

The Archaeology of Intensive Beekeeping in Postclassic Yucatán

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The long existence of beekeeping practices in Prehispanic Yucatán has been reported by a number of Maya scholars exploring the archaeological evidence of this activity from Preclassic to Postclassic times (for recent examples, see Batún Alpuche 2009; Bianco 2014; Dedrik et al. 2017; Žralka et al. 2018). Likewise, several Europeans described in 16th century accounts the taming of native bees and the production of honey and wax by skillful Maya beekeepers (De Landa 1966; Diaz del Castillo 1958; Fernandez de Oviedo 1853). This paper presents a summary of ancient Maya beekeeping, focusing on the evidence indicating that Postclassic (900-1518 C.E.) Maya beekeeping was not only a domestic practice, but a large-scale, organized activity. Following my research on the Island of Cozumel and other archaeological reports from the Yucatán east coast across from the island, I present evidence for a massive masonry system of land management primarily focused on beekeeping.

Key words: Maya beekeeping, Postclassic Maya, Yucatán East Coast, Maya Archaeology, Cozumel



The importance of stingless beekeeping in the Yucatán peninsula has been studied by ethnohistorians and ethnographers who provide us with enough published data to evaluate changes and continuity in this practice from contact times to present days. Early accounts noting the importance of beekeeping in Yucatán include Diego de Landa (Tozzer 1941: 193-194), Alonzo de Avila (Fernández de Oviedo 1853: T-III: 245-246), Ciudad Real (1976: T-II: 318-319), and Cogolludo (1957:173) among others. In addition, modern compilations of this practice have been done by Redfield and Villa Rojas (1934: 48-50, 116-117, 144-147), Villa Rojas (1945:57-58, 117), Poot and Bocara (1980:2-24), Weaver and Weaver (1981:7-19), Teran and Rasmussen, (1994:73-75, 265-274), Mayer (2009) and Brunius (1995:5-30). Also, detailed overviews on Prehispanic Maya beekeeping have been compiled by Crane (1999), Imre et.al. (2010) and Paris et.al. (2018).



The Late Postclassic (1250-1450 C.E.) Madrid Codex, of probable east coast Yucatec origin (Bricker and Vail 1997; Sharer 1995:603, Vail and Aveni 2004), depicts beekeeping activities and associated ceremonies (Ciaramella 2002:1-68; Cordan 1966; Vail 1994:37-68), indicating the importance of this industry long before the Spanish invasion. Yet, archaeological investigations have done little to clarify the nature and extent of beekeeping activities among the Prehispanic Maya.

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In this paper, I first summarize archaeological findings from the Island of Cozumel and from the Yucatán east coast which indicate the practice of beekeeping in a variety of architectural structures. I then present the description and distribution of structures discovered at the site of Buena

Vista, on southern Cozumel, and how these are related to a functionally unexplained system of stone walls (i.e., *albarradas*) previously reported at many sites on Cozumel and the Yucatán east coast (Batún-Alpuche 2009; Freidel and Leventhal 1975; Garber 1981; Goñi 1998; Perez 1994; Terrones 1994). Finally, I present ecological characteristics of Yucatán stingless bees and ecological factors considered by modern Maya beekeepers in establishing their apiaries. Ancient management of the different bee species and of the Yucatán environment provide a plausible explanation for the function of the albarrada network on Cozumel and for the different types of reported beekeeping structures.

First Encounter

The massive Island of Cozumel is situated 16 km off the northeastern coast of the Yucatán Peninsula. The domestication of bees to obtain honey and wax practiced on Cozumel in the 16th century amazed early European visitors, who documented extensive beekeeping practices (Juan Diaz in Garcia Icazbalceta 1980:286; Gomara 1985:31-32; Las Casas in Wagner 1942:50). Cozumel's importance as a beekeeping center is also mentioned in the Chilam Balam de Chumayel, which refers to Cozumel as the “first Apiary” (Mediz Bolio 1973:5). In addition, the 1582 town list of Yucatán mentions the existence of two main towns on the island – San Miguel Xamancab and Santa Maria Oycib – both of which bore their Maya toponyms after their new Spanish names. Xamancab could be translated as “the northern honey/bee”, whereas Oycib means “bee wax”, with both names clearly implying the importance of bees on the island.

Archaeological Evidence

One of the first systematic archaeological projects conducted in Quintana Roo, Mexico, and the first of this type on Cozumel, was directed by William Rathje and Jeremy Sabloff from 1972 to 1973 (Freidel and Sabloff 1984; Rathje and Sabloff 1973; Sabloff and Rathje 1975). Among the strangest objects found at every Cozumel site explored by this project were 255 limestone and coral disks ranging from 10-15 cm in diameter, which were mainly found at surface level inside circular stone structures ranging from 5-15 m in diameter (Freidel and Leventhal 1975:69). A detailed analysis of these artifacts by Wallace (1978) interpreted these disks as stone plugs used in hollow logs functioning as bee hives similar to those described in ethnographic and historical accounts of beekeeping in Yucatán (Freidel and Sabloff 1984:33-34; Wallace 197; Figures 1 and 2).

Since Wallace's report, later archaeological research on the east coast has reported more of these stone disks, but in association with a variety of structures. In order to illustrate the range of these purported apiaries, I summarize relevant data from projects led at Cozumel, Punta Piedra, Xamanha, Cerros, and Chan Chen.

The Island of Cozumel

Occupation on the island has been dated as beginning in the Early Classic (300/400-600 C.E.; phases known as Litoral Cochuah and Peten Provincial) with a constant development during the Late Classic (600-900 C.E.; phases known as Ribera Cehpech and San Gervasio) and Early Postclassic (900-1200 C.E.; phases known as Arrecife-Sotuta-Hocaba and Chichen Provincial), and an apogee during the Late Postclassic (1200-1650 C.E.; phases known as Costa-Tases and Costa Oriental Cozumel; Peraza 1993; Vargas 1992). Of the aforementioned 255 Cozumel stone disks, 63% were collected at two sites: Aguada Grande (n=73) on the northern side of the island and Buena Vista (n=87) on the southern side. Stone disks were principally found at surface level inside dry-laid masonry, walled circular structures, of a maximum observed height of 1.5 m. These structures were composed of inner and outer retaining, 1 m-thick walls built with roughly shaped limestone blocks and a core of rubble and gravel, directly on the bedrock (Freidel and Leventhal 1975:69). In some cases, they were observed to have a low parapet running around the outside, about 0.5 m above ground level (Freidel and Sabloff 1984:33). These circular structures were found isolated or in groups of two or three, sometimes next to other structures like rectangular platforms, half circles, straight walls, and cenotes. In addition, some of these circular structures featured an altar-like platform in their center (Freidel and Leventhal 1975:69), and sometimes associated straight walls with niches. Notably, a sizeable sample of Postclassic censer sherds was collected near one of these niches from Aguada Grande (Freidel and Sabloff, 1984:33).

During the 1980-1981 archaeological work conducted on Cozumel by INAH (Instituto Nacional de Antropología e Historia), under the direction of Fernando Robles (Robles et al. 1986a, 1986b), similar circular structures were found in San Gervasio. These circular structures were in average 2 m-wide and were subdivided into four types: a) circular hollow enclosed; b) circular hollow with open entrance; c) circular hollow with adjacent small room; and d) circular enclosed with central altar (Sierra 1991:110-115); (Figure 3).



Figure 1. Contemporary Yucatec Apiary of stingless *Melipona* bee, showing the use of stone disks plugging tree log hives (photo by the author).

Rancho Ina and Punta Piedra

Both Rancho Ina and Punta Piedra are located on the east coast of Yucatán across from Cozumel and their major period of occupation is dated to the Late Postclassic. As part of a long INAH project (1981-1985 and 1987-1991), archaeological work at these two sites was reported by Enrique Terrones (1990, 1994), who documented finding stone disks in association with non-circular structures. These structures consist of stone alignments (i.e., dry-masonry walls) of ca. 1-1.2 m in width, 1 m in height, and 3-20 m in length, and are sometimes shaped like of squares open on one side. These structures lie directly on the bedrock and were never found atop platforms; they are sometimes associated with domestic platforms and cenotes, and are either located inside walled lots or form part of the boundary lots. In addition, Terrones (1994:53-55) reported finding a considerable number of stone disks in his excavations conducted on the great wall of Tulum.

Xamanha (Playa del Carmen)

Xamanha is located on the east coast of Yucatán, north of Punta Piedra. Xamanha was heavily populated during the Early Classic, but suffered a decline in population during the Late Classic and Early Postclassic, only to reach its maximum occupation during the Late Postclassic (Perez 1994:19, 211-213). INAH conducted archaeological research there from 1985 to 1987, directed by Carlos Silva R., and from 1991 to 1992, directed by Concepción Hernandez, producing a complete

site map and a great sample of excavated structures. The site's Group R and Group S, located 1 km inland, were both reported to feature Cozumel-style circular structures (Structures R-3 and S-2). Structure R-3 has a diameter of 7 m and is adjacent to a 10 m-long albarrada, whereas Structure S-2 has a diameter of 6 m and is adjacent to a 14 m-long albarrada (Silva and Hernandez 1991:73-74). Further excavation in Group R showed that it was actually composed of two wall-enclosed lots, one containing the isolated Structure R-3 and the other containing four structures: a stone circle of ca. 5.5 m in diameter, a rectangular platform measuring ca. 8 x 5 m, and two linear walls (similar to those reported by Terrones) of ca. 8 m and 9 m in length. Excavation in all these structures yielded an important concentration of over 200 stone disks (Perez 1994: fig 67; also see Goñi 1998).

Chan Chen and Cerros

Chan Chen is a minor center located 7 km northwest of Corozal and Cerros is located on the southern shore of the Corozal Bay (both sites are located in Northern Belize). Chan Chen was mapped and excavated by Raymond Sidrys (1983) in 1974, whereas Cerros was excavated by David Freidel (1977, 1979) from 1974 to 1979. Stone disks were reported at both sites. At Cerros, 101 burned disks were found in association with the vestiges of a Late Preclassic (300 B.C.E. - 300 C.E.) termination ritual – i.e., a ceremonial setting – which means they were not found in a utilitarian context (Garber 1981:67-68).

At Chan Chen, excavations in two structures from Group F revealed a good number of stone disks (Sidrys 1983:92-106). The first is Structure F-4, a 1 m-tall, 7 x 10 m rectangular platform located in the center of Group F. Excavations in Structure F-4 uncovered 33 limestone disks at 25-45 cm below surface, above a sealed thick plaza floor associated with Early Classic and Late Preclassic material. Interestingly, several Late Postclassic censer sherds of a possible representation of the



Figure 2. Archaeological Stone disks found in Buena Vista, Cozumel (photo by the author)⁴



Figure 3. Prehispanic circular apiary found in Buena Vista, Cozumel (photo by the author).

Bee God Ah Mucencab (a.k.a. the diving god) were found on the surface directly above these stone disks (Sidrys 1983:250). A second deposit of two stone disks in association with more Ah Mucencab censer sherds was found in a small Late Postclassic shrine located in the northwest section of Group F. This shrine was a 1.5 x 1.2 m rectangular structure formed by 28-cm tall limestone blocks. In addition to the stone-disks, a cache consisting of a large tulip shell (*Fasciolaria tulipa*) and a barrel-shaped jade bead (2.2 cm in length, 1.4 cm in diameter) was found in this shrine, next to both its interior southern wall and a barrel-shaped stone (31 cm in height, 18-21 cm in diameter).

Buena Vista Cozumel

The site of Buena Vista is located 1.5 km inland from the southeastern coast of Cozumel (Figure 4). During my doctoral dissertation work, I directed an archaeological team which surveyed and mapped a 5 km² area surrounding the site core of Buena Vista. This survey identified a mosaic of micro-environmental zones related to the island's variable karstic topography and a large network of albarradas and circular structures.

The albarradas and circular structures in Buena Vista are not homogeneous. Interestingly, there are direct correlations between the different forms and construction techniques of these architectural features and the microenvironmental zones where they were built. Albarradas were probably used in the site not solely as property boundaries but also to enhance soil properties and to plant selected species. The circular structures present a variety of sizes and characteristics indicating different functions, also in direct relation with their micro-environmental context (Batún-Alpuche 2003, 2009). Below, I present formal and contextual evidence indicating that the Buena Vista circular and linear stone structures were Prehispanic apiaries.

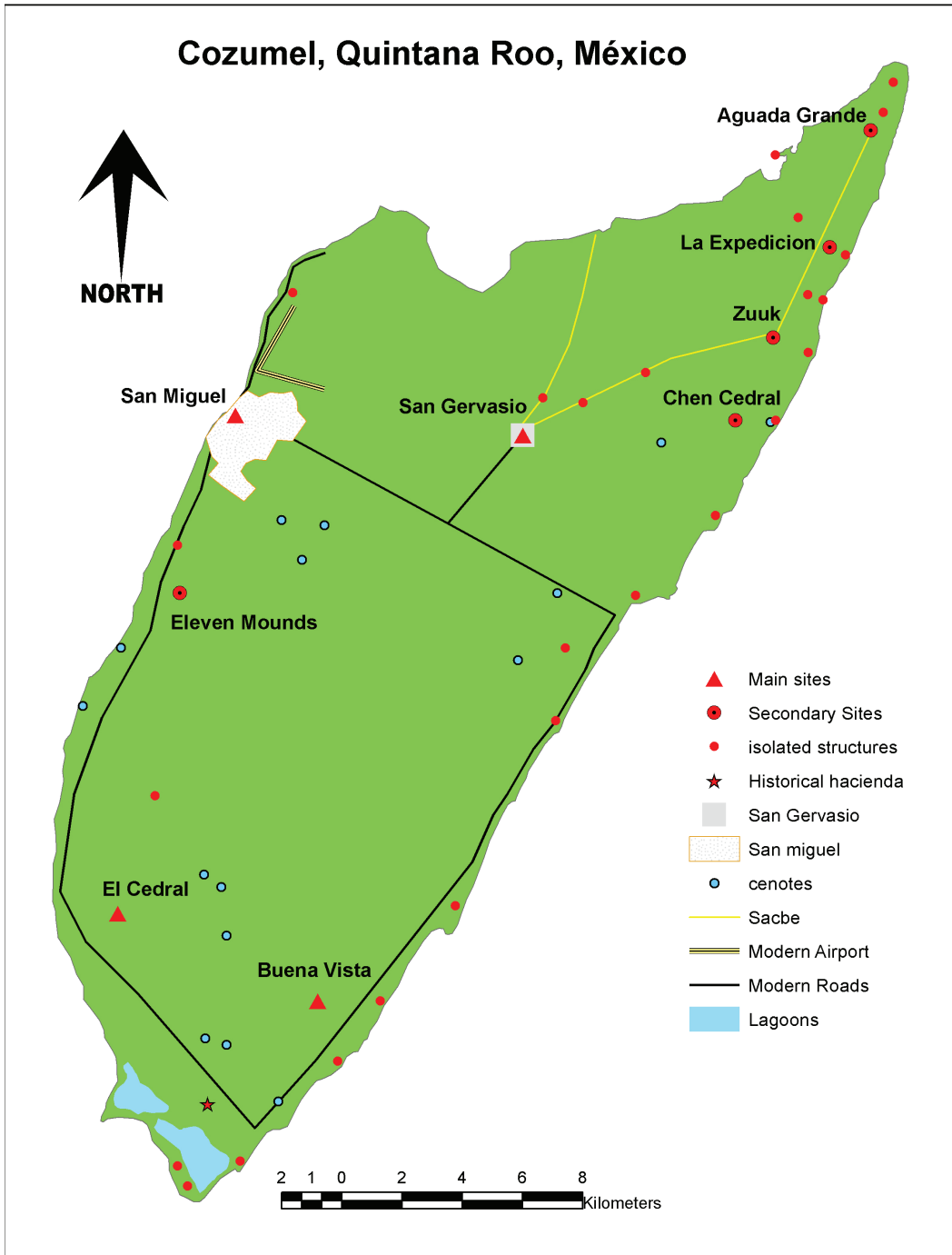


Figure 4. Map of the island Of Cozumel showing archeological sites (map by the author).

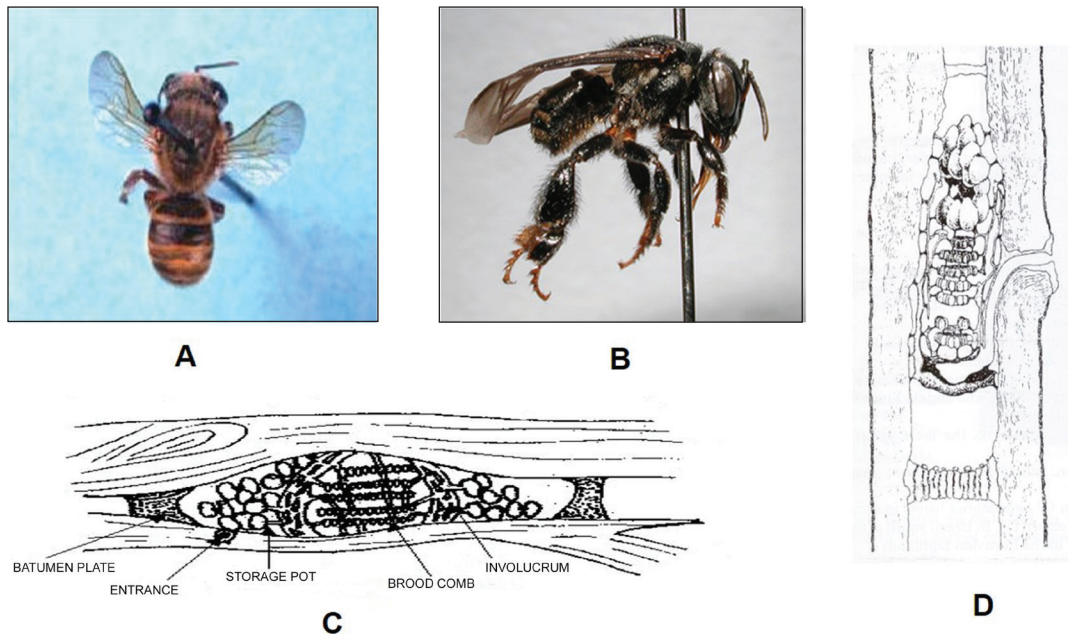


Figure 5. Two Yucatan Stingless Bee Species and their Nest Characteristics: A) Scaptotrigona, B) Melipona Beecheii, C) Melipona Beecheii Nest, D) Scaptotrigona Nest (illustration by the author).

1) *Circular Apiaries*. Circular apiaries correspond to the types described above for San Gervasio (Sierra 1991:110-115), but found in a greater quantity. Seven of these structures – circular hollow enclosed – were identified in the site-core, all of which were built adjacent to albarradas. Outside of the site-core, clusters of four to seven similar structures were found near cenotes. Some of these presented vestiges of an altar-like feature in their center that seems to have been covered with stucco and one or two barrel-shape stones like the one found at the Chan Chen shrine (Sidrys 1983:104).

2) *Half Circles*. Half circles are similar to structures from Punta Piedra and Rancho Inah described above (Terrones 1994:53), with the difference that the Buena Vista structures have rounded corners, and that sometimes a dry-masonry wall fronts the open side of the circle. One of these half circles was also attached to a large platform.

3) *Niched Walls*. Niched walls are sections of dry-laid stone walls measuring in average 1.5-2.0 m in width and 1.0-1.5 in height. Some sections of these walls also feature parapets of ca. 1 m in height and in width, which have been interpreted as walking spaces, or *andadores*. Some of these walls feature square, ca. 1 m-wide niches built with stone boulders and slabs. There is no indication for the use of these niches as burials, crypts, or altars; hence, these niches have tentatively been interpreted as beehive shelters.

Most of the structures mentioned above are distributed along a line of ridges running north-east-southwest along the island, following the coast line, and located 1.5 km inland at an elevation of roughly of 10-15 m above sea level.

Stingless Bees in the Yucatán Peninsula

Meliponini and Trigonini (family *Apidae*, subfamily *Meliponinae*) are the principal species of stingless bees domesticated in Mesoamerica. A recent study in central Quintana Roo reported the presence of two species of Meliponini including *Melipona beecheii* (*Colecab* or *XunanCab* [lady bee], or *Abeja Real*), and thirteen species of **Trigonini** including the following 7 genera: *Trigona*, ***Scaptotrigona***, *Nannotrigona*, *Partamona*, *Lestrimelitta*, ***Trigonisca*** and *Plebia* (Roubik et al. 1990, Roubik, 1992), with ***Trigona*** of the subgenera *fulviventris* and *Fuscipennis* as the most abundant in the area (Roubik 1992; Roubik et al. 1990, cited in Cairns 2002:17).

Meliponini, the traditional Yucatán tribe of stingless bees, are kept in hollow log hives piled horizontally inside an open-wall bee house, as described in the colonial reports and ethnographies cited above. On the other hand, Trigonas species have been described as wild bees tamed occasionally in hollow logs hanging under the palm leaf eaves of houses in Chan Kom (Redfield and Villa Rojas 1934:49). Another Trigonini genus present in Yucatán is the *Scaptotrigona*, for which we have no early local descriptions of domestication. Trigonini was, however, intensively domesticated in highland Mexico, but always in hives positioned vertically. In her work in eastern Quintana Roo, Cairns (2002:36) found *Scaptotrigona* as one of the domesticated bee species still kept in hollow logs by traditional Maya beekeepers.

The difference in hive position for keeping these species has an ecological explanation: Meliponas and *Scaptotrigonas* build differently shaped nests – whereas Meliponas build horizontal nests, *Scaptotrigonas* build vertical ones. This difference is explained as an evolutionary adaptation of *Scaptotrigonas* to cooler latitudes: whereas Meliponas are better adapted and only inhabit tropical climates, Trigonas are found in both tropical and colder climates (Crane 1983:115-116).

Villa Rojas (1945:58) makes note of the possible domestication of these two species in Yucatán using the same type of hollow logs placed in different positions: “[...] certain varieties of wild bees [...] are raised in separate hives and provide honey of good quality. The hives of these wild bees are kept in a vertical position and those of the others (Meliponas) in a horizontal position...” (Villa Rojas 1945:58; Figure 5).

Forest Management and Tolche Bee Gardens

The management of forests by selection of useful species, elimination of others, introduction of useful species from other areas, and protection of the forest from fire and destructive uses is a common practice among modern Maya peasants, and is known in Yucatec Mayan as the *tolche* system (Flores and Ek 1983). As a primary characteristic, *tolche* assign Maya names to different sizes and forms of forested belts surrounding the *milpa* (agricultural fields) or to the different stages of forest regeneration elsewhere (Gomez-Pompa 1991:338).

Gomez-Pompa and colleagues (1987) interviewed contemporary Maya peasants about the albarradas crosscutting the eastern Yucatán forest and found that they knew these albarradas as *pet kots*; where *pet* refers to “a space in the milpa where other crops are planted” and *kot* means “albarrada”. The researchers were told that these areas were made by their ancestors for the protection and cultivation of useful trees (Gomez-Pompa et al. 1987:10).

Recent studies on the Yucatán phenology (i.e., plants flowering cycle) and its relation with

beekeeping and the honey production cycle (Chemas and Rico 1991; Porter, 2001; also see Ewell and Merrill-Sands 1987:95-129 for the milpa-beekeeping relation), showed that Maya beekeepers have a specialized knowledge of the local phenology and seek to either locate their apiaries near selected plant species or to plant honey-flowering species near their apiaries. When modern beekeepers select appropriate places for new apiaries, the following ecological factors are deemed crucial: a) the active radius of bees (500-600 m for stingless bees), whereas there should be no other apiary in this radius; b) year-round flowering, whereas a mixture of stages of forest regeneration is ideal because different species flower at different times of the year; c) a permanent water source; and d) the area surrounding the apiary should not be heavily bushed nor yield thick trunks, because the queen could crash and die during the nuptial flight (Chemas and Rico 1991).

The Intensity of Beekeeping

This review of the archaeological data on architectural structures associated with stone disks indicative of beekeeping activities shows that a variety of buildings were used by Prehispanic Maya beekeepers. Although tentatively, all these structures have been identified as apiaries, with distinct shapes and associated features and artifacts pointing to specialized uses. These were probably related to the domestication of different bee species and/or other practices associated with beekeeping, such as beekeeping ceremonies, storage for bee products, workshops for the manufacture of stone disks, or family dwellings where a reduced number of beehives were kept hanging at the house eaves.

At Buena Vista, buildings with half-circular (i.e., half circles) and hollow circular architectural plans (i.e., circular apiaries) can be proposed as *bee houses*, where log beehives were kept. Circles with central shrines could be interpreted as special bee houses where offerings and bee ceremonies were performed. The presence of censer shrines in one of these buildings excavated in Aguada Grande, along with the Ah Mucencab fragments and barrel-shaped stones found in a similar altar in Chan Chen, contribute to this interpretation. In addition, the only complete censer representing Ah Mucencab, the Maya Bee God, was found on Cozumel (depicted on the nearby marginalia), providing more evidence for the location on the island of designated places of worship for this god.

Although there are fewer excavation data to prove their function, niched walls are here proposed as “bee bole walls.” Bee boles is a term for similar niches built into thick walls used to shelter beehives in some European countries, with uses also documented in Africa and the Near East (Crane 1983:117-162). While further excavations are necessary to clarify this, this interpretation provides a reasonable explanation for both the strange, unnecessary width of some field wall segments at Buena Vista and for the stone disks found along Tulum’s great wall. It is possible that most of the thick walls on Cozumel and at other sites had such recesses. In fact, the disorderly collapse of these walls may have been caused in part by the presence of these niches, making their identification difficult. Meanwhile, the lack of interest of early projects to excavate these thick walls found in other sites left us no comparative data to evaluate this possibility. This hypothesis is supported by the fact that some niches in walls associated with, or forming circular structures were reported by the 1972-73 expedition (Freidel and Sabloff 1984:33).

Landscape analysis of the location and distribution of beekeeping structures in Buena Vista

resulted in the discovery of a marked preference to locate apiaries in a land belt located 1-1.5 km inland above a ridge system extending northeast and southwest of the mapped area. Clusters of beekeeping structures are distributed at an average distance of 500 m and are surrounded by or form part of the albarrada system dividing the area in unevenly distributed plots ranging from 400-10,000 m².

Given the cluster patterns of beekeeping structures surrounded by albarradas at Buena Vista, I suggest that these lots worked as the *pet kots* described by Gomez-Pompa and colleagues (1987). These could have been used to cultivate maize milpas for 2-3 year periods and flowering species during fallow periods. Milpa rotations in different lots around apiaries left fallow lots at different stages of regeneration, following the *tolche* system, and provided bees with different flowering species year round. In addition, the proximity of regenerated forest to new fallow lots facilitated the pollination and regrowth of flowering plants within new fallow lots. Maize cultivation near apiaries is also important for beekeeping cycles since, right after the dry season, during the first rains when flowering species are scarce, pollen from tasseling maize is the primary stimulus for renewed colony development (Ewell and Merrill-Sands 1987:95-129). In sum, *pet kots* surrounding beekeeping structures probably worked in the past just as the modern *tolche* system does today. Buena Vista was probably located in the heart of the Bee Gardens of the Cozumel Mayas, a fact which is highlighted by the Prehispanic Maya names of the island's towns reported in 1570 – Xamancab to the north (i.e., “the north bee/honey”) and Oycib to the south (i.e., “bee wax”).



During the 1972-73 expedition, low altitude flights above Cozumel led archaeologists to distinguish the locations of its albarrada network. Walls were reported as covering most of the island's surface, except for the deep lagoons at the northern and southern ends, a zone extending 100-200 m along the coast, and a 2 km-wide region of extremely rough and rocky terrain between El Cedral and Buena Vista (Freidel and Sabloff 1984:86-87).

The island-wide albarrada network and masonry features imply a great amount of organized labor employed to build an extensive and intensive agrarian production system which remains poorly understood. In addition, sites interspersed over hundreds of km along the Yucatán east coast, across from Cozumel, display the same characteristics. This enormous system adds a colossal amount of land employed mainly for beekeeping activities, complementary agricultural tasks, and administration facilities. A system of land management of this scale likely reflects a centralized administration and the organization of intensive agrarian production with beekeeping as its main industry. How the Postclassic Maya from Cozumel and the Yucatán east coast were politically organized and how such an intensive agrarian system was administered merits further investigation.

More archaeological and agroecological studies are necessary to understand how postclassic Maya use their infield and outfield spaces to optimize beekeeping and other agrarian activities at *longue durée* (Batún 2009). The Yucatán karstic peninsula is a mosaic of land patches of variable productivity requiring skillful management to produce. Also, weather and rain precipitation,

needful for these activities, are variable and unpredictable. Nevertheless, Maya from Cozumel and the east coast transform their landscape into an intensive and extensive agrarian system we are just starting to reveal.

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