

5. SIXTH AND SEVENTH CENTURY VARIABILITY IN THE SOUTHERN MAYA LOWLANDS: CENTRALIZATION AND INTEGRATION AT CARACOL, BELIZE

Arlen F. Chase and Diane Z. Chase

University of Central Florida

While differences in environment, resources, and cultural development have been extensively contrasted for the highlands and lowlands of Mesoamerica, archaeological data have more recently been used to demonstrate that substantial cultural and environmental variability also existed throughout the lowland areas of prehistoric Mesoamerica. This environmental and cultural diversity could have played a role in the differential successes of individual polities during times of social and/or environmental stress. The archaeological records of Caracol, Belize and Tikal, Guatemala (both sites were the focus of extended archaeological projects) can be compared and contrasted to explore socio-political variations that could help explain their different developmental trajectories. The A.D. 536 event is viewed as one potential catalyst in the rise of Caracol, Belize between A.D. 562^{cal} and A.D. 680^{cal}.

Could global climatic events have impacted the course of Maya civilization? The answer must be "certainly." But world-wide or even hemispheric concerns are not a standard issue of concern in Maya studies. Considerations of change in Maya civilization are either painted in the broadest of strokes (Messenger 1990) or, more usually, in the smallest of lines. With few exceptions (Sharer 1991; Webster 1988), such expositions also do not usually emphasize contemporary variation in cultural trajectories. Environmental change has been considered a factor primarily in explanations for the eighth and ninth century onset of the "Classic Maya Collapse" (Adams 1973:23). Excessive ground clearing for farming has been viewed as causing soil exhaustion/erosion or leading to the dominance of savanna over forest (Cook 1921, Cooke 1931; Abrams and Rue 1988) and climate-triggered drought has been suggested as playing a role in the Maya collapse (Gunn and Adams 1981; Dahlin 1983; Hodell et al. 1995). With the exception of the "collapse," however, there has been little consideration of the differential impact of global phenomena on the diverse environmental and cultural landscape of the Maya lowlands.

Yet, advances have been made toward correcting this outlook. Americanists have long been concerned with identifying relationships among various prehistoric Mesoamerican cultures and their neighbors. The lowland Maya of all time periods have been viewed as receptors for outside cultural influences and impacts, which were sometimes thought to have been expressed locally as horizon styles (cf. Stone-Miller 1993). Proposed interactions have

had a major impact on the interpretation of Maya prehistory, although many of them have been called into question by more recent data (see, for example: the Maya Protoclassic development out of the "Q Complex" [Vaillant 1935]; Early Classic Teotihuacan, Mexico influence at Tikal, Guatemala [Sanders and Price 1968]; Terminal Classic Tula, Mexico relationships with Chichen-Itza, Mexico [Tozzer 1930, 1957]; and the extent and impact of the Postclassic "Mixteca-Puebla" style [Nicholson 1960]). Rathje (1971), in contrast, proposed a model that combined ideology and economy to explain the largely internal development of lowland Maya civilization. Wallerstein's (1974) world systems model introduced an interactive and more multi-directional approach that has been used to consider the interconnectedness of Mesoamerica as a whole. Following this perspective, a change in one part of the Mesoamerican system (whether highland Mexico or the Maya lowlands) could have consequences for, or be related to, events and processes elsewhere in the system. Such an inter-related approach has been applied to Classic warfare arenas (Chase and Chase 1992), Postclassic economics (Kepecs et al. 1994), and overall Mesoamerican development (Blanton et al. 1996). However, even these applications are predominantly within the realm of human endeavor rather than global environmental events. They are generally not concerned with worldwide patterns or phenomena. Yet, they could be.

The Maya thought of time and experience as being embedded in ever larger cycles - flowing from one into another - all working together; cyclical time influenced and conditioned Maya perceptions and actions (Puleston 1979; Chase 1991). Archaeological considerations of causality can be regarded as somewhat analogous to Maya views of cyclical time. Immediate causes of events are often superficially identified, but these events could be embedded in other, broader contexts that are not always immediately accessible or apparent. They are, therefore, not given due consideration. And, past perceptions and conclusions about causality cycle back and condition modern interpretations, assumptions, and models. Even though Maya archaeologists have made impressive strides in understanding the problems of using analogies and models for interpreting the past (Marcus 1995 and Issac 1996), once an immediate field - and possibly a regional arena - has been recognized, we may never look for or consider broader contexts. The A.D. 536

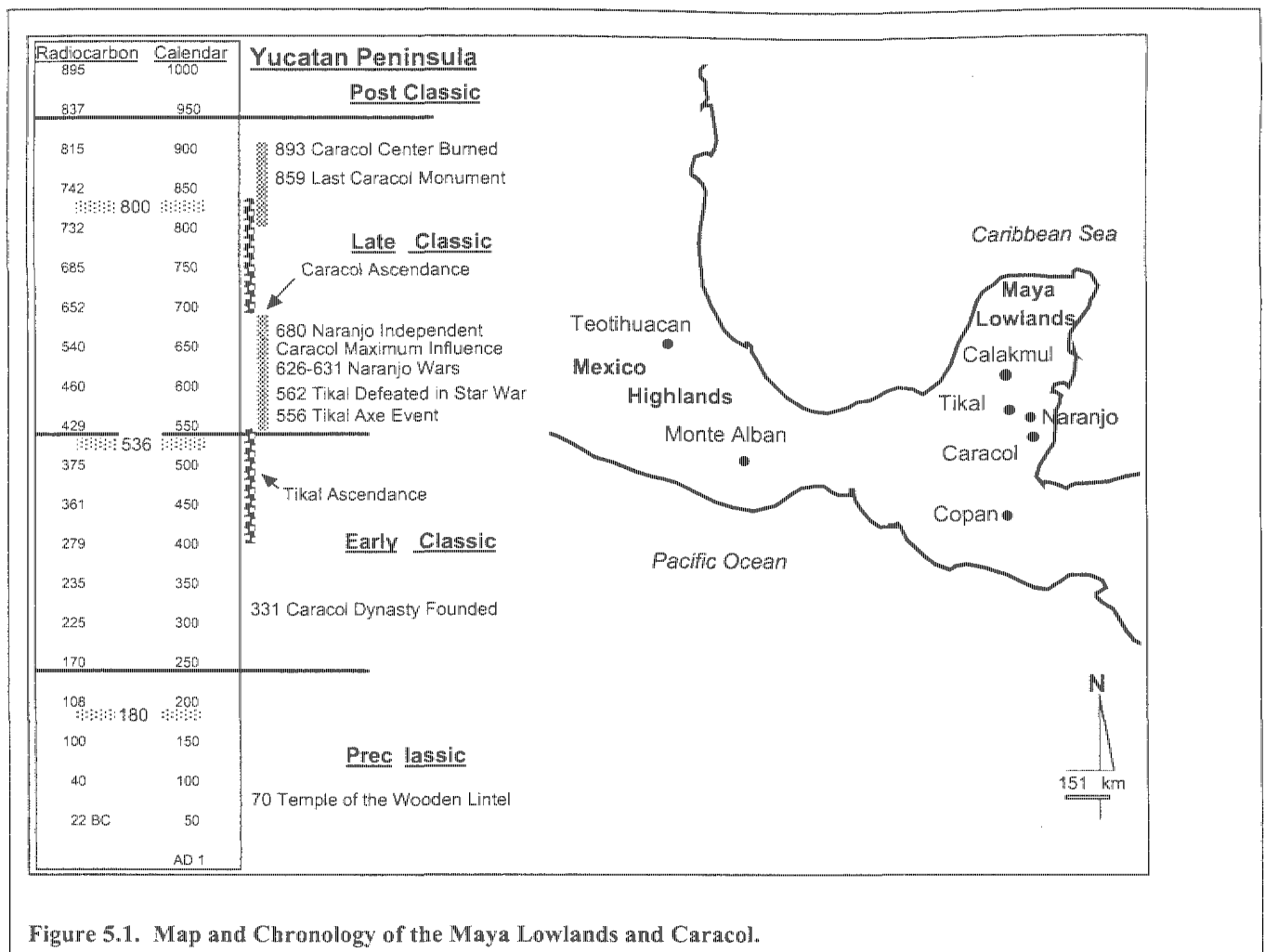


Figure 5.1. Map and Chronology of the Maya Lowlands and Caracol.

event (Baillie 1994; Gunn, this volume) may well be one of these broader contexts.

Evidence of Trouble in the Sixth Century Maya Lowlands

Tree-ring and historic writings reflect a climatic change from Ireland through Mediterranean Europe and into mainland China for the decade following the recognized, but still unexplained, A.D. 536 event. The entire northern hemisphere was seemingly affected. The areal extent and length of the associated climatic problems and other catastrophes that can be seen in the Eastern Hemisphere of A.D. 540^{cal} would indicate that the Western Hemisphere may well have experienced similar ill effects. And, indeed, the Maya area the mid-sixth century is one that was characterized by turmoil - an era that was once described by Gordon Willey (1974) as being a practice run for the eventual Maya collapse (Figure 5.1). This "hiatus" was initially viewed as a Maya "dark ages" and was identified by a decline in carved stone monument erection at Maya sites between the years A.D. 534^{cal} and A.D. 593^{cal} (Proskouriakoff 1950:111); this absence of monuments was especially evident and prolonged at Tikal, Guatemala, where a lack of carved stelae and altars spans from approximately A.D. 558^{cal} through A.D. 692^{cal}.

One current explanation ascribes this troubled era to an archaeologically documented shift in political fortunes between Tikal, Guatemala and Caracol, Belize (Chase 1991; Chase and Chase 1987:59-60; see Figure 5.1). A previous perspective held that the troubled times in the Maya lowlands resulted from the economic and political collapse of Teotihuacan in central Mexico (Rathje 1977; Willey 1982), but more recent (and later) dating of Teotihuacan "collapse" (Millon 1988; Diehl and Berlo 1989), as well as concerns over the priority of Teotihuacan versus Tikal developments (Demarest and Foias 1993; Laporte and Fialko 1990:58-59, 1995:66; Valdes 1995:85), have to a large extent disadvantaged this earlier model. An even broader context in which to interpret the political events that unfolded in the sixth century Maya lowlands could be in terms of differential responses to the disastrous world-wide climatic event of A.D. 536.

Many early models of Maya development were predicated on a largely uniform lowland people existing in a redundant environment (Meggers 1954; Sanders 1973); however, we now recognize a great amount of environmental diversity within the Maya lowlands (Sanders 1977; Rice 1993). It is evident as well that the lowland Maya area was characterized by substantial linguistic and cultural diversity (Chase et al. 1991; Schele and Freidel 1990:51; Sharer 1991; Webster 1988). And while this diversity has implications for

differential responses and development by the lowland Maya, these potential differences have been neither completely explicated nor explored, partially because of the difficulty in gathering appropriate data and formulating archaeological interpretations.

Likely a direct result of early Carnegie research strategies geared towards investigation of one key site for each time horizon (cf. Chase 1990:149), reconstructions of Maya history have often sequentially focused on a series of primate centers. In past paradigms this primate center was often

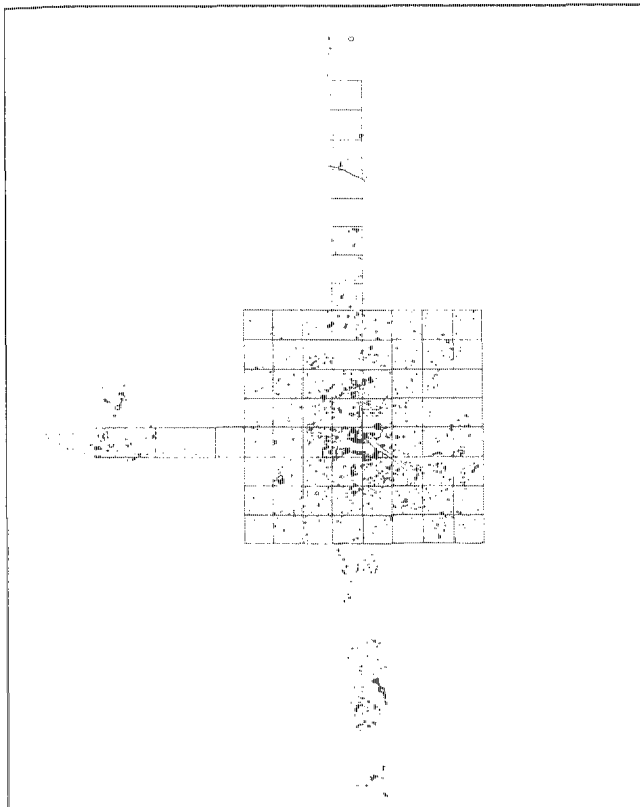


Figure 5.2. Map of Tikal, Guatemala, showing locations of architecture and causeways. This map combines information from Carr and Hazard (1961) and Puleston (1983) and is designed to be easily compared to the Caracol map. Each grid square represents 500 square meters. Grid is oriented to magnetic north, which is at the top of the page.

perceived as being Tikal, Guatemala (Figure 5.2) - the locus of long-term investigations by U.S. and Guatemalan researchers (Coe 1967; Coe and Haviland 1982; Laporte and Fialko 1990, 1995). By partial analogy to the Mexican examples, it was once assumed that Tikal's excavation would provide a framework for understanding the totality of development in the Southern Maya lowlands. We now know that this is not the case. Rather than having a single mega-site, the Maya area can claim at least half a dozen - and all provide amazingly different and diverse adaptations and developmental trajectories. Caracol, Belize (Figure 5.3) was one of these other Maya mega-sites.

Caracol, Belize

The site of Caracol is a massive settlement covering approximately 177 square kilometers and located in the western foothills of the Maya Mountains of Belize. While within the Southern Maya lowlands, Caracol is at an elevation of approximately 500 meters above sea level. In its proximity to the Maya Mountains, Caracol had easy access to many resources not found elsewhere in the Southern lowlands (Graham 1987). Caracol also receives heavier

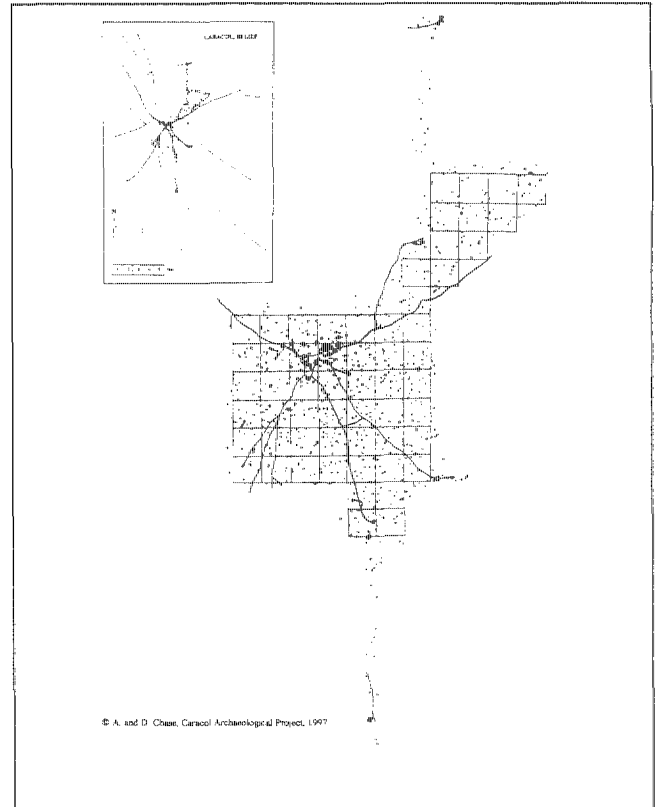


Figure 5.3. Map of Caracol, Belize, showing locations of architecture and causeways. Each grid square represents 500 square meters. Grid is oriented to magnetic north, which is at the top of the page. Inset shows the wider Caracol causeway system. Dashed lines indicate causeways visible on landsat imagery that have not yet been ground-checked.

rainfall amounts than nearby sites to its west and north (such as Tikal - Rice 1993: Fig. 4). Thus, micro-environmental variations may have been a factor in the ultimate development of Caracol's distinctive history - particularly with regard to the impact of the A.D. 536 event.

The University of Central Florida Caracol Archaeological Project began investigations at the site in 1983 and 1984. Formal field seasons started in 1985 and have continued on an annual basis. As a result of these research efforts, a substantial body of data has been collected that document the development of one of ancient Mesoamerica's largest urban centers (A. Chase and D. Chase 1987, in press; D. Chase and

A. Chase 1994). Of the 177 square kilometers that the city of Caracol occupied, approximately 17 square kilometers have been mapped by transit (see Figure 5.3). The central 16 square kilometers of this settlement manifest over 4,400 structures in 903 discrete groups. Extensive excavations have been undertaken in the site epicenter and in the surrounding core and indicate that the site's settlement history begins between B. C. 900 and 600^{ca} and ends by A.D. 1200^{ca}. During 14 seasons of work, 107 plaza groups (12 percent of the mapped sample) have been investigated - some in great detail. Of the 107 groups examined, 102 (95 percent) of them provided evidence of having been occupied at the height of Caracol's prominence in the Late Classic Period between A.D. 550^{ca} and 800^{ca}; the remainder of the investigated groups (n=5) represent contemporary (Late Classic Period) special function architectural complexes. At its peak in A.D. 650^{ca} the city itself consisted of over 36,000 structures in an estimated 9,000 plaza groups housing some 150,000 people. At this time Caracol was the primate center of a small empire that spread over approximately 12,000 square kilometers of the Southern Maya lowlands and exerted some type of control over a much larger population - presumably in the neighborhood of 1,000,000 or more people.

Methodological Concerns in Interpreting Caracol's History

The consideration of Caracol's past requires the conjunction of several bodies of data: calendric, hieroglyphic, and archaeological. Within Maya studies, problems in interpretation exist for each of these data classes.

One of the most critical factors in the interpretation of Maya history is the correlation of the Maya and contemporary calendars. The Maya maintained their own calendar which recorded the passage of time in a cyclical fashion in a base-20 system from an initial starting date centuries before the time of Christ. The correlation of Maya and Christian calendars used by most Mayanists and in this paper (for convenience) is the 11.16.0.0.0 Goodman-Thompson-Martinez correlation (Thompson 1950). Many other potential correlations exist (Kelley 1983; Chase 1986). An 11.3.0.0.0 or 12.9.0.0.0 correlation (both of which have occasional adherents) would change the dates used here by 256 years in either direction. Under a 12.9.0.0.0 correlation, the A.D. 536 event would conceivably be linked with the onset of the Maya collapse at 9.18.2.0.0. Under an 11.3.0.0.0 correlation, the A.D. 536 event would be linked with the onset of the Early Classic Period in 8.12.2.0.0. Under the 11.16.0.0.0 correlation that is generally used by Mayanists, the A.D. 536 event occurred in 9.5.2.0.0, which correlates with the very beginning of the Maya Late Classic era (conventionally dated as starting about A.D. 550^{ca}).

Setting aside the correlation question by assuming it to be 11.16.0.0.0, information concerning Caracol's past history comes from both Maya hieroglyphic texts and archaeological investigations. Yet, the inter-relationships between the hieroglyphic and archaeological records also are very complicated. Because they provide tangible information about royal people and events, the glyphic records often constitute the frame for our perceptions of Maya history. Yet, these records are a form of political history that may be

contradicted by other epigraphic interpretation or by archaeological data. For instance, Schele and Freidel (1990:130-164) use the hieroglyphic record to argue for the conquest of Uaxactun by Tikal in A.D. 378^{ca}. Laporte and Fialko (1995:58) question that such an event ever took place; they suggest that extant archaeological data from the well-excavated sites of Uaxactun and Tikal show that it did not. Thus, the hieroglyphic records and the archaeological records must be carefully related to each other in order to understand past Maya history.

The value of conjoining archaeological and epigraphic data are amply demonstrated by examining the Tikal star-war recorded on Caracol Altar 21. The interpretation of hieroglyphic texts are not always straight forward and small changes in readings can have substantial impact on overall interpretation. Grube (1994:106) has recently reinterpreted the warfare recorded on Caracol Altar 21 - in which Tikal was defeated - as not being directly carried out by Caracol (cf. Houston 1987, 1991), but rather by Calakmul. However, there is additional epigraphic and archaeological information pertaining to these interpretations. First, the hieroglyphs and emblem on Altar 21 following the agency expression for this event cannot be assumed to be Calakmul, as Grube (1994:106) implies; the glyphs are too eroded to ascertain this. Grube's (1994:107) dynastic reconstruction identifies Batz Ek, Caracol ruler K'an II's mother, as coming from Calakmul, but the key texts on Caracol Stela 3 relating to this interpretation do not actually comment on her place of origin. And the use of the "k'ul yax ahau" title by Batz Ek at Caracol, seen as supporting evidence by Grube (1994:107) for a Calakmul association, substantially predates any usage at Calakmul. These same texts also note that K'an II and the Site Q rulers were "brothers" (Grube 1994:108), rather than in a hierarchical relationship as has been implied (Martin and Grube 1995); David Stuart (personal communication, 1997) has re-interpreted this passage to simply note that the Site Q ruler witnessed K'an II's actions. Also problematic for any direct Calakmul connection is the fact that another location for the epigraphically known Site Q has recently been identified at a site in northwest Guatemala, quite distant from Calakmul (Graham 1997; Schuster 1997; Stuart, personal communication, 1997). Furthermore, the geographic distance between Calakmul and Caracol may also be used to imply that the two sites were not in a direct hierarchical relationship (Chase and Chase 1998a). Finally, the archaeological record indisputably shows that Caracol directly benefited from the Tikal star-war with its population growing from 19,000 people to over 120,000 people within one hundred years of this A.D. 562 event (Chase and Chase 1989, 1996a:68; 1997). The only record of this star-war is at Caracol and Caracol's dramatic growth and expansion followed this event. Such a linkage suggests that Caracol was both instrumental in and directly involved in the Tikal defeat, as was originally suggested (Chase 1991; Chase and Chase 1987:33,60; Houston 1987:93, 1991). Thus, a conjoined analysis of archaeological and epigraphic data are necessary to view relationships among sites and the potential impact of any global environmental phenomena.

Site History: Caracol's Rise to Dominance between A.D. 562 to A.D. 680

The Maya of Caracol carved stone monuments and left us an epigraphic political history that extends from A.D. 331^{cal} to A.D. 859^{cal} in an 11.16.0.0.0 correlation. For Caracol most dates of historical significance are derived from Maya texts on over 60 carved stone monuments, on a handful of stuccoed building facades, and on the walls or roofs of a few painted tombs. Individual death dates in tombs at Caracol are recorded for unnamed individuals in A.D. 537^{cal}, A.D. 577^{cal}, and A.D. 634^{cal}; the dedication of tomb chambers is noted in capstone texts for A.D. 582^{cal}, A.D. 614^{cal}, and A.D. 696^{cal}. Unfortunately, none of these dates currently can be correlated either with recorded dates on Caracol's monuments or with the deaths of any of Caracol's dynastic kings. However, these dated tombs can be used to anchor other, less precise, dates that are obtained by traditional archaeological means (e.g., stratigraphy, seriation, C¹⁴). Assuming that methodological difficulties have been overcome, such a conjunctive approach permits fine-tuned dating of ancient activities. The archaeological excavations carried out by the UCF Caracol Project confirm some aspects of the site's epigraphic history as well as considerably expand and amplify our understanding of the site's past. Significantly, investigations suggest that times with limited hieroglyphic history are not always times of decline, but rather sometimes correlate with substantial prosperity and growth. The combination of Caracol's inscriptions and archaeology provides us with a detailed view of the development of this distinctive Southern lowland polity.

Archaeology informs us that Caracol had an extensive early occupation. Preclassic Period (ca. 900 B.C. - A.D. 250^{cal}) remains dating to at least 600^{cal} B.C. have been recovered in the outlying settlement. Epicentral remains in several locations date to before the time of Christ. By A.D. 150^{cal} an early version of Caracol's tallest complex - Caana - rose to over 38 meters in height and the Temple of the Wooden Lintel had already been built. The substantial prosperity enjoyed by epi-Preclassic Caracol is revealed in the simple burial of a woman that dates to this era: it was accompanied by at least 32 pottery vessels and over 7,000 jadeite and shell beads. Ritual deposits dating to A.D. 70^{cal} (Chase and Chase 1995) contain cached items that are not seen at Tikal for another 200 years (Krejci and Culbert 1995:113). Thus, Preclassic Caracol was an important site, although not the demographic giant that it became in the Late Classic era.

While the archaeology of Early Classic Caracol (A.D. 250-500^{cal}) suggests that the site prospered, few epicentral texts are known from this era. A Late Classic monument dating to A.D. 798^{cal} records the founding of the Caracol dynasty in A.D. 331^{cal}, but the detailed histories of the site's early rulers have yet to be recovered. Elaborate Early Classic tombs found in the epicenter and its immediate settlement area presumably include members of the royal family, but are not associated with hieroglyphic texts. Contemporary ritual offerings suggest Mesoamerican-wide patterns and trade connections.

Towards the end of the Early Classic era - definitely by A.D. 495^{cal} - Caracol began a tradition of erecting monuments

every 20 years (a Maya "katun"). This carved record was particularly focused on "Giant Ahau" altars (a Maya day sign that corresponded to the end of a katun - Beetz and Satterthwaite 1981) and the tradition of erecting these katun markers at Caracol continued uninterrupted from A.D. 495 through 652^{cal}. Stelae, carved upright rectangular stones that often accompanied these katun ceremonies, provide most of what we know about Caracol's political history. The births and enthronements of various Caracol rulers are found in these texts, as are records of their successful wars.

Scattered dynastic interpretations have been made concerning Caracol's early history (Houston 1987:87-88; Grube 1994:105-106). Events dated to A.D. 484^{cal} and A.D. 487^{cal} can be linked to an earlier king or kings, whose name or names are not known. A Giant Ahau altar was set in A.D. 495^{cal} and Stela 13 was erected in A.D. 514^{cal}. Epigraphically, we know that lord K'an I acceded to the throne in A.D. 531^{cal} and erected two katun monuments in A.D. 534^{cal}. His son, Lord Water (or, more correctly, Yahaw Te K'inich), acceded to the throne in A.D. 553^{cal}, possibly under the aegis of a Tikal king (Grube 1994:106). Yahaw Te K'inich enjoyed a relatively long reign and erected katun monuments in A.D. 554, 573, and 593^{cal}. The first non-katun event that can be associated with Lord Water is an A.D. 556^{cal} "axe event" involving Tikal and Caracol. The next event we know about is the Tikal star-war in A.D. 562^{cal}, which effectively proclaimed Caracol's independence.

Following the Tikal star-war, Lord Water remained in power for at least 35 more years. One of his sons, Smoke Ahau, acceded to Caracol's throne in A.D. 599^{cal}. Little is known, however, about his reign because of the eroded conditions of his monuments. A second son of Lord Water, K'an II, acceded to the throne in A.D. 618^{cal}. K'an II extended Caracol's military success by incorporating the Guatemala site of Naranjo into the Caracol polity between A.D. 626 and 631^{cal} (with a final, possibly symbolic, event in A.D. 636^{cal}). The archaeological record of Caracol for this era confirms that this was a time of unprecedented population growth at Caracol. Based on a stucco hieroglyphic text on a buried building, K'an II died in A.D. 658^{cal}; 29 days before his death he was succeeded by Smoke Skull, whose relationship to K'an II is unknown.

Even before the death of K'an II in A.D. 658^{cal}, Caracol's formal inscriptions began to fall silent. We suspect that the Caracol bureaucracy usurped much of the dynastic power of the kingship following the death of K'an II and that archaeologically visible manifestations of kingship, such as stelae, were largely suppressed. We know, however, from a stucco text on a buried building that Naranjo regained its independence from Caracol in A.D. 680^{cal}. Based on the inscriptions (and in spite of the later lack of them), it is archaeologically clear that Caracol reached its greatest extent and influence between A.D. 631 and 680^{cal}.

Even though only a single carved stone monument (Stela 21 dating to A.D. 702^{cal}) is known from Caracol between A.D. 652^{cal} and 798^{cal}, other epigraphic dates relating to this era occur in a tomb (A.D. 696^{cal}), on stucco building texts (A.D. 658, 662, 680, and about 750^{cal}), and on carved monuments at the Guatemalan site of La Rejolla (A.D. 662 and 672^{cal}) that

record Caracol dynastic information. In A.D. 692^{cal} Tikal, Guatemala erected its first monument in well over a century, signaling a new upsurge in that center; interestingly, the Tikal altar of A.D. 692^{cal} is in Caracol style and is the only Giant Ahau altar to occur at that site. The archaeological record indicates that Caracol prospered through the remainder of the Late Classic era, in spite of a dearth of inscriptions to affirm this. There is continued economic activity with the bulk of Caracol's population having access to most goods and services; Caracol simultaneously exhibits a managerial style that does not overly focus on dynastic control.

The final sequence of monuments at Caracol begins in A.D. 798^{cal}, when H'ok Kauil is named as the 27th king in the Caracol royal dynasty, and extends through A.D. 859^{cal}. The epigraphy of this period demonstrates a resurgence of dynastic power, perhaps gained through the manipulation of ideology. This is most likely seen in the iconography of Caracol Stela 18 which aggrandizes the royal dynasty through covering the face of the stela with a huge vision serpent, a motif related to dynastic ritual. Whether manipulated or not, the epigraphic record ceases in A.D. 859^{cal}. The archaeological record indicates that during this late part of Caracol's history, more plaza groups made use of carved and uncarved monuments, but that, in general, goods were not evenly distributed throughout Caracol's society, as they had been for most of the Late Classic Period. The royal elite seemingly had reclaimed control of Caracol's economic system and did not share certain goods with the general populace. The epicenter of the city, occupied by the royal elite, prospered unabated for almost 40 years beyond the last dated monument. At this point, however, the epicenter was burnt in a sudden conflagration that left many artifacts and a dead child on the floors of Caracol's central palaces. Yet, non-epicentral settlement apparently continued for another two centuries in Caracol's rich agricultural fields.

In summary, then, while Caracol was an important site throughout its history, it clearly blossomed after the A.D. 562^{cal} defeat of Tikal and came to dominate the Southern Maya lowlands through approximately A.D. 680^{cal}. Caracol continued to prosper for minimally 200 years beyond this point. Caracol's distinctive cultural and political systems, which functioned until the Terminal Classic era (ca. A.D. 790^{cal}) and which are likely directly responsible for its long-term success, are perhaps best embodied in the site's unusual layout (described below).

Site Layout: Caracol's Distributed Economic System

The site of Caracol is organized in a solar fashion with a series of causeways radiating out from a central concentration of plazas and architecture (see Figure 5.3 inset). When combined with archaeological data, this spatial pattern has implications for social and economic policies at Caracol that can be contrasted with other city plans in the Maya lowlands.

The city of Caracol occupied a huge metropolitan area. Its largest plaza and groups occur in the epicenter of the city (see Chase and Chase 1987:51-54 for definitions of "epicenter," "core," and "mantle" relative to Caracol). Caracol's core settlement is continuous for a distance of 8 to

10 kilometers in any direction from this epicenter. Five main roadways lead out from the epicenter. Most of these split into multiple roads within 1.5 kilometers from the site center; there is some suggestion of further bi- and tri-furcations in these road systems at a distance of 3 kilometers from the epicenter. The resulting causeways bind the core of Caracol together, connecting both high-status groups directly to the epicenter as well as large formal plaza complexes (Chase and Chase 1996b). Two rings of causeway termini can be identified. The first occurs at a distance of approximately 3 kilometers and consists of special function architecture and plazas that appear to be purposefully placed in their loci during the earlier part of the Late Classic era (post A.D. 560^{cal}). The second ring of termini exists at a distance of 5 to 9 kilometers from the epicenter and appears to represent the incorporation of pre-existing centers, and in a few cases elite residential units, into the Caracol urban system. Again, this was accomplished largely during the early part of the Late Classic era - the period noted above as being one of explosive growth. It is important to note that the ring of termini located 3 kilometers distant from the epicenter do not serve as connecting nodes for termini located 7 to 10 kilometers away from the Caracol site center. Instead, each terminus is directly connected to the epicenter by its own causeway branch; none connect with other termini. Thus, the layout is not so much "dendritic" as it is "solar." This layout is also extremely centralized; the site epicenter is interconnected with each terminus independently without an intermediate connector.

Site Variability: Contrasting Caracol's Layout with Other Maya Centers

Caracol's layout is one feature that sets it apart from other Southern lowland Maya centers. The centrally-focused, solar causeway layout contrasts with that at Tikal where causeways connect major epicentral architecture. However, it would be a mistake to conclude that all of Caracol's large architecture is epicentrally bound, for, unlike Tikal, Caracolenos purposefully placed large plaza areas and structural groups throughout its core area, joining these architectural complexes to the epicenter by means of long causeways.

Just as the Caracol causeway system is well-defined and seemingly unique in the Southern Maya lowlands, other aspects of the Caracol settlement and archaeological record are also relatively unusual compared to what we have come to expect as being "typical" of the Classic era Maya. Most notably, this variability stands in strong contrast to what we have come to expect of the Southern Maya from a Tikal perspective. Differences include features that are visible in the layout of the site and other items that are manifest in the archaeological record.

At Caracol, residential plaza groups do not cluster together and are rarely situated immediately adjacent to each other; rather, they are rather fairly regularly spaced over the landscape, especially given the karst backdrop. Because this distribution contradicts an inherent tendency of kin to live near kin, which is observed in the city plans of both Tikal (Haviland 1972) and Copan (Henden 1991), we interpret this feature as indicative of zoning control at Caracol with regard

to group location. It, thus, reflects a level of control of the landscape by Caracol's central bureaucracy that is not generally seen at other Classic Maya sites.

The extensive terracing that characterizes most parts of the site and exists between and about almost all plaza groups is also seemingly unique to Caracol and its vicinity. These terraced fields abut the epicenter on all sides and are ubiquitous both in low broad valleys and on steep hillsides throughout the site (Chase and Chase 1998b). Caracol terracing is also associated with features that served to control the flow of water. The intensive and all-encompassing nature of these terrace systems has been interpreted as an attempt by the Caracol Maya at agricultural self-sufficiency, consistent with the site's role as an expansionist imperial capital (Chase and Chase 1996b).

The archaeological remains are also indicative of a variant bureaucratic strategy for controlling the Caracol population. Caracol integrated its society through fostering a sense of nationalism and ethnic identity by permitting widespread access to both goods and rituals that were generally restricted at other Classic Maya sites (Chase and Chase 1996a; see also A. Chase 1992). This interpretation is derived from the extensive settlement work that has been undertaken by the Caracol Project. The settlement mapping and excavation analysis has demonstrated that most Maya households at Caracol had access to tombs and to buildings that functioned as mausoleums within living groups. These same outlying households contain specially-made ritual goods in the form of cache vessels and incense burners that are generally thought to be socially restricted in use at other excavated Maya sites. Polychrome ceramics, many being trade items, appear in simple burials throughout Caracol's outlying Late Classic households. Obsidian, another trade item, occurs within all household groups. And, most household groups also once contained individuals who had their teeth inlaid with jadeite or hematite, a trait once thought to be associated with higher status (Krejci and Culbert 1995:105). Thus, the ancient Caracolenos had access to ritual items and social markers that were highly restricted at other Maya cities. In fact, we believe that the widespread distribution of archaeological tradewares at Caracol is the result of a highly administered economy in which the Caracol epicenter utilized its termini as market areas for the distribution of these items in a further effort to better integrate its population and "nation-build."

Site Summary: Nation Building and its Consequence

As reflected archaeologically, Caracol's development between A.D. 562 and 800^{cal} indicates a highly organized and centralized administration that permitted access to wealth and ritual for a wide proportion of its population. While the components for this organization (and its associated practices) had to be in place prior to A.D. 562^{cal}, they were successfully employed by a series of strong charismatic rulers who used successful warfare and its spoils, as well as a shared internal identity, to integrate a large population. While consolidating its nation-building program, there was also a concerted effort to gain the self-sufficiency desired by an imperial capital through the careful control of both agriculture and settlement in Caracol's extended urban

system. Sometime after A.D. 658^{cal}, dynastic power may have been subverted by mid-level bureaucrats who managed the huge metropolis and its economy. The resurgence of Caracol's dynasty at the end of the Classic Period - at least as expressed in carved stone monuments - is correlated to a large extent archaeologically with the cessation of social and economic policies that had formed the bulwark for Caracol's original rise to political power in the Southern lowlands some 250 years earlier.

Archaeology, Epigraphy, and the "Hiatus" at Tikal and Caracol

The need for viewing contemporary variation among sites is nowhere clearer than in the spot-light of the Maya sixth-century "hiatus." Evidence from Caracol and other sites have dispelled the notion that this era was a Maya "dark ages." The archaeological data from Caracol, in fact, document a distinctive and independent Maya cultural adaptation in the Southern lowlands that can be compared and contrasted with contemporary Tikal. When combined with a consideration of the global A.D. 536^{cal} phenomenon, a more complete and interesting interpretation of Maya prehistory can be devised.

What was the situation in the Maya lowlands before, at, and after the A.D. 536 event? In order to understand this era, it is necessary to critically examine both the hieroglyphic records and the archaeological contexts at Tikal and Caracol.

At both Tikal and Caracol, the hieroglyphic records for this period are much disturbed. At Caracol, the critical monuments (Stelae 13, 14, 15, and 16) were all assembled in front of Structure A4 and some were buried beneath a later altar dating to A.D. 652^{cal} (Beetz and Satterthwaite 1981:52). Other early monuments were also interred beneath altars elsewhere at the site (Grube 1994:91), suggesting that intentional burying of early stelae was a common practice at Caracol. At Tikal the site's earlier monuments were also greatly disturbed (Satterthwaite 1958). They were moved about, reset upside down, as well as placed in the interior of purposefully buried buildings (Jones 1991; Laporte and Fialco 1990). Ancient monument disturbance at Caracol occurred at various times and this activity cannot be ascribed to any single event; however, it has been suggested that extensive movement and disturbance at Tikal was a direct outcome of the Tikal-Caracol conflict (Chase 1991:35-36; Jones 1991:117). Thus, for whatever reasons, a number of key epigraphic records that bracket the global A.D. 536 event at Caracol and Tikal were disturbed in antiquity.

In spite of the ancient Maya disruption of archaeological contexts, there is substantial information on this time. It is evident that the epigraphic records of both sites are continuous before and following A.D. 536^{cal}. Nothing indicative of the A.D. 536 event appears in the texts of either site. Relations between Caracol and Tikal were initially amicable (Grube 1994:106). At Caracol, Lord Water's father, K'an I, came to power in A.D. 531^{cal} and was succeeded 22 years later in A.D. 553^{cal} by Lord Water. Caracol's even earlier dynastic history is presently unclear, but monuments exist at the site that were erected during this era (cf. Stelae 2, 20, and 23) and carved altars were erected on schedule (each katun or 20-year period) at A.D. 534^{cal} and

A.D. 554^{cal}. Stability, however, is evident in the relatively long reigns of Caracol's mid-sixth century royalty (K'an I [accessed A.D. 531^{cal}] - 22 years; Lord Water [accessed A.D. 553^{cal}] - 46 years).

At Tikal, Double Bird came to power in A.D. 537^{cal} and celebrated 20 years of rule in A.D. 557^{cal} on Tikal Stela 17. Six other rulers are thought to have reigned between Jaguar Paw Skull, the 14th ruler, who is noted as being in power in A.D. 488^{cal} on Tikal Stela 7, and Double Bird, the 21st ruler, whose accession to power in A.D. 537^{cal} is recorded on Tikal Stela 17. The names and accession dates of the six rulers during this 49-year timespan are unknown, and the total length of their reigns is a matter of debate (Schele and Freidel 1990:167; Jones 1991:115); Jones (1991:115) suggests that it is possible that all six of these rulers could actually have been sandwiched into a single decade between A.D. 527^{cal} and A.D. 537^{cal}. Even though this era at Tikal is characterized by a great many stelae, these many monuments are largely eroded, broken, and out of context - presumably as a result of the A.D. 562^{cal} star-war. New monuments relating to this era and even earlier periods are still being located at Tikal (Valdes, Fahsen, and Munoz C. 1997), and it can be expected that more dynastic details covering this turbulent time at Tikal will eventually be revealed.

Thus, Tikal's dynastic history was continuous, but volatile for either one or four decades before the A.D. 536 event. Six rulers occupied a span ranging from 10 to 49 years (Jones 1991:115). This turbulent era was followed by the stability of Double Bird's minimally 25-year rule. It is unclear as to how long Caracol's early rulers were in office; while some presumably have been found archaeologically (Chase and Chase 1996c), they are not associated with any hieroglyphic texts. K'an I, who came to power in A.D. 531^{cal}, presumably ruled for 22 years.

The combined evidence from Tikal and Caracol suggests that if the A.D. 536 event had an impact on the Southern Maya lowlands, it could have been to encourage dynastic stability. If the climate worsened and made agricultural production more difficult, then stable dynastic rule could have solidified these polities in the face of environmental problems. Looked at from this standpoint, however, it would appear that Caracol's adaptation - which stressed participatory nation-building through co-opting much of populace into both a highly centralized administered economy and state-sanctioned ritual at the household level - was more successful and "forward-looking" than Tikal's adaptation - which seemingly continued with older, less participatory, social strategies. The success of Caracol's adaptation to environmental stress is suggested in at least three specific lines of evidence: by Caracol's public works (e.g. causeways and agricultural terracing), by Caracol's defeat of Tikal, and by Tikal's political absence from the realm of formal inscriptions for almost 130 years.

In sum, then, the Maya "hiatus" is a misnomer. Rather than suffering a decline - almost on the order of the Maya collapse (Willey 1974) - Maya society was vibrant, changing, interacting, and continuous. Dynastic political fortunes waxed and waned. Even when no monuments are known, such as at Tikal, large constructions continued to be built and

elaborate burials continued to be made (cf. Jones 1991:114-119). More recent archaeological data and epigraphic readings suggest that the previous interpretation of a "Maya hiatus" resulted from an incomplete record and from historical accident.

Conclusion

To return to, and to paraphrase, the question posed at the beginning of this discourse, did the A.D. 536 event have an impact on Caracol? Possibly. Did it lead to calamity at Caracol? Probably not. For, there is no evidence for any disaster at Caracol immediately following A.D. 536^{cal} and there is no monument gap. As noted above, during the fifth and early sixth centuries, Caracol monuments were erected once every katun (20 years) and Caracol continued in this process, as expected, during the time of the A.D. 536 event by erecting monuments in A.D. 534^{cal} and in A.D. 554^{cal}. It could be that Caracol's already somewhat distinctive features - particularly its agricultural terracing and potentially higher rainfall inherent in its mountain siting - had buffered it from atmospheric disturbances and given it an advantage that Tikal and other neighboring centers lacked.

Could the A.D. 536 event account for Caracol's success? Indirectly, yes. By causing environmental turmoil in the Southern Maya lowlands, the A.D. 536 event could have contributed to, or even caused, a volatile situation to develop. The differences in cultural backgrounds and in the variable environments of diverse Maya cities could have spawned differing adaptations to a perceived calamity. The higher elevation and higher yearly rainfall of Caracol could have permitted it to follow a different path than that taken by Tikal, ultimately resulting in the A.D. 562^{cal} confrontation. "Just-so stories" of a quarter-century agricultural famine at Tikal, combined with the forced, long-term tribute of Caracol's agricultural products could have resulted in the final conflict. But we, as archaeologists, cannot tangibly deal with these mythical scenarios beyond using them as hypotheses against which to contemplate data. Rather, we can only order known events and then attempt to imply causal relationships. But, this requires studies to establish linkages between local cultural and climatic processes and global changes - work that still remains to be done for the western flanks of the Maya Mountains.

The value of viewing the lowland Maya relative to global phenomena such as the A.D. 536 event go far beyond the development of another "just so story" for a troubled time in Maya history in that it forces the consideration of micro-variations in Maya cultural development. The core-periphery model developed by Rathje (1971) to explain the rise and development of Maya civilization was based on the assumption that all lowland Maya lived in an ecologically redundant lowland environment with little opportunity for agricultural intensification; in that model, the lowland Maya traded ritual thoughts, practices, and specific symbols (i.e., ideology) for necessary household commodities (i.e., material items from the highlands). There was no consideration of internal variation in the Maya lowlands. While few would subscribe to a strict interpretation of Rathje's (1971) original model, the "core"-periphery"

juxtaposition that is commonly found in broader applications of Wallerstein's world-systems models (cf. Kepecs et al. 1994) implies a simplification of variability that we now know not to be the case. Caracol and Tikal, with epicenters located only 76 kilometers distant from each other, are merely two examples of the cultural and political diversity that once existed within the Southern Maya lowlands and of the potential impact that these differences could have had on long- and short-term cultural survival.

Acknowledgements: The University of Central Florida Caracol Project has been assisted by many individuals, institutions, and foundations during its existence. The University of Central Florida and the Government of Belize have been particularly instrumental in ensuring the success of the Project. Over the years major funding for the project has been obtained from numerous sources: private donations to the University of Central Florida (annually); the Harry Frank Guggenheim Foundation (1988, 1989); U.S.A.I.D. and the Government of Belize (1989-1992); the Government of Belize (1993); the National Science Foundation (1988, 1994-1996); the Dart Foundation (1996); the Foundation for the Advancement of Mesoamerican Studies, Inc. (1997); the Stans Foundation (1997, 1998); the J.I. Kislak Foundation (1998); and the Ahau Foundation (1998). Joel Gunn kindly provided editorial comments and inspiration for the final version of this manuscript.

References

- Abrams, Elliot and David Rue (1988) The Causes and Consequences of Deforestation Among the Prehistoric Maya. *Human Ecology* 16:377-395.
- Adams, Richard E.W. (1973) The Collapse of Maya Civilization: A Review of Previous Theories. *The Classic Maya Collapse*, edited by T.P. Culbert, pp. 21-34, University of New Mexico Press, Albuquerque.
- Baille, M.G.L. (1994) Dendrochronology Raises Questions about the Nature of the A.D. 536 Dust-veil Event. *The Holocene* 4(2):212-217.
- Beetz, Carl P. and Linton Satterthwaite (1981) *The Monuments and Inscriptions of Caracol, Belize*, University Museum Monograph 45, The University Museum, Philadelphia.
- Blanton, Richard E., Feinman, Gary M., Kowalewski, Stephen A., and Peter N. Peregrine (1996) A Dual-Processual Theory for the Evolution of Mesoamerican Civilization. *Current Anthropology* 37(1):1-14.
- Carr, Robert F. and James E. Hazard (1961) *Tikal Reports Number 11: Map of the Ruins of Tikal, El Peten, Guatemala*, The University Museum, Philadelphia.
- Chase, Arlen F. (1986) Time Depth and Vacuum: The 11.3.0.0.0. Correlation and the Lowland Maya Postclassic. in J.A. Sabloff and E.W. Andrews, V., Eds., *Late Lowland Maya Civilization: Classic to Postclassic*, pp. 99-140, University of New Mexico Press, Albuquerque.
- Chase, Arlen F. (1990) Maya Archaeology and Population Estimates in the Tayasal-Paxcaman Zone, Peten, Guatemala. in T.P. Culbert and D.S. Rice, *Precolumbian Population History in the Maya Lowlands*, pp. 149-165, University of New Mexico Press, Albuquerque.
- Chase, Arlen F. (1991) Cycles of Time: Caracol in the Maya Realm. in M.G. Robertson and V.M. Fields, Eds., *Sixth Palenque Round Table, 1986, Vol. VII*, pp. 32-42, University of Oklahoma Press, Norman.
- Chase, Arlen F. (1992) Elites and the Changing Organization of Classic Maya Society. in D.Z. and A.F. Chase, Eds., *Mesoamerican Elites*, pp. 30-49, University of Oklahoma Press, Norman.
- Chase, Arlen F. and Diane Z. Chase (1987) *Investigations at the Classic Maya City of Caracol, Belize: 1985-1987*, Monograph 3, Pre-Columbian Art Research Institute, San Francisco.
- Chase, Arlen F. and Diane Z. Chase (1989) The Investigation of Classic Period Maya Warfare at Caracol, Belize. *Mayab* 5:5-18.
- Chase, Arlen F. and Diane Z. Chase (1992) El Norte y el Sur: Política, Dominios, y Evolucion Cultural Maya. *Mayab* 8:134-149.
- Chase, Arlen F. and Diane Z. Chase (1995) External Impetus, Internal Synthesis, and Standardization: E Group Assemblages and the Crystalization of Classic Maya Society in the Southern Lowlands. in N. Grube, Ed., *The Emergence of Lowland Maya Civilization*, pp. 87-101, Acta Mesoamericana No. 8, Berlin.
- Chase, Arlen F. and Diane Z. Chase (1996a) A Mighty Maya Nation: How Caracol Built an Empire by Cultivating its 'Middle Class,' *Archaeology* 49(5):66-72.
- Chase, Arlen F. and Diane Z. Chase (1996b) More than Kin and King: Centralized Political Organization Among the Ancient Maya. *Current Anthropology* 37(5):803-810.
- Chase, Arlen F. and Diane Z. Chase (1996c) The Organization and Composition of Classic Lowland Maya Society: The View from Caracol, Belize. in M.G. Robertson, M. Macri, and J. McHargue, Eds., *Eighth Palenque Round Table, 1993*, pp. 213-222, Pre-Columbian Art Research Institute, San Francisco.
- Chase, Arlen F. and Diane Z. Chase (1998a) Late Classic Maya Political Structure, Polity Size, and Warfare Arenas. in A. Ciudad Ruiz et al., Eds., *Anatomia de Una Civilizacion: Aproximaciones Interdisciplinarias a la Cultura Maya*, pp. 11-29, Sociedad Espanola de Estudios Mayas, Madrid.
- Chase, Arlen F. and Diane Z. Chase (1998b) Scale and Intensity in Classic Period Maya Agriculture: Terracing and Settlement at the 'Garden City' of Caracol, Belize. *Culture and Agriculture* 20(2).
- Chase, Arlen F. and Diane Z. Chase (in press) *Investigations at Caracol, Belize: 1988-1996*, Monograph 8, Precolumbian Art Research Institute, San Francisco.
- Chase, Arlen F., Grube, Nikolai, and Diane Z. Chase (1991) *Three Terminal Classic Monuments from Caracol, Belize*, Research Reports on Ancient Maya Writing No. 36, Center for Maya Research, Washington, D.C.
- Chase, Diane Z. and Arlen F. Chase (1994) Eds., *Studies in the Archaeology of Caracol, Belize*, Monograph 7, Pre-Columbian Art Research Institute, San Francisco. (1997) La Guerra Clasico Maya Vista por Caracol, Belize. in Sylvia Trejo, Ed., *La Guerra Entre Los Antiguos Maya*, Primera Mesa Redonda de Palenque, INAH, Mexico.

- Coe, William R. (1967) *Tikal: A Handbook of Ancient Maya Ruins*, The University Museum, University of Pennsylvania, Philadelphia.
- Coe, William R. and William A. Haviland (1982) *Introduction to the Archaeology of Tikal, Guatemala*, Tikal Report No. 12, Monograph 46, The University Museum, University of Pennsylvania, Philadelphia.
- Cook, Orator F. (1921) Milpa Agriculture: A Primitive Tropical System. *Annual Report of the Smithsonian Institution, 1919*, pp. 307-326, Smithsonian Institution, Washington, D.C.
- Cooke, C. Wythe (1931) Why the Mayan Cities of the Peten District, Guatemala were Abandoned. *Journal of the Washington Academy of Sciences* 21(13):283-287.
- Dahlin, Bruce H. (1983) Climate and Prehistory on the Yucatan Peninsula. *Climatic Change* 5:245-263.
- Demarest, Arthur A. and Antonia E. Foias (1993) Mesoamerican Horizons and the Cultural Transformations of Maya Civilization, in D.S. Rice, Ed., *Latin American Horizons*, pp. 147-191, Dumbarton Oaks, Washington, D.C.
- Diehl, Richard A. and Janet C. Berlo (1989) Eds., *Mesoamerica After the Decline of Teotihuacan: A.D. 700-900*, Dumbarton Oaks, Washington, D.C.
- Graham, Elizabeth (1987) Resource Diversity in Belize and Its Implications for Models of Lowland Trade. *American Antiquity* 52:753-767.
- Graham, Ian (1997) Mission to La Corona. *Archaeology* 50(5):46.
- Grube, Nikolai (1994) Epigraphic Research at Caracol, Belize. in D.Z. Chase and A.F. Chase, Eds., *Studies in the Archaeology of Caracol, Belize*, pp. 83-122, Pre-Columbian Art Research Institute, San Francisco.
- Gunn, Joel and Richard E.W. Adams (1981) Climate Change, Culture, and Civilization in North America. *World Archaeology* 13(1):87-100.
- Haviland, William (1972) A New Look at Classic Maya Social Organization at Tikal. *Ceramica de Cultura Maya* 8:1-16.
- Henden, Julia (1991) Status and Power in Maya Society: An Archaeological Study. *American Anthropologist* 93:894-918.
- Hodell, David A., Curtis, Jason H., and Mark Brenner (1995) Possible Role of Climate in the Collapse of Classic Maya Civilization. *Nature* 375:391-394.
- Houston, Stephen D. (1987) Appendix II: Notes on Caracol Epigraphy and Its Significance. in A.F. Chase and D.Z. Chase, *Investigations at the Classic Maya City of Caracol, Belize: 1985-1987*, pp. 85-100, Pre-Columbian Art Research Institute, San Francisco.
- Houston, Stephen D. (1991) Appendix: Caracol Altar 21. in M.G. Robertson and V.M. Fields, Eds., *Sixth Palenque Round Table, 1986*, pp. 38-42, University of Oklahoma Press, Norman.
- Issac, Barry L. (1996) Approches to Classic Maya Economies. *Research in Economic Anthropology* 17:297-334.
- Jones, Christopher (1991) Cycles of Growth at Tikal. in T.P. Culbert, Ed., *Classic Maya Political History: Hieroglyphic and Archaeological Evidence*, pp. 102-127, Cambridge University Press, Cambridge.
- Kelley, David H. (1983) The Maya Calendar Correlation Problem. in R.M. Leventhal and A.L. Kolata, Eds., *Civilization in the Ancient Americas*, pp. 157-208, University of New Mexico Press and Harvard University Press, Cambridge.
- Kepecs, Susan, Feinman, Gary, and Sylviane Boucher (1994) Chichen Itza and Its Hinterland: A World-Systems Perspective. *Ancient Mesoamerica* 5:141-158.
- Krejci, Estella and T. Patrick Culbert (1995) Preclassic and Classic Burials and Caches in the Maya Lowlands. in N. Grube, Ed., *The Emergence of Lowland Maya Civilization*, pp. 103-116, Acta Mesoamericana 8, Berlin.
- Laporte, Juan Pedro and Vilma Fialko C. (1990) New Perspectives on Old Problems: Dynastic References for the Early Classic at Tikal. in F.S. Clancy and P.D. Harrison, Eds., *Vision and Revision in Maya Studies*, pp. 33-66, University of New Mexico Press, Albuquerque.
- Laporte, Juan Pedro and Vilma Fialko C. (1995) Un Reencuentro con Mundo Perdido, Tikal, Guatemala. *Ancient Mesoamerica* 6:41-94.
- Marcus, Joyce (1995) Where is Lowland Maya Archaeology Headed? *Journal of Archaeological Research* 3:3-53.
- Martin, Simon and Nikolai Grube (1995) Maya Super-States. *Archaeology* 48(6):41-46.
- Meggers, Betty J. (1954) Environmental Limitation on the Development of Culture. *American Anthropologist* 56:801-824.
- Messenger, Lewis C., Jr. (1990) Ancient Winds of Change: Climatic Settings and Prehistoric Social Complexity in Mesoamerica. *Ancient Mesoamerica* 1(1):21-40.
- Millon, Rene (1988) The Last Years of Teotihuacan Dominance. in N. Yoffee and G.L. Cowgill, Eds., *The Collapse of Ancient States and Civilizations*, pp. 102-164, University of Arizona Press, Tucson.
- Nicholson, H.B. (1960) The Mixteca-Puebla Concept in Mesoamerican Archaeology: A Re-examination. in A. Wallace, Ed., *Men and Cultures*, pp. 612-617, International Congress of Anthropological and Ethnological Sciences, University of Pennsylvania, Philadelphia.
- Proskouriakoff, Tatiana (1950) *A Study of Classic Maya Sculpture*, Publication 593, Carnegie Institution of Washington, Washington, D.C.
- Puleston, Dennis E. (1979) An Epistemological Pathology and the Collapse, or Why the Maya Kept the Short Count. in N. Hammond and G.R. Willey, Eds., *Maya Archaeology and Ethnohistory*, pp. 63-71, University of Texas Press, Austin.
- Puleston, Dennis E. (1983) *Tikal Report No. 13: The Settlement Survey of Tikal*, Monograph 48, The University Museum, Philadelphia.
- Rathje, William L. (1971) The Origins and Development of Lowland Classic Maya Civilization. *American Antiquity* 36:275-285.
- Rathje, William L. (1977) The Tikal Connection. in R.E.W. Adams, Ed., *The Origins of Maya Civilization*, pp. 373-382, University of New Mexico Press, Albuquerque.
- Rice, Don S. (1993) Eighth-Century Physical Geography, Environment, and Natural Resources in the Maya Lowlands. in J.A. Sabloff and J.S. Henderson, Eds., *Lowland Maya Civilization in the Eighth Century, A.D.*, pp. 11-63, Dumbarton Oaks, Washington, D.C.

- Sanders, William T. (1973) The Cultural Ecology of the Lowland Maya: A Reevaluation. in T.P. Culbert, Ed., *The Classic Maya Collapse*, pp. 325-365, University of New Mexico Press, Albuquerque.
- Sanders, William T. (1977) Environmental Heterogeneity and the Evolution of Lowland Maya Civilization. in R.E.W. Adams, Ed., *The Origins of Maya Civilization*, pp. 287-297, University of New Mexico Press, Albuquerque.
- Sanders, William T. and Barbara J. Price (1968) *Mesoamerica: The Evolution of a Civilization*, Random House, New York.
- Satterthwaite, Linton (1958) The Problem of Abnormal Stela Placements at Tikal and Elsewhere. in E.M. Shook, W.R. Coe, V.L. Broman, and L Satterthwaite, *Tikal Reports Numbers 1-4*, pp. 61-83, The University Museum, Philadelphia.
- Schele, Linda and David A. Freidel (1990) *A Forest of Kings: The Untold Story of the Ancient Maya*, William Morrow, New York.
- Schuster, Angela M.H. (1997) The Search for Site Q. *Archaeology* 50(5):42-45.
- Sharer, Robert J.
- Schuster, Angela M.H. (1991) Diversity and Continuity in Maya Civilization: Quirigua as a Case Study. in T.P. Culbert, Ed., *Classic Maya Political History*, pp. 180-198, University of New Mexico Press, Albuquerque.
- Stone-Miller, Rebecca (1993) An Overview of 'Horizon' and 'Horizon Style' in the Study of Ancient American Objects. in D.S. Rice, Ed., *Latin American Horizons*, pp. 15-39, Dumbarton Oaks, Washington, D.C.
- Thompson, J. Eric S. (1950) *Maya Hieroglyphic Writing: Introduction*, Publication 539, Carnegie Institution of Washington, Washington, D.C.
- Tozzer, Alfred M. (1930) Maya and Toltec Figures at Chichen Itza. *Proceedings, XXIII International Congress of Americanists*, pp. 155-164, New York.
- Tozzer, Alfred M. (1957) *Chichen Itza and Its Cenote of Sacrifice: A Comparative Study of Contemporaneous Maya and Toltec*, Memoirs of the Peabody Museum of Archaeology and Ethnology, Nos. 11 and 12, Harvard University, Cambridge.
- Vaillant, George C. (1935) Chronology and Stratigraphy in the Maya Area. *Maya Research* 2:119-143.
- Valdes, Juan Antonio (1995) Desarrollo Cultural y Senales de Alarma entre los Mayas: El Preclasico Tardio y la Transicion hacia el Clasico Temprano. in N. Grube, Ed., *The Emergence of Lowland Maya Civilization*, pp. 71-85, Acta Mesoamericana 8, Verlag von Flemming, Berlin.
- Valdes, Juan Antonio, Federico Fahsen, and Gaspar Munoz Cosme (1997) *Estela 40 de Tikal: Hallazgo y Lectura*, Instituto de Antropologia e Historia de Guatemala, Guatemala.
- Wallerstein, Immanuel M. (1974) *The Modern World System*, 3 volumes, Academic Press, New York.
- Webster, David (1988) Copan as a Classic Maya Center. in E.H. Boone and G.R. Willey, Eds., *The Southeast Classic Maya Zone*, pp. 5-30, Dumbarton Oaks, Washington, D.C.
- Willey, Gordon R. (1974) The Classic Maya Hiatus: A Rehearsal for the Collapse. In *Mesoamerican Archaeology: New Approaches*, edited by N. Hammond, pp. 417-444, University of Texas Press, Austin.
- Willey, Gordon R. (1982) Maya Archaeology. *Science* 215:260-267.

The Years without Summer

Tracing A.D. 536 and its aftermath

Edited by

Joel D. Gunn

BAR International Series 872

2000