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New Archaeological Evidences from the Late Pleistocene/Early Holocene Paso Otero 5 Site (Pampean Region, Argentina)

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The archaeological knowledge of the early human occupations of the Pampean Region has improved through the finding of new archaeological sites dated between 10,000 and 11,200 RCYBP (Martínez *et al*. 2003; Politis 2003). Among them, Paso Otero 5 (Martínez 2001), chronologically located between *ca*. 10,000 and 10,400 years BP, is characterized by the presence of extinct megamammals and modern species in association with "fish tail" projectile points (Holliday *et al*. in press; Martínez 2001; Martínez *et al*. 2003).

The goal of this paper is to update the information recovered from the site. As part of a broader archaeological project, data on fauna, lithic, stratigraphy, chronology, pollen, silicophytoliths, diatoms, stable isotopes on gastropods, geoarchaeology, taphonomy, and diagenesis have been recovered (Martínez *et al.* 2003). In this paper we present preliminary results of faunal and lithic analyses, present new ^{14}C ages, and discuss the ^{14}C chronology in light of bone diagenesis and preservation. Analyses of other materials are in process.

The site was discovered in 1994 and it has been studied since then. The current excavated surface is 98 m^2. A total of *ca*. 80,000 complete and fragmented bones of extinct megamammals and modern species were recorded. Among them, only 58 bone specimens are taxonomically determinable (Table 1). The preliminary bone analysis shows a high degree of fragmentation and an extremely high proportion of burnt bone (*ca*. 91%).

The total number of lithic artifacts is 85. Among them, 79 are small flakes and debris, mostly on quartzite. The most relevant tools recorded are two fractured "fish-tail" projectile points, and a stem

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fragment of a probable third fish-tail point. Also found were a small piece of a bifacially reduced artifact and two fractured tools performed on flake with retouched margin.

Table 1. Taxonomic Determination and Quantification of Bone Specimens Recovered from Paso Otero 5.

Taxonomic determination	**NISP**
Xenarthra indet.	5
Pilosa indet.	1
Scelidotherium sp.	1
Glossotherium sp.	2
Mylodon sp.	1?
Lestodon armatus	2
Megatherium americanum	29
Glyptodon sp.	1
Toxodon sp.	3
Litopterna cf. *Macrauchenia*	2
Macrauchenia patachonica	1
Equus sp.	1
Equus neogeus	2
Hemiauchenia sp.	1
Lama guanicoe	5
Dusicyon patagonicus cultriden	1
Total	**58**

The stratigraphic sequence is composed of sediments of the Luján Formation that consists of two members: the late-Pleistocene Guerrero Member and the early to middle Holocene Río Salado Member. At Paso Otero 5, the sedimentary column of the Río Salado Member shows six periods of landscape stability represented by buried "A" horizons of soils. The sixth stabilization surface, which separates the two members, is a regional paleosoil named Puesto Callejón Viejo and chronologically situated at the Pleistocene-Holocene transition (Fidalgo and Tonni 1978; Holliday *et al*. 2003). The archaeological component is mainly recorded within this paleosoil.

Fourteen AMS attempts were made in order to date the bone assemblages, but the majority of them failed due to the poor content of collagen. Eight of the samples failed, three were anomalous, and three yielded expected ages considering the archaeological context and stratigraphic position. The first ^{14}C dates were conducted on megafauna bones and yielded ages of 10,440±100 RCYBP (AA-39363) and 10,190±120 RCYBP (AA-19291) (Martínez 2001). Moreover, a sample of sediment organic matter from the paleosoil yielded an age of about 9400 RCYBP (Holliday *et al*. 2003). Four other bone specimens processed yielded the following results: 1) *Macrauchenia patachonica*, 4150±30 RCYBP (GX-29792); 2) *Equus neogeous*, 2110±30 RCYBP (GX29794); 3) *Lama guanicoe*, 2090±40 RCYBP (GX-29793); and 4) *Megatherium americanum*, 9560±50 RCYBP (GX-29795).

Previous work at the Paso Otero archaeological locality (Gutierrez 1998, 2001; Gutierrez *et al*. 2001) highlighted the importance of the diagenetic aspects of site formation in the area. We have concluded that the diagenetic alterations severely influenced the microscopic features of the bones and, as a consequence, their biological signals (Gutierrez 1998, 2001; Gutierrez *et al*. 2001). New diagenetic analyses were conducted on 15 bone samples and the results are consistent with those obtained in former studies. In this sense, the %N quantities (protein content) found in every sample were below 0.3% (error margin), indicating a high degree of collagen decay. Although all of the sites of the locality present histological alterations induced by microorganism, there is no statistical correlation between this variable and the %N, indicating that the microorganisms attack is not the only responsible agent in the collagen decay. We proposed that the combination of intense microorganism activity and chemical hydrolysis were the processes responsible for the poor bone collagen preservation.

Although the obtention of an absolute chronology based on bone is problematic, the recovered evidence is indicative of the late Pleistocene/early Holocene age of the site. This assumption is sustained by the faunal (megafauna) and lithic (fish-tail points) association, as well as the stratigraphic position of the cultural component. As a consequence, the three late dates reported in this paper are rejected. The chronological anomalies and failures are the results of diagenetic alterations. It is remarkable that the three late Pleistocene and early Holocene ages were obtained on burnt bones,

suggesting that the burning process would favor the collagen preservation (Gutierrez *et al*. 2001).

The preliminary results presented in this paper shed new lights on the faunal diversity during the Pleistocene-Holocene transition. The presence of at least 10 species of megamammals is explained by the human reoccupation of the same place and by the possibility of bone scavenging from nearby carcasses. The large amount and the variety of burnt/calcinated and mixed thermal alteration stages of bones (Joly 1999-2000) are not only the result of using the megamammals as a food resource but of using bones as fuel (Martínez 2001).

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