

THE PRECERAMIC CULTURES OF LAGOA SANTA, SOME OBSERVATIONS

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For scholars unfamiliar with the many different ancient cultures of Brazil, the interest and knowledge of prehistory is confined to cultures of the Lagoa Santa region and that of the sambaquis (shellmounds) along the coast. In particular the century and a half controversy regarding man's association with the extinct Pleistocene fauna of Lagoa Santa continues to attract world-wide attention. In this paper, however, attention will center only on certain problems of the Lagoa Santa cultures.

The world-wide interest in the archaeological and paleontological sites of the Lagoa Santa region can be attributed directly to the investigations of Peter Wilhelm Lund, the Danish naturalist who excavated numerous rockshelters and caves of the area between 1832 and 1880, and astonished scholars with his claim that he had found evidence of man's contemporaneity with extinct megafauna. Such a claim, however, was far ahead of its time, for it was not until 1926 with the discovery of skeletons of extinct giant-sized bison associated with stone projectile points of Folsom, New Mexico, that archaeologists in general accepted the fact that man had lived in the New World with megafauna, now extinct, during the Late Pleistocene Age.

Since the time of Lund's investigations there have been numerous excavations in the sites of the Lagoa Santa region, both by professional archaeologists and paleontologists and by amateurs. Because there has been published already several

detailed histories of these projects, it is not the purpose of this paper to repeat this endeavor (Walter, n.d; 1958; Hurt and Blasi, 1969; Laming-Emperaire, 1975; Mello e Alvim, 1977; Cunha and Guimarães, 1978). Rather this paper will discuss the following topics: 1) the possible association of Lagoa Santa man and the extinct Pleistocene megafauna; 2) the relationship of the Lagoa Santa cultures to the local environment; 3) the culture traits of the Lagoa Santa cultures; 4) the relationship of Lagoa Santa culture to other prehistoric cultures of South America; and⁽⁵⁾ the climatic changes of the region.

The Prehistoric Cultures of Lagoa Santa and the Extinct Megafauna

As previously mentioned, the first scientist to claim contemporaneity of Lagoa Santa man and the extinct mammals was Lund. Although he explored more than 200 sites and found the remains of 114 species comprising 56 genera, of which 16 are extinct, he found only six caves containing human skeletons in apparent association with the bones of extinct fossil animals (Couto, 1950). Of these sites inhabited by man, the most important one was the Gruta do Sumidouro. The fact that these human skeletons were not articulated, that is in their original position of burial and thus had been redeposited by flood water from a frontal lake, led Hurt and Blasi to conclude that local evidence was not sufficient to establish that man and the fossil mammals were contemporary.

The claim of a Pleistocene age for Lagoa Santa man was revived by members of the Academy of Sciences of Minas Gerais, such as Walter, Mattos and Cathoud, in particular, by their excavations of Confins Cave from 1933 to 1960 (Walters, n.d., 1958; Mattos, 1946). In the Confins cave, sometimes called the Gruta da Lapa Mortuária, in deposits under a stalagmitic level a human skull was found near three molars of an extinct Pleistocene horse and a part of a femur a young mastodon. Throughout this same stratum were found also bones of other fossil mammals, such as llama and cave bear. While both the human and mammal bones were fossilized, a chemical analysis showed both similarities and significant differences. The fluorine content of all the bones was nearly the same, but the phosphates of the human skull had been replaced by carbonates in the extinct horse bones (Stewart and Walter, 1955, p. 932). That the human skull, however, was not of recent age is indicated by its possession of three times as much fluorine as was present in the skull of a cow. Hurt and Blasi questioned also the theoretical equal age of the human and fossil mammal bones because the publications describing the find were not accompanied by detailed sketches or photographs of the stratigraphic units and the fact that when Hurt visited the site in 1956 he found local laborers working without direct supervision of archaeologists and that the members of the Academy of Sciences of Minas Gerais were present at the excavations of the cave only during the weekends. Thus the archaeologists obtained only verbal information on the finds made during the time they were absent (Hurt, 1960).

To examine once more the prehistory of the Lagoa Santa region, a project

in 1956, co-sponsored by the Museu Nacional in Rio de Janeiro and the University of South Dakota under the general supervision of Hurt, excavated seven rockshelters at Cerca Grande (Hurt, 1960; Hurt and Blasi, 1969). Although radiocarbon dates of 10,000 – 9,000 years ago were obtained from the oldest cultural level in Abrigo nº 6, the most important site, no fossil bones were encountered in this project. A much larger project in 1971, 1973-1975 sponsored by the Missão Franco-Brasileira and supervised by Laming-Emperaire, excavated the large rockshelter Lapa Vermelha IV (Laming-Emperaire, et. al., 1975; and Laming-Emperaire, 1977). Although few artifacts were found, there was obtained a large number of radiocarbon dates, ranging in time from ca. 20,000 – 320 years ago, as well as considerable information on the stratigraphy. It is only the dates from 9,500 to 11,600 that appear relevant to the question of contemporaneity of man and the extinct animals. In detail the following significant data were obtained:

1) 10.30m. depth from datum point, which was 1.80 above surface of deposits, produced a date of 9580 ± 200 years ago, contained artifacts.

2) 10.50m. depth, no dates but contained the bones of the extinct edentate **Scelidotherium gigas**.

3) 11.40m. charcoal dated at $11,680 \pm 500$ years ago.

4) 12.90m. contained a human skull but produced no radiocarbon dates.

5) 13.35m. charcoal present but was not dated.

There exists, however, a major controversy among the archaeologists who at the site and the geologists and bioanthropologists who visited the site and studied its contents regarding the relationship of the human skull to the bones of the fossil edentate. Laming-Emperaire considers the human skull to have been found in situ and thus to be of an age at least as great as that of the **Scelidotherium** bones (Laming-Emperaire et al., 1975, p. 75). Prous, another archaeologist who worked at the rockshelter, states that both the human skull and the edentate bones when removed were red colored, indicating that they came from the same strata (Andre Prous, personal communication, 1980). Mello e Alvim points out, however, that the human skull must have been intrusive into the 12.90m. level, for the mandible was found at the depth of 10.45m., the left tibia at 11.50, and the femure between 10.00m. – 10.20m. and thus the human skeleton as a whole was found in a level above the bones of the **Scelidotherium**, the latter encountered at 10.30 level and dated at 9580 years ago. According to a drawing of the vertical profile of the strata published by Cunha and Guimarães, the skull lay in a red stratum clearly separated by a vertically inclined disconformity from yellow beds, contained the bones of the extinct megafauna (1978). They also point out that the bones of the fossil mammals were mineralized in contrast to the natural condition of the human bones.

Nevertheless, there is indirect evidence that in the Lagoa Santa region man did live during the time of the extinct megafauna. At Lapa Vermelha IV charcoal that apparently represents the remains of a man-made fire was found at the depth of 13.35m. This would indicate that man lived there earlier than that the $11,680 \pm$

500 year date from the 11.80m. level. Such a date apparently falls within the range of time for the Late Pleistocene fauna of south-west Rio Grande do Sul. For example, Miller notes that fossil bones were encountered in Horizon VI of that area and that this horizon is more recent in time than Horizon VII which contains the bones of a *Glossotherium* and man-made flakes dated at $12,770 \pm 220$ years before present (1976). If man did not live in the Lagoa Santa region during the time of the Pleistocene megafauna the animals must have become extinct only a short time before human migration into the region.

It is certain that man lived in the Lagoa Santa region at the beginning of the Holocene Age (ca. 10,000 years to present). In addition to the dates from Lapa Vermelha IV of more than 11,000 years, the oldest cultural levels from Abrigo 6, Cerca Grande dated between 10,000 – 9,000 years ago (Hurt and Blasi, 1969), while a C14 date of 9600 ± 200 years was obtained from the oldest cultural deposits in the Caieiras Rockshelter (Laming-Emprereire, et al., 1975, p. 107).

As yet there have not been sufficient investigations of the Lagoa Santa region to determine the climatic changes that occurred during the time of human habitation. The oldest evidence of man occurs in a compact but unmineralized red-colored stratum (nº 9) over which lie several similar deposits, but which have a grey color (nºs 8-2). Once these strata were deposited there followed a humid period when stalactites and stalagmites were formed and mineral water which permeated Stratum 2 turned the deposits into a very hard layer. Hurt and Blasi postulated that this pluvial and probably warmer period corresponded with the Altithermal or Climatic Optimum (ca. 6000 – 3000 years ago) period noted elsewhere in the world (1969). Similarities exist in some of the deposits of Lapa Vermelha Rockshelter IV. In that site the strata between the 10.30m. and the 9m. are compact and alternate in color from red to grey. The age of these deposits, 9500 – 6800 years overlap with those of Abrigo 6. Corresponding apparently in time with the period of mineralization of Stratum 2 of Abrigo are the red-colored silt and sand deposits in Lapa Vermelha IV (ca. 6800 – 3000 years ago). These strata were formed by material transported to the high level of a frontal lake, the water of which no longer attains the entrance of the site. This, then, is additional evidence of a pluvial period in the Mid-Holocene in the Lagoa Santa region. The uppermost levels of both sites are similar in that they consist of loosely consolidated fine-grained deposits of ash, sand and silts, suggesting a return to drier conditions in the recent period.

Additional data on Holocene climate exists in adjacent areas to the Lagoa Santa region. For example Musinho de Meis has observed high water levels of Lake Jacarei on the Rio Doce of Minas Gerais that date from ca. 10,000 years before present (Maria Regina Mousinho de Meis, personal communication, 1980). This evidence confirms a fluctuating climate during the first half of the Holocene, a conclusion supported by the lowermost strata of Lapa Vermelha and Abrigo nº 6. Translated in terms of human adaptation it can be concluded that the Mid-Holocene represented by a humid pluvial climate and probably by forests more extensive

than present would have been the least desirable period in Post-Pleistocene times. This conclusion is also supported by the fact that stalagmites and stalactites were forming in Abrigo 6, with the result that wet conditions in the site would be prejudicial to human habitation, while the constant flooding of Lagoa Vermelha would have made that site equally undesirable. The fact that very few artifacts were found in Lagoa Vermelha is additional confirmation that this site was undesirable during much of the early and mid-Holocene.

The oldest cultural material from the Lagoa Santa region that has been assigned to a definite taxonomic unit is the Cerca Grande Complex (Hurt and Blasi, 1969). Although this complex was defined on the basis of the excavation in 1956 in the rockshelters of Cerca Grande, this cultural unit is found throughout the Lagoa Santa area. In time the complex began at least 11,000 years ago and lasted until about 3,000 years ago, or until the ceramic-agricultural cultures appear in the area. A major tool type consists of the stone and bone projectile points, indicating that hunting was an important activity. The main type of stone points have a constricted base with rounded or slightly barbed shoulders. Less common are triangular, leaf-shaped (or lanceolate) and square stemmed points. A pentagonal form with a concave base or with a fish-tailed base are represented only by single examples.

The stone projectile points also indicate a relationship with sites of the Umbú Tradition of the southern Brazilian highlands, although a much greater variety of types are represented in the latter cultural complex. These constricted-base and lanceolate-shape points are the main types in the upper half of Camada III of the Alice Böer site, Rio Claro Basin, of São Paulo (Beltrão, 1974, 1978). At this site these artifacts seem to be older than those of Lagoa Santa for the projectile points began in a level that has been dated by C14 at $14,000 \pm 3,000$. A distant relationship is indicated in the presence of the constricted stemmed points and the pentagonal type in upper levels of the El Inga site near Quito, Ecuador, dated by Mayer-Oakes at about 8,000 years ago. If the estimate of age for El Inga II is correct, the examples from Lagoa Santa and the Alice Böer site appear to be older. A further relationship with the El Inga site appears in the find of a projectile with a fish-tailed base in Eucalypto Cave by Walter (1958, Fig. 22, Ex. H). This type is similar in form to those from the lowest level of Fells Cave, a type which has been designated as Magellan I type (Bell, 1965). Estimates of age of El Inga I complex by Mayer-Oakes indicates an age of 10,000 years, but the earliest radiocarbon dates are approximately 9000 B.C. or about the same age as the constricted-base points from Cerca Grande. It should be noted, however, that many of the points with a fish-tailed stem are fluted at the base, a trait absent in the example from Eucalypto Rockshelter.

A different relationship with the Andean cultures and those of Lagoa Santa is observed in the leaf-shaped or lanceolate types. These resemble more closely those of the Ayampatin complex of northwest Argentina and those of Laucricho I and II complexes of Peru, which are estimated by Mayer-Oakes to have a maximum age of 1,000 years, a time period comparable once more to that of the oldest cultu-

ral levels of Cerca Grande. In summary, the above information indicates that stone projectile points of similar types appear at about the same age in both the Andean area and Lagoa Santa areas, while at the Alice Böer site they seem to be even older.

Equally characteristic of the Cerca Grande complex are two types of bone projectile points, one made from a split, hollow long bone of a bird, and the other a splinter of the long bone of a mammal. Although not confirmed by the excavations of Abrigo 6 or in the excavation of Lapa Vermelha IV, Walter, on the basis of presence or absence of certain types in the rockshelter he excavated, concludes that there was a sequence from points with an unmodified base to those with a notched base, while in the more recent ceramic deposits stemmed forms are most common. Bone projectile points, made from the long bones of animals, are also characteristic of the Paranaíba Phase of southeast Goiás (ca. 10,800 – 9,000 years ago) but the remaining tools of this industry are very much different from those of the Cerca Grande Complex (Schmitz, 1972, 1980). For example, stone projectile points are absent in the phase while a main tool type is a long elongated blade with a rounded cutting edge at one end, a type locally called "lesmas". Such a tool is absent at Cerca Grande but is common in the Alice Böer site. Without doubt major differences existed in the tool kit of the hunting cultures of prehistoric Brazil at any one time period.

Another major tool type in the Cerca Grande Complex, useful for hunters are numerous flakes obtained from quartz crystals that could serve as hide scrapers and meta cutters. Rarely are these flakes retouched, since their natural edges are sharper than the modified examples. Equally important in the economy were axes with a ground bit that would be useful for cutting fire wood or making wood handles for tools. Although not confirmed in the excavations of Cerca Grande or Lapa Vermelha IV, axes from Mae Rosa made by flaking the sides and bits by percussion were found (Walter, 1958, Fig. 25). Since the technique of grinding the bits of axes is a more complex operation, the percussion-flaked axes may be older in time.

The economy of the Cerca Grande Complex was not confined to hunting, for tools associated with the gathering and preparation of wild vegetable products are common. Such specialized tools include the pitted hammerstone (quebracocos) which served as a base for breaking coquinhos and the cobble stones with surfaces flattened from grinding food.

In spite of the conclusion by Walter that there were minor changes in the types of bone projectile points and possibly a change in axe types, the Cerca Grande Complex as a whole existed over a long period of time (ca. 10,000 – 3,000 years ago). This conservatism in tool types probably resulted from an initial successful adaptation to the local environment. In addition, there seems to have been only one group of people responsible for this culture, for according to Mello e Alvim the skeletal remains from the preceramic cultures of Lagoa Santa indicate the existence of the same physical type (1977).

The Cerca Grande Complex is also known for the many pictographs of animals painted on the walls of rockshelters and caverns, a testimony to the artistic talents of Lagoa Santa man. In age some of the pictographs may be more than 3720 years as indicated by the fact that charcoal from deposits in Lapa Vermelha IV rockshelter which covered some of the paintings produced a date of that age (Laming-Emperaire et al., 1975, p. 133). In Abrigo nº 5 at Cerca Grande a former level of the frontal lake, much higher than at present, almost erased the lowermost pictographs from walls (Hurt and Blasi, 1969, Fig. 7). The age of this high water level is unknown, but it may have occurred during the warm, humid, mid-Holocene climatic cycle that has an age older than 3,000 years ago. Other evidence of decorative skill is manifested in the perforated bone and tooth beads in the preceramic deposits.

If the entire Cerca Grande Complex is examined in detail there appears to be a close relationship with that culture of the sambaquis along the southern Brazilian coast, in particular with the oldest ones, a trait first noted by Serrano (1946, p. 404). In common are the bone and stone projectile points, percussion flaked axes, axes with a ground or polished bit, pitted anvil stones, cobble hammerstones, cobble grinding stones, and bone beads. To be explained, however, is why the oldest known sambaquis, such as Ramal on the Bay of Antonina, Paraná, have a maximum age of only 6600 years in contrast to the age of about 11,000 – 10,000 for the earliest manifestations of the Cerca Grande Complex (Rauth, 1971). Is it difficult to believe that the hunters from an interior region such as Lagoa Santa would have waited for more than 2,000 years before descending to the coast. Most likely the oldest sambaqui sites have not been found yet. As Fairbridge has noted, prior to about 6,000 years ago the coast of southern Brazil lay outward many kilometers from the present shoreline (1976) and thus sites constructed much earlier than that date would now lie submerged on the continental shelf. In spite of the cultural resemblance, it does not appear that the population groups from Lagoa Santa and the sambaquis of southern Brazil represent an identical type, for those of the former area are gracile in contrast to the robust traits of the latter sites.

SUMMARY AND CONCLUSIONS

(1) At present the oldest date obtained for a prehistoric culture of Lagoa Santa is approximately 11,000 years ago, as indicated by charcoal obtained from the Lapa Vermelha IV Rockshelter. In spite of numerous excavations, no positive evidence has been found to support the claim, first made by Lund, that man lived in the region during the time of the now extinct Pleistocene fauna. The oldest dates, however, fall within the late range of time of fossil animals elsewhere in Brazil, such as at the Ibaciú sites of southwest Rio Grande do Sul.

(2) Judging by the types of tools, the oldest culture designated as the Cerca Grande Complex was one adapted to hunting animals and the gathering of wild vegetable products in an environment characterized by forests mixed with open

grasslands. Because of climatic changes the relative proportions of forests to grasslands varied through time, and these changes may have had an effect on the number of people who could live within the region at any one time. Major tool types included bone and stone projectile points, sharp flakes obtained from quartz crystals, stone axes, choppers, cobble grinding stones, and the pitted anvil stone known as "quebracocos". Artistic talent is revealed in the pictographs of animals on the cave walls, some of which are older than 3700 years.

(3) The small amount of evidence that exists indicates that known cultures of Lagoa Santa first existed as early as the early Holocene (10,000 — 6,000 years ago) when there were marked fluctuations in humidity and when the moisture as a whole was more abundant than at present. This cycle was followed by a time when the temperatures were probably even more humid and warmer (ca. 6,000 — 3,000 years ago). The forests, denser than at present, and the wet conditions within the rockshelters probably provided the least desirable habitat for man in the entire post-Pleistocene period.

(4) Although there is evidence of changes in axe types and in varieties of bone projectile points, the *preceramic cultures of Lagoa Santa as a whole were conservative*, for they extended over a time period from about 11,000 years ago to about 3,000 years. This conservatism may reflect the success of the initial technological adjustments as well as the fact that there appeared to be no changes in the human populations until the arrival to the ceramic, agricultural peoples.

(5) The tool kit of the Cerca Grande Complex most closely resembles that of the sambaquis, but apparently the relationship was one of diffusion of inventions rather than actual migrations of people, for the skeletal types of the two complexes are different.

(6) More distant relationship is indicated with the possession of similar types of projectile points with the cultures of the Alice B'êr site of São Paulo and with sites of the Umbú Tradition of the southern Brazilian highlands. Similar projectile point types also indicate an even more distant relationship with the El Inga, Ayampatin and Lauricocha cultures of the Andean region, although it is not clear whether the Brazilian sites or those of the latter region are older.