

CAVES ALONG THE SLOPES OF THE GUADALUPE MOUNTAINS

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In the little known Canyons of the Guadalupe Mountains lie buried many secrets relating to the early inhabitants of that region. To unlock some of these secrets is, at times, a discouraging task but withal a fascinating one. Many caves have to be examined before one is found which shows evidences of human occupation of sufficient interest to warrant the necessary time and energy required to properly excavate it.

In outlining the work done during the past two seasons for the University Museum of Philadelphia, it will be well, perhaps, to give some description of the region which was explored for caves. The Guadalupe Mountains are a southward extension of the Sacramento Mountains and are largely located in Otero and Eddy Counties in southeastern New Mexico, and extending into Culberson County, Texas, where Guadalupe Point terminates in an almost sheer precipice of limestone 1500 to 1800 feet thick. The highest peak rises to over 9000 feet. On the west side are salt flats while on the east the land is cut up by many canyons heading in a generally eastern direction to the Pecos River.

The mountains themselves are formed of limestone, though in some places alternating with gypsum and sandstone. The country, like so much of the Southwest presents the usual semi-arid appearance, there being very few canyons which are not dry. How long this area has been as dry as it now is would be hard to say, but it seems to be generally believed that these conditions have been of no short duration. Upon the recession and shrinking of the great ice sheet which covered a large part of this country during the last glacial period, the climate of the desert regions underwent considerable changes. The ice sheet apparently was bordered by a belt with plants and animals characteristic of the modern tundras or barren grounds of the north. We shall refer to this later, and must now go on to some description of the caves.

The caves in this region range in size from mere shelters to the Carlsbad Cavern, the enormous size

and beauty of which is rapidly becoming familiar to everyone. There are dry caves and caves in which water-action is evident by the formation of stalactites and stalagmites. The dry caves only are of interest to us here, inasmuch as material recovered from them is often found in the most remarkable state of preservation; and in many cases indicate very early occupancy. While some of these caves are found well up the sides of the mountains most of those showing the evidence we seek are found in the canyons cutting the slopes of the mountains and at no very great height above the beds of the canyons, probably from fifty to a hundred feet. The three principal canyons in which we worked are Last Chance, Anderson, which is a small canyon running into Last Chance, and Three Forks. Last Chance has running water in it at all times while the other two are dry. The cave of chief interest to us, to which we have given the name Burnet Cave, after R. M. Burnet of Carlsbad, lies on the south fork of Three Forks Canyon which is another name for the upper reaches of Rocky Arroyo, this latter running into the Pecos River above Carlsbad, New Mexico. Burnet cave is nearly west of Carlsbad and is reached in a roundabout trip of some fifty miles over ranch trails for a good part of the way. (See No. 1 Plate 1). The cave itself is about seventy feet above the bed of the canyon and at an elevation of approximately 4,600 feet above sea-level. It is in the side of a spur which extends into a small flat, on one side of which the bed of the dry stream is cut, piling up rocks washed down from above. The formation in which the cave is made is a limestone of late Carboniferous Age, probably representing a transitional stage into the early Permian. There are a number of other caves in this same formation most of them smaller than the one I am describing. There are others also nearby across the little flat, and only a few feet above it. In front of these last mentioned caves are what are known locally as mesal pits composed of mounds of burnt rock with circular depressions. These are no doubt similar to those described as being found in other parts of West Texas and New Mexico. The theory that they were

used over a long period for the purpose of cooking the mescal plant which contains a rather large percentage of sugar, seems to offer the best explanation.

To return to the cave, when we first went to it, we were faced with the fact that some one else had been there before us and had dug in it, probably for the purpose of looking for buried treasure. There were several holes along the right-hand or east wall extending towards the rear. These holes seemed to be about three feet deep and did not go to the bottom of the cave by any means, but they offered us a disappointing outlook as we had hoped to locate a cave which had been undisturbed. Looking at the cave from below it gives the appearance of having a very large high opening. This is due to the fact that large pieces of the roof have fallen off near the entrance and the weathering has formed a steep talus in front. In getting up to it you see that there is a second overhang inside the first formed by the weathering of the roof having struck a somewhat harder formation at this point. This second overhang is about 18 or 20 feet inside the edge of the outer overhang. The level as we found it in the undisturbed portion at the second overhang was only three feet from the roof and sloped steeply so that at the outer overhang the roof was some twenty-five feet above. From the inner roof to the back of the cave was a little over thirty feet. The cave faced east of south. The width of the cave was about 13 or 14 feet, the walls roughly parallel.

I was fortunate in being able to find one of the young men who had done the digging there before us. He told me that when he and his brother first went there a number of years ago, 1920 to be more exact, the cave had a wall across the inner overhang, and another a few feet farther in, the first one reaching to the top and

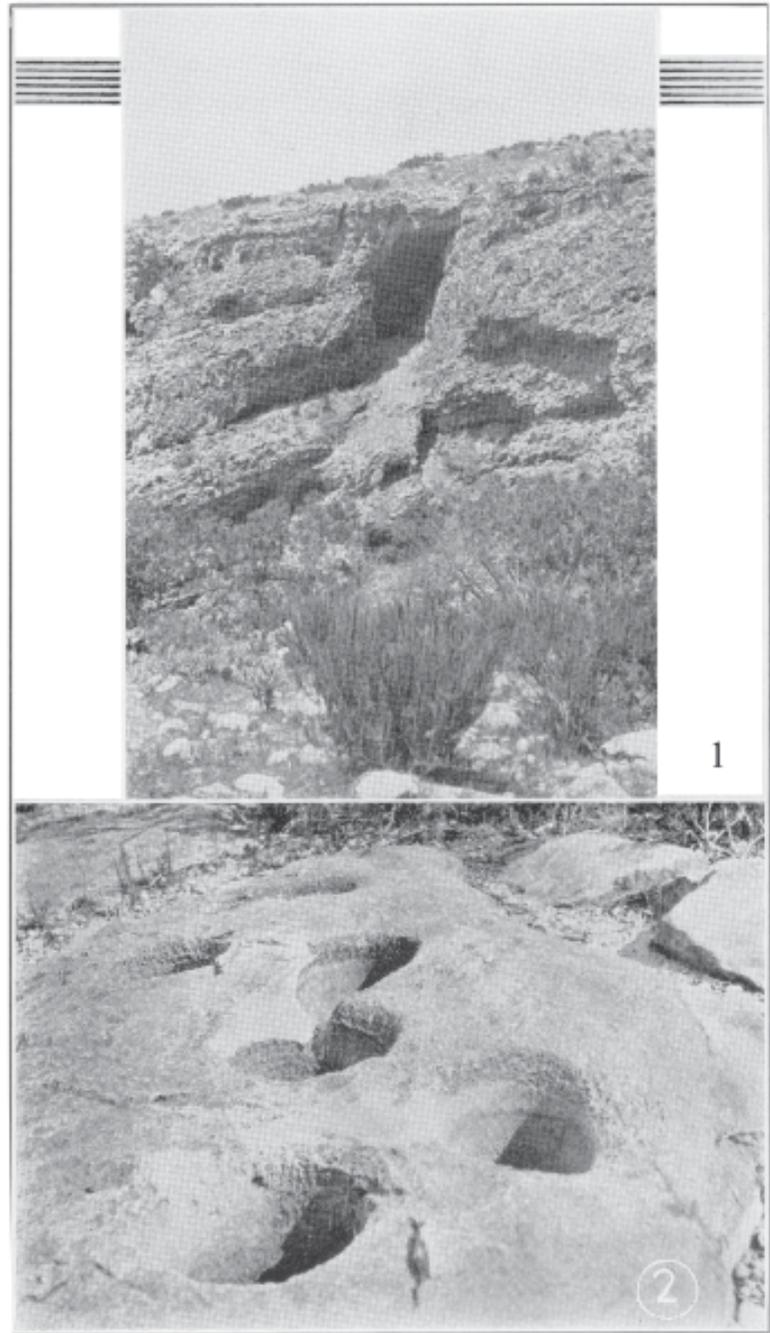


PLATE 1

No. 1. Burnet Cave.

No. 2. Round Mortar Holes Near Carlsbad, N. M.

the second one to within one foot of the roof. He said further that they had found a part of a basket lying on the surface inside the first wall and that, at a depth of about eighteen inches below the surface they had uncovered three other baskets, one of which he thought was now in the Museum at Houston. One of these he described as a flat tray-shaped basket and one of the

others a cone-shaped carrying basket. They also found pieces of netting, hide, sandals and beads. In one of the baskets were charred human bones.

In view of the disturbed shape of the cave, as we found it in the summer of 1930, we decided to dig a trench along the west side which was the least disturbed. We made this trench four or five feet wide and about three feet deep. From a point well in front of the inner roof we began to uncover bones of various animals scattered through the fine dust and rocks which had fallen from the roof. This dust, by the way, like that found in all the dry caves of this region is so fine that it becomes necessary to wear a respirator of some sort in order to protect the lungs. Aside from the dust the work was not unpleasant. We also found that it was better for us to strip to the waist while we worked in the cave since the dirt came off our bodies much easier than it did off our shirts and did not take so much water.

In addition to the bones which appeared as we progressed into the cave, bits of twined-woven cord and fragments of basket and sandals showed up here and there. As our trench reached about two-thirds of the way to the back of the cave we recovered two coiled baskets, one of which was placed over the other. They were not in very good condition, but we were able to take them to the Museum for further study which showed them to be similar in shape and make to Basket-maker types from other parts of the Southwest. They were found at a depth of approximately eighteen inches. Nearby, at the same level and in some cases not so deep and in others deeper, we found the animal bones already mentioned. Upon further study on the part of Dr. Malcolm R. Thorpe of the Peabody Museum at Yale University these bones were identified as being those of an extinct bison, two extinct horses, and a rather rare extinct antelope, *Tetrameryx shuleri*, the horn-core and part of the lower jaw representing the latter. There were also a number of large bird bones uncovered, and these were identified by Dr. Wetmore of the Smithsonian Institution as those of the California condor and wild turkey. With this evidence we ceased our work there for the season, being unable to draw any conclusions as to the association, in the same cave and at similar depths, of an extinct fauna with material such as coiled

baskets, sandals, bone awls, spear foreshafts, and fragments of coiled twine, representing a material culture similar in many respects to the Basket-maker of other parts of the southwest.

It was with high hopes therefore that we went back to this cave at the beginning of the past summer. The party consisted of two of the same men who went last year with me, namely, R. M. Burnet and Norman Riley, both of Carlsbad, and without whose strong arms, keen eyesight, and intelligent cooperation I should have been lost. Nobody so far as we could see had disturbed our cave since we had left it at the end of the previous summer.

Acting on the sound advice of Dr. A. V. Kidder, that we should dig down to the hard-pan of the cave somewhere near the front and work in on a much deeper face, we started our excavation this summer at a point nearly directly under the edge of the outer overhang, throwing the large pieces of rock and the dirt over the edge of the cave, after carefully examining it. We found that bones of animals similar to those we were uncovering last year were showing up again, scattered through the dirt we were taking out; but in addition to this we began finding deep hearths. There seems little likelihood that these could have been anything else as there were pieces of charcoal and ashes in place and in some of the hearths burnt animal bones. These hearths were found at depths ranging from three feet to six feet below the surface of the cave.

As the work progressed and the face we were digging reached nearly to the inner overhang, we encountered on the east side and at a depth of approximately one foot and a half, a piece of hide on which was resting, what turned out to be, a very fine twined-woven bag. The skin was that of an antelope doubled over and with the hair turned in. On top of it and between it and the bag was a small piece of hide, with the hair still on, of a young buffalo. The bag contained small pieces of charred human bones. There was also what appears to have been a feather head-dress the cords of which were made out of the same material as the bag, the feathers were identified by Dr. Wetmore as golden eagle. The bag itself is typical of Basket-maker bags from other parts of the southwest, particularly those from the Grand Gulch region of

southeastern Utah. It had been split down one side. The material is of some form of the yucca, made into two-strand cord, alternating red and white. It is decorated with several bands of black and yellowish lines. (See No. 3, Plate 2). The depth at which this bag was found is approximately the same as that of the baskets found by us the year before further back in the cave, and also those baskets which had been found some years previously by the two brothers who went to the cave before it had been disturbed, namely about a foot and a half.

Slightly west of this cremated burial and about 18 inches farther under the surface was found a large hearth containing animal bones. Other hearths appeared as we progressed along both walls of the cave, bones of horse, bison and bird being probably the most frequently encountered. Of the horse bones,

in addition to teeth, jawbones and leg bones we found a number of cores of the hoofs, one of which was so small that it undoubtedly was that of an unborn horse. There were also a number of the large bird leg-bones similar to the ones identified for us last year by Dr. Wetmore of the Smithsonian Institute as those of the California condor and the turkey. This year we recovered the beak of some large bird, no doubt that of the condor. Dr. Wetmore has identified all of the bird bones found this year and the list includes the following: Lesser Prairie Chicken, Turkey, California Condor (these two already mentioned), Turkey Vulture, Cooper's Hawk, Swainson's Hawk, Prairie Falcon, Great Horned Owl, Shorteared Owl, Flicker, Yellow-headed Blackbird, Mountain Quail, and Black Vulture (these last two being new to that locality, and not found there today).

The most interesting hearth we came across in our work was one along the west wall. After a hard but rather fruitless day of work, when we were just about to stop, Bill Burnett's eye focussed on a large rock which we had not yet removed from the cave, and he said that he had a "hunch" that we would find something interesting under it. More or less to humor him we lifted it up and he began to feel around carefully in the dirt with his hands, taking out some bison bones. In a few minutes, however, his hand struck a stone object, which, when I examined it in the light, gave me quite a thrill, because it was different from anything we had found. It was a spear-point and had a groove along the face from the base similar to the points found at Folsom, N. M., and now generally known as Folsom points. (See No. 4, Plate 3). It was not as beautifully made as the Folsom points I had seen, but it was made the same way and the material from which it was made differed from that of the points we had found nearer the surface. It might be called a generalized type of Folsom point, as it does not show the remarkable control in chipping shown



PLATE 2

No. 3. Basket Maker Twined Woven Bag Found in Cave.

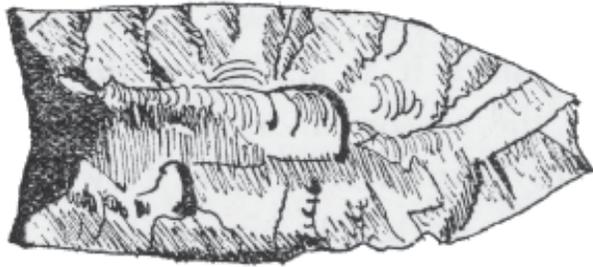


Plate 3

 No. 4. Generalized Folsom Type Spear Point.

in the points recovered from Folsom. There have been a number of others found in west Texas and other places in the southwest like the one I am trying to describe here, the most noticeable feature of which is the groove along each face. The depth at which our spear-point was found was five feet seven inches below the surface and about four feet below the level of the Basket-maker burial. As I mentioned we had to move a large rock which was directly over the hearth. The rock had evidently fallen from the roof of the cave, and the underneath side was covered with charcoal.

At this point in our work we were running very low on supplies of food and water. This last was always a serious matter with us, since we had to carry along with us all our water for drinking, cooking and washing. For this purpose we had a tank constructed in the car, with a spigot on the outside, and this tank held close to forty gallons. We, therefore, covered up the place in the cave where we had been excavating the hearth, packed up our equipment and went back to Carlsbad to replenish our supplies.

When we returned a few days later Mr. W. B. Lang of the U. S. Geologic Survey very kindly went with us to help us check some of our calculations. He spent the day with us and returned that evening. While he was there we took up our digging where we had left off at the edge of the hearth in which we had found the bison bones and the spear-point. A few inches away from where we had found these and at approximately the same level we uncovered a horn which we recognized could not be bison as it had a peculiar twist to it. This turned out later to be the horn of a musk-ox. On the east side of the cave we found a horn of a bison, teeth of bison and horse and other bones associated with charcoal and ashes. At this time we

dug to a depth of eight feet six inches, which was about as deep as we went. At seven feet below the surface we found bird bones.

It seemed wise, after a few more days, to discontinue our work in order to have some more competent judge than myself pass on the importance of these finds. A conference of those engaged in studies and field work in the southwest was scheduled to be held in Santa Fe within a few days, so I decided to embrace this opportunity to seek some information relative to our finds. I attended the conference and was much pleased to have everyone who saw the spear-point pronounce it as similar to the Folsom type. I had arranged earlier in the season to meet Mr. Barnum Brown of the American Museum of Natural History of New York at Folsom, and this turned out to be a fortunate circumstance for me, as I knew that he would be interested in the finds we had made. After a few days spent at the site where he had found the original Folsom points, Mr. Brown agreed to go back to the cave at Three Forks with me. In the meantime I had shown him some of the bones we had brought in from the cave, and he identified many of them, being particularly interested in the horn with the peculiar shape and which he identified as that of an extinct musk-ox.

Four of us went out to the cave, and choosing a camping-site a short distance away from our old site, in order to try to fool the gnats which had been a great annoyance to us before, we took up some further digging in the cave. It was very gratifying to me to have Mr. Brown begin almost at once to take out various animal bones, most of which he was able to identify on the spot. It was also a rare opportunity for me to see with what care he removed bones which were in very fragile condition. In this way Mr. Brown took out several jaw bones with the lower teeth in place; these turned out later to belong to the musk-ox. At a depth of six feet eight inches below the surface of the cave he took out a vertebra of a large camel. A number of small animal bones and bird bones came out at depths below this, almost all the way to the original floor of the cave.

As we worked down the face of our excavation we came across another burial. It was in rather a disintegrated state, but with the patience and care which

comes from a long experience in such matters, Mr. Brown removed a considerable quantity of human bones, among which were some skull bones. It was evidently a cremated burial like the one we had uncovered nearer the front of the cave, and although not very much remained, there was sufficient to show that there had been a twined-woven bag with it, and also some sort of grass basket. This burial was some three feet below the surface, and near the edge of one of the holes dug by the two young cowpunchers some years before. There was in the burial a large *Unio* shell, made into an ornament of some sort, and a smaller one for the same purpose. Mr. Brown identified a part of a very small skull, which from the size could have been only that of a human embryo. The larger skull is in process of being put together at the American Museum in New York, and enough of the work has been done to show that it is of a long-headed type. Taking into consideration the evidence of this burial and of the other objects found in the same cave, it would seem to be a safe conclusion that they represent what is now known as a Basket-maker culture, though there is nothing to prove that it is of the same age as the culture of the San Juan area of northeastern Arizona and southeastern Utah.

To return, now, to a further examination of the animal bones, the identifications made by Dr. Thorpe of Yale University and recently by Mr. Barnum Brown of the American Museum of Natural History of New York, make it appear evident that the fauna of this cave is largely an extinct one. A list of the forms found is made up of an extinct four-horned antelope (*Tetrameryx*), two extinct horses (*Equus fraternus* and *E. complicatus*), extinct bison (*Bison alleni*), extinct musk-ox (*Bootherium* sp), a large extinct camel, extinct California condor, and a number of other bird bones, including those of the wild turkey. There is also the red fox, ring-tailed cat, prairie dog, pack rat, kangaroo rat, field mouse, white-footed mouse, pocket mouse, true squirrel, pocket gopher, jack rabbit, cotton-tail rabbit, and turtle. A few invertebrate fossils were found in the rocks in the cave, a spirifer and a productus among others.

The first question that presents itself is: when did these animals become extinct; is there any way to establish the age of these bones? If so can it be definitely

shown that the so-called Folsom point was in association with some of them, and therefore, of a contemporaneous period? It seems unwise to attempt to offer definite proof that these bones have been in the cave for years, measured by the thousands rather than the hundreds; in other words, that they represent Pleistocene animals. It is perfectly possible that these animals continued to live in that region, due to local conditions, long after the recession of the great ice sheet of the last glaciation. All that can be done is to present the facts as found, in the hope that they will eventually aid in proving the existence of man in this country at a period much earlier than the Basket-maker.

It can be readily seen, from an examination of the cave, that the rocks found there were dislodged from the roof; the material is the same and the shapes of the larger blocks are similar to those which can be removed from the walls today. There are pieces which are blackened by smoke and other blocks with a coating of charcoal and ashes adhering to one face—usually the under side. This would seem to indicate that parts of the roof-rock had fallen on to hearths below, as the appearance of smoke-blackened roof-rock is quite different. In this connection it might be mentioned, in passing, that the excreta of the daddy-long-legs found in the darker parts of these caves give a very similar appearance to a smoke-blackened roof, till examined carefully through a hand lens.

Between the rocks thus fallen from the roof there is a very fine dust, mixed in places with debris and pack-rat dung. The dust, under the microscope, shows it to be mostly the disintegrated rock particles of cave walls and roof. It is very fine and goes through a 200-mesh sieve readily. In spite of this fineness we were able, on account of the rocks and fibrous debris, to cut down the face of our excavation so that it was nearly vertical, showing that the undisturbed dirt and rock was packed down sufficiently to prevent the working down of objects to lower levels. However, the cave had been used by pack-rats for a long time, and where they have burrowed down along the walls, objects could undoubtedly work down to lower levels, and bones, showing tooth marks of rodents could be carried upwards.

Could the spear-point, therefore have worked its way down from a higher level than that at which it was found? It would be hard to prove definitely that it had not; but the facts are that it was found directly under the flat side of a rock, in size about two feet long by one and a half wide by ten inches thick, under which was a hearth composed of charcoal and ashes which extended beyond the edges of the rock, and some of the charcoal was adhering to the under side when two of us lifted it up. It looked as though the rock had fallen directly from the roof upon the hearth in which the spear-point and the bones were found.

Granted that the facts tend to show the spear-point and the bones in this hearth were at an undisturbed level of the cave, how can we date the spear-point by the age of the bones? To put it another way can we date the bones in a satisfactory way, and thus arrive at an approximate date for the spear-point, found in close association? The bones were not mineralized, but they were decalcified, and many of them broken, particularly the leg bones. They may have been broken by man for the marrow, although many were, no doubt, broken by the rocks which fell from the roof. The bones of the musk-ox probably offer the best evidence in helping to arrive at a time factor in regard to this cave, since climatic conditions must have been very different at the time he lived in that region from what they have been for a long period since. Today the musk-ox lives in Arctic North America—Alaska and Greenland. Remains of this animal have been found in a number of places which are very distant from his present habitat. According to Hay these fossil remains have been found outside the outermost moraines in Illinois, Indiana, West Virginia, Missouri, and Iowa; and within the glaciated area of Ohio and Indiana. So far as we have been able to ascertain the finding of the musk-ox in southeastern New Mexico marks the farthest point south that the bones of this animal have been found.

It seems reasonable to suppose, therefore, that the musk-ox moved south with the oncoming of the last ice sheet, and that he moved northward as the ice-sheet retreated. There is considerable evidence that the desert belts of Arizona and New Mexico underwent distinct climatic changes in post-glacial times, and it might be well to refer briefly to some of the references on the subject. The literature on glaciers

and climate in this country is extensive and we shall refer to only two or three authorities. Good bibliographies can be found in "The Evolution of Climate" and "Climate Through the Ages," by C. E. P. Brooks; and in "The Last Glaciation," by Ernst Antevs. In these publications reference is made to the region we have been discussing. We may note that the last or Wisconsin glacier extended across two-thirds of the Continent from Nantucket and Cape Cod through Long Island, northern New Jersey, southern New York, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, the Dakotas, Manitoba, Saskatchewan, and Alberta. At the same time the Cordilleran centre probably bore valley glaciers.

The cave we have been discussing is at an approximate elevation of 4,600 feet, the highest peaks of the Guadalupe beyond rising to over double this height. During the period when the snowfall became greater on the mountains, during the last glaciation, mountain glaciers must have formed in the Guadalupe. Brooki says that further south, out of reach of the main ice-sheets, there are traces of two and in places three separate developments of valley glaciers resembling those of the Alps. There is, therefore, the possibility that even after the last glacier began to recede, a very much colder climate existed, at the altitude of the cave, for a long period; but how long this lasted would be hard to say. Ellsworth Huntington in Carnegie Institution Publication No. 192, says that the alluvial terraces of both Asia and America are evidently due to a series of changes of decreasing intensity, which makes it seem probable that the oldest terrace may represent the last glacial epoch, and that the others represent the post-glacial stages or minor epochs of glacial retreat. He adds, that if the oldest terrace dates back no more than 30,000 years, more or less, the youngest cannot be more than 2000 or 3000 years old at the most, and maybe much less. Antevs has done very extensive work on clay varves, or annual clay layers formed during ice retreat. Based on these studies, together with other lines of research upon the subject, it would seem to be safe to assume a date of say 20,000 to 25,000 years ago for the beginning of the last glacial retreat. It would also seem to be safe to assume that the musk-ox lived in the region of the Guadalupe Mountains for a considerable period after the ice began to retreat farther to the north and that

mountain glaciers were left in the higher parts of these mountains where such animals may have retreated until such time as the gradually changing climate caused their extinction.

We have no space for any further discussion of these questions but we should like to call attention to the fact that the bones of the extinct horses found in this cave bring up some interesting queries.

These things open up many interesting lines of thought, but we must curb our flights of fancy, and observe the facts. Summed up we may restate these: extinct animal bones have been found in a cave in southeastern New Mexico. Some of these have been found in hearths, some of them actually burned, and in the case of certain bison and musk-ox bones found in actual association with a spearpoint resembling the Folsom type. This particular hearth was four feet below a cremated Basket-Maker burial, the bones of which were placed in a very finely made twined-woven bag, wrapped about with antelope skin. We present these facts not with the purpose of proving anything,

but with the idea that it will add to the evidence which seems to be accumulating and pointing to an occupation of certain parts of this country by people who antedated the Basket-Makers. To mention only two examples, of several which have been reported, as evidence of this kind, first the well-known discoveries at Folsom, New Mexico, of a large number of extinct bison bones found in association with spear points, which have given the name to the specialized type of points mentioned, secondly, the discovery, last summer, at Angus, Nebraska, by a party under the direction of J. D. Figgins, of the Colorado Museum of Natural History, of a spear point of the general Folsom type found under the shoulder blade of a large elephant.

The continuation of work of this kind, it is to be hoped will eventually produce sufficient evidence to enable something definite to be offered which will convince the most skeptical that man has existed longer in this country than we are willing to admit at this time.