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Tikal, Guatemala, and Emergent Maya Civilization

Excavations reveal evidence of early complex-living at a prime Maya Indian site.

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The sources and the composition of tropical-lowland Maya culture of northern Guatemala and adjacent areas continue to be an outstanding problem of Mesoamerican archeology. Hundreds of once-magnificent centers of ceremony, government, artisanship, and residence attest to the success and complexity of Maya culture during so-called Classic times—that is, the centuries from A.D. 200–300 to the time of widespread and still enigmatic esthetic decay and cultural failure, around 900. It was during these centuries that certain basic, long-cited diagnostics of "Classicism" coalesced—namely, a realistic art style unmistakably Maya, polychrome pottery in distinctive forms, the common use of the corbel vault in major architectural forms, and stone monuments (stelae and altars) carved with calendric texts based on the Maya Long-Count method of calculation. How these basic components originated, and, more significantly, how social, economic, and political trends of Preclassic times maturated to provide a Classic context for what was achieved have long been matters of speculation.

Some skeptics have viewed Classic lowland Maya ceremonial culture or civilization as basically a donation or transplant; they emphasize such points as lack of continuity between Preclassic and Classic, and the improbability that lowland maize agriculture of the slash-and-burn, shifting type was sufficiently productive to allow not only local growth from a Preclassic base but actual sustenance of the Classic centers as well (*1*). Others, who offer a more optimistic interpretation of the agricultural base of this area, have nevertheless proposed that the stimuli or incentives for Maya civilization ultimately derive from Olmec culture, a reputedly precocious, deeply influential development of the middle first millennium B.C., thought to have flowered, and possibly to have originated, in the tropical Tabasco and southern Veracruz region of Mexico (*2*). As one would expect, there is also the opinion that various peoples in Mesoamerica, including the lowland Maya, were simultaneously achieving, undoubtedly in interdependent fashion, a level of cultural complexity which we tag, if only arbitrarily or impressionistically, "civilization." The search for original causes or preconditions centers on the achievement of a stable form of agriculture, on village living, and on functional specialization of individuals. It is an immense jump, however, from the simple yet essential farming village to a level of organization exemplified by a huge center such as Tikal, with its thousands of coeval small and large masonry structures.

My objective here is to examine new Tikal material relating to the problem of origins of a complex pattern of living within the Maya lowlands of Guatemala. A primary goal of the Tikal Project (a project of The University Museum, University of Pennsylvania) since its inception in 1956 (*3*) has been to reveal, through excavation, remains and conditions of a time earlier than what is spoken of as the Classic Period. Only the availability of published data on carefully excavated sites will allow us to choose among formational or causal theories which, individually, have often gone beyond available archeological fact.

It was assumed from the beginning of excavation at Tikal that remains of Preclassic life would be found beneath the many square kilometers of Classic construction and occupation. Guidelines were provided by the work of the Carnegie Institution of Washington a quarter of a century ago at the site of Uaxactún, 5 hours, on foot, north of Tikal (*4*). The sophistication of Uaxactún architecture before A.D. 300 was demonstrated by Structure E-VII-sub, a square pyramid, 8 meters high, supporting a building platform. On each intricately terraced side of the pyramidal substructure there is a stairway flanked by elaborate stuccoed grotesque masks. Archeologists cannot agree on where, in relatively early time, this structure belongs. Furthermore, stratigraphically earlier vestiges of masonry construction were found in deep subplaza deposits. The deepest deposits, overlying bedrock, contained simple burials and artifacts, as well as pottery (termed, for reference, "Mamom"), while younger, though still Preclassic, fills contained pottery designated "Chicanel" to distinguish it from the earlier distinct Mamom assemblage. A Chicanel-related house platform was found elsewhere at the site, as was Pyramid A of the A-I complex, which, like E-VII-sub, once carried a building of pole and thatch on its summit. Analysis of Uaxactún ceramics additionally indicated the presence, in small amounts,

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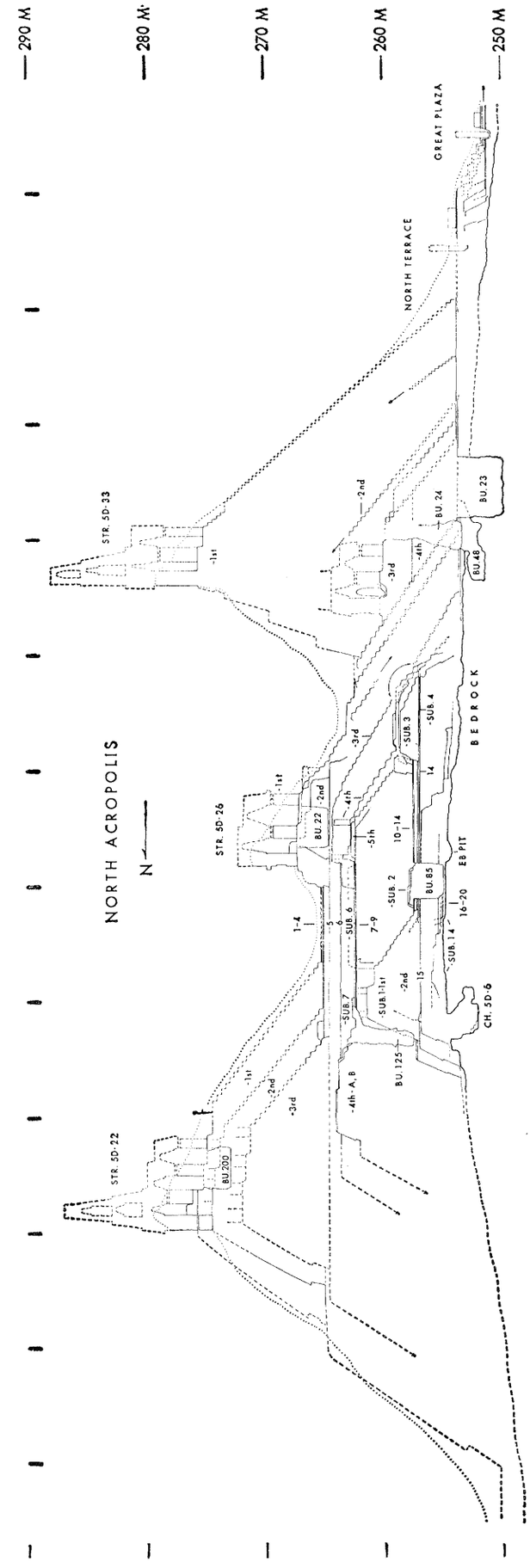


Fig. 1. North Acropolis composite north-south section, showing various major features discussed in text. Preclassic construction underlies Floor 5. Floors 1 and 4 of the North Acropolis abut and sustain Early Classic buildings. Structures 5D-33-1st and 5D-33-2nd are Late Classic, as are the stelae and altars on the North Terrace and Great Plaza. The human figure in front of the doorway of Structure 5D-22-1st suggests scale of architecture. About 1000 years of construction are represented here. (1:500)

of a "Matzanel" complex of pottery, quite different from Chicanel, and of later date. The Matzanel pottery has, among other peculiar features, hollow mammiform tetrapod supports and true polychrome decoration. This complex, assigned a time span of, roughly, from A.D. 200 to 300, was believed to have been the immediate predecessor of Early Classic remains. Matzanel ceramics have been used to define a "Protoclassic Period," between late Preclassic (Chicanel) and Early Classic (Tzakol ceramics). However, the "Protoclassic Period" was represented at Uaxactún by little more than a small collection of potsherds that were typologically isolated in early sherd collections. Architectural and other cultural correlates were not found, though E-VII-sub has been occasionally considered a possible Protoclassic construction.

Reexamination of burial material at nearby Holmul gave considerably greater substance to the Protoclassic concept. This Protoclassic material from Holmul, combined with other, contemporaneous material from Mountain Cow, British Honduras, was considered to represent a ceramic precursor of Early Classicism. During the past decade, excavations by Harvard University at Barton Ramie, British Honduras, have documented the intrusiveness of this Protoclassic ceramic complex. A major inference resulting from this work is that this intrusion may have been the medium through which the lowland Maya gained the fundamentals of Classic culture, and that the mechanism of innovation was the actual invasion of the lowlands by culturally advanced highland peoples (*5*).

It happened that, following the work at Uaxactún, large-scale excavations were conducted in the highland or upland regions of Guatemala, south of Tikal. This today is an area heavily populated by Maya-speaking peoples. Through excavation here there emerged a picture of extraordinarily rich development in Preclassic contexts, particularly at Kaminaljuyu, now being disastrously engulfed by an expanding Guatemala City (*6*). Carved monuments were discovered, one of them with a hieroglyphic text closely resembling Classic lowland Maya forms, along with large ceremonial adobe constructions, with log-roofed tombs impressively stocked with hundreds of items of pottery, jade, and other materials. What existed at Kaminaljuyu in the final cen-

turies of the first millennium B.C. was a theocratically dominated peasantry sufficiently nucleated (perhaps intentionally so) to form the labor pool necessary for building great religious edifices and ceremonial plazas. A surplus-producing economy had been achieved; its efficiency was expressed in its ability to sustain the craft specialists, the traders, and the sacerdotal, elite group which the archeologist infers. One has to assume a high degree of reciprocity between peasant and priest, the priest providing total control through family prestige, magic, and religious assurance, the farmer sustaining, by labor and the surpluses of his field, the pyramidal social structure of the times. The organization which characterizes Mesoamerican Classic culture thus appears to have developed by these relatively early times.

These discoveries reinforced suspicions that Classic lowland Maya achievement was highland Maya in origin, possibly stemming from Olmec by way of a Protoclassic stage. Once the package of civilization had been handed them, the lowland Maya became brilliant elaborators. In essence, theirs was a derivative civilization.

Excavations of Preclassic Tikal

The record of Preclassic remains at Tikal is incomplete. Work at various promising localities between now and the end of the current program, in 1966, is scheduled. What has been found, however, warrants discussion and illustration in an interim report, such as this, prior to full (and necessarily slow) publication in the *Tikal Report* series of the University Museum. In brief, Tikal, physically the greatest of the Classic Maya lowland centers, has produced, on deep excavation, an almost overwhelmingly detailed record of sequent Preclassic remains, revealing a culture the final four centuries of which established the pattern and often the physical scope of Classic Tikal.

In 1958 extensive excavations were made in the Great Plaza, the ceremonial, geographic center of the site. The Plaza is bounded on the east and west sides by Temples I and II, both major Late Classic edifices, and to the south by 1.6 hectares (4 acres) of linearly arranged palace compounds known as the Central Acropolis. To the north (Fig. 1) the Plaza is bordered by the North Terrace and, behind it, the North Acropolis, the latter a platform, 12 meters high, covering about 1 hectare and sustaining eight symmetrically placed temples, with three others overlapping its south face. Excavation showed the North Terrace to be simply the final, Late Classic (about A.D. 700) version in a long, complicated development of terraces, eight in all, only the final two of which could be shown to belong to the Classic Period. The Great Plaza, in turn, comprised four superimposed plaster floors, or plazas, the earlier two being Preclassic. The most ancient plaza was as large as the Late Classic one, about 1 hectare in extent. From five dates obtained by the radiocarbon method (samples P-285 through P-289) it is believed that the earliest formal plaza and terrace constructions date back to the 2nd century B.C. Both the Plaza and the Terrace were, as noted above, essentially frontal stages of the dominant North Acropolis. Clearly, the mass of the Acropolis was artificial and, in part, probably the result of Preclassic activity.

Four long seasons have been spent in trenching, tunneling, and digging test pits in the North Acropolis. These efforts have been reasonably successful. Only a portion of this incredibly rich feature has been "mined," but enough has been exposed to clarify, often in great detail, its long and largely Preclassic evolution. The Acropolis (Fig. 1) must be visualized as a series of superimposed, south-oriented, rectangular platforms, plaster-surfaced and masonry-walled, with one or more stairways connecting the top of each platform with the contemporaneous North Terrace below. The abandonment of one platform and the building of a new one over it frequently resulted in the complete or near-total razing of all structures built on the earlier platform. Sometimes some or all of the earlier structures survived and continued in use when a new Acropolis platform was built. New plastered tops were added at various times to an Acropolis platform, interring structures singled out for obliteration, encroaching on others permitted to go on functioning, and supporting entirely new structures. To limit, over the centuries, lateral expansion of the Acropolis, the Maya excavated the sides on occasion, exposing features then hundreds of years old. Had they not done so, the final Early Classic Acropolis would have covered an area far in excess of the 1 hectare it actually occupied. Maya architects, in three instances during Preclassic times, dictated an eastward shift in the center line of the Acropolis. Almost incessant demolition, together with axial shifts and sheer size of construction, have created obstacles for archeologists that at times have proved insurmountable.

Twenty plaster floors, one on top of another, provided the most convenient means of reconstructing the growth of the North Acropolis (Fig. 1). Floor 20, the earliest detected in excavation, lies 10 meters below the latest, Floor 1. Floor 1, laid in the 6th century A.D., sustains construction embodying various traits transitional between Early and Late Classic architecture. The earliest Acropolis remains underlie Floor 20 and date back to about 600 B.C. Floor 20 appears to have been laid sometime between 300 and 200 B.C. The architecture of the North Acropolis did not show Early Classic traits until about A.D. 250, when Floor 5 was laid. During Early Classic times the arrangement of temple structures on the Acropolis conformed closely to a tradition established centuries earlier by Preclassic conventions. During the 5th century A.D., Structure 5D-22-1st, the largest of the final Acropolis temples, was built. A priest in its doorway probably had no idea that the beliefs he professed and the rites he practiced had been handed down from remote predecessors whose remains lay 20 meters beneath his feet.

The early series of floors, platforms, and buildings of the North Acropolis enable us to isolate five sequent ceramic complexes, with a total time span of about 800 to 900 years. These complexes are entirely Preclassic: Eb (the earliest), Tzec, Chuen, Cauac, and Cimi (the latest). The following rough relationships obtain between Tikal and Uaxactún: Eb = pre-Mamom, Tzec = Mamon, Chuen and Cauac = Chicanel, and Cimi combines persisting Cauac traits with Matzanel "Protoclassic" features. These Tikal ceramic complexes provide the excavator with a convenient reference system for relating architecture, burials, cached offerings, artifacts, and other cultural features, though the names Eb, Tzec, and so on apply exclusively to ceramics. In this article, various aspects of early Tikal development are discussed under these headings, but these are only expedient substitutes for the more inclusive names that will eventually be assigned the Tikal cultural phases.


a
b
c
d
e
f

Fig. 2. Some preclassic ceramic types. (*a*) Eb Complex, clouded orange-red; diameter, 12.6 cm (from Chultun 5G-15). (*b*) Chuen Complex, black-on-red, resist technique; diameter, 41.0 cm (from problematical deposit, Plaza 5D-4, bounded by Structure 5D-96, and so on). (*c*) Cauac Complex, red; height, 39.2 cm (Burial 166; see Fig. 7, object 13). (*d*) Cauac Complex, positive red-on-orange; height, 21.5 cm (Burial 166, see Fig. 7, Object 11). (*e*) Cauac Complex, stuccoed and painted, pink and green-on-cream over polished black-ware; height, 30.3 cm (Burial 167, see Fig. 10*a*, object 5). (*f*) Cauac Complex, red-on-orange; diameter, 37.7 cm (Burial 167, see Fig. 10*a*, object 4). (*g*) Cauac Complex, combed, red; diameter, 33.7 cm (Burial 167, see Fig. 10*a*, object 8, nested in lower vessel). (*h*) Cauac Complex, black-on-orange yellow, resist technique, tetrapod support; diameter, 18.4 cm (Burial 85, see Fig. 14, object 5). (*i*) Cauac Complex, incised, black; height, 15.2 cm (Burial 85, see Fig. 14, object 13). (*j*) Cauac Complex, red; height, 41.1 cm (Burial 85, see Fig. 14, supporting-object 2). (*k*) Cauac Complex, red and positive black-on-orange, tetrapod support; height, 30.0 cm (Burial 85, see Fig. 14, object 1).

Eb Times

Eb pottery has been found at Tikal in only two localities, one being the North Acropolis. When the excavators cut a north-south trench, 5 to 10 meters wide, through the center of the North Acropolis, they found a large pit cut into the bedrock, overlain by Tzec- and Chuen-bearing material (Fig. 1, Eb Pit). This pit contained a ton or so of dark earth and occupation refuse, including a pure sample of Eb material. Within this trash was a lone human skull (conceivably the result of deliberate decapitation) with an articulated mandible, and nearby was a contracted adult human skeleton (Burial 120), with head to the southwest. The trash contained large numbers of shells of freshwater snail (*Pomacea flagellata*), indicating that this snail was a source of food; in addition, it contained obsidian flakes and quartzite (both imported substances), and scrap, presumably from the production of flint artifacts. Small pieces of unidentifiable hardwood charcoal were recovered from the trash. These provided a date of 588 ± 53 B.C. (sample P-750) (*7*). It is probable that there was once a considerable Eb occupation over the North Acropolis area but that later quarrying and construction destroyed most of the evidence, and that this one pit occurred in an area that was not later quarried.

The only other concentrated collection of Eb material was fortuitously found 1500 meters east of the North Acropolis. This is a collection of largely reconstructable Eb vessels (see Fig. 2*a*) from earth fill at the bottom of a chultun (a specially excavated bedrock chamber with a constricted orifice); the fill contains Early Classic sherds in its upper levels.

The Eb ceramic complex, as now known, comprehends a limited range of shapes and decorations. While various Eb features persisted in association with the subsequent Tzec complex, Eb ceramics as a whole do form a distinct assemblage. However, expanded comparative studies are required before one can fully assess the meaning of this middle Preclassic complex relative to other, roughly coeval complexes known from the southern Petén district of Guatemala (*8*) and from central Chiapas in Mexico (*9*).

These early inhabitants of Tikal may not have been the first. Only pure chance leads the excavator to such early contexts. Hundreds of major and minor excavations have been made at Tikal without a trace of Eb-related occupation being found. For Eb, and conceivably earlier, cultural detritus to have survived incessant quarrying and fill reclamation by later occupants required concealment below superimposed construction.

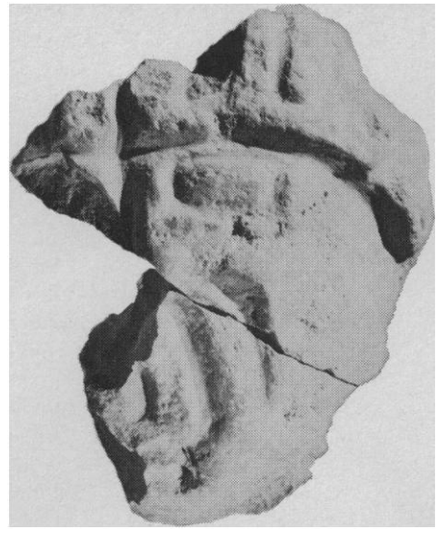


Fig. 3. Miscellaneous Stone 54, limestone, from hearting of Floor-14 platform of North Acropolis (see Fig. 1), 16 cm high; upper fragment is from roof-comb debris of Temple II.

The original occupants of the site may have been attracted by two natural features, the local abundance of flint and the marked elevation of the site center. This marked elevation facilitated drainage and led eventually, if not at the time, to construction of a system of reservoirs. Eb people made tools of flint and of imported obsidian (perhaps from highland Guatemala) and traded in quartzite, probably from British Honduras, in order to manufacture corn-grinding implements. What little is known of these people hardly contradicts the presumption that they were Maya and the progenitors of the Maya who followed them. The single date of 588 ± 53 B.C. is not inconsistent with earlier rough estimates of where, in time, Eb should fall. However, Eb's beginnings are unknown. A terminal date of 500 B.C. has been provisionally agreed upon.

Tzec Times

While moderate quantities of Tzec sherds have been found in subsequent Chuen deposits, the North Acropolis excavations failed to uncover intact Tzec-related construction. Ceramic material of this complex is widespread at the Tikal site, but is generally found in Chuen constructions, admixed with Chuen sherds. However, one large unmixed lot of Tzec pottery and associated artifacts was found in a filled-in small quarry below a platform that sustained two small Late Classic residences,

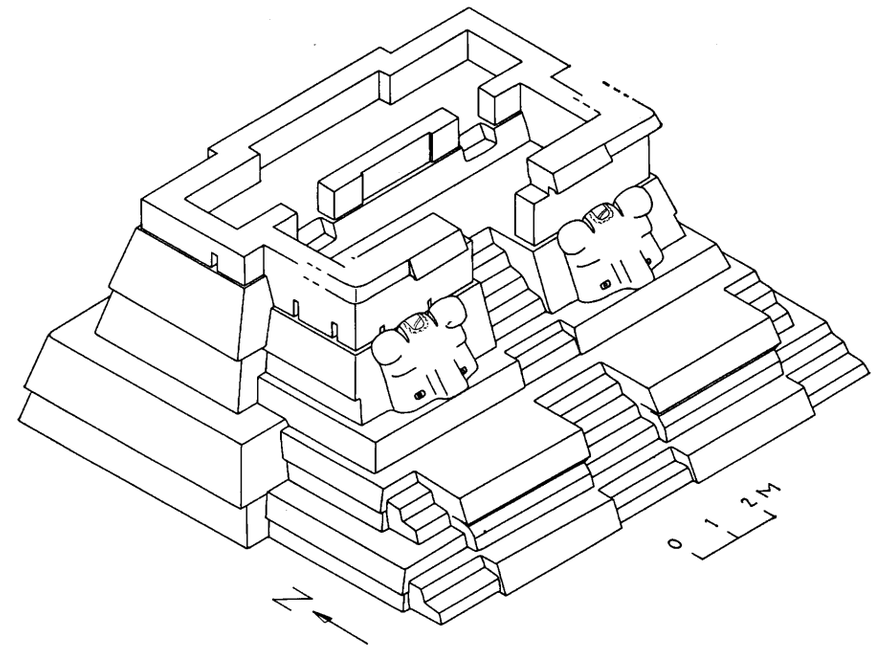


Fig. 4. Isometric view of Structure 5D-Sub.1-1st, with excavation limits omitted (see Figs. 1 and 5). Jaguar-head masks are shown unrestored.

Structures 5F-17 and 5F-18, 1000 meters east of the North Acropolis. Burial 158 was also found in this pit; it consisted of a skeleton of an originally seated adult, facing east, with a few associated vessels. Findings in deep test pits dug in a large area 500 meters southwest of the North Acropolis point to the possible existence of well-buried Tzec-related architecture that can be reached only by means of heavy excavation. Only one Tzec sample has been dated by the radiocarbon technique—sample P-759, from the quarry mentioned above; a date of 456±47 B.C. was obtained. This one date, for a somewhat undersized sample, provides no clue as to the duration of the Tzec complex. But, taking into consideration the Eb and Chuen dates, we might allow three centuries, from 500 to 200 B.C. This may seem long, especially in view of current ignorance of coeval development in architecture, let alone other cultural components. Conceivably, continued work may reveal the existence of transitional ceramic entities between Eb and Tzec and between Tzec and Chuen.

Chuen Times

With the advent of Chuen pottery at about 200 B.C. the record at Tikal becomes much more extensive and complicated. Whether accelerated development or simply better preservation and greater luck in excavation are responsible for the increased volume of information is a problem that can be answered only after Tzec-bearing levels have been comprehensively investigated throughout the site.

The beginnings of known architecture in which shaped stone masonry and plastered surfaces were used coincide with the time of production of Chuen ceramics. Chuen material is broadly distributed at the site, but knowledge of ceremonial architecture is restricted to the North Acropolis–Great Plaza area. Contemporary data on residence have been found only beneath a raised platform sustaining Structures 5F-17 and 5F-18, 1000 meters east of the North Acropolis.

The Chuen ceramic complex is a fascinating entity in that it established a balance of major ceramic types that remained unchanged at Tikal until the end of Preclassic times (*10*). Important Preclassic types make their first appearances in the Chuen complex—for example, Repasto black-on-red (Fig. 2*b*), a type that nevertheless continued into later complexes.

The stratigraphically earliest Chuen-associated feature on the North Acropolis is Chultun 5D-6 (Fig. 1), a subterranean chamber 2.8 meters in diameter, cut within bedrock and entered by a large orifice at the head of a three-step masonry stairway, and three small raised chambers off the periphery of the main one. The main chamber had a smooth plastered floor. Its function is a matter of speculation. Tons of fill, laden with occupation rubbish, had been deliberately thrown into these chambers at the time the first series of small Chuen-related platforms and floors overhead were built. A date of 219 ± 52 B.C. (sample P-751) was obtained for abundant carbonized bits of wood throughout this fill. On the unquarried bedrock above the chultun the Maya built successively three masonry platforms, termed Structures 5D-Sub.14-3rd, -2nd, and -1st (5D-Sub.14-1st is the latest). These platforms were fronted by Floors 20, 19, 18, 17, and 16 of the Acropolis sequence. Three human interments, Burials 122, 123, and 126, had been laid out in the hearting of Sub.14-1st. This structure is known to have been a three-level building platform, the top of which had been burned, then charred again following resurfacing. Tunneling failed to reveal postholes, though a building of poles and thatch seems a reasonable conjecture. The platform hearting contained quantities of burned, red-painted plaster, probably from the earlier, almost entirely demolished, Sub. 14-2nd. Nothing

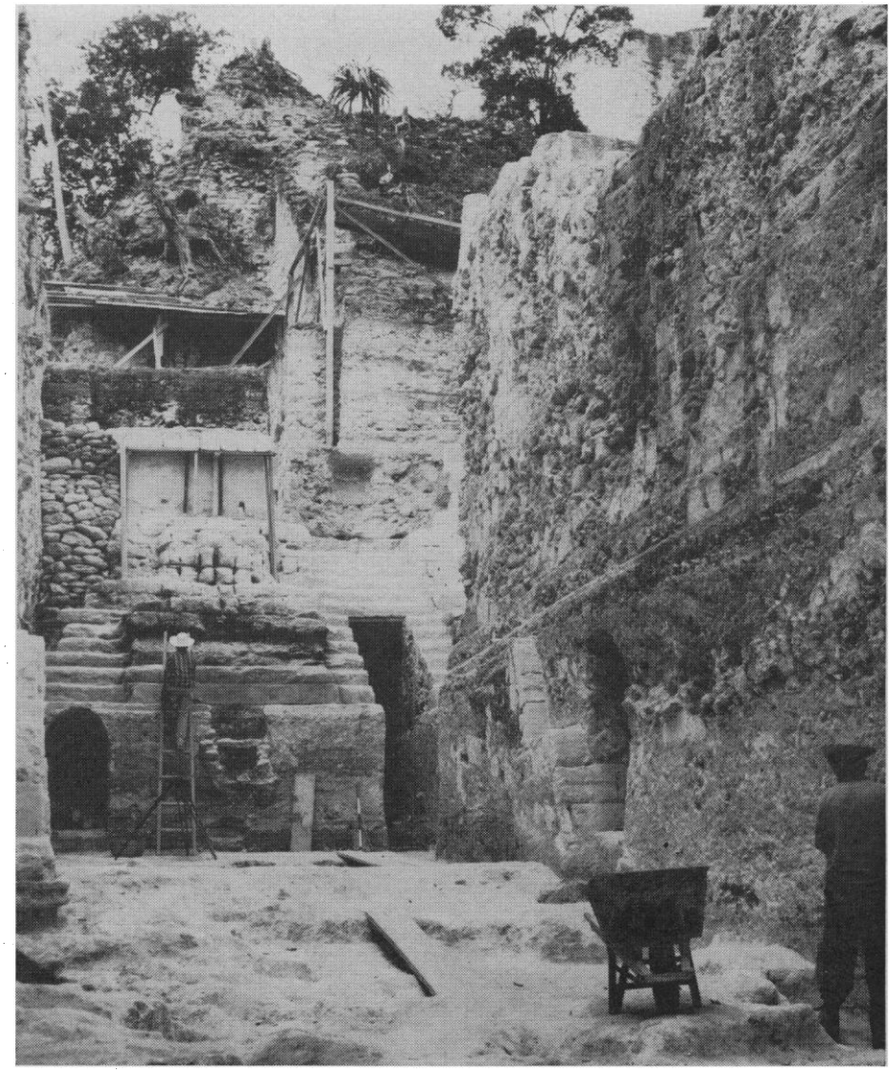
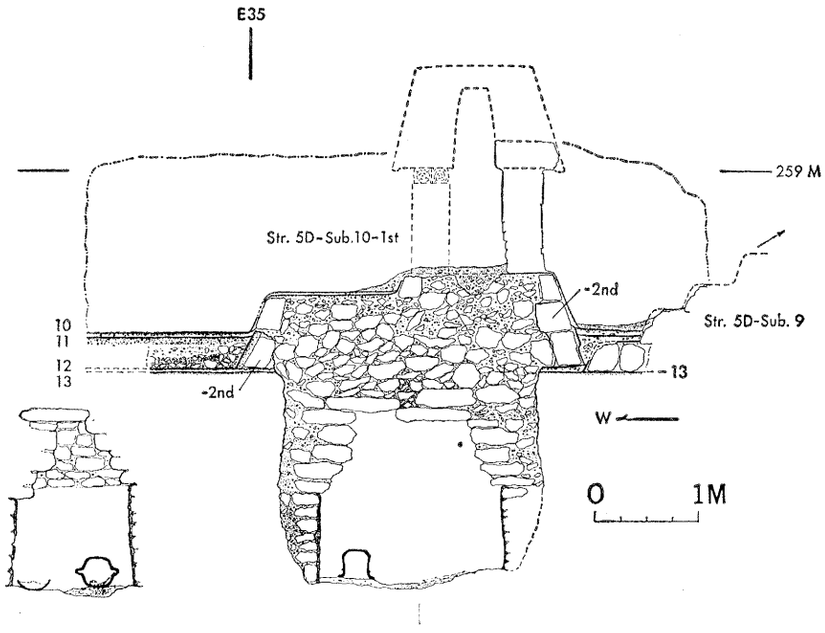


Fig. 5. The North Acropolis trench, on completion (1963), looking north. The workman to the right is standing on bedrock; the other workman is ascending a ladder to Structure 5D-Sub.1-1st (see Figs. 1 and 4).



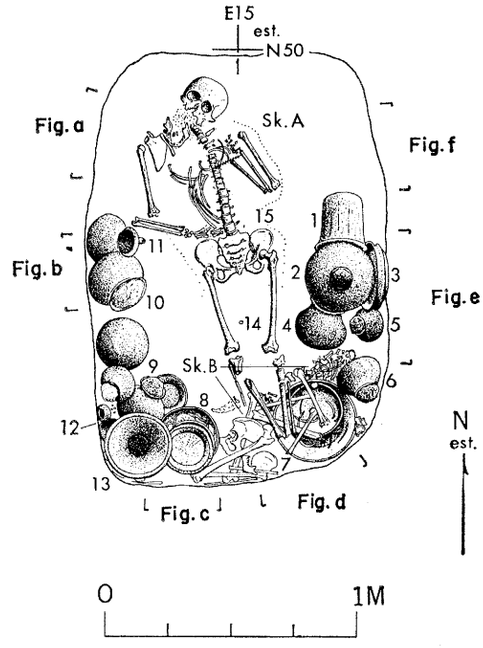


Fig. 6 (left). Center-line section of Structures 5D-Sub.10-1st and 5D-Sub.10-2nd and the 5D-Sub.9 lower stair, showing location of Burial-167 chamber; transverse cross section at left shows corbel vaulting (see Fig. 10). Fig. 7 (right). Plan of Burial 166. The tomb was sealed by Structure 5D-Sub.11. The wall paintings in locations *a* to *f* are shown in Fig. 9. Pottery and other objects are shown in Figs. 2*c*, 2*d*, and 8*b*.

of the rear faces of these structures is known, since these faces were ripped away during later building activity. The long axes of the three platforms were probably oriented east-to-west. The platforms looked south. Structure 5D-Sub.14-1st measured at least 6 meters in a north-south direction and, at the rear, stood 0.70 meter above the latest of the five floors—Floor 16. Dates obtained for charcoal from these structures are as follows: 207 ± 52 B.C. (sample P-752), 118 ± 52 B.C. (sample P-753), and 114 ± 52 B.C. (sample P-756). These dates, and that from the chultun, are difficult to evaluate because of possible redeposition of charcoal and the impossibility of knowing from what part of a long-lived tropical tree the charcoal derives. Nonetheless, in combination they do indicate modest ceremonial construction at Tikal by about 200 B.C.

The three burials mentioned above were an infant and two adults in extended positions, partially protected by large inverted Chuen plates. South of the platforms and in an area of destroyed Acropolis floors are two small pits, dug into bedrock, which were probably once sealed by one or more of the floors. One pit contained a young adult interred seated in a severely contracted position, with a necklace of shell pendants and jade and shell beads (Burial 121). The other pit contained the incomplete disarticulated remains of an adult, accompanied by fragments of one or more stingray spines; partial redeposition of a disturbed burial is suggested by this material.

The hearting of the Acropolis stage that replaced Sub.14-1st contained a great deal of cut stone masonry from demolished structures, possibly from Sub.14-1st. Certain blocks had specific shapes indicating use in sloping apron moldings. The utilization of such moldings on Chuen structures is their earliest known use by the Maya. The apron became a fundamental feature of lowland Maya architecture.

During the time of production of Chuen ceramics, architectural work on the Acropolis was greatly accelerated. The north side of Sub.14-1st, possibly with the apron molding just described, was intentionally torn off to make way for a new Acropolis platform many times the size of anything previously attempted. Floor 16 was largely obliterated by wear and by building activity. The new platform had Floor 15 as its original top surface. It stood 2.30 meters high and measured 23 meters north to south and about 28 meters east to west (a large portion of the west side was later demolished). The south face had two central, well-separated, two-flight stairways and an additional stairway at each end; the three intervening platform faces were in two terraces, each terrace having an apron molding of grooved blocks thickly coated with plaster. The north face of the platform had a single large apron and a battered inset zone below the apron. A single radiocarbon analysis of charcoal bits from within the platform hearting provided a date of 67 ± 52 B.C. (sample P-754). A construction date of about 100 B.C. seems acceptable, particularly in view of results from radiocarbon analysis of stratigraphically younger samples.

Floor 15, the top surface of this platform, supported to the south a large pole-and-thatch structure termed 5D-Sub.15 (not shown in Fig. 1). This building stood directly in front of a large masonry platform, Structure 5D-Sub.1-2nd. From tunneling, the latter is known to have measured 11 meters north to south. We can only assume that it was a south-oriented building platform that sustained a pole-and-thatch building. Later demolition had reduced Sub.1-2nd to a height of 20 centimeters. While these buildings were in use, a new top floor, number 14, was laid. On this floor a frontal masonry addition to Sub.1-2nd was constructed. This, too, was later almost completely obliterated to make way for subsequent construction.

A single interment, Burial 164, was associated with this stage, within the hearting of the Floor-15 platform. The skeleton is that of an adult, fully extended on its back, with head toward the south, in an earth-filled grave with

a rough perimeter of stone. It was accompanied by four pottery vessels, a few jade beads, and a stingray spine.

In time, a large, semicircular, low platform was built against the south base of the Floor-15 platform. A considerable amount of hardwood charcoal was recovered from a fire pit sealed by the floor of this new construction. A date of 275 ± 55 B.C. (sample P-755) was obtained for this material. One cannot reasonably assign the semicircular platform itself such an early date. The discrepancy can be explained by assuming that old structural wood from long-lived tropical trees was burned for ritualistic or other purposes in this pit.

During the use of Structure 5D-Sub. 1-2nd, the platform covered by Floors 14 and 15 was abandoned and a totally new one, surfaced by Floor 13, was constructed both over the earlier platform and around 5D-Sub.1-2nd. This new Acropolis, definitely built during Chuen times, measured 35.5 meters north to south and about 23 meters east to west. Surprisingly, the south face, 3.5 meters high, was built without a stairway. We can only assume that access to the top was via stairways set against the east and west sides of the platform. The central portion of the south face consisted of a huge apron molding that differed slightly in construction from earlier ones but, again, was quite unlike those of Classic times. The corners of the platform were rounded and built in two terraces, each with an apron molding. The Maya later added a stairway against the south face, almost as an afterthought. This addition, interestingly, occurred after the whole face of the platform had been stained brown by a major fire. This fire broke out on Structure 5D-Sub.4, a large building platform built along the south edge of the Acropolis. This structure was rebuilt at the time the south stairway was added. A "grading floor," merging with Floor 13, was laid over the south portion of the Acropolis, probably to conceal the scorched Floor 13 around 5D-Sub.4. The soft earth hearting of the south, secondary stairway caused the stairway to slump, and thick coats of tread plaster had to be added on the upper steps to correct for the slump.

The Floor-13 hearting yielded a fragment of stone sculpture, the earliest known from Tikal and, for that matter, from the Maya lowlands. This unprepossessing carved piece of limestone (Fig. 3) was found to fit a second one previously discovered in roof-comb debris of Temple II, an imposing religious edifice built about A.D. 700. Eight centuries probably separate the ultimate depositions of these two fitting fragments, a fact that underscores emphatically how almost constant demolition, reclamation, refurbishing, and building have served to project old materials ahead in time. Known as Miscellaneous Stone 54, the total piece is so fragmentary that we cannot tell whether it derives from a stela or an altar or from some other form of sculpture. Nor can we be sure what the carving represents. Mute as this piece is, it nonetheless evidences monumental sculpture at about 100 B.C. Carving and fragmentation could well have antedated deposition of the Floor-13 fragment.

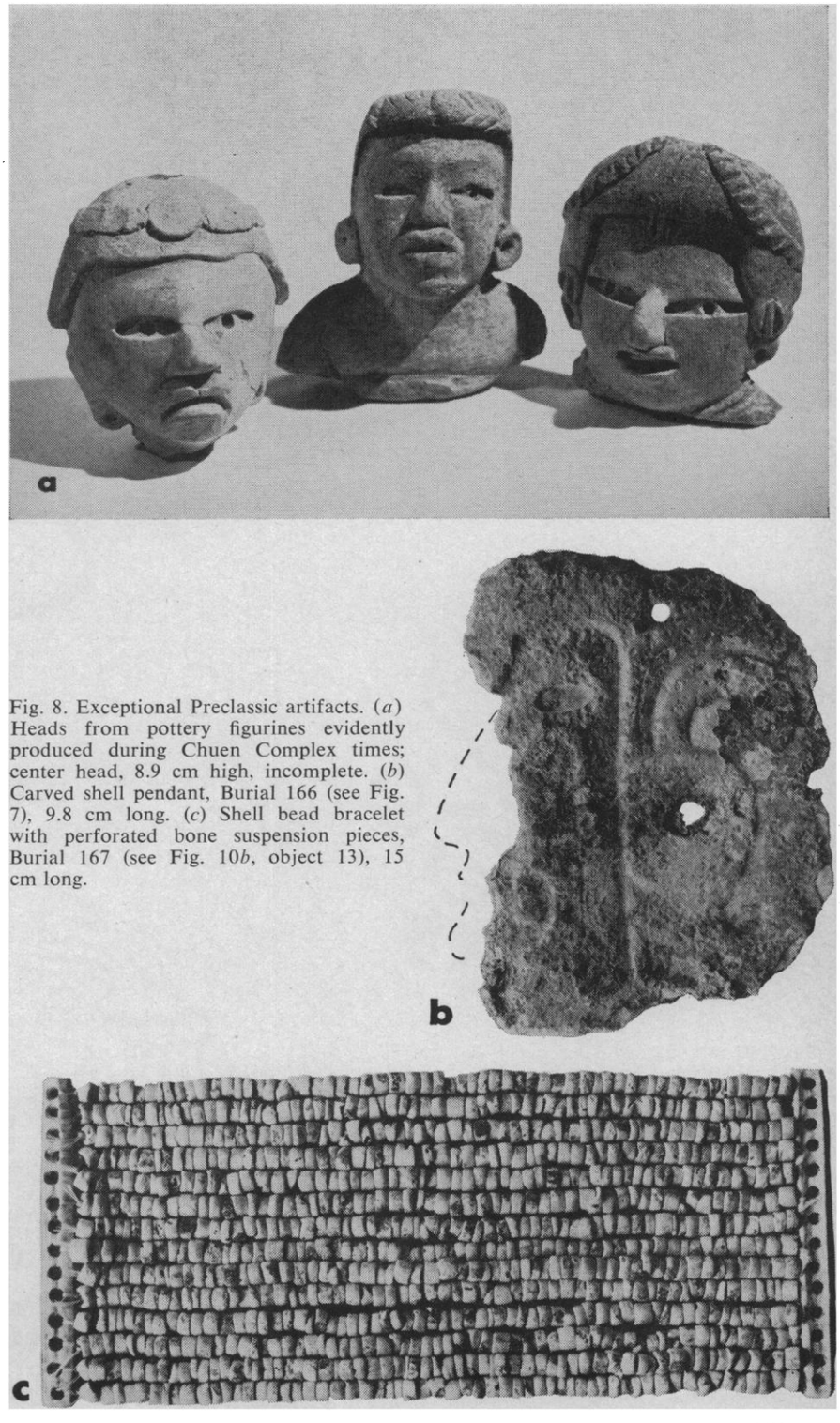
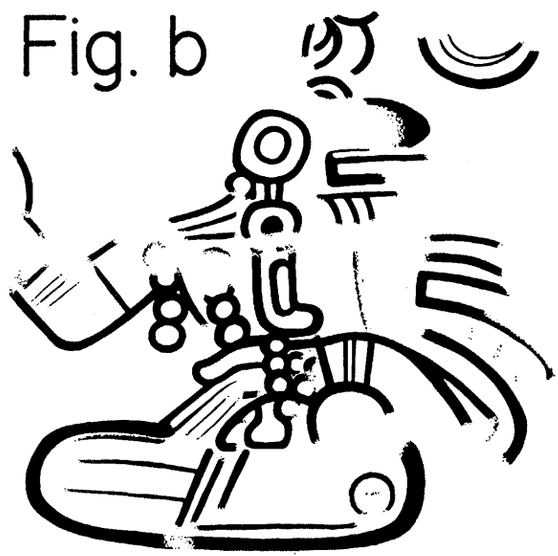


Fig. 8. Exceptional Preclassic artifacts. (*a*) Heads from pottery figurines evidently produced during Chuen Complex times; center head, 8.9 cm high, incomplete. (*b*) Carved shell pendant, Burial 166 (see Fig. 7), 9.8 cm long. (*c*) Shell bead bracelet with perforated bone suspension pieces, Burial 167 (see Fig. 10*b*, object 13), 15 cm long.

Cauac Times

Diagnostics of the Cauac ceramic complex first occur almost imperceptibly in the North Acropolis construction sequence. Architecturally the North Acropolis appears to have been rapidly transformed at about 50 B.C. Structures 5D-Sub.4 and 5D-Sub.1-2nd were practically obliterated. A magnificent building, Structure 5D-Sub.1-1st (Figs. 1, 4, and 5), replaced 5D-Sub.1-2nd. A relatively small collection of sherds, entirely Chuen, was recovered from the hearting of this new building; there are fair grounds for assuming that it was only by chance that no Cauac material entered the construction fill. A structure which was probably the twin of Sub.1-1st was built off the southeast corner of Sub.1-1st. This building, Structure 5D-Sub.9 (Fig. 6, section), was oriented west. The fact that no balancing, east-oriented building was built off the southwest corner of Sub. 1-1st is extremely interesting. The south half of the, by then, quite old Chuen-related Acropolis platform was resurfaced with a grading floor that, to the south, covered the razed remains of Sub.4. Here the Maya built Structure 5D-Sub.3-5th, facing south. Just to the northwest of this imposing platform they also built the east-oriented Structure 5D-Sub.11, and to the northeast of the platform, they built the north-facing Structure 5D-Sub.13-1st. The only available date for this mass of new construction is 125 ± 49 B.C. (sample P-560), obtained for scattered bits of charcoal within the hearting of Sub. 3-5th.



Discovered in a large test pit in 1960, Structure 5D-Sub.1-1st is one of the most remarkable early buildings in the Americas. At its base this building measures 11.40 meters north to south and about 13 meters east to west; its height measured from the floor of the rear room, is 4.4 meters. The intricately composed pyramidal substructure supports a two-level building platform which in turn directly sustains the masonry walls of the two broad rooms, one behind the other. The sides and rear of the substructure are faced with great apron moldings. These rise and fall and step in and out in a manner that was to become traditional in Classic Tikal temple construction. The south, principal face has a central inset stairway, flanked at the base by broad masonry blocks and at the top, by jaguar (?) masks, now badly damaged. There is a minor stairway to the side of each masonry block. The south face of the building proper is broken by a central doorway, 2.1 meters wide. The upper facade, projecting 0.45 meter beyond the room walls, had been decorated by deeply modeled stucco painted in cream, black, red, and pinks. This upper facade was demolished almost entirely when this stage of the Acropolis was abandoned. Enormous quantities of shattered stucco work were recovered from the fill around and above this structure. In the absence of definite proof, there is considerable speculation as to whether this building was vaulted, or could have been vaulted. If it was vaulted, the Maya must have used unspecialized vault stones, unlike those used in Classic times. If it was not vaulted it must have had a beam-and-mortar transverse roof, inasmuch as thatch would have obscured the upper facade. Structure E-VII-sub at Uaxactún and this Tikal structure have a number of important points in common which, nevertheless, are outweighed by differences.

Structure 5D-Sub.3-5th, along the south side of the Acropolis, is a two-level building platform 1.5 meters high, measuring 7.3 meters north to south; the principal face has a central five-step stairway once flanked by monumental masks, which are now entirely destroyed. It supported two rooms, which had thin masonry walls.

Structure 5D-Sub.11, off the northwest corner of Sub.3-5th, was smaller but had two levels and a fully projecting small stairway on its east side; the whole structure was painted orange-red. East-to-west tunneling beneath this Acropolis level had, by pure chance, revealed an extraordinary tomb, Burial 166 (Fig. 7). To discover to what structure and Acropolis floor this burial related it was necessary to tunnel at a higher level. This work resulted in the discovery of Sub.11 and, among other structures in this asymmetrically placed

Fig. 9. Drawings of damaged wall paintings in the Burial-166 chamber (see Fig. 7). Black line on red background; *e*, 88 cm high. [Drawings by Virginia Greene]

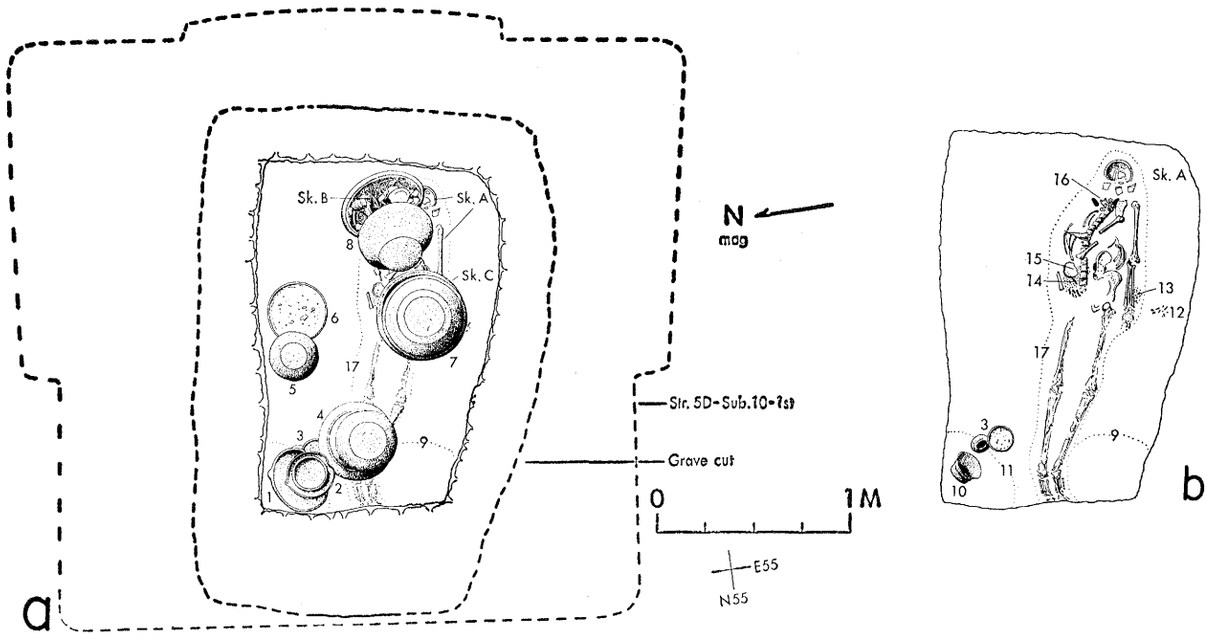


Fig. 10 (*a*) Plan of Burial 167, within outline of Structure 5D-Sub. 10-1st (see Fig. 6). (*b*) Plan of Burial 167, showing Skeleton A (obscured in plan *a*). Various objects in the two plans are shown in Figs. 2, *e*, *f*, and *g*; 8*c*; 11, *a* and *b*.

cluster of building platforms, Sub.12-1st. The first ritual offering to be found in association with a specific Tikal structure was found within the hearting of Sub.11. This offering, Cache 168, was a lidded pottery jar containing a few shell and jade beads. This is the earliest known definite example of a custom that became common during Classic times at Tikal. Axial trenching of Sub. 11 disclosed not only this offering but a cut through the earliest grading floor merging to the north with Floor 13. We are convinced that this floor cut was made to intrude Burial 166, and that Sub.11 was built over the excavation immediately following completion of the burial. Normally excavation would have been extended to prove this conclusively, but in this case work had to be abandoned because of irremediable cave-ins of the tunnels. Fortunately Burial 166 had already been excavated and substantially recorded via the lower-lying system of tunnels.

The floor of the Burial-166 chamber (Fig. 7) lay about 1.5 meters below the floor supporting Sub. 11. The rectangular chamber, measuring 3.45 meters north to south and 1.40 east to west, had been vaulted in corbel fashion with a few large capstones. On the floor rested a fully extended adult skeleton (A), on its back, with head to the north (age and sex have not yet been definitely determined). A second individual (B), evidently almost completely disarticulated upon interment, lay as a jumble of bones beneath the lower legs of Skeleton A; the cranium of Skeleton B had been separately deposited in the lowest of three nested vessels. The sides of the south end of the chamber were crammed with 20 Cauac pottery vessels (two are shown in Fig 2, *c* and *d*) with clay seals and perishable contents, probably foodstuffs. Other vessels contained powdered cinnabar and marine material. With Skeleton A were the scattered remains of a necklace of shell and jade beads. Additionally, on the chamber floor were fragmented stingray spines and a shell pendant (Fig. 8*b*) carved with a human head in left profile. The masonry walls of the chamber had been crudely plastered, then painted red. Six black-line figures had been painted on the red plaster, two on each wall except the north wall (Fig. 9). Unfortunately, through flaking and crumbling of the weak plaster these remarkable paintings have been damaged. Despite this, enough remains of style and content to indicate exceptional sophistication. The paintings show in some cases seated individuals, in others, upper parts only, with faces, earplugs, and intricately plumed headdresses. The profile in *b* is almost certainly the uppermost element of a headdress. To what degree these paintings relate to roughly contemporary sculptural styles of highland Guatemala remains to be studied.

Acropolis Floor 12 was later laid around all structures of this stage. On this floor a small shrine-type building, Structure 5D-Sub.11-2nd, was built at the base of the stairway of Sub. 9, the eastward apparent twin of Sub. 1-1st. Floor 11 was subsequently laid; it was the top surface of a totally new Acropolis platform that was somewhat larger and higher than its Chuen-related predecessor. Floor 11 interred the intentionally demolished Sub.12-1st to the southwest. Finally, Floor 10 was laid over the Acropolis. This floor abutted Sub.1-1st, Sub.9, Sub.11-2nd, Sub.3-5th, and Sub.11. Later, just before Floor 10 was laid, the shrine Sub.11-2nd, in front of Sub.9, was dismantled and a large pit was dug through the remains of its building platform (Fig. 6, section). At the bottom of this pit, 2.5 meters deep, Burial 167 was found.

Burial 167 (Fig. 10*a*) was a vaulted tomb, 3.5 meters long east to west and 2.4 meters north to south, and rectangular in plan. On the small chamber floor were the following: a fully extended adult (Skeleton A) on its back with head to the east; bracelets of tiny shell beads strung between bone clasps, perforated to support the beaded strands, with stingray spine hasps (Fig. 8*c*); a necklace of large shell beads with twin carved shell pendants (Fig. 11*a*); in the pelvic area of Skeleton A, a greenstone figurine (Fig. 11*b*), not unlike much later ones common in the Quiché region of highland Guatemala; over the chest, a large pottery bowl, with a second inverted as a cover, the

lower one containing the disarticulated remains of a second adult—that is, Skeleton B (both adults had greatly thickened cranial bones, suggestive of a pathological, though as yet unstudied, link between the two), and a second bowl, with matching inverted lid, containing the articulated extended remains of an infant or stillborn fetus (C), resting over the pelvis of Skeleton A. At the northwest end of the chamber were nine Cauac vessels (for example, Fig. 2, *f* and *g*), one a finely stuccoed and painted urn (Fig. 2*e*), and the remains of two red-painted stuccoed gourds. The masonry walls of the chamber were crudely plastered with mud and left unpainted (unlike the earlier Burial 166). After installing the burial and filling the grave cut, the Maya constructed a new shrine, Structure 5D-Sub.10-1st, directly over the remains of its predecessor. At this time Floor 10 was laid. The new shrine consisted of a red-painted, two-level building platform, west-oriented like its predecessor, with the upper level supporting a diminutive building with a single room of inside dimensions 0.40 by 2.2 meters. There is an excellent chance that this building was crudely vaulted, although no proof of this exists. The single, central, west-facing doorway led into this room, which had smoke-blackened walls and an inset panel rising from floor level in the center of the rear wall. Two fine grafitti had been incised in this panel. Polychrome frescoes on the exterior sides and rear were a striking feature of this building.

These paintings (Fig. 12) show standing and elaborately ornamented human figures with grotesque faces. The figures occur at the four corners of the walls and at the angles of the rear outset of the rear wall (Fig. 13). Remains of five figures (four of them shown in Fig. 12, *a–d*) were exposed in tunneling (*f*, at the northwest corner of the building, is postulated; since the corresponding *a* was all but destroyed through mutilation, *f* was left unexposed by the excavators, who feared to overextend the tunnels). The colors are black, red, and yellow over a pink undercoat laid on the smooth cream plaster. A decorative horizontal band, directly underneath the medial molding, connects the figures. A small, finely done graffito had been incised in the rear wall, to the right of *c*. It and the two others within the shrine room are among the earliest known from Tikal.

One can only regret the damaged condition, probably intentional, of these extraordinary paintings. Of interest is the incorporation of a Maya day-sign, the Akbal glyph, in the headdress of figure *d*. These paintings, the shrine, and the underlying Burial 167 are estimated to date back to about 25 B.C., a quarter-century later than the date assigned Burial 166, with its tomb paintings.

The distribution of Cauac-related mortuary activity at Tikal is partly indicated by Burial 128, roughly contemporary with Burial 167. Burial 128 was found in the large platform-sustaining Structures 6E-25 and 6E-26, which

Fig. 11. (*a*) Pair of carved shell pendants, Burial 167 (see Fig. 10*b*, area of neck of Skeleton A); right pendant, 6.2 cm high. (*b*) Figurine of soft green stone, Burial 167 (see Fig. 10*b*, object under right pelvis of Skeleton A), 10.3 cm high.

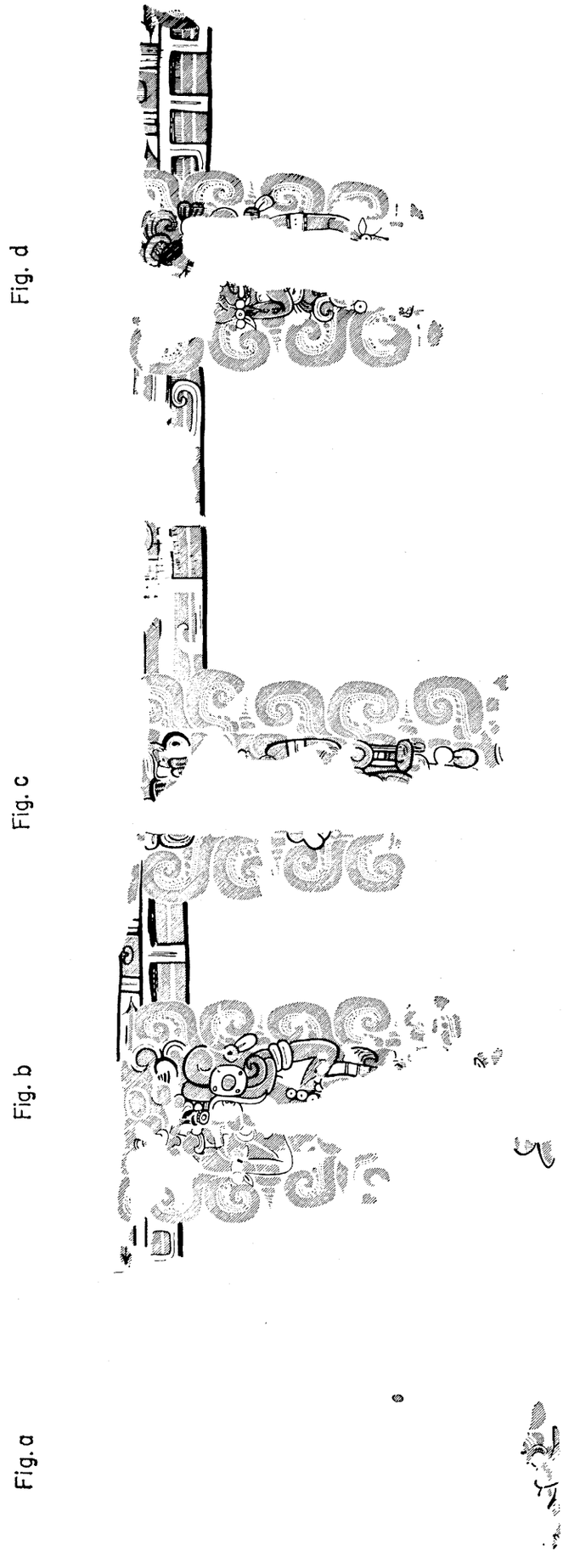


Fig. 12. Drawings of frescoes on rear and sides of Structure 5D-Sub. 10-1st (see Figs. 6 and 13); black, yellow (vertical hatching), red (diagonal hatching), pink background in area of scrolls, all on cream plaster. Maximum height of paintings, 101 cm. [Drawings by Virginia Greene]

are 500 meters south-southeast of the North Acropolis. The burial comprised eight Cauac vessels, one a huge vessel containing the only individual, an adult female with deformed head, together with shell and bone bracelets smaller than those in Burial 167 but essentially identical to them.

During the use of Floor 10 (and the shrine, Sub.9, Sub.11, Sub.1-1st, and so on) a member of the elite died and was interred in another vaulted tomb, Burial 85, cut down through Floor 10 directly in front of the stairway of Sub. 1-1st (Figs. 1, 14, and 15). Striking features of this North Acropolis burial are the 26 vessels (four shown in Fig. 2*h–k*); a single adult skeleton, originally seated, contracted, in a bundle of textiles but lacking head and thigh bones (which presumably were retained as relics); and an extraordinary mask (Fig. 16) of polished, soft green stone (mistakenly described as jade in an earlier report), with shell-inlaid eyes and teeth. This mask probably had been sewn to the bundle as a substitute for the individual's missing head; the bundle also contained a stingray spine and a shell, with scraped interior, of *Spondylus* sp. or thorny oyster; both the spine and the shell were important mortuary items during Classic times. The rectangular chamber measured 2.45 meters north to south and 1.25 meters east to west; the bundled body was set facing south, close to the center of the chamber floor. Burned slivers of pine wood in one of the associated bowls yielded a date of A.D 16 ± 63 (sample P-535). A two-level, red painted building platform supporting a building of pole and thatch (Structure 5D-Sub.2-2nd) was immediately built over the tomb and grave cut. This shrine-type building was dismantled in time, and a somewhat larger version, Sub.2-1st, was built. At the time this stage of the Acropolis was abandoned, the Sub.2-1st building burned. The Maya sealed the burned debris in a pit in front of the platform. A date of 1 ± 46 B.C. (sample P-561) was obtained from this material. There is every reason to date Burial 85 and the Sub.2 structures above it at about A.D. 1.

Another outstanding feature of this stage is Structure 5D-Sub.3-3rd, which was built on Floor 10 over earlier versions on the south edge of the Acropolis. A south-central stairway of the structure was flanked by polychromed grotesque masks of stucco and plaster, 4 meters long and painted red, black,

yellow, and pink (Fig. 17). Each mask, probably of a serpent, was decorated with round earplugs, 0.70 meter in diameter, and with elaborate stucco scroll work. Only the mask to the west was exposed in trenching. The structure had two rear exits which permitted one to pass through it and down onto Floor 10, to proceed to the buildings to the north.

The obsolescence of this important stage of the Acropolis was marked not only by demolition and filling operations but by the cutting of rough pits in the floor of Sub.1-1st and the burning of terminal sacrificial offerings. A date of A.D. 76 ± 54 was obtained from a charcoal sample (P-562) from one of these offerings. On the basis of various dates for the Acropolis obtained by radiocarbon analysis, a date of A.D. 50 appears the most reasonable for the abandonment of this stage. Five meters of demolition debris and fill were laid over Floor 10. With the exception of the front of Sub.3-3rd, everything from earlier periods was interred.

The new Acropolis was surfaced by Floor 9. Among the many artifacts in the supporting fill was a shattered squatting figure of limestone, Miscellaneous Stone 82 (Fig. 18). This is reminiscent of a type of sculpture that was quite common in the Highland and Pacific Coast regions of Guatemala during Preclassic times. It is also related stylistically to the green-stone figurine of Burial 167.

The Floor 9 version of the Acropolis, built still within Cauac-producing times, sustained a number of important new structures. To the north of center stood Structure 22-4th-B, facing south and measuring 11 meters east to west, 9 meters north to south, and 2 meters high. This two-level platform probably carried a pole-and-thatch building, despite its being the successor (from the standpoint of location) of Sub.1-1st, with its masonry building. The fully projecting stairway was flanked by large masks that were smaller versions of those decorating the earlier Sub.3-3rd. Existence of a west-oriented platform structure off the southeast corner of 22-4th-B is postulated; further tunneling, in search of such a structure, is planned. Again, there is no evidence of a balancing east-oriented structure off the southwest corner of 22-4th-B. In front of 22-4th-B, however, stood a red-painted round platform, Structure 5D-Sub.6, about 8 meters in diameter. Only red stains and a portion a little more than 1 centimeter high remained after later demolition. South of this platform stood Structure 5D-26-6th, later largely destroyed. This was a masonry-walled building facing south, with a central doorway 3 meters wide, and, probably, two rear exits. A stairway must have led down from this building onto the rear of the by then quite old Sub.3-3rd. All traces of this stairway were later removed.

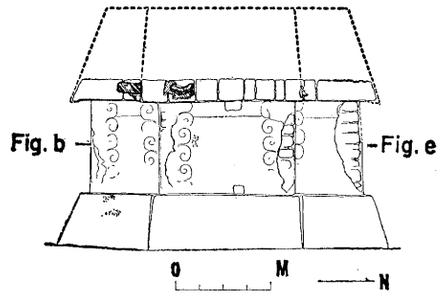


Fig. 13. Structure 5D-Sub.10-1st, rear elevation, showing location of frescos *b–d* of Fig. 12. Note remains of upper-zone red, pink, and cream stucco work and traces of black line paintings on red-painted building platform.

Cimi Times

It was during the use of Structures 22-4th-B and 26-6th that Cimi ceramic items first appear at the site, or at least in the North Acropolis construction sequence. At about A.D. 150, according to present estimates, the North Acropolis was resurfaced by Floor 8, which abutted Structures 22-4th-B and 26-6th. The first structure to be built on this floor, 5D-26-5th, may have been built during very early Cimi times. The small west-oriented building platform, Structure 5D-Sub.8-2nd, was built off the southeast corner of 22-4th-B, the dominant north-central feature. Also, Structure 22-4th-B was renovated: it was totally replastered, a new stairway was built over the old one, and the medial portions of the elaborate polychrome masks were interred, while the outer, exposed parts were totally stripped away. We term the result Structure 5D-22-4th-A.

Eventually the Maya built on Floor 8 the large, almost palace-like Struc-

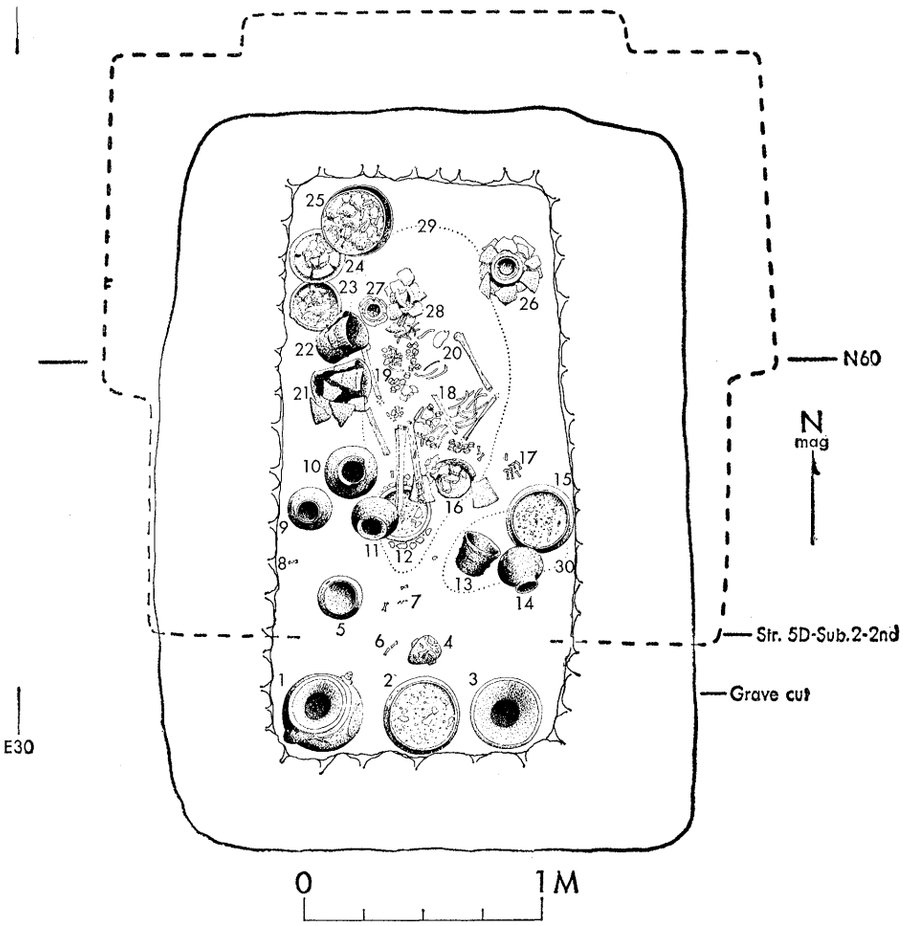


Fig. 14. Plan of Burial 85 (for location of tomb, see Fig. 1), sealed by Structure 5D-Sub.2-2nd. For photographs of various objects shown, see Fig. 2 (*h, i, j,* and *k*) and Fig. 16.

ture 5D-26-4th. This imposing building contained substantial amounts of Cimi pottery in its hearting—in particular, types that appear to have been used in offertory rituals. This building had a large central room (5.75 meters wide) open to the south, two side rooms open to the north, and, beyond these, two rooms which are still being excavated. An imposing stairway led down, south of the building, onto a low-lying new building, Structure 5D-Sub.3-2nd, and later to Sub.3-1st. These latter sequent buildings were reached from the North Terrace below by another flight of stairs. None of these buildings could have been vaulted, since the walls were too thin and the rooms and doorways were too wide to have supported vault masses and thrusts.

This same North Acropolis was again resurfaced, this time by Floor 7, abutting 22-4th-A and associated buildings. The large pole-and-thatch building on 22-4th-A was then burned, the south face of the platform being deeply charred. Immediately after this severe fire, the stairway and Floor 7, in front, were cut into, and a shaft 5 meters deep was dug down to the level of the rear base of the long-buried Sub.1-1st. Burial 125 was placed at the bottom of this perilous cut (Fig. 1). Its important location and the depth at which it was set led us to expect a productive and informative grave. It was disillusioning to discover that the chamber was empty save for a single large male skeleton extended on its back with head to the east. Not a single Cimi vessel, or anything else, accompanied the skeleton. The chamber had been excavated rather than built. It had been roofed by a few logs over which hundreds of kilograms of specially struck flint chips and flakes had been deposited in thick layers in the grave-shaft fill. Between two flint layers the Maya had laid out a second individual. Eventual collapse of the log roof brought down much of the overhead fill, including this second individual. This is the first known instance of the use of flint flakes in interments; during Classic times they were used fairly generally in burials of the elite. The upper fill used to seal the Burial-125 cut contained a considerable amount of burned stairway plaster, together with charcoal, identified as from the chicle tree, *Manilkara* (formerly *Achras zapote*), and almost certainly derived from burned structural members of 22-4th-A. A date of A.D. 173 ± 45 was obtained for this material (sample P-768). A small one-level platform, Structure 5D-Sub.7, roofed by pole and thatch, was also repaired and continued to function in front of the refurbished stairway.

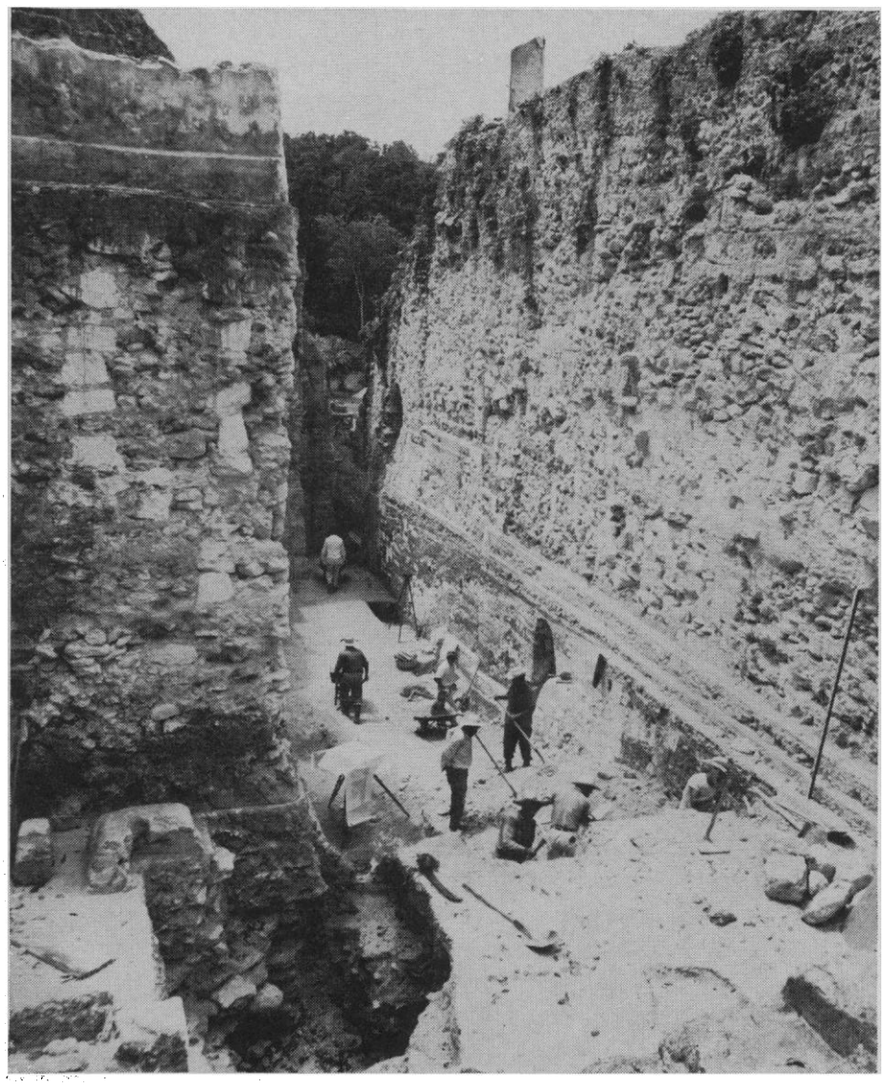


Fig. 15. Excavation of Preclassic levels of North Acropolis, looking south, with excavated Burial-85 pit in left foreground. Workmen are removing an exposed portion of the Floor-15 platform (see Fig. 1).

Sometime in this period, Structure 26-4th, to the south, was partially razed, and its remains were incorporated in the hearting of a new structure, 5D-26-3rd. This was a very large south-oriented structure with rear exits; it was reached directly from the North Terrace by a continuous, magnificent stairway of 29 steps. This stairway, built above Sub.3-1st, set a pattern of direct access which was maintained throughout the subsequent history of the North Acropolis. The final center line of the Acropolis was established at this time. The form of the building itself, on the 26-3rd platform, is barely known, due to later demolition. During the period of its use, the North Acropolis was again rebuilt, this time with Floor 6 as its top surface. By this time the south edge of the Acropolis stood 9 meters above the North Terrace. Floor 6 was so thick that it practically interred the substructures of 22-4th-A and 26-3rd, though both buildings continued to function. Structure 5D-Sub.8-2nd was completely obliterated by this new floor. To replace it, the Maya built on Floor 6 a larger version of a west-oriented platform, called Sub.8-1st. The old pattern of having no balancing structure to the west was again maintained. Here again we have no proof of vaulting, although the corbel principle had long been used in Tikal tomb burials.

The Preclassic–"Protoclassic" North

Fig. 16. Masquette of polished soft green stone with shell-inlaid eyes and teeth, 12.3 cm high; Burial 85 (see Fig. 14).

Acropolis sequence is thought to have ended about A.D. 200 to 250. At this time all features of the extant Floor 6 Acropolis were sufficiently demolished to permit the laying of Floor 5 and the creation of a totally new Acropolis platform. This floor sustains buildings containing Early Classic ceramics in their heartings. Such Early Classic temples as Structures 5D-26-2nd and 5D-23-2nd were first built on Floor 5; 26-2nd has been well excavated and most certainly was not vaulted. In time, both structures were covered over by new ones (26-1st and 23-1st, respectively). Radiocarbon determinations on beams from these latter buildings suggest construction dates of around A.D. 250. These buildings were vaulted; they are the first in the entire Acropolis sequence definitely known to have been vaulted.

Just before construction of the new Floor-5 Acropolis was started, a pit was cut into Floor 6 and the calcined fragments of a finely carved, incomplete monument were placed in it, to be directly sealed by the Floor-5 fill. These fragments (two principal ones are shown in Fig. 19) are known collectively as Miscellaneous Stone 69. It has been suggested that these fragments may well pertain to a miniature stela in Miraflores style, Miraflores being a late Preclassic phase at Kaminaljuyu (Guatemala City). The earliest known lowland Maya stela with a text is Tikal Stela 29. It was carved in A.D. 292 during Early Classic times, probably a century after whatever object Miscellaneous Stone 69 derives from was destroyed (perhaps intentionally). The date of carving of this stone is entirely problematical.

Conclusions

It would be extravagant to claim that these pages have outlined meaningfully the early evolution of Tikal. Data have been provided largely for one excavation locus at a site which, for all its importance, merely has symptomatic value. We cannot claim to have, at present, sufficient material to document satisfyingly the conditions and products of community-wide living at any point in these early times. Present knowledge of Eb and Tzec ceramics and of all the usual archeological correlates (architecture and so on) is disturbingly incomplete. While we do have a good many data on residence throughout much of Preclassic time, considerably more information is needed before a solid evaluation of Preclassic Tikal society can be achieved. One can only hope that pending excavation programs will provide it. Yet, experience shows that probably only a tiny percentage of early cultural remains, regardless of their grandeur and importance at the time, would have survived the constant quest for construction fills to satisfy a seemingly interminable need to build and revamp.

From Chuen times on, perhaps the most striking aspect of Preclassic Tikal was the extent and magnificence of its ceremonial or cultist architecture. By about 100 B.C., if not earlier, swarms of laborers and specialists were engaged in building massive masonry platforms studded with large and small temples and shrines. A ½-square-kilometer area in the center of Tikal was almost certainly paved and dominated by architectural aggregates comparable to the North Acropolis. Already at this time artisans of extraordinary skill were stuccoing and plastering the facades of great buildings in the knowledge that they would live to see the destruction of their work, and aware of the utter impermanence of their awesome creations. By this time, and even earlier, environment, maize, peasantry, and theocratic elite were effectively in league, and the known cultural results are basically indistinguishable from those of Classic times. The developmental implication of "Classicism"—that is, maturation or fulfillment—is not, however, to be discarded because of the patent precociousness of the early Maya. For instance, a Tikal apron molding of 100 B.C. appears to be no different from one of A.D. 200, but, when examined in section, the two are found to differ considerably in construction. Continuity, with progressive change and increment, is found in various features of Tikal culture (in offerings, burials, artifacts, art style, and so on). Excavation of the North

Fig. 17. Polychrome stucco mask, probably of a serpent, on the front of Structure 5D-Sub.3-3rd, as seen from the south (see Fig. 1). The mask was burned and badly mutilated at time of interment.

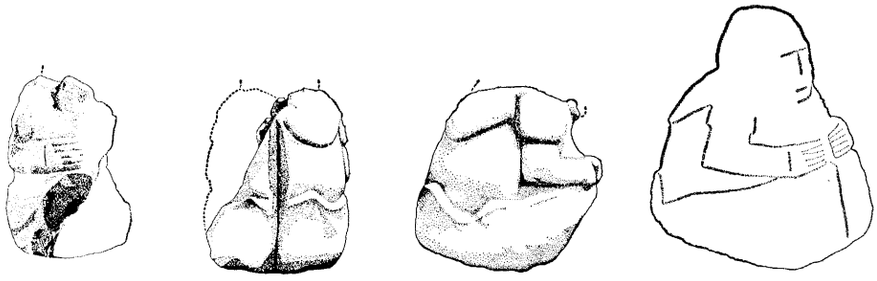


Fig. 18. Miscellaneous Stone 82, limestone, from hearting of Floor-9 platform of North Acropolis (see Fig. 1); 24 cm high, incomplete.

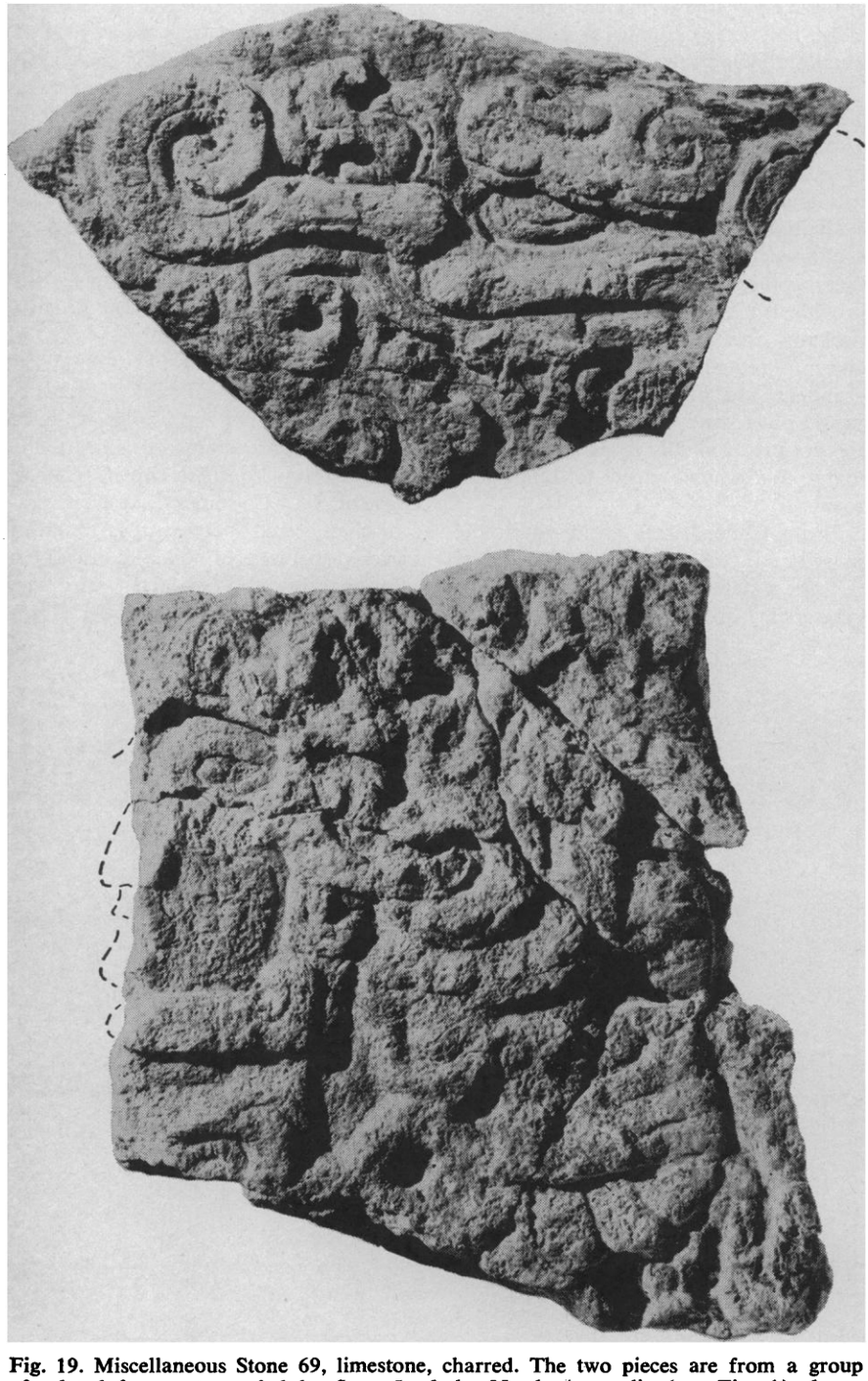


Fig. 19. Miscellaneous Stone 69, limestone, charred. The two pieces are from a group of related fragments, sealed by floor 5 of the North Acropolis (see Fig. 1); lower fragment, 14.7 cm high.

Acropolis has greatly extended backward in time our knowledge of various basic features of Classic culture, including the corbel vault, although the latter is not known in architectural context until about A.D. 250 (Structure 5D-Sub.10-1st is a possible exception) (see Fig. 6, section). The collection of Preclassic Tikal sculpture in stone is so miniscule as to be useless as a means of indicating whether the Maya did calculate and record time in Classic fashion prior to the 3rd century A.D. The Akbal glyph in the headdress of one of the Sub.10-1st fresco figures is a sophisticated ideographic inclusion, yet hardly proof of the existence of inscriptions in the Maya Long Count system on coeval stone monuments.

Probably few would disagree with the assertion that in the last century or so of the first millennium B.C. the residents and sustaining population in and about Tikal were living within a context of civilization, and one manifestly Maya. Whether or not the pattern of residence and the interaction of people and environment were such as to make Tikal urban during these times is a subject even more controversial than that of urbanism in Classic times, for which many more data exist.

Apart from such considerations, we still must face the problem of the origins or stimuli of the Preclassic Tikal elite-ceremonialism mentioned so often in this article. Here one has to deal with concepts of diffusion and origination and their specific and general expressions. Preliminary thinking along these lines has so far failed to produce anything very satisfactory. A few assertions nonetheless seem justified by what is now known of early Tikal. For one, the introduction of "Protoclassic" pottery at Tikal (Cimi times) appears to have had at the most a negligible effect on this dominant Peten center. As far as can be seen, the appearance of new ceramic types at this time was without influential correlates that could have created or promoted Classic civilization where there had been none before. The fact is that many of the frequently cited diagnostics of civilization were present at Tikal long before Cimi ceramics appeared. Moreover, one cannot, with anything approaching confidence, directly or remotely attribute the brilliance and complexity of what is known of Preclassic Tikal to Olmec "diffusion," however this term is construed, even when the hallmarks of that distinctive culture are assumed to be as early as some students have

held them to be. On the other hand, it is clear that during Preclassic times Tikal was not a hothouse, self-propagating sport. From probably as early as 700 B.C. it depended on trade with distant regions for basic raw materials, and its neighbors may have depended on a variety of Tikal products.

What traveled these trade routes? Comparative stylistic studies may eventually show conclusively that certain features of early Tikal culture are of highland derivation. However, in any such study, quality, quantity, and time must be very carefully considered before donor and recipient, or innovator and emulator, can be specified with assurance and the direction of diffusion can be pinned down.

Much remains to be learned of Preclassic Tikal. Despite the magnitude of the North Acropolis excavation, the work was limited by a shortage of time and funds. However, without the knowledge gained from this work, Tikal could not figure in the profound searchings for the beginnings and fulfillments of Mesoamerican and particularly Maya brilliance. The most disturbing aspect of Tikal is the quantity of architectural masses as yet untouched. Excavation of these might greatly augment our knowledge of the Preclassic Maya of the southern lowlands. Archeology depends on reliably amassed information. Learning the facts of Preclassic times is costly when settlements, such as Tikal, which are critical to such a study have been constantly built and rebuilt. It is clear that solid answers to the questions of cultural beginnings which plague Mesoamericanists cannot come quickly. To think otherwise is to discount the extraordinary limitations of archeology.

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11. I thank W. A. Haviland, T. P. Culbert, and H. Moholy-Nagy for suggested additions and changes throughout the manuscript.

The History of the Theory of Structure of the Atomic Nucleus

J. Hans D. Jensen

I have had occasion during recent weeks to think of my teachers. One man who had a decisive influence on my early attempts to gain some understanding of nuclei stands out among them: he was Niels Bohr. Thus it seems appropriate today to look back and to examine the background from which our concepts of nuclear structure emerged.

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I shall devote only a few sentences to the time preceding Chadwick's discovery of the neutron (1932). At that time our information regarding the nucleus was very sparse. All we had was a chart of stable isotopes with nuclear masses which were not very accurate, a few nuclear spins, an estimate of nuclear radius of about $1.4 \times 10^{-13} A^{\frac{1}{3}}$ centimeter, the phenomenon of natural radioactivity, and a few nuclear reactions. Ideas on nuclear structure were still dominated by Prout's hypothesis of 1815; this was that electrons and protons, the only elementary particles known at the time, were bound together in a nucleus in such a way that A protons and $A-Z$ electrons formed a nucleus of charge Z. But from the point of view of quantum mechanics this picture led to a great puzzle. Consider the deuteron as the simplest example today. According to this picture, the deuteron contains two protons and one electron, just like the ion of the hydrogen molecule. Yet in the deuteron these particles occupy 10^{-5} times less space in linear dimensions than in the hydrogen molecule. According to the uncertainty principle, very strong forces must be present in order to confine electrons to such a small space. These new forces should then show up in the hydrogen spectrum and change the Balmer formula; in particular, they should give rise to a much larger splitting than that discovered later by Lamb. Because of lack of time I cannot go into other difficulties arising from this picture.

In view of these conflicts many physicists including Niels Bohr were inclined to expect far-reaching changes in our basic physical concepts as well as in quantum mechanics (*1*).

At the same time there was an attempt to postulate that alpha particles form the basic building blocks of nuclei. One warning by Schroedinger still persists in my mind from those days. During the late '20's he accused the participants in a Berlin seminar of lack