CONTRIBUTIONS

OF THE

UNIVERSITY OF CALIFORNIA

ARCHAEOLOGICAL RESEARCH FACILITY

Number 14 January, 1972

MISCELLANEOUS PAPERS ON ARCHAEOLOGY

UNIVERSITY OF CALIFORNIA

DEPARTMENT OF ANTHROPOLOGY

BERKELEY, CALIFORNIA

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Grateful acknowledgement is made to Dean Sanford S. Elberg, Graduate Division, for a Grant-In-Aid to publish the present volume.

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CONTENTS

V. NOTES ON LARGE OBSIDIAN BLADE CORES AND CORE-BLADE TECHNOLOGY IN MESOAMERICA

Thomas Roy Hester

In this paper four very large obsidian polyhedral blade cores from archaeological sites in Mesoamerica are described. The small depleted (exhausted) obsidian blade cores abundant at most Mesoamerican sites have been discussed at length in the regional literature (Kidder, Jennings and Shook 1946; Coe 1959; Epstein 1964; MacNeish, Nelken-Terner and Johnson 1967; Hester, Jack and Heizer 1971; Hester, Heizer and Jack 1971). These worn-out specimens represent the terminal phase of a blade production process which began with the removal of blades from much larger, roughly-shaped cores. These large cores (termed "macrocores" by P. Tolstoy, n.d.) have received little attention, although they, too, are a potential source of information on core-blade technologies in Mesoamerica. It is these cores which represent the initial activities in blade manufacture, activities about which little of substance has been published.

The macrocores are discussed in the following pages; one is from southeastern Mexico, and the others are from sites in Guatemala.

The Papalhuapa Specimen

This large core (Fig. 1,A) collected from the obsidian workshops near the site of Papalhuapa, Guatemala, has been previously described by Graham and Heizer (1968:104). However, a more detailed account of the core attributes seems warranted. Dimensions of this specimen are given in Table 2.

The Papalhuapa core is pyramidal in shape. The striking platform is a broad flat surface, created by the splitting of a larger obsidian nodule (concentric force rings are evident on the platform surface). Prior to the detachment of blades, the platform was prepared by the removal of several short arc-shaped flakes on the periphery of the platform (see Fig. 1,A). There is also a scratched area on the platform and some crushing along the platform edges. The sides of the core immediately below the platform are marked by a series of small flake scars. These scars apparently result from the trimming of the platform edge before a blade was removed. In such trimming activities, the overhanging platform edge (caused by negative bulbs of percussion left by prior blade removals) was removed and the edge straightened.

Near the edge on one side of the platform there is a shattered area with an intact cone of percussion. Pond (1930:49) states that such a cone could have been formed by a direct blow on a flat obsidian surface. A similar shattered spot is found nearby. In both instances, these shattered areas appear to result from attempts at blade removal in which the hammerstone or other percussion tool delivered a blow 10 to 15 cm. inside the platform edge. One side of the core bears considerable battering, perhaps indicative of secondary use as an anvil.

There are scars indicating the removal of eight large blades (see Table 1) and a number of smaller flakes and blades, including two adjacent hinge fractures. Six triangular flake scars are present (7.6 to 10.4 cm. in length). Large blades such as those derived from this core were used at Papalhuapa for the manufacture of large bifaces and biface preforms (see Graham and Heizer 1968:108).

The distal end of the core is wedge-shaped. Several small flakes emanate from this end and there is slight crushing. Two major flake scars are present, one representing the removal of a blade 8.7 x 2.0 cm., and the other, an irregular flake, 7.6 x 4.0 cm. These may have been detached during the initial core-shaping procedures.

Blade scar length(cm.)	Blade scar width (cm.)
19.6	5.6
17.8	3.3
17.4	4.0
14.8	4.3
14.3	5.0
13.2	6.3
15.4	3.4
16.9	3.9

Table 1. Dimensions of major blade facets on the macrocore from Papalhuapa, Guatemala.

The Villahermosa Specimen

Another very similar macrocore is on display in the "Sala Azteca" of the Museo del Estado, Villahermosa, Tabasco (Fig. 1,B). According to museum records, the core was found in the "central Mexican plateau". Dimensions of the core are given in Table 2. It, too, has a pyramidal shape. The striking platform is a flat flake surface similar to that of the Papalhuapa specimen and formed by the splitting of an obsidian nodule. However, it is more extensively facetted. Three large flakes and two smaller flakes have been removed from the platform periphery and portions of the periphery are heavily battered. One side of the core, near the distal end, retains a small area (10.0 x 6.5 cm.) of nodular cortex which survived the shaping of the core. There are eight large blade scars on the sides, six of which extend from the striking platform to the distal end; maximum widths of the scars vary from 2.5 to 7.5 cm. Ten other flake scars are present, mostly triangular in shape. There is one hinge fracture 13.0 cm. in length, another 4.0 cm. long, and a series of three overlapping hinge scars, 4.0 cm. in length. The distal end of the core is lightly battered.

The Quirigua Specimen

A third macrocore (Fig. 1,C) has been published by Stromsvik (1941:81; Fig. 32,d). This specimen was found in a lidded pottery box, packed in fine bluish-clay and placed beneath Zoomorph G at the site of Quirigua, Guatemala. The Quirigua core is not described in Stromsvik's text. However, the core has been recently located in the National Museum of Guatemala. The following descriptive data are based on photographs and observations by Marion P. Hatch and E. M. Shook; dimensions of this macrocore are given in Table 2.

The Quirigua macrocore has a shape quite similar to the previously-reported specimens. It has a flat flake striking platform. Trimming flake scars are evident around the platform edge. Ten large blades have been detached from the core, most extending from the platform to the distal end. Several smaller blades and flakes were also removed. The distal end is wedge-shaped and shows crushing.

A small sample of the Quirigua macrocore was provided by the National Museum of Guatemala, and was subjected to rapid-scan X-ray fluorescence analysis by Robert N. Jack of the University of California, Berkeley. Jack's analyses indicate that the macrocore is made of obsidian from the Ixtepeque source near Jutiapa (approximately 80 miles southwest of Quirigua). A geologic description of the obsidian flows in this region has been published by Williams, McBirney and Dengo (1964).

The Tiquisate Specimen

A fourth macrocore (Fig. 1,D; Table 2) has been found at the site of Tiquisate on the south coast of Guatemala. It is now stored in the National Museum of Guatemala. I am indebted to Marion P. Hatch and E. M. Shook for the following descriptive comments and for the photograph of the specimen.

In shape, the Tiquisate macrocore resembles the other specimens, although it is considerably larger. The striking platform is flat and smooth (i.e. a single facet), with trimming flakes removed along the periphery. There are eleven blade scars on the core, most of which extend from the platform edge to the distal end. A remnant of nodular cortex is preserved on one side of the specimen.

As in the case of the Quirigua macrocore, the personnel of the National Museum of Guatemala allowed the removal of a small piece of the Tiquisate specimen. X-ray fluorescence analysis revealed the presence of trace elements distinctly characteristic of the El Chayal obsidian source 70 miles to the northeast (for a description of the El Chayal obsidian quarry, see Coe and Flannery 1964).

Discussion and Interpretations

With this brief review of four Mesoamerican macrocores, it is apparent that these pieces in their initial form share a number of characteristics: (1) they are pyramidal in shape; later in the blade removal process, their shape often changes to cylindrical, conical or bullet-shaped; (2) striking platforms are flat flake surfaces, modified only along the peripheries; the extensive platform alterations (such as truncation, facetting, grinding and scratching) noted by Hester, Jack and Heizer (1971) were apparently performed when the cores were greatly reduced in size (there is an area of scratching on the platform of the Papalhuapa specimen); (3) a number of large blades (eight to ten) had been detached; such pieces could have served as blanks for biface manufacture, as they did at Papalhuapa; (4) the sides of the cores, just below the platform edge, were trimmed in order to remove overhang created by negative bulbs; these trimming activities were necessary throughout the life of the core; (5) the distal end of each shows crushing or battering.

These macrocores were probably always manufactured at obsidian quarry-workshops, such as Papalhuapa, El Chayal, and Cerro de Navajas (Holmes 1900, 1919 ; Breton 1902; Coe and Flannery 1964; Charlton 1969; Graham and Heizer 1968). To initiate the process, a large obsidian nodule was split, or "quartered" (see Pond 1930; Leakey 1960, 1965; Howell 1970), and the resulting flat flake fracture plane was used as a striking platform. Holmes (1900:413) states that such roughed-out macrocores were "...roughly cylindrical...and averaged four or five inches in length and two to four in diamter". It seems likely, based on the data presented here, that newly-formed macrocores were more often pyramidal in shape and considerably larger than the size range indicated by Holmes. If, during the shaping process, the nodule was ruined or found to be flawed, it was rejected. (Holmes 1900: Fig 45; 1919, Fig. 97).

Once the macrocores had been shaped, they were ready to be used in the production of large blades. Holmes (1900:413; 1919:22) did not think that the blades were detached at the quarry sites. However, R. F. Heizer informs me that at Papalhuapa there are numbers of macrocores present, as well as an abundance of large blades and bifaces made on blades. It was Holmes' belief that the macrocores were carried to occupation sites and the blades made when needed. This would almost certainly be true in instances, such as at Papalhuapa, where occupation sites were very near the obsidian source; the data provided by the Tiquisate and Quirigua cores indicate that long-distance transport of macrocores was also practiced. In the case of the Quirigua specimen, its transport from the quarry at Ixtepeque might have had some ceremonial significance, since Stromsvik (1949) reported that it had been carefully cached. The ritual use of cores in Mesoamerica is widespread (Kidder 1947:20).

Michels (1971:266) has offered the hypothesis that quarried nodules of obsidian "...were brought to market and sold by the miners themselves. Other craftsman [sic], skilled in the preparation of cylinder cores and in the pressure-flaking technique of blade production, would very likely purchase a portion of these for further processing and resale". Michels' hypothesis is strictly applied to the green obsidian of the Valley of Mexico, the source of which was not easily accessible. On the other hand, the gray obsidian of that region was less difficult to obtain, and Michels (p. 267) postulates "...separate collecting efforts of many individuals aimed at satisfying their own needs". It seems reasonable to assume that no single model of macrocore distribution (and the subsequent manufacture of blades from them) is applicable to all parts of Mesoamerica.

I would like to offer some brief comments on the techniques used in detaching blades from macrocores. All four of the specimens described here have large, deep negative bulbs of percussion and battering along the edges of the striking platforms. The presence of such attributes suggests that direct percussion (perhaps with a hard hammer; J. Desmond Clark, personal communication) was used. Certainly the intact cone of percussion on the Papalhuapa specimen would reflect such a technique (Pond 1930:49). Honea (1965:32) believes that cores worked by direct percussion methods were often rested on an anvil, and it is possible that the use of an anvil could have produced the crushing noted on the distal ends of some macrocores.

Crabtree (1968:457-458) has experimented with hammerstone percussion and was unable to produce regular, parallel-sided blades. He has examined the Papalhuapa specimen and believes that it may have been worked by indirect percussion with a punch (D. E. Crabtree, personal communication; for a discussion of the punch technique, see Ellis 1940:32; Crabtree 1968; Bordes 1969; Bordes and Crabtree 1969). However, Crabtree has acknowledged that the Papalhuapa macrocore could have been made by direct percussion, "...with much skill and a soft hammerstone" (personal communication).

It is entirely possible that some macrocores may have been worked by impulsive pressure with a T-shaped crutch (Ellis 1940:48-49; Crabtree 1968). Indeed, some Spanish accounts of impulsive pressure techniques, as in the Aztec blade-making process, suggest that very large cores were used (see a translation of Torquemada's 16th century account in Hester, Jack and Heizer 1971; see also Fletcher, 1970). A recent translation by Feldman (1971:214) of an account by F. Hernandez suggests that impulsive pressure was used for blade-making on smaller cores ("medium-sized pieces" from which "small thick flakes" were removed; Feldman 1971:214). According to data presented by Honea (1965), the impulsive pressure technique (as well as indirect percussion) would not have produced the massive negative bulbs which can be observed on the macrocores.

The striking platforms of these macrocores are horizontal, forming angles of 70^{o} - 90^{o} with the sides. Bordes and Crabtree (1969:5) have reported that a slanted, oblique striking platform is most efficient for cores being worked by indirect percussion. However, Crabtree has more recently stated (personal communication) that when the punch is held vertical to the platform, a conical core will result.

As the discussion above points out, there is no concrete evidence which indicates that one blade-removal technique was used to the exclusion of all others. Perhaps this question can be resolved through continued experimentation, such as that reported by Crabtree (1968).

There are probably many macrocores extant in museum collections in the United States and Mesoamerica. For example, Holmes (1900:413) notes: "...the largest nucleus that has come to the writer's attention is now preserved in the Field Columbian Museum and is about eight inches long and six inches in diameter". A recent communication from D. Collier indicates that a somewhat larger macrocore (found at Texcoco) than the one described by Holmes is on display in the museum (now the Field Museum of Natural History). Our knowledge of core-blade technologies in Mesoamerica would be measurably increased if data on additional macrocores were presented. More importantly, analyses are needed of the variety of workshop debris at obsidian quarry sites where these large cores are found. Such systematic, quantitative studies (none of which exist at present) would deal with the total workshop assemblage, thereby enabling us to define the processes involved in the manufacture of these cores and in their subsequent use.

Acknowledgments

I would like to thank a number of persons for their direct assistance with various aspects of this paper: Dr. Robert F. Heizer (Dept. of Anthropology, University of California, Berkeley); Dr. Robert N. Jack (Dept. of Geophysics, U.C. Berkeley); Christopher R. Corson and Marion P. Hatch (graduate students, Dept. of Anthropology, U.C. Berkeley); Mr. E. M. Shook (Monte Alto Archaeological Project); and Arq. Carlos Sebastian Hernandez (Museo del Estado, Villahermosa). This study was aided by Grant No. 1-403820-08613 from the Chancellor's Patent Fund for Graduate Student Research.

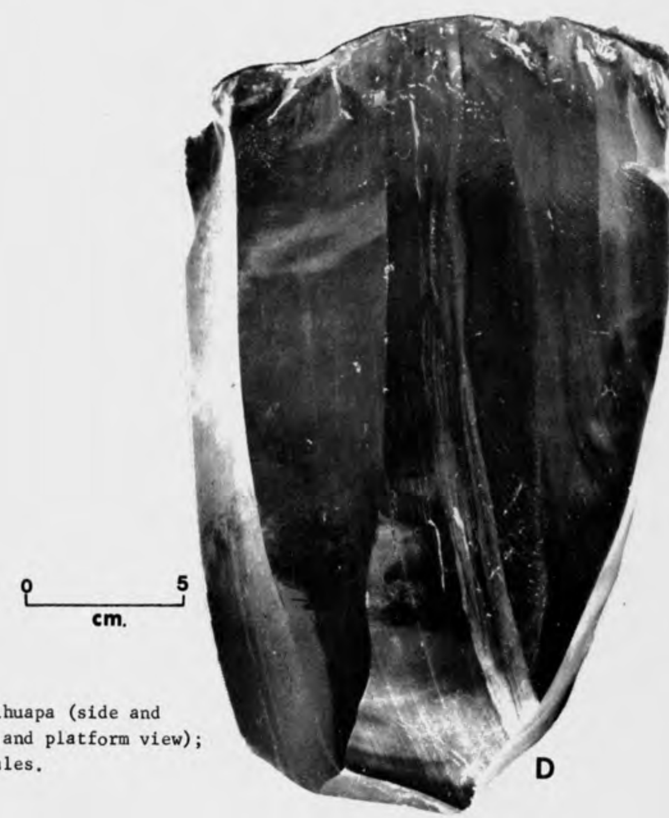

Fig. 1. Macrocores from Mesoamerica. a, Papalhuapa (side and platform views); b, Villahermosa (2 side views and platform view); c, Quirigua; d, Tiquisate. Note individual scales.

	Papalhuapa	Villahermosa	Quirigua	Tiquisate
Core Height (proximal-distal distance)	19.2	22.0	16.0	24.6
Maximum width of core	16.3	17.0	12.7	20.0
Maximum diameter of striking platform	16.0	15.0	12.2	20.0
Minimum diameter of striking platform	13.3	13.0	12.0	15.5
Weight (lbs.)	11.0	[13.0]est.	4.9	27.0

Table 2. Dimensions and Weights of Mesoamerican Macrocores. All linear measurements are in centimeters.

Bibliography

Bordes, F.
1969 Reflections on Typology and Techniques in the Palaeolithic. Arctic Anthropology 6:1-29.

Bordes, F. and D. Crabtree
1969 The Corbiac Blade Technique and Other Experiments. Tebiwa 12:1-21.

Breton, A.
1902 Some Obsidian Workings in Mexico. International Congress of Americanists 13:265-268.

Charlton, T. H.
1969 On the Identification of Prehispanic Obsidian Mines in Southern Hidalgo. American Antiquity 34:176-177.

Coe, M. D. and K. V. Flannery
1964 The Pre-Columbian Obsidian Industry of El Chayal, Guatemala. American Antiquity 30:43-49.

Coe, W. R.
1959 Piedras Negras Archaeology: Artifacts, Caches, and Burials. Museum Monographs, University of Pennsylvania.

Crabtree, D. E.
1968 Mesoamerican Polyhedral Cores and Prismatic Blades. American Antiquity 33:446-478.

Ellis, H. H.
1940 Flint-Working Techniques of the American Indians: An Experimental Study. Ohio State Museum, Columbus.

Epstein, J. F.
1964 Towards a Systematic Description of Chipped Stone. 35th International Congress of Americanists, Actas y Memorias I:155-169.

Feldman, L. H.
1971 Of the Stone Called Iztli. American Antiquity 36:213-214.

Fletcher, C. S.
1970 Escapable Errors in Employing Ethnohistory in Archaeology. American Antiquity, Vol. 35, No. 2:209-213.

Graham, J. A. and R. F. Heizer
1968 Notes on the Papalhuapa Site, Guatemala. Contributions, University of California Archaeological Research Facility 5:101-126.

Hester, T. R., R. Jack, and R. F. Heizer
1971 The Obsidian of Tres Zapotes, Veracruz, Mexico. Contributions, University of California Archaeological Research Facility 13:65-131.

Hester, T. R., R. F. Heizer and R. N. Jack
1971 Technology and Geologic Sources of Obsidian from Cerro de las Mesas, Veracruz, Mexico, with Observations on Olmec Trade. Contributions, University of California Archaeological Research Facility 13:133-143.

Holmes, W. H.
1900 The Obsidian Mines of Hidalgo. American Anthropologist 2:405-416.

1919 Handbook of Aboriginal American Antiquities: Part 1, The Lithic Industries. Bureau of American Ethnology, Bulletin 60.

Honea, K.
1965 A Morphology of Scrapers and Their Production. Southwestern Lore 31: 25-40.

Howell, F. C.
1970 Early Man. Time-Life Books, New York.

Kidder, A. V.
1947 The Artifacts of Uaxactun, Guatemala. Carnegie Institution of Washington Publication 576.

Kidder, A. V., J. D. Jennings, and E. M. Shook
1946 Excavations at Kaminaljuyu, Guatemala. Carnegie Institution of Washington Publication 561.

Leakey, L. S. B.
1960 Adam's Ancestors: The Evolution of Man and His Culture. Harper Torchbooks, New York.

1965 Working Stone, Bone and Wood: In A History of Technology, edited by Charles A. Singer and others, 1:128-143.

MacNeish, R. S., A. Nelken-Terner and I. W. de Johnson
1967 The Prehistory of the Tehuacan Valley: Vol 2, The Non-Ceramic Artifacts. University of Texas Press, Austin.

Michels, J. W.
1971 The Colonial Obsidian Industry of the Valley of Mexico. In Science and Archaeology (R. H. Brill, ed.):251-271. MIT Press, Cambridge.

Pond, A. W.
1930 Primitive Methods of Working Stone Based on the Experiments of Halvor L. Skavlem. Logan Museum, Beloit College 2 (1).

Stromsvik, G.
1941 Substela Caches and Stela Foundations at Copan and Quirigua. Contributions to American Anthropology and History 37, Carnegie Institution of Washington Publication 528.

Tolstoy, P.
n.d. Stone, Bone and Antler Tools of Central Mexico from Preclassic to Aztec Times. Handbook of Middle American Indians (Manuscript to appear in a forthcoming volume).

Williams, H., A. R. McBirney, and G. Dengo
1964 Geologic Reconnaissance of Southeastern Guatemala. University of California Publications in Geological Sciences, Vol. 50.