size in the sample, such as deer and peccaries, calls for more investigation. A distribution analysis of the skeletal features of these important species will be presented, to examine the slaughtering patterns and food standards. This is achieved through the comparison of the distribution of skeletal features observed with the optimum distributions based on the number of identifiable features of a complete artiodactyle skeleton (Table 3). As shown in the table, the fragments of the anterior and posterior extremities are present in higher proportions than the preceding ones, while cranial, axial and distal features seem to be poorly represented. The results point to the dietary use of these species, with slaughtering activities probably occurring outside the proveniences represented in this sample; this would also suggest that even at such an early stage, elite groups had a preferential access to larger packs of meat and to their favorite species.

This taxonomic and skeletal information comes to stress two important observations. First, with the remarkable exception of sea remains (discussed below), the majority of the fauna was available in the local habitat. The distribution of species stresses as well that the habitats used were mainly terrestrial rather than aquatic. The place where water species were more frequently found was in the swamp located in the vicinities of the site center. Besides, the selection of species emphasized fauna of a large size, with artiodactyls among the mammals, and gallinaceous among the birds. Although the collections of Preclassic animal remains include, as a rule, a great quantity of water resources or middle size fauna (Lange 1971; Carr 1986; Pohl 1994; Fradkin and Carr 2003), the collection from El Mirador resembles those of Late Classic sites, with a larger proportion of remains of large terrestrial animals.

ECONOMY, COMMERCE, AND ANIMAL PRODUCTS

Additional interesting information originates in a minute study of mollusk and fish remains. In fact, fish constitute a very small proportion of the animal remains found at the site, probably a consequence of the techniques of collection used. Despite the fact that there is an abundance of fresh water resources available, such as lakes and rivers in the vicinities, the only fish species identified in the sample corresponds to the parrotfish *(Sparisoma* spp.), a sea species of the Atlantic. This foreign species clearly shows the important role that El Mirador played in the trade networks of the coast. Even though it is common to identify ocean resources in Preclassic sites, the occurrence of sea fish remains at El Mirador is important because of the great distance between the site and the coast and other major navigable routes.

Fish were not the sole ocean species found at El Mirador. Several species of sea mollusks were collected, including *Crassostrea virginica, Spondylus* spp., *Strombus* spp., *Scaphopoda,* and *Conus spurious.* All these species suggest an exchange of animal resources between the coast (the Atlantic, mainly), and the lower inlands. However, a large articulated specimen, the *Spondylus* from the Pacific Ocean (cf. *calcifer*), is also present in the collection, and its occurrence in El Mirador, therefore, points to the introduction of coastal animal resources to the site from multiple directions, suggesting animal commerce in both coasts and elsewhere.

If we consider the non-local sea shells found at the site, it should not come as a surprise that many of the remains show evidence of modification for a subsequent use as artifacts. The *Spondylus* artifacts include a small pink bead and two almost complete bivalves, polished and perforated twice close to their axis. Other shell artifacts include a sea shell pendant in the shape of a tear, three rectangular and polished shell splines (possibly *Strombus* spp.) with perforations at both ends, and a conical shell with a groove at the base of the opening. The most important item was a small square of shell which was added a cut mark. This was intentionally fractured and then polished, perhaps in the elaboration of other artifacts. This fragment of production residue suggests that sea products arrived unmodified to El Mirador, for their final elaboration as artifacts to be used by the local elite. This hypothesis is supported by the amount of complete or modified sea shells present in the sample.

The exotic sea shells were not the sole animal product used in the elaboration of artifacts. The most common artifact modifications among the remains of vertebrate animals were the grooves and the intentional fractures in the terminals of the long bones. The outer surfaces of many of the tubes in the long bones were also polished, and in one case, covered with black paint. The majority of the long bones come from middle sized and big mammals, but there is an example of the *tibiatarsus* of a big bird (a turkey, possibly), that was also intentionally broken in the extremes, and its outer surface polished.

Other remains of vertebrate animals modified to create artifacts include one peccary tooth with a perforation through its root, one fragment of a perforated turtle carapace (probably a part of a drum or a maraca), and a small cylindrical bead with thin grooves cut around its circumference at each end. The occurrence of both artifacts together with manufacturing debitage, shows that the residents of El Mirador were involved in the carving of bones and shells for the creation of tools and adornments.

DISCUSSION

The faunal collection of El Mirador provides information about subsistence, the use of animal parts and trade in the Central Lowlands during the Late Preclassic period.

SUBSISTENCE

The results point to an intensive use of terrestrial mammals of a large size, such as deer *(Odocoileus virginianus)*, goats *(Mazama Americana)*, and peccaries *(Tayassu*

spp.). Domestic dogs were also present at the site, and they even may have been eaten, together with a variety of other terrestrial mammals of a medium and small size. Certain gallinaceous birds, like turkeys and pheasants *(Crax rubra)* were also consistent with this pattern of mostly terrestrial subsistence. The exploitation of the fresh water habitat is indicated in a lesser degree by the species contained in the collection of El Mirador, with certain types of snails and several species of water turtles. However, these species preferred primarily the concentrations of enclosed waters and were probably species from the local swamps.

The dietary patterns of the first Maya have been described as focused on their rivers and lakes, and it has been posited that this focus was a cultural preference associated with the Preclassic Maya (Pohl 1994). However, the city of El Mirador was not located anywhere near an aquatic habitat, but on the edge of a swamp. The patterns of food selection and the use of the habitat associated with these foods are clearly terrestrial at this site, a pattern much more similar to those observed in Late Classic sites. These observations suggest, in fact, that the water diet of the Preclassic period, as defined by researchers like Pohl, were in fact one function of the continued approach to the exploitation of the local habitat, a pattern of selection that at El Mirador was to favour terrestrial fauna of a large size and that was initiated with the first cities established in the Maya world.

ECONOMY AND COMMERCE

Another interesting issue approached by this analysis of the animal remains from El Mirador has to do with the extension of commerce and exchange of animal products in Preclassic times. It is presumed that in these earlier stages of the growth of civilization, the commerce of animal products was rather limited, both if they were as food or as raw materials for manufactures. However, evidence, once again, points to a different conclusion. The occurrence of abundant sea species, including fish and shells (both from the Pacific and the Atlantic), suggests wide trading routes and a commerce of animal products and probably as well of food, since very early in time.

The access to animal resources, both from direct exploitation or through commerce, is evident by the presence of parrotfish *(Sparisoma* spp.) and of multiple species of sea mollusks. The parrotfish may have been consumed on the spot, and if it was, it was probably consumed by the elite; this pattern of use of exotic foods by elite groups as a symbol of wealth and status is clearly defined in the Late Classic period, and may have been common also in Preclassic times. The presence of almost complete specimens of marine shells from both coasts is fascinating, and outlines the importance of the wide trading connections of the earlier elites of the place, underlining the significance of El Mirador in the commerce interactions from north to south and from east to west, between the coasts and the interior of the Maya Lowlands (Sharer 1994:458). However, evidence also suggests that some shells were imported in one piece, possibly for the elaboration of artifacts or ornaments.

CONCLUSIONS

To conclude, the preliminary results of the zoo-archaeological study at El Mirador show an intense exploitation of terrestrial mammal species of a large size, such as deer and peccary, with the additional use of domesticated dogs and big gallinaceous birds. Fresh water habitats were not significantly used, alike other Preclassic sites. Despite the fact that El Mirador is located in the inlands of the territory, its inhabitants had access to the marine resources of both the Atlantic and the Pacific coast for raw materials to be uses in their craftworks, probably for the commodities themselves and possibly for consumption as well.

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TABLE 1

NATURAL AND ARTIFACTUAL MODIFICATION OF ANIMAL REMAINS AT EL MIRADOR

Type of Modification	NISP	%
Artifacts	**35**	**0.8**
Burning	**18**	**0.5**
Rodent marks	**5**	**01**

TABLE 2

TAXONOMIC FREQUENCY OF REMAINS IDENTIFIED AT EL MIRADOR

TAXA	NISP	%	MNI	%
Sea Mollusks*	19	1.0	10	19.2
Fresh Water Mollusks*	11	0.6	6	11.5
Fish	2	0.1	2	3.8
Amphibians	1	0.1	1	1.9
Reptiles	256	14.0	7	13.5
Birds	45	2.5	4	7.7
Mammals**	1500	81.8	22	42.3
TOTAL =	1834	100.0	52	100.0

* it does not include unidentified mollusks

** it does not include human remains

TABLE 3

OBSERVED *VERSUS* PREDICTED FREQUENCY OF THE SKELETAL FEATURES OF ARTIODACTYLES

Anatomic Region*	Observed	Predicted	Proportion Observed/Predicted
Cranium	**39.0**	**63**	**0.62**
Axial	**21.0**	**73**	**0.25**
Anterior limb	**21.0**	**8**	**2.63**
Posterior limb	**25.0**	**16**	**1.56**
Distal	**44.0**	**104**	**0.42**

*** Note:** Cranium = skull, mandible, teeth, horn; Axial = vertebrae, ribs; Anterior limb = scapula, humerus, cubitus, radius; Posterior limb: pelvis, sacrum, femur, tibia; Distal = carpus, tarsus, metacarpus, metatarsus, phalanx

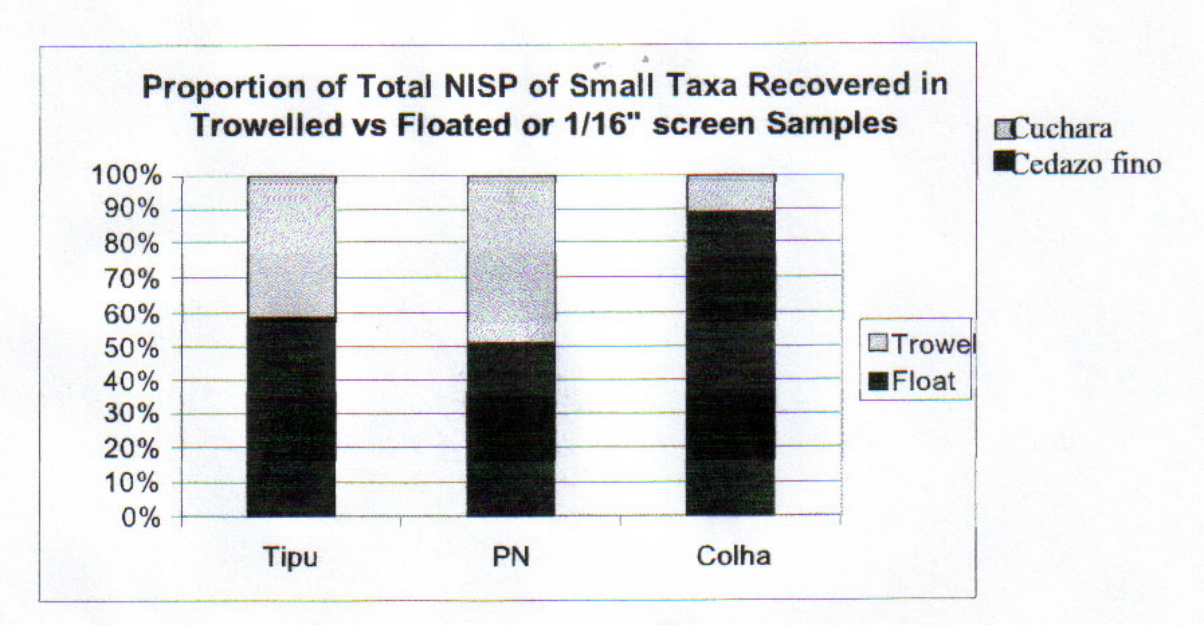

Figure 1. NISP proportion of small fauna recovered through toweling *versus* screen samples (PN = Piedras Negras).