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ASSOCIATION OF ARTIFACTS WITH MAMMOTH IN THE VALLEY OF MEXICO¹

LUIS AVELEYRA ARROYO DE ANDA AND
MANUEL MALDONADO-KOERDELL

IN THE PAST 30 years discoveries of great importance in the prehistory of Mexico have been made in the vicinity of Tepexpan, a town some 35 kms. northeast of Mexico City. Diaz Lozano (1922-23, 1927) disinterred a mammoth identified as *Mammuthus* (*Archidiskodon*) *imperator* Leidy, which is now seen partially mounted in the entrance hall of the Instituto Geologico de Mexico. Mullerried (1933, 1934) collected teeth and bones of the ground sloth *Myiodon harlani* Owen on lands of the Colonia Estrella on the northern side of Mexico City near the old exit road to Pachuca, which continues on to Tepexpan and Teotihuacan. Both Diaz Lozano and Mullerried simply described the sequence of strata at the fossil localities, mentioning the nature and depth of the deposits, but without applying specific names to the formations.

The modern concepts of upper Pleistocene and Recent stratigraphy in the Valley of Mexico began to develop with the work of Arellano (1946a) and Bryan (1946), who established the stratigraphy and terminology now used: e.g., the lower and upper formations of the upper Pleistocene (Tacubaya and Becerra, respectively) are separated by Caliche I; the lower and upper portions of the Becerra are sometimes separated by Caliche II; and the Becerra itself is sometimes found overlaid with Caliche III, the Totolzingo "earth," and other Recent deposits. Arellano (1951) has described the lacustrine, alluvial, and aeolian facies of the Becerra, and the corresponding details of the Totolzingo "earth."

¹Based upon the article "Asociación de artefactos con mamut en el Pleistoceno superior de la Cuenca de Mexico" in *Revista Mexicana de Estudios Antropológicos* (Sociedad Mexicana de Antropología), Tomo XIII, Num. 1, pp. 3-29, Mexico, 1952. This publication is the second to come from the Instituto Nacional de Antropología e Historia. A literal translation was made by Frederick Ruecking, Jr., which A. D. Krieger has considerably reduced and abridged. The original should be consulted for further photographs of the site, the artifacts *in situ*, a general map, and some statements which are here very freely rendered. Practically all of the objective data are here included.

Beginning in 1945, Helmut de Terra, under the auspices of the Viking Fund, Inc. (now the Wenner-Gren Foundation for Anthropological Research), conducted analysis of physiographic, geologic, and stratigraphic conditions in the Valley of Mexico, particularly evidences of glaciation in connection with the volcano Iztaccihuatl, and the geohydrology or fluctuations in the extent and volume of Lake Texcoco. De Terra's work culminated in the discovery of a fossil human skeleton under the lakebed surface near Tepexpan in 1947. Previously, indications of ancient cultural remains in this vicinity were described by Arellano (1946b, 1946c) who collected a worked obsidian flake near a mammoth skeleton under somewhat doubtful stratigraphic conditions. Other finds of de Terra (1946) consist of artifacts of bone, flint, and obsidian from various localities in the Valley of Mexico, which gave him the basis for establishing two preceramic levels: the San Juan "industry" corresponding to the Becerra formation, and the Chalco "complex" corresponding to the Totolzingo "earth." The second survived into Recent times. Thus de Terra synthesized prehistoric materials which until then had only been described in incoherent form.

Maldonado-Koerdell and Aveleyra Arroyo de Anda (1949) reported other discoveries at the Tequixquiac locality 60 kms. north of Mexico City, a locality well known to geologists and paleontologists for the richness of its upper Pleistocene fossils. At the beginning of 1952, through the combined efforts of Caso and Marquina, the Dirección de Prehistoria was formed under the Instituto Nacional de Antropología e Historia (see Notes and News, *American Antiquity*, July 1952, p. 100), with Pablo Martínez Del Río as Director. Funds were provided by Antonio J. Bermúdez, Director General of Petróleos Mexicanos, and by Antonio Martínez Baez, Secretary of the Economía Nacional.

In July 1950, Aveleyra and Maldonado-Koerdell visited the little town of Santa Isabel Iztapan, about 2 kilometers south of Tepexpan, where workers opening an irrigation ditch had found fragments of bone and tusks of mam-

moth. The authors were able to identify the remains as belonging to *Mammuthus* (*Archidiskodon*) *imperator* Leidy from one well-preserved molar and parts of the skeleton. The remainder of the skeleton remained covered by the overlying strata, but it was indisputably within a Pleistocene level equivalent to the lower part of the Upper Becerra formation. Circumstances prevented further investigation at the time.

Early in March 1952, Aveleyra, with the cooperation of Arturo Romano, began excavation of the Santa Isabel Iztapan locality. Maldonado-Koerdell took charge of stratigraphic and paleontological studies. On March 13, after four days work, Aveleyra found the tip of a projectile point imbedded between two ribs on the left side of the animal (Fig. 101 and Fig. 105, 1) indisputably in primary association with the skeleton. Two more implements of obsidian and stone, respectively (Fig. 105, 3, 4) were also discovered in clear association by Aveleyra, while Maldonado-Koerdell found an obsidian scraper, broken at one end (Fig. 105, 2). These four artifacts were left in place and work suspended so that recognized authorities in prehistoric archaeology might serve as witnesses to the discovery.



FIG. 101. Projectile point in place between two ribs, base projecting outward. This specimen is also shown in Figure 105, 1.

Among those who viewed the discovery before the mammoth skeleton was removed were: Alfonso Caso, Ignacio Marquina, Daniel F. Rubin de la Borbolla, Eusebio Davalos Hurtado, Ignacio Bernal, A. R. V. Arellano, and Frederico K. G. Mullerried of Mexico; Marie Wormington of the Denver Natural History Museum, E. H. Sellards, director of the Texas Memorial Museum, and Alex D. Krieger, archaeologist of the University of Texas; and G. Stresser-Pean of the Museum of Man in Paris. On March 19, 1952, three of the artifacts (Fig. 105, 1-3) were removed from the remains in the presence of most of the above persons. The fourth artifact (Fig. 105, 4) had slipped overnight from its original position near a vertebra (Fig. 106) into the ground water.

Upon resumption of the work, Sra. Sol Arguedas R. de la Borbolla and Martinez Del Rio discovered two more artifacts, of obsidian and flint, respectively (Fig. 105, 5, 6) also in clear association with the mammoth. The major portion of the skeleton was recovered, partly articulated and partly strewn about (Figs. 102, 103, 106). Although most of the skull and tusks had been destroyed in the ditch operation in 1950, one complete lower right molar was salvaged (Fig. 107), as has been mentioned. Twenty-one sacks of argillaceous sand were collected near the skeleton for later geochemical determinations.

In May 1952 the site was visited by V. P. Sokoloff of Johns Hopkins University, accompanied by archaeologist Jose Luis Lorenzo and anthropologist Arturo Romano of the Direccion de Prehistoria, to take further samples for geochemical determinations which might serve to determine the age of the geologic strata. In July, de Terra took samples for radiocarbon dating, while Paul B. Sears of Yale University and Mrs. K. Clisby of Oberlin College collected samples for analysis of pollen and other vegetal remains.

STRATIGRAPHY AND PALEONTOLOGY*

The site of the excavation, about 2 kilometers southwest of Tepexpan and west northwest of the village of Santa Isabel Iztapan, Municipality of Atenco, State of Mexico, is in the northeastern part of the dry plain left by the shrinking of Lake Texcoco. The general inclination is toward the west, in the direction toward

* This section by Manuel Maldonado-Koerdell.

which the lake retreated from this point. Here and there are small propagated "tlateles," and toward the villages of Tequisistlan and Santa Isabel Iztapan is a somewhat greater elevation of land. Cereals and vegetables are raised with some small irrigation works. Some trees grow in the vicinity but the major part of the plain is pasturage, interrupted by areas of salt brine toward the southwest, nearer the present lake.

At the excavation, the geologic column is as follows:

1. Vegetal soil35 cm.
2. Argillaceous sand of a dark color with some small roots and small gastropods ("*Planorbis*" sp.) .60 cm.

~~~~~ Disconformity ~~~~~

#### UPPER BECERRA FORMATION

3. Argillaceous sand, fine grained and of a reddish-brown color with small argillaceous concretions of yellowish color and some gastropods ("*Planorbis*" sp.) .....20 cm.
4. A sandy material, fine grained, with a pale greenish color, mixed with some amount of clay and — near the bottom of the excavation — with material of bentonitic aspect and numerous gastropods (*Limnaea* sp., *Helisoma* sp., *Paludetrina* sp., *Succinea* sp., *Physa* sp. ....65 cm. +

The vegetal soil has the usual character in regard to color and texture of the present plain of the Valley of Mexico. Over the surface are small salinitous spots and the natural vegetation is somewhat more abundant than where the Tepexpan human skeleton was found, toward the north.

The second layer, considered equivalent to the Totolzingo "earth," clearly shows that it was deposited under water at a certain distance from the shore of the ancient lake. Its thickness indicates a long period of sedimentation, and its texture and composition contrast with the vegetal layer above and the Becerra formation beneath. The presence of small roots is obviously due to the present-day vegetation being able to penetrate to this level.

The disconformity between layer 2 and the Becerra is perfectly marked and probably represents a period of changeable weather and erosion, toward the end of the Pleistocene and the beginning of the Recent, that affected the geochemical composition of the upper part of the Becerra formation, for it contains a high proportion of carbonates and its color contrasts with that of the lower part. There is no

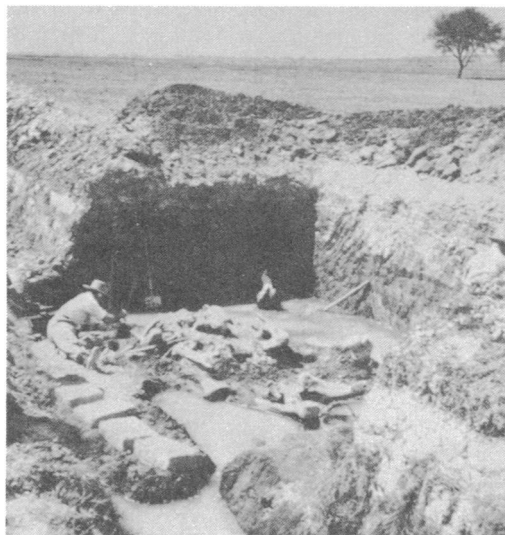


FIG. 102. General view of excavation, looking northwest. The Tepexpan fossil human skeleton was found toward the hill margin beyond the tree at the right of the picture, 2 km. north.

caliche over this formation, such as was observed at the site of the Tepexpan skeleton and other sites nearby, but these geochemical characteristics seem to indicate a temporary period of desiccation of the ancient lake that exposed the upper part of the Becerra formation to the action of atmospheric factors, resulting in the concentration of carbonates at this level. Together with the disconformity, this



FIG. 103. Greater part of mammoth skeleton with isolated femur in background. Irrigation ditch which destroyed skull is at left. View toward northwest. The upper limit of the "limo verde" is marked by the lowest string. Ground water is at normal level.

seems to indicate that the paleo-ecological conditions at Santa Isabel Iztapan were very similar to those which caused the layer of caliche to form on top of the Becerra formation at the fossil man site of Tepexpan.

The said formation, whose actual depth is unknown at Santa Isabel Iztapan, has an aspect and composition peculiar to its lacustrine facies, as Arellano (1951) has defined it. In its lower part it contains a certain proportion of bentonitic material, abundant gastropods, and the skeleton of the mammoth, which was *entirely* within it. For descriptive purposes it has been called the “green muck” (*limo verde*) from its texture and coloring, which clearly contrasts with the ruddy appearance of the upper part. This “green muck” surrounds and covers the mammoth skeleton completely, and 21 samples of this material were removed for microscopic analysis. Although the excavation reached more than 3 m. in depth, the base of the Upper Becerra formation apparently has not been reached at this locality.

The highest part of the mammoth skeleton (the spinous process of a dorsal vertebra) was 1.60 m. below the ground surface. The skeleton lay on an east-west axis with the head (destroyed by the ditch digging) toward the west or southwest. This orientation may indicate that the animal was pursued by hunters toward the lake margins from the higher ground to the east, until it became mired or weakened. One of the femurs lay a short distance from the remainder, as though pulled aside for butchering. It is unbelievable that predatory animals could have moved a bone of such weight, although other natural factors such as a river entering the lake, or strong waves, probably could have done it. The skeleton was completely fossilized and in excellent preservation. Possibly after butchering the remains were exposed to the elements for a time, for the projectile point (Fig. 105, 1) shows a patina.

The molar (Fig. 107) belongs to the right side of the mandible and is that of an imperial mammoth, *Mammuthus* (*Archidiskodon*) *imperator* Leidy, as indicated by the general shape of the molar and the disposition of the transverse crests, etc. It was compared with similar fossils in the Instituto de Geología, Universidad Nacional de Mexico, with materials in the

Department of Vertebrate Paleontology at the University of Texas, and at the Texas Memorial Museum, Austin. E. H. Sellards, Director of the Museum, kindly placed at our disposal the collections of his institution and had the accompanying illustration of the molar prepared.

As to the remainder of the skeleton, all of the vertebral column, the ribs, majority of the long bones, a scapula, the pelvic girdle, and a great quantity of short bones—probably about 80 per cent of the total—were recovered. It is probable that other bones were destroyed by exposure or were taken away by the hunters. In the long bones, incomplete ossification between the epiphysis and diaphysis indicates that the animal had not yet reached maturity, although it was a well-developed individual for the bones had reached large dimensions.



Fig. 104. Stratified north wall of excavation. On top of bank is loose earth, below which are the four strata outlined in text. The disconformity is at the base of the darkest zone.

### ASSOCIATED ARTIFACTS\*

The six artifacts so clearly associated with the Iztapan mammoth have considerably enriched the small collection of tools in the Valley of Mexico whose Pleistocene age is no longer subject to doubt. In addition to de Terra's publication (1949), in which he proposed a sequence of preceramic lithic industries in the Valley of Mexico (later reviewed and evaluated by Aveleyra, 1950), a number of prehistoric and paleontological investigations have been undertaken by the authors and associates which culminated in the discovery of the Iztapan mammoth. Other recent proofs of the contemporaneity of man with fauna of the last Pluvial age have been obtained in the famous fossil beds of upper Pleistocene age at Tequixquiac at the extreme northern rim of the Valley of Mexico (Maldonado-Koerdell and Aveleyra, 1949). Still more recent discoveries there have yet to be published.

The excavation at Iztapan was conducted like that of a human burial with offerings, leaving all the skeletal parts in their original position on an earthen platform. Five of the arti-

facts were left in place until an exhaustive photographic record had been made and the ground plan (Fig. 106) drawn.

1. The first artifact (Fig. 105, 1) was found by Aveleyra on March 13 while cleaning the matrix from between two ribs on the left side of the skeleton. It is a projectile point of flint and was pointed inward toward the chest, but could hardly have mortally wounded the mammoth. Its missing tip could not be found even with the most careful screening of the sand in contact with the skeleton. A recent break at one corner of the stem shows that the flint was originally a dark grayish color, in contrast to the white patina which curiously runs diagonally across both faces. This patina suggests partial exposure of the artifact to weather or natural agencies for a long time.

The edges of the body of the point are parallel in the lower one-third, then converge gently toward the tip. The artifact is 60 mm. long, to which perhaps 10 or 15 mm. should be added for the tip, and the greatest width is 27 mm. It is quite thin and delicate due to fine flaking. The flaking is somewhat irregular, and the scars unequal in length and width. There is no medial ridge as in the case of

\* This section by Luis Aveleyra Arroyo de Anda.

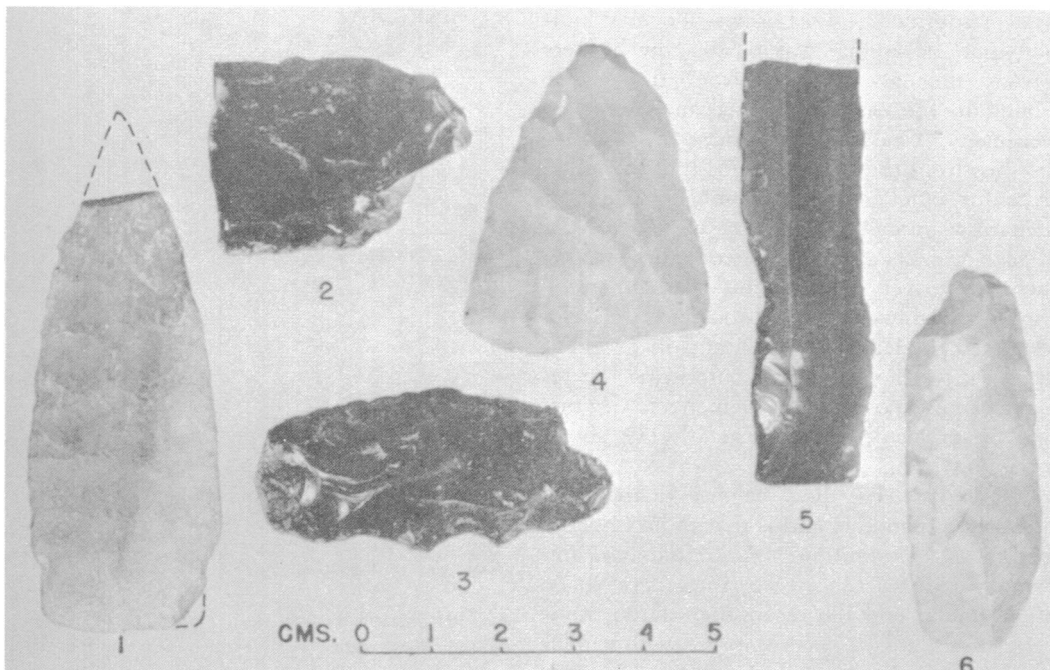


FIG. 105. Six artifacts associated with Iztapan mammoth. For position see Figure 106 with corresponding numbers.

parallel-flaked points of the Eden variety (Wormington, 1948). There is extremely fine pressure retouching along the edges. It seems indisputable that this Iztapan point can be classified with the Scottsbluff group, although it is not exactly typical of this type, first found associated with fossil bison in Nebraska, and later in various sites of the Great Plains (Barbour and Schultz, 1932; Schultz and Eiseley, 1935). The general characteristics of Scottsbluff points are given by Krieger (1947) as follows:

They are not collaterally flaked, the flake scars being roughly parallel across the blade, or irregular . . . the faces are well rounded and often very well chipped . . . they also lack the long parallel edges of Eden points, the whole artifact being notably wider and the blade edges parallel only a fourth or a third of the distance forward before they begin to curve toward the tip. The stem is also more prominent than on Eden points, the right-angular notches being cut inward strongly one-half to three-quarters inch above the base. The base itself is typically quite straight. . . .

Wormington (1949) states that Scottsbluff points "in certain form resemble the Eden type, but the blade is wider and flatter. The median ridge is less marked and the shoulders more pronounced than in the Eden type. The flaking is sometimes of the typical horizontal, parallel form, sometimes more irregular." Although both Krieger and Wormington have used the term "Yuma" in connection with Scottsbluff and Eden points, they now urge that the term "Yuma" be abandoned completely.

The Iztapan specimen agrees with the general features of the Scottsbluff type in shape, proportions, and flaking technique, the principal difference lying in its thinness. Is it possible to suggest that the Iztapan point is an ancestral form from which the classic form of the Great Plains was derived? This would presuppose a greater antiquity for the Mexican specimen, which finds some confirmation in radiocarbon dates given for the Becerra formation in the region of Tepexpan. The "green muck" lacustrine facies of the Becerra, in which the Iztapan mammoth was enclosed, is provisionally calculated at between 10,000 and 12,000 years. Scottsbluff points in the Great Plains, where it has been possible to date them, have always appeared in post-Folsom deposits and do not surpass approximately 8,000 years. The Scottsbluff points found at Lime Creek site, Nebraska, were once estimated to be more than 20,000 years old (Wormington, 1949), but more recent radiocarbon datings give an age of less than 10,000 years (Roberts, 1951).

Apart from this, Scottsbluff points in the United States have always been found associated with fossil bison (when found with extinct fauna), while in the case of Iztapan this type appears for the first time in positive association with a mammoth. The Iztapan point is also the first shouldered projectile point to be found in direct, positive association with this mammal on the continent. Wormington, who examined the Iztapan specimen personally, has noted that very recently similar points were found at the Cody site in Wyo-

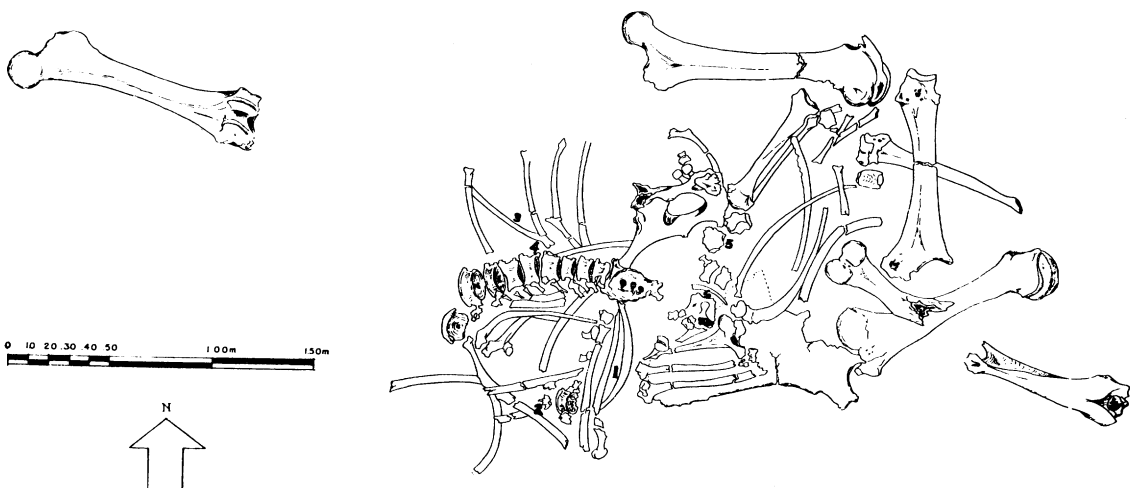


FIG. 106. Ground plan of mammoth skeleton showing original position of associated artifacts. The numbers correspond to Nos. 1-6 in Fig. 105.

ming, associated with fossil bison. Only a short note, without illustrations (Jepsen, 1951) has been published on this discovery, from which it is premature to look for close affinities.

2. The second artifact (Fig. 105, 2) was found on March 14 by Maldonado-Koerdell while clearing off a rib with needle and brush, near the first artifact. It is a two-edged scraper of black obsidian with a greenish tinge. The chipped edges are parallel and worked by means of very fine, though irregular, pressure retouching. Only the edges show workmanship, the remainder of the dorsal face presenting only large flake scars, and the ventral face simply a large percussion face without flaking. A percussion bulb with clear concentric waves, and a typical hinge fracture may be seen on the ventral face. This artifact is 36 mm. long with a maximum width of 27 mm.

3. The third artifact was encountered on March 15 by Aveleyra, under a rib and below the last lumbar vertebra. It is a flake knife of the same obsidian with greenish tinge, 50 mm. long and 24 mm. wide (Fig. 105, 3). It apparently had a double function. The dorsal face is flaked with relatively ample scars, irregular and without retouching. One edge is crudely pressure retouched to form a scraping edge in a wide arc, while the other bears three concentric arcs, the central one being the deepest, obviously to serve as a "spokeshave," possibly for rounding and planing atlatl shafts. The ventral face presents the bulb of percussion at one end and the hinge fracture at the other, as in the second artifact. Identical artifacts, interpreted in the same manner, have been found with some frequency in various localities in the United States, including that at Lindenmeier, Colorado.

4. The original position of the fourth artifact (Fig. 105, 4) was, without doubt, directly below and in contact with one of the last lumbar vertebrae, a few centimeters from 3. It was found by Romano and Aveleyra in a loosened clod of clay on March 17, and was the only artifact not left in its original position, for it later fell into the ground water. It is a fine-grained, clear gray flint, roughly triangular in outline. Along the base, one face was pressure-flaked into a steep bevel, hence it is provisionally classified as an end scraper. There is almost no retouching of the other

edges. It might also be regarded as a pointed implement held in the hand. It is 43 mm. long and 35 mm. wide.

There is a surprising similarity between this artifact and specimens recently described from the region of Falcon Dam on the Rio Grande in northern Tamaulipas (Aveleyra, 1951). The University of Texas collections from the American side of the reservoir include a number of "end scrapers" of this type, some of which are duplicates of the present specimen in all details. There is also a certain typological relationship between this specimen and another "hand point" of flint recently found *in situ* in the gravels at the base of the Upper Becerra formation at Tequixquiac (Maldonado-Koerdell and Aveleyra, 1949).

5. On March 28, after excavation had been resumed following the removal of 3 of the first 4 artifacts in front of witnesses as mentioned in the opening section, Aveleyra and Sra. Sol Arguedas R. de la Borbolla continued to search for additional artifacts. Sra. Borbolla found a long prismatic flake knife of greenish obsidian, partly encrusted, under one of the patellas. This measures 59 mm. in length and 17 mm. in maximum width (Fig. 105, 5). The dorsal face presents three percussion planes running the full length of the specimen. In the center, immediately below the large striking platform, there is a negative bulb of percussion and concentric rings that give evidence of the previous removal of another such knife from an original core. At the end opposite the striking platform, the blade is broken straight across, suggesting that it was once much longer. Both edges are pressure-retouched. The right edge (in the illustration) is retouched along about half the total length, very fine and regular work. The left edge shows an indentation near the middle, with ragged but doubtlessly intentional flaking, which must have

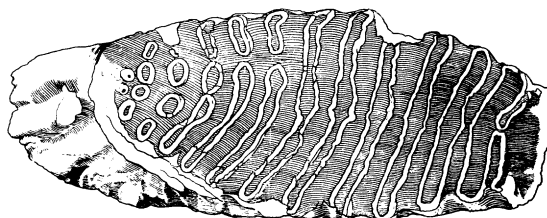


FIG. 107. Lower right molar of Iztapan mammoth. Length of crown about 22 cm., width about 8 cm.

served for cutting and possibly as a "spoke-shave." On the ventral face, well-marked waves radiate from the bulb of percussion.

For comparative purposes, this artifact is not very diagnostic. Hundreds of similar knives can be found on the surfaces of *milpas* and hill slopes all over the Valley of Mexico. If this specimen had been found on the surface it could not have been distinguished from identical implements made until the time of the Conquest. Its unquestionable association with the Iztapan mammoth shows that this elemental technique of removing long prismatic flakes from obsidian cores was continued for more than 100 centuries in the Valley of Mexico.

6. The last artifact (6) was discovered on March 29 by Martinez del Rio when all the persons who had taken part in the excavation were present. It is a clear gray flint blade, 54 mm. long and 19 mm. in maximum width. It has marginal retouching, extremely fine and delicate, along both edges of the dorsal face, which also has several large flaking planes without later workmanship. The upper end (in the illustration) bears pressure flaking extending half way around the end, next to which an intentionally-made open break is noticed. The face of this break lies obliquely in relation to the long axis of the implement, forming a sort of hook or curved beak. Although this detail might be sufficient for some American archaeologists to classify the tool as a burin, it is preferable to adhere to the European definition of a burin which requires that burin blows be clearly present (for further discussion by an eminent typologist of French Paleolithic implements, see Bourlon, 1911). The ventral face of this artifact which for this reason must be classified only as a retouched blade, consists of an even plane of percussion, without a bulb or waves.

#### CONCLUSIONS

Considering the implements as a whole, some additional observations seem pertinent. In the first place, attention should be called to the typological variety, which actually constitutes a small industry. Surely the one atlatl or spear point was not the only weapon employed against so formidable an animal. An explanation has already been offered by Mar-

tinez del Rio (1952) in that these points, however much they were used in the hunt, were not the principal cause of death of the proboscideans. Their function may have been primarily to irritate and wound the animals, so that, weakened by loss of blood and frightened by the cries of the hunters, they fled toward the marshy margins of the lake and mired down until they died, more through exertions and contusions from rocks thrown against the head, or from long wooden spears thrust into the body.

The presence of cutting tools is indisputable evidence of butchering, confirmed by the arrangement of the bone fragments, partially displaced and piled up. It does not seem possible that natural agencies could have caused such displacement at this point, for the argillaceous sands enclosing the remains are sediments deposited in quiet waters at the bottom of a lake. Especially notable is the case of the heavy femur, isolated from the rest of the skeleton by more than 2 m.

The implements show that the hunters used both flint and obsidian. Although the series is very small, there is some suggestion that flint was preferred for artifacts of a penetrating function (the projectile point, the triangular point or end-scraper, and the pseudo-burin), and obsidian for cutting implements (the flake knives or scrapers, two of them also having "spokeshaves").

Although there are not yet any fundamental similarities or patterns, owing to the still great scarcity of diagnostic artifacts in the Pleistocene of the Valley of Mexico, it is advisable to include the Iztapan artifacts provisionally within the San Juan group created by de Terra. Their approximate contemporaneity, geographical proximity, and their connection with the nomadic hunting of great mammals, seem to justify this assertion.

The results obtained in the excavation of the Santa Isabel Iztapan mammoth confirm once and for all the existence of man as a hunter of these animals in the Tepexpan region, as the work of Arellano and de Terra had previously suggested. This area, aptly called "the reservoir of the elephants" by Martinez del Rio, adds greatly to our knowledge of prehistory in the New World, and may be expected to add much more.

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