The American Philosophical Society

Held at Philadelphia
for Promoting Useful Knowledge
Independence Square

NOV 12 1938

To All Recipients of Research Grants
from The American Philosophical Society:

The American Philosophical Society held at Philadelphia for Promoting Useful Knowledge is engaged in supporting research work in many fields through the distribution of grants-in-aid. These grants are in no sense gifts or charities but rather investments in men and projects, this being the only way in which an institution such as this can cooperate in promoting research.

It is important that recipients of grants should give credit to the Society in the publications of work which has been supported in whole or in part by such grants, and this is best done in the case of journal articles by a line or footnote following the title, such as "With the support of a grant from the American Philosophical Society." In the case of books or monographs such acknowledgment could be made on the reverse of the title page or in a preface.

The American Philosophical Society will publish in its Year Book, to be issued soon after the close of each Calendar Year, a list of grants made during the year and brief abstracts of work so far accomplished together with lists of all publications which have resulted from grants unless final reports have already been made in previous issues of the Year Book; second or third reports should be so designated. The Society also desires to keep in its records at least two reprints of every article or monograph that has resulted from each grant.

You are, therefore, requested to send to the Society before January 1, next, for publication in its Year Book a brief abstract of the work which you have accomplished, together with the titles, places of publication, volume, inclusive pages and date of any and all articles which have resulted from your grant, and also two copies or reprints of each publication, unless a final report on your grant has appeared in a previous Year Book. For your guidance a sample abstract with the form of bibliography desired is enclosed.

Edwin G. Conklin
EXECUTIVE OFFICER.

University Museum
Grant No. 151 (Piedras Negras Expedition)

Memo re preparation for publication
Piedras Negras expedition, October 1937 - Nov.1938.

1. Factual report of findings:

a. Restoration drawings of twenty-six buildings, many involving several sequent stages, have been prepared. These include ~~all~~ plans, sections and elevations, interior and exterior, sufficient for actual reconstruction of the buildings to the extent justified by their remains. Similar drawings were made ~~are ready~~ for five temple pyramids, and nine temple building platforms. Integrated plans and cross-sections of Courts 1 and ~~two~~ 2 of the Acropolis have been made, as well as isometric projections of most of the temple and palace buildings and building platforms. The descriptive text on architecture is in the form of notes only; it has been decided to await certain check-ups during the next season. For the same reason the drawings have not be inked.

b. The potsherds from the main acropolis cross-section have been analysed as to shape and decoration, four plates prepared and descriptive text written.

c. Certain especially important objects have been drawn,

2. Interpretation:

a. Two ball-court types have been identified, relatively dated, and their distributions traced; the probable ~~ixpox~~ meaning of two sculptured figures on Piedras Negras has been elucidated by a study of ball-court sculptures throughout the Maya Old Empire. (Text and plates ready for publication).

b. Roof-types on temples and palaces have been analysed and relatively dated. (text, in two sections, needs revision; most plates ready).

c. Stylistic and functional influences on Piedras Negras architecture, emanating

from the center of the Old Empire (Peten) have been further analysed. (old manuscript needs revision).

d. The subject-matter on the Piedras Negras monuments has been analysed, and certain conclusions reached respecting the ancient ceremonies and the uses of palaces and temples. (Notes only).

e. The inscriptions and representations on the four stelae at the museum have been exhaustively photographed with various lightings. Many details, previously unnoticed, or at least unrecorded, are ready for publication.

f. An analysis of bench types in the Piedras Negras palaces, combined with a study of the monuments, has been made the basis for conclusions respecting the true functions of palaces; the study has been extended to include the whole of Middle America, but is incomplete except at Piedras Negras. (Notes only).

g. The pottery analysis referred to under 1-b has justified the setting up of two sequent pottery periods and a beginning has been made at fitting the sequence into the general Middle American ceramic picture.

Year Book, 1938 pp ~~[illegible]~~
pp 236-238.
(L S Pamphlets)

THE UNIVERSITY MUSEUM

Grant No. 151. Archeological excavations at the Maya Old Empire site Piedras Negras, during the seventh field season, 1937.

1. The simple double-range palace type (i.e. without end rooms) was identified with reasonable certainty on the earliest of six Acropolis building levels, and also in the probably earliest vaulted palace on the latest level, in this latter instance, with subsequent alteration to provide the end room. The simpler type was also identified in the South Group, with non-vaulted roof. On analysis of all palace plans it is concluded that the transverse end room is a late importation, probably from the Peten, but that the simple double range type was established at an early date.

2. Knowledge of the designs of temple building platforms and temple pyramids was greatly extended. It appears that Peten stylistic influence on Piedras Negras architecture was very strong from the time of the earliest dated monuments (circa 9.5.0.0.0 in the Maya calendar). Some of this information requires reconstruction of non-vaulted temples with complex Peten plans. This tends to confirm the theory that beam and concrete roofs, rather than thatch, immediately preceded the masonry vaulted roof. Two of these non-vaulted temples probably had massive roof combs placed to the rear, as at Tikal. A rectangular inset corner was found stratified above an inset round corner.

3. The stucco masks of temple Pyramid No. K-5 were shown to pertain to the latest of three superimposed temples, previously found. The earliest temple (consisting of a room much larger than any other known in the Maya Old Empire) was shown to have no side outset. Further excavation will probably show it to be a simple rectangle in plan. The Peten architectural influence, so clear on all temples on the surface, probably was weak or non-existent at the beginning.

4. Discovery of a small crude plain stela in an early fill suggests that plain stelae accompanied the early buildings before carved monuments began to be erected.

5. All vaulted palaces and three of the six vaulted temples have been shown to post-date earlier constructions; further facts supporting the theory that vaulting reached the site, probably from the Peten, long after it had reached maximum size.

6. Further excavation in the palaces showed no evidence of domestic fires, or of sleeping accomodations. The number of known bench thrones and therefore throne rooms was greatly increased. The varying designs, constructions and placements strongly suggest that the single plain masonry bench encountered is also a throne. It has been generally believed that palaces were priestly domiciles, and it has been suggested that the characteristic benches were beds. Both suppositions seem negatived by the season's work. The throne rooms indicate that the function of the palace was probably public or semi-public, though different from that of temples. However, many galleries and rooms were devoid of thrones or other function indicators. The local distribution of table-thrones was extended to a probable fairly early non-vaulted palace in the South Group. The probably original position of "Throne 2", was identified in a probably later non-vaulted palace. The date on this re-used fragment has been read as 9.11.10.0.0 (?). There is thus ground for believing that palaces were in part used for throne ceremonies during most or all of the period of dated monuments.

7. Column altars, all but universal in temple rooms, were found in position also before a pyramid stairway. A possible connection between this characteristic Piedras Negras feature and the somewhat similar stones found in northwestern Yucatan is rendered more plausible.

8. One of the thrones excavated was broken and parts of the seat and legs removed while the palace roof was still standing. Large numbers of potsherds, of the late type referred to below, were found on the floor of another palace, and are restorable to form whole vessels. Both circumstances tend to confirm the previously held belief that the city met a violent end as a ceremonial center.

9. Additional deposits of potsherds were sought and found in various stratified building fills; accurate cross-sections of all forms encountered were drawn. Subsequent analysis indicates two main pottery periods. The earliest, based primarily on shape, secondarily on decoration, beginning at bed rock in the West Group, includes polychrome rounded-bottom tripod flanged bowls, and slab feet; the latest includes polychrome flat-bottom tripod bowls and plates and cylinder jars. These periods seem to equate in a general way with the Tzakol and Tepeu pottery periods at Uaxactun, Peten. Sherds of the later period were encountered in fill probably laid down at 9.17.15.0.0 in the Maya calendar. This fact and the position of the sherds referred to in (8) impels the belief that the ceremonial buildings were abandoned during a pottery period which had come into existence by 9.17.15.0.0.

10. A number of late and probably trade wares were encountered. Carved bowls are identical in form and design with bowls excavated in the mountainous Alta Vera Paz to the south; pottery drums are identical in form with others seen at Jonuta, near the Gulf coast to the north; an incised complex silhouette bowl type is the same as found in a tomb at ~~Yextha~~ Yaxiha, to the northwest. Two examples of "candeleros", of the type common at Teotihuacan, Valley of Mexico, were found in a terrace fill built after the first Acropolis building period, but otherwise undated. An elaborate hollow slab foot, probably fairly late, is similar to feet found in the Guatemala highlands and in the

Valley of Mexico. No plumbate ware has as yet been found.

11. A hieroglyph in what has been claimed to be a Maya codex style was found painted on a late period vessel. A discussion of this and other Piedras Negras glyphic material, "Maya Dating by Hieroglyph Styles", has been published by the writer in American Anthropologist, Vol. 40, No. 3, 1938.

The American Philosophical Society

Held at Philadelphia
for Promoting Useful Knowledge

Autumn General Meeting

November 17 and 18, 1939

(In the Hall of the Society on Independence Square)

Open Sessions are in the Lecture Hall, First Floor; Executive Sessions, for Members only, in the Members Room, Second Floor.

FRIDAY MORNING, NOVEMBER 17

OPEN SESSION, 10 o'clock

ROLAND S. MORRIS
President, in the Chair

WILLIAM B. SCOTT*, Professor Emeritus of Geology, Princeton University.

White River Fauna. (Lantern slides.)

HELMUT DETERRA*, Formerly Research Associate, Academy of Natural Sciences of Philadelphia.

Results of the American Southeast Asiatic Exploration for Early Man. (Lantern slides.)

RONALD L. IVES*, Research Geologist.

A Re-exploration of the Colorado Headwaters. (Lantern slides.)

HAROLD SELLERS COLTON*. Director, Museum of Northern Arizona.

A Remarkable Twelfth Century Burial Found Near Flagstaff, Arizona. (Lantern slides.)

LINTON SATTERTHWAITE, JR.*, Assistant Curator, University Museum, University of Pennsylvania.

Fundamental Components of Maya Temples at Piedras Negras. (Lantern slides.)

JOHN FRANKLIN DANIEL, Member, The Cyprus Expedition of the University Museum, University of Pennsylvania. (Introduced by Dr. Jayne.)

Kourion in the Late Bronze Age. (Lantern slides.)

M. F. ASHLEY-MONTAGU, Associate Professor of Anatomy, Hahnemann Medical College.

The Author of the First Comparative Anatomy of an Ape and Man: Edward Tyson, 1650-1708. (Lantern slides.)

*Recipient of Grant from The Penrose Fund.

E. NEWTON HARVEY, Professor of Biology, Princeton University.

Benjamin Franklin's Views on the Phosphorescence of the Sea. (Lantern slides.)

JOSIAH COX RUSSELL*, Assistant Professor of History, University of North Carolina.

The Effects of Some Rapid and Continuous Population Changes.

GEORGE A. BARTON, Professor Emeritus of Semitic Languages, University of Pennsylvania.

The Palæolithic Beginnings of Religion—an Interpretation. (To be read by title.)

LUNCHEON FOR MEMBERS AND INVITED GUESTS, 1 o'clock

FRIDAY AFTERNOON

2 o'clock

ERNEST MINOR PATTERSON
in the Chair

SYMPOSIUM ON THE TOTALITARIAN STATE FROM THE STANDPOINTS OF HISTORY, POLITICAL SCIENCE, ECONOMICS AND SOCIOLOGY

FRITZ MORSTEIN MARX, Associate Professor of Political Science, Queens College.

Totalitarian Politics.

WALTER THOMAS WOODY, Professor of Education, University of Pennsylvania.

Principles of Totalitarian Education.

MORITZ J. BONN, Lecturer, London School of Economics.

The Economics of Totalitarianism.

HANS KOHN, Professor of Modern European History, Smith College.

The Totalitarian Philosophy of War.

Discussion to be led by
HERBERT HEATON, Visiting Professor of Economics
Princeton University

STATED MEETING OF COUNCIL
EXECUTIVE SESSION, 4 o'clock

FRIDAY EVENING LECTURE

8.15 o'clock

CARLTON J. H. HAYES

Seth Low Professor of History, Columbia University
will speak on

THE NOVELTY OF TOTALITARIANISM IN THE HISTORY OF WESTERN CIVILIZATION

The Lecture will be followed by a Reception

SATURDAY MORNING, NOVEMBER 18

EXECUTIVE SESSION, 9.30 o'clock

ROLAND S. MORRIS
President, in the Chair

Amendments to the Laws to be acted on.

OPEN SESSION, 10 o'clock

EDWIN G. CONKLIN
Vice-president, in the Chair

A. M. BANTA*, Professor of Biology, Brown University, and THELMA R. WOOD.

Cytoplasmic Effects in Inheritance in Daphnia. (Lantern slides.)

T. M. SONNEBORN*, Associate Professor of Zoology, Indiana University.

Genetic Evidence of Autogamy in Paramecium aurelia, and its Significance. (Lantern slides.)

GEORGE CRILE, Director, Cleveland Clinic Foundation, and D. P. QUIRING.

Comparison of the Energy Organs of the White Whale and the Thoroughbred Horse "Equipoise." (Lantern slides.)

THOMAS HALE HAM*, Instructor, Department of Medicine, Harvard Medical School, and WILLIAM B. CASTLE.

Studies on the Destruction of Red Blood Cells. (Lantern slides.)

WILLIAM C. STADIE*, Associate Professor of Research Medicine, University of Pennsylvania, and JOHN A. ZAPP and FRANCIS D. W. LUKENS.

The Effect of Insulin Upon Ketone Formation by the Liver of the Normal and Diabetic Cat. (Lantern slides.)

JEAN BROADHURST*, Professor of Bacteriology, Teachers College, Columbia University.

Embryo Chick Cultivation of a Virus from Scarlet Fever Patients. (Lantern slides.)

FRANCIS HARPER*, Research Associate, John Bartram Association.

Retracing the Routes of John and William Bartram in the Southeast. (Lantern slides and charts.)

MERRITT L. FERNALD*, Professor of Natural History and Director, Gray Herbarium, Harvard University.

Discoveries in the Flora of Tidewater Virginia. (Lantern slides.)

CARL C. SPEIDEL*, Professor of Anatomy, University of Virginia.

Effects of Metrazol on Tissues of Frog Tadpoles with Special Reference to the Injury and Recovery of Individual Nerve Fibers. (Moving pictures and lantern slides.)

LUNCHEON FOR MEMBERS AND INVITED GUESTS, 1 o'clock

SATURDAY AFTERNOON, 2 o'clock

HENRY NORRIS RUSSELL
in the Chair

A. M. SKELLETT, Physicist, Bell Telephone Laboratories. (Introduced by Mr. Cook.)

The Coronaviser, a New Astronomical Instrument. (Lantern slides.)

KARL F. HERZFELD*, Professor of Physics and Head, Department of Physics, Catholic University of America.

Theory of Light Absorption in Simple Aromatic Compounds. (Lantern slides.)

JAMES FRANCK, Professor of Physical Chemistry, University of Chicago.

A Contribution to the General Theory of Photosynthesis. (Lantern slides.)

ROBLEY D. EVANS*, Associate Professor of Physics, Massachusetts Institute of Technology.

New Work on International Standards of Radioactivity. (Lantern slides.)

KARL K. DARROW, Research Physicist, Bell Telephone Laboratories.

Status of Nuclear Theory. (Lantern slides.)

J. W. BEAMS, Professor of Physics, University of Virginia.

A High Resolving Power Ultracentrifuge. (Lantern slides.)

W. F. G. SWANN, Director, Bartol Research Foundation of the Franklin Institute.

Showers Produced by Penetrating Rays. (Lantern slides.)

ALLAN C. G. MITCHELL*, Professor of Physics, Indiana University.

The Relation Between the Emission of Beta and Gamma Rays in Radioactive Substances. (Lantern slides.)

Tea will be served in the Reception Room at the close of the session

Fundamental Components of Maya Temples at Piedras Negras.

The ~~ruined~~ Maya cities of Central America consist of remains of various types of solid structures and, in most cases, of buildings which stood on their tops. There is a logical and usually structural distinction between the solid platform and the building which it supports. By varying the relative sizes, heights, and decoration of these two components, sometimes the building, sometimes the substructure is given greater visual importance.

In general, the long buildings called palaces overshadow their substructures, while the usual definition of a Maya temple is that it is a small building set on a pyramid. A pyramid in the sense used here is a substructure more or less high in relation to its length, and with a flat top reached by one or more staircases. slide The analogy is to a truncated pyramid, and if very high the sides are broken up into terraces, as on this famous example, the Castillo at Chichen Itza, slide in the northern so-called New Empire region, in Yucatan. slide The building rests directly on the pyramid top, the pyramid directly on the artificially leveled and paved plaza. There are only these two elements, building and pyramid, and the above definition covers it adequately. Althoguh early historical sources describe such structures as places of sacrifice and religous ceremonialism, it does not follow however that this definition is broad enough to cover all temples. This paper is intended to show some ways in which it is too narrow a definition for Maya temples in general.

This is done by examining sample temple structures in the southern or "Old Empire" part of the lowland region. These are at one site, Piedras Negras, Guatemala, which has been under investigation by the University Museum, University of Pennsylvania, since 1931. We have here the advantage of knowing the variations in a considerable number of temples. The buildings illustrated were excavated in 1937 and in 1939, in each case with the aid of generous assistance by the American Philosophical Society, and in the latter, by the Women's Committee of the Museum. The drawings are restored isometric projections, destroyed or unexcavated portions being indicated by broken lines. The buildings are shown as if cut off horizontally, below the roof, in order to show the ground plan and the interior arrangements.

We can identify this building as a temple without recourse to the substructure, by the small limestone column set upright in its floor. At Piedras Negras this is an especially constant, though not universal, temple indicator. These stones always show the action of fire, being calcined and, if they have been protected from weathering, they are covered by soot. Yet the plastered floors into which they were set are not similarly burned. The fire must have been in some receptacle, brought close to the stone. Since a major feature of Maya rituals today and at the time of the conquest was the burning of copal incense in pottery brasiers, religous activity about these stones is the best explanation of their condition. Bishop Landa, the most reliable chronicler of the New Empire Maya of the sixteenth century, seems to guarantee the interpretation, when he describes stones set on round pedestals at the head and foot of the temple stairway. These stones ~~They were four or five palms high~~. We find them in similar positions here, as well

as in the building. Landa's They were four or five palms high. Though these ours are somewhat smaller, a column of such size exists on another Pyramid in the same court. His They were somewhat slender, and set upright, as here are ours, and it is clear that they his were intended for use in a variety of ~~enumerated~~ sacrificial rites, which he enumerates.

The building walls rests on a low foundation platform or plinth. The rear of both had completely collapsed, leaving insufficient evidence for restoration. As restored at front and sides, ~~largely~~ but not entirely partly by analogy with other better-preserved examples, the distinguishing character of the plinth is its lowness and the fact that it follows in a general way the irregularities of the building plan. These are in accordance with a typical pattern for these components, designated as the Peten style.

Below this is a supplementary terrace or platform. ~~The~~ Its rear ~~of this~~ had also collapsed but there is little doubt that it was a simple rectangle in plan. It is furnished with its own stairway. This in turn appears to rest on another component, two terraces high, served by another stairway. Although much longer for its height than is usual, this falls within the generally accepted meaning of the term pyramid, and we shall call it that. The treatment of its corners is that of the Peten style for pyramids. All but a few parts of the front facing had fallen, and sides and rear are restored after that pattern.

As seen from the front the pyramid rests on still another element which we shall call a basal terrace. This extends far off to one side. In design it is severely plain, but in an earlier form may not have been so. Originally it was served by a stairway of the sort seen above. Its present design accomodates itself

to buried features of intermediate periods, but still permits ascent in front of the pyramid.

There are, then, four components instead of one fundamental masses making up the substructure of this temple, each differing from all the others in form and proportions. These we have called, for want of better terms, plinth, supplementary platform, pyramid, and basal terrace. The plinth, in form and size, seems to be a subordinate part of the building. The platform may seem to supplement the pyramid rather than the plinth, conforming more closely to a pyramid terrace in height, general shape, and like the pyramid having considerable areas of exposed upper surface. However, it probably first served an earlier building and plinth, which may have been also a simple rectangle in plan, and in length it conforms more closely to the plinth and building. These units probably have a single front to rear axis in common, but probably here, as certainly on other examples, the platform is placed toward the rear of the pyramid. These set-backs widens the exposed upper surfaces of the pyramid at the front, and there is an analogous situation at the basal terrace level. The altars on the basal terrace and pyramid, in each case on the axis, show that these spaces served as ceremonial outdoor stages, supplementing the plaza at the bottom and the building floor at the top. These latter also were provided with column altars on this axis.

We have thus expanded our original definition of what a temple substructure may be, but the pyramid remains as one of the components

The use of the plaza and at least one elevated stage in a single festival is described by Landa. The passage gives some idea of the importance of these sacred structures in the community. "On the 16th of Xul all the chiefs and priests assembled at Mani, and with them a great multitude from the towns .... On the evening of that day they set out in a great procession with many comedians, from the house of the chief, where they had gathered, and marched slowly to the temple of Kukulcan, all duly decorated. On arriving and offering their prayers, they set the banners on the top of the temple, and below in the court set each of them his idols on leaves of trees brought for this purpose; then making the new fire they began to burn incense at many points, and to make offerings of viands cooked without salt or pepper, and drinks from their beans and calabash seeds. There the chiefs and those who had fasted stayed for five days and nights, always burning copal and making their offerings, without returning to their homes but continuing in prayers and certain sacred dances . ." The banners referred to presumably were placed on the pyramid, the phrase used being perhaps better translated as "on the height of the temple".

Elsewhere, in describing a new year ceremony, Landa says "The evil one caused them to make an idol called Yaxcoc-Ahmut, which they placed in the temple and took away the old images." The phrase here might be translated either "in" or "on" the temple. But since Cortés, in traversing the Old Empire region, spoke of idol houses in the centers of towns, the temples here probably were such, as in Mexico. Landa's description of Maya idol-making shows they were small portable affairs of wood or pottery, and numerous. The low bench across the rear of the temple room, a common feature at this site, probably was for

the support of these images.

It is clear that this temple building, at least two substructure components and the plaza itself played semi-independent roles as settings for religous festivals. However, only the building, with its closely related plinth, and presumably the plaza, were essential, for there occurs elsewhere a building with the column altar, its low plinth resting directly on the plaza. Between these extremes are examples with plinth and supplementary platform only, plinth and pyramid only, and plinth, pyramid and basal terrace only. In one case the basal terrace is a secondary afterthought, in two others, including this South group temple, it existed before the pyramid, as the supplementary platform existed before the building and plinth.

In view of the varying combinations of substructure components in other temples, and their differing times of origin, it is fair to ask if the combination of all four was ever more than a chance arrangement utilizing pre-existing constructions, and whether the combination occurred before the latest period of building activity. An affirmative answer is supplied by this year's digging, summarized on this slide.

slide

slide

Passing from left to right the two rows of drawings summarize successive changes in a single temple, this time in the West Group. A still later and final phase is not shown. At the end of each period some parts of the old substructure and building were buried or removed, but not all. Therefore in each period portions of each preceding construction are still exposed, just as we noted on the South group example. Nevertheless the changes are profound and great labor was involved at each time of change.

Interesting as these modifications are in other connections,

we must confine ourselves here to the substructure components. All four appear in the earliest period, Fig. 1, and excavation proved they are all contemporary with the building, proving that they result from a single plan. The basal terrace stage disapp ars below the pyramid/stairway in the next period. In both it serves the local purpose of masking remains of a still earlier platform at the right, and of providing a level base for the pyramid, the plaza being imperfectly graded at the left. Nevertheless, these functions were probably subordinate. In the third period, Fig. 3, when these needs were attended to, it was widened, the only apparent reason being to restore the basal terrace stage on the center axis. In all periods it shows stylistic affinity with the pyramid.

The earliest pyramid is very much like that in the South Group, except that it is very much longer, probably because of the great and unusual length of the building. The proportion of height to length is so great that we should hesitate to call it a pyramid if it did not develop into more typical proportions in the next period, Fig. 2.

The supplementary platform is first a simple rectangle in plan, then it disappears, but, like the basal terrace, reappears in the third and later periods, this time exhibiting the Peten style. The plinth shows the same style sequence, in the first and fourth periods conforming respectively to simple rectangular and the more complex Peten style building, respectively. It is at first very low and increases in height in the second and third periods. We know little more about it in the second period. If there was a building at this time, it was completely removed. We know that from a remaining remnant of its wall. a third period building was removed. Changes in the basal

terrace and pyramid of this period (Fig. 3) were contemporary with the new supplementary platform and plinth. Since all are in the Peten tradition, the temple probably was also. Comparing this with Fig. 1, it seems safe to deduce a feeling that where the style of building and plinth differ from that of the pyramid, the platform ought to harmonize with the building. But where those components are in the same general tradition, the specific decorative details agree with the pyramid. If this is so, the original plinth and building in the South Group were probably simple rectangular, in plan.

Outdoor Column altars occurred in first, second, and probaly third periods on the pyramid; in the fourth this was probaly moved to the supplementary platform. In no period did they occur on basal terrace or plaza levels. From the disappearance of the basal terrace and supplementary platform in the second period we can surmize a greater importance for the pyramid stage.

With stelae present in the fourth period we can make a useful minimum age estimate for the earliest period. We do not know the order of the numerous changes shown in Fig. 4. For the sake of extreme conservatism let us assume that the earliest of the two stelae was the first innovation, and that its erection followed the third period by only five years. Both third, and second periods involved great labor and fundamental changes, each of which must have followed at least a generation. The stela (No. 39) is dated 9.12.5.0.0. in the Maya system, 150 or more approximate years before dating ceased, It is generally believed that stelae were erected at the time of their dates. There is no reason to think this one was moved and re-erected, and some evidence to the contrary. Assumming that it was not, and allowing twenty years to a generation,

In the fourth period two platforms were built against the basal terrace and on its stairway, as shown in Figure 4. These were obviously built as supports for the carved monuments found lying on their ruins. These stelae bear readable dates ~~in the~~ Expressed in the Maya calendar and give the basis for estimates of the minimum ages of the earlier phases of Figures 1, 2 and 3.

~~With dated stelae added to the basal terrace in the fourth period we can estimate the minimum age of the earliest temple.~~ We do not know the order of the numerous changes shown in Figure 4, (and others which followed it. For the sake of extreme conservatism let us assume that the earlier of the two stelae, No. 39, at the center, was the first of these innovations. It carries the Maya Initial Series date 9.12.5.0.0 and accompaning moon data for that day, (without secondary series. It is generally believed that such a date marks the time of erection of the stela. ~~Axxxxxxx~~ There is ~~xxxxx~~ no evidence that it has been moved from some other location, and some evidence to the contrary. Making the assumption that it is in its original position, the temple must have assumed the form of Figure 3 before this date, let us say five Maya tuns or approximate years, to be ultra-conservative. What interval separates this from the building activity of Figure 2, and the latter from that of Figure 1?

It is possible that building activity was synchroninized with the recurring cycles of the calender, (This is by analogy with the monuments ~~by analogy with the monuments~~, which generally were erected at the end of five or twenty approximate year periods. There are twelve other pyramids at the city, all of which undoubtedly received successive increments. Even if rebuilding went on constantly, (or modify in order to complete a temple every five years, such activity would not, on the average, return to the same spot for sixty-five years. The twenty-year or Katun yardstick is clearly a minimum one for use at one spot. If we use this here, the original

temple goes back at least two katuns further, to the middle of Cycle 9. This is 180 approximate years before the end of monument erection and 100 before it beginning.

This correlation of building activity with the calendar is theoretical in the extreme. But we can check the yardstick used, as a minimum, from another point of view. In the period of Figure 2 the pyramid height was doubled, the supplementary platform eliminated; in that of Figure 3 the platform is restored in a new style and the pyramid is made more nearly square. In one or the other period the temple shrank very greatly in size. These changes are so great that in each case the old structure must have appeared obsolete. We need a measure of the admitedly restless spirit of Maya builders. We can deduce one from the changes which may have followed the stela, since they must cover at least the period from the stela to abandonment of the city. The second stela, No. 38, is dated five approximate years after the first, or one hundred and thirty before the latest surely dated monument known. Taking this as a new point of departure there are seventeen physically separable added features. The eight masks were surely contemporary. The same may be said for widenings of temple, plinth and supplementary platform, not shown in Figure 4, so that the maximum probable number of secuent episodes is eight. Dividing 130 by 8 we get over sixteen years for the minimum average interval between them. They can be crowded into two phases, which would raise this figure to sixty-five years. The twenty-year Katun intervals as minimums between the pre-stela building activities appears more than conservative from this point of view also.

Temple building activity
the earliest ~~period~~ must be placed at least forty-five years before the stela. This reasoning places it at the middle of Cycle 9 in the Maya calendar, 190 years before dating may have ceased, 165 years after it began. It was probably much older.

We have no way of reaching a maximum age estimate (of the earliest temple) in terms of the Maya calendar. It does not go back to the original foundation of the city, because it overlies remains of (a period of) earlier platforms, and these in turn (lie on) a deposit (containing) early period pottery fragments. Mr. Cresson, formerly of the expedition staff, (on the Acropolis,) in a study limited to a single stratification, has established the existence of an early and a late pottery period, and the probability of an intermediate period when a type of polychrome decoration known as ~~Polychrome~~ A-1 (Polychrome A-1 sherds) first appeared. These never appear in the earliest deposits lying on bed-rock, such as that found below the earliest architectural remains here. But they were found in the hearting of (the earliest) building and substructure (shown in Fig. 1.) ~~Figure 1. This earliest~~ (This) temple therefore belongs in the middle ceramic period, if it can be established; certainly after the introduction of Negative-painted ware.

The spread of this decorative technique, non-Maya in origin, is being used, with other ceramic traits, to link and relatively date Middle American ruins over a very wide area. The apparently well-founded establishment of a minimum age for it here, in terms of the Maya Calendar is therefore important. This date happens to coincide exactly with the estimate of the distinguished archeologist and ceramicist Lothrop, for introduction of negative painting in the Old Empire generally. It is therefore important to note that ~~it may be much too late~~ our estimate is a minimum one.

Summary for Am. Phil. Paper, 1939.
Components of Maya Temple Structures at P.N.

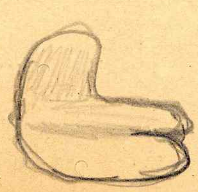
The Indians of Middle America were accustomed to erect many tribes great architectural centers or "cities" for the practive of their religion. The University Museum, University of Pennsylvania, this year completed its eighth season of archeological investigations of one of these such a centers ruins, the Maya site Piedras Negras, in Guatemala. The work was again generously supported by the American Philosophical Society.

Although the Spanish conquerors of the sixteenth century seem to have apparently found the important cities of this part of the Maya country deserted and in already in ruins, they saw cities elsewhere in other regions still in use and left some accounts of them. From these accounts and studies of the 100 ruins themselves it is clear that numbers of temples, dedicated to ritual and sacrifice formed an important part of the architectural group. This structure type of building has is uaually been defined as a small building on a high terraced solid substructure, or "pyramid". An impressive exterior stairway leads from the ground to the top of the pyramid.

This definition suffices for the temple structures in many parts of middle America, but is oversimplified for Temples those of the southern or "Old Empire" district of the Maya region. In this

1 Subh Plat.
2 Pynd.
3 Bostam

1 only U3
2 only R-3, R-10
3 only no
1 + 2 R-16
1 + 3 no
2 + 3 yes



paper it shows that at Piedras Negras, the temple substructure may typically consist of a number of components, only one of the which seems to correspond to the pyramid of other regions. From the ground up these are a basal platform, the pyramid, a suplementary platform and a plinth/platform. The plinth platform, or foundation serving as a foundation for While each of these units helped to elevate the Of the first three of these components temple building it is probable that Probably the first three often served the specific function of providing elevated stages for outdoor ceremonies in connection with those within the temple building. However one or more all three, including the pyramid itself, were on occassion dispensed with.

With this enlarged picture of what a Maya Old Empire temple might be, a sequence of four, each a modification of that preceding it in the series, are briefly described. The combined use of the four components mentioned is carried back to fairly early Maya times, from later Old Empire and certain changes in them are noted.