

THE CALICO SITE:

THE WORK OF MAN OR NATURE?

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The question with which this paper shall deal is whether or not the chipped stone specimens recovered at the Calico Mountains Site in southcentral California were made by man. It has been suggested that they could be the work of nature, that there has not been adequate proof demonstrated that they are artifacts and not geofacts. As archeologists dig their way further back into the history of man, their ability to recognize his work in stone becomes the most crucial question they must answer, for there are no other time-resistant indicators of his presence during the Pleistocene remaining. The Calico Site proposes extreme antiquity for man in America; it has been dated by geological means, and this problem shall be dealt with shortly. The principal objection to the authenticity of the Calico artifact assemblage arises from its age, because the further back tools go in time, the more their crudeness resembles natural lithic forms. The Calico flints are now accepted as man-made by at least 75% of the professionals who have visited the site and inspected the collections (15), but there remain as yet unanswered objections to their validity by respected archeologists and geologists, and it will be the purpose of this paper to deal with them.

The Calico excavations were made during seven seasons, from 1964 through 1970, mid-Fall to mid-Spring each year, under the

direction of Ruth DeEtte Simpson of the San Bernadino County Museum. Calico lies in the Manix Lake Basin, and from 1954 to 1963 more than 120 surface sites were recorded from this area (8, 33). Dr. L. S. B. Leakey was invited to inspect the area and chose the site, the excavation of which he directed throughout. The record that has been kept of the excavations is complete; even among those who doubt the interpretation of Calico, there is no question as to the excellence of the excavations (13, 4).

As the excavations progressed and the lithic assemblage began to take shape, first doubts were voiced as to its authenticity. It was suggested that other trenches be dug into the alluvial fan at random to see if specimens similar to those already recovered could be found. Out of the first Control Pit came 12, 962 pieces of chalcedony and other siliceous material, but not one accepted tool was found (8, 40). A critic has written that the control pit exposed deposits in the Upper Yermo (fan) formation of different lithology and grain size than those exposed by the lower Yermo formation (4, 307), but the fact is that it was taken down to the depth of over 60 feet, clearly covering both postulated formations of the Yermo fan which the project geologist concludes are both part of one fan, since the materials found in each are identical (8, 22). The same critic writes later in the same article that he believed at the time of the excavation of the control pits (at his suggestion)

that they would be inadequate tests because more and smaller test pits would have been statistically more representative (4, 308).

To get on with the criticisms; since the Calico specimens have been redeposited, there can be no living floor; and since they are beyond the range of carbon dating and no other materials have been found to date them by other means, Calico is an archeological site in a geological context and must be dated geologically. This has given rise to the problem of differences in geological opinion, and has also exacerbated those who take the pro-Calico position, since estimates of 500,000 to 1,500,000 years would effectively rule out the possibility of man in America. Many who doubt that the Calico finds are artifacts base their opinions not on the nature of the specimens themselves, but on the context of where they were found. Dr. Thomas Clements, who has done more work in the Mojave Desert in general and at the Calico site in particular than any of his critics, dates the Yermo fan deposits as pre-Wisconsin, or older than 70,000 years. He believes the fan to have been formed during the Sangamon Interglacial. The crux of the geological problem seems to be in the interpretation of the desert erosion cycle and how quickly it can work. Dr. Clements considers the fan, at the present time, to be in very late youth to early maturity in its degree of dissection (8, 29), and feels that if it were earlier Pleistocene, the cycle would have gone much farther than it has. Karl W. Butzer and Carl L. Hansen, in their report on the geomorphology

and stratigraphy of the Calico Hills Site stated that it seemed improbable to them that the Yermo fan is older than late Middle Pleistocene, perhaps 120,000 years (13, 8). It becomes obvious from the difference in expert opinion that further detailed geological study is needed at Calico.

In addition to further study of the Yermo fan itself, more work must be done on the lithology of the Calico Mountain basin from which the fan deposits have been built up. Besides the artifacts, several varieties of exotic materials were found during the excavations. Five quartz crystals, chipped and battered from a single crystal, have been studied by John Witthoft who states that their abrasion pattern is not that of stream transport, beach pounding, wind erosion, bird-cropstone abrasion, or chemical erosion. It is like that seen on quartzes from ethnographic medicine bundles which have been long-carried and abraded in pouches (8, 48). The nearest known source of this type of quartz crystal is 40 miles to the east. Witthoft has stated that the formation of 2 varieties of these quartz crystals must have taken place no later than the Mesozoic and Cretaceous. Two flakes of moss-agate gravel, known for its use in later Amerindian commerce were found in situ; the nearest known source for this material is 100 miles to the east. And, finally, a fossil gastropod was found which was identified as marine Pleistocene. Calico lay at least 100 miles from the sea during the Pleistocene, so the presence of this fossil again

suggests the presence of man as carrier at Calico. There have been arguments advanced, however, against the exotic nature of the quartz crystals, moss agate, and fossil gastropod. Though none are yet known to be present within the immediate environment, more work must be done in the Barstow formation of the Calico Mountains. Empirical proof is needed to show that these specimens are not available in Mule Canyon where the Yermo fan originated. Detailed analyses of all Mule Canyon source material must be made.

The final geological consideration which must be brought to bear on the interpretation of Calico is the geological process by which the Yermo fan was created. Dr. Clements has stated that the Calico site shows all the characteristics of a typical alluvial fan (8, 21), and all critics of the site are agreed that the fan is the result of deposition by a series of mudflows. A mudflow is a streaming mass of mud and water moving down the floor of a stream channel (11, 186), occurs in arid regions such as the Mojave, and is capable of transporting large boulders, which are features of Calico. As one point in his explanation of how the chipped stone artifacts found at Calico could have occurred naturally, Van Noyes stated that mudflows carrying tough igneous rocks as well as chert cause abrasion, battering, and flaking (4, 307). What he fails to take into account in his violent interpretation of the process is that the mud itself, which is carried along as part of the viscous flow, acts as a cushioning agent between rocks. The included

rocks do hit each other and rub and grind, but repeated, violent contact between them is not a feature of a mudflow due to this cushioning. Natural fractures of these included rocks are expectable, and chips can be expected to have been broken from them, but repeated attacks on any one rock are not expectable, and several scores of chips broken from a single rock would be unusual. In the very small area dug at Calico, several hundred rocks have each had several scores of chips removed and I suggest that this could hardly have resulted from the natural action of a mudflow (13, 5).

Calico can be compared with the Sheguiandah site on Manitoulin Island, Ontario, in two ways. Both glacial action and solifluction have been proposed as the geological process responsible for the deposition of the artifact-bearing horizons there, but in either case there was significant movement of deposits richly laden with pebbles, cobbles, and boulders of quartzite not encased in mud. Conditions were ideal for breakage with movement, yet almost no questionable flakes were produced (9). Breakage, where it occurred at all, resulted in blocky or angular chunks, with a minimum of corner or edge battering. Rarely was there any doubt about whether a fragment was struck off by man or by natural forces, throughout four years of excavating (9). The Sheguiandah site has been conservatively assigned an age of at least 30,000 years, and may well be interglacial in its origin (9). It should thus be borne in mind by those who dispute the authenticity of the Calico

finds on the basis of their antiquity that Calico does not stand alone in North America in its rather broadly defined geological time period.

The importance of the geological study that has already been made at the Calico site and that which must be undertaken in the future cannot be stressed enough; the understanding of natural processes is a critical factor in the interpretation of the artifacts themselves, but it is at this point that archeological study takes precedence. The man who has spent more time than anyone studying Calico's lithic technology, John Witthoft, has stated that Calico was a flake industry (8, 52). Several different flaking techniques were used, but all were accomplished by percussion flaking from a core supported upon an anvil. It has been determined that the sub-spherical andesite hammers found in situ at Calico were certainly the flaking tools (8, 54). The same authority has characterized the industry as Clactonian, based on platform angle, form of platform, and wedge-shaped section analysis of the tools; but warns that most workshop components of any industry include a great deal of Clactonian work, since Clactonian techniques are well adapted to massive breaking of flint, and thus are usually conspicuous at quarry sites. There seems to be little doubt that Calico is a quarry site, or at least a site where raw materials were gathered and made into tools.

The first question which arises in an examination of the Calico lithic assemblage is typing the artifacts. Their validity has been

questioned on the grounds that the assemblage does not break down into known typological categories. It should of course be understood that not all artifacts necessarily fit neatly into preconceived categories. Typologies are mental constructs designed to help understand and deal with archeological data; they are not ends in themselves nor determinants of the data. The lithic analyst must go beyond formal typology in attempting to define the sequence of operations in the manufacture of a tool. Witthoft has stated that typologically Calico is a nondescript industry, but technologically it is a crisply definable industry, marked by a number of significant attributes (8, 55). There are, nevertheless, typological categories which others have observed. These include side and end scrapers, hammerstones, anvils, and handaxes. Study of the lithic assemblage is still going on at the present moment, and a significant number of burins are being identified (12).

Oakley has commented on the extraordinary complexity of the flaking agencies at work in the Calico flakings, noting that he found errailer in a large number of them (8, 61). Many of the specimens are bifacially chipped along one or more edges, and on some of them the chipping alternates from side to side of the edge. Many have clearly distinguishable bulbs of percussion, and some of the chips are concave-convex, having been struck from existing bulbs of percussion by well placed secondary blows. A few of the specimens are chipped

on several sides and edges by numerous blows requiring that they be repeatedly struck from several angles. A few are chipped on all surfaces of one end to form a point, while the opposite end is not chipped at all and tends to be rounded. It would seem that the chance of any of these being formed by natural forces is remote, and that to find so many of them together in one place is highly unlikely. The last mentioned hand axe-like pieces, for example, would have to have been caught by one rounded end in a crevice and repeatedly struck on all exposed surfaces by a score of blows from rocks falling by.

More important than pigeonholing the tools according to type, and perhaps even more important than understanding the process by which they were made, in proving their authenticity, is finding evidence of their use by man. As of 1972, under only a 20X lens, 18 specimens had been found to show indubitable wear-marks from tool-use (8, 51). High powered microscopic analyses must be made for wear scars, use abrasions, and chip scars. This work is currently being done at UCLA and is providing positive proof that the tools were being used by man (12).

Another point supporting the artifactual interpretation of the Calico finds rests on the fact that nature is never selective, and at Calico the flakes are, almost without exception, never struck off a piece of poor quality chert (8, 15). The source of this material is found higher up in Mule Canyon, and the outcrops consist of both good and poor quality chalcedony. Both types were found in abundance in situ, yet most of the

artifacts were made of the better quality material. Selection of the best available material for tool making is characteristic of man, not nature. And when nature strikes flakes from a core, the flakes are often found in situ near the core, yet exceedingly few cores were found at Calico. It could be argued that sorting as a result of alluvial action is responsible for this, yet there were many large cobbles and boulders found on the artifact bearing strata at Calico. In one very small area, 1,100 flakes in four different materials were found, but not a single core or block of those materials from which the flakes could have come (8,39).

Most of the arguments for and against the validity of the artifacts at Calico or any other site are based upon intuitive interpretations which remain independent of scientific proof. What the archeologist needs as the specimens he studies become cruder and more unsophisticated is a step-by-step course of action involving procedures with a scientific method. The exercise of control in the removal of flakes from cores is diagnostic of man the tool-maker. A.S. Barnes demonstrated that evidence of control is found in the angle formed by the intersection of the surface on which the blow has been struck and the surface of the scar left by the flake removed (1,245). The distribution of angle sizes is distinctly different between stones shaped by man and those shaped by nature in any one given lithic industrial situation. The use of this test must take high priority among recommendations for further analysis of the well preserved Calico specimens.

Finally, there is the matter of the hearth. Dr. Rainer Berger has, on the basis of magnetic measurements of one of the stones found in a circular arrangement at Calico, judged the feature as a hearth. The rock was cut into cubes, and it was found that the cubes at the end of the rock facing toward the center of the feature were more highly magnetized than those at the other end. It has been argued that lightning could be responsible for the magnetization of the rock, but it seems plausible to assume that if lightning had struck a rock, the much greater charge of electrical power and heat would have spread throughout the rock and magnetized it uniformly. This would seem to hold especially true for rocks which contain appreciable amounts of electrically conductive iron, as do the Calico chalcedony specimens. It is clear that what is needed is further experimentation with the feature's other rocks. This was slowed down by the very deliberate, painstaking character of the excavations as directed by Dr. Leakey and Miss Simpson, but why it has not been accomplished yet is questionable. Miss Simpson declared in 1972 that the rocks in the feature have uniformity of size which is not elsewhere; a uniformity of position which is not elsewhere; a uniformity of direction of the long axes of the rocks we do not have elsewhere (8, 42): the question is, why haven't the rocks been sent elsewhere in order to prove the uniformity of the feature as a hearth?

There remain many other tests which must be run with the well preserved Calico data. Much laboratory work with the specimens is required in order to demonstrate clearly that they are or are not artifacts. Every analytical technique available must be used. The work with high powered microscopes must be continued in the search for wear and use abrasion. Statistical treatment of fracture angles, bulbs of percussion, and other physical features are essential. Any repetitive patterns present in the assemblage must be isolated. There remains much geological work to be done in both the lab and the field. In order to arrive at a closer date for the site, there is drilling, fan mapping, and sediment and soil analysis to be completed.

In conclusion it can be said that if the Calico Mountains site is proven to have been occupied by man before the last glacial age, it will revolutionize American archeology. For this reason, there has never been so controversial a site among American archeologists. Conclusive proof of the Calico occupation would cast a shadow over the career of many a reputable excavator. The digging is done, at least at Calico, so more sites of comparable antiquity are needed even more than further laboratory and geological field study of Calico itself. Especially helpful would be the location and excavation of a Pleistocene site which could be dated more surely. Other than

postulating for greater horizons for the arrival of man in America than was previously thought possible, Calico has pointed out a new geological setting in which sites can be searched for in the future. In the final analysis, whether the industry present in the alluvial fan of the Calico Mountains in the Mojave Desert is proven to be the work of man or nature, it will have brought about a wider definition of American prehistorical perspective and opened up inquiry into entirely new possibilities of extreme antiquity for man in this hemisphere.

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