

El *International Council for Archaeozoology* (ICAZ) promueve la organización pluralista y transdisciplinaria, al reunir a arqueólogos, biólogos, paleontólogos, veterinarios, entre otros especialistas de todo el mundo, cuyo objeto de estudio es la relación entre la sociedad humana y los animales a través del tiempo. En Latinoamérica este tipo de estudios han alcanzado un desarrollo muy notorio en las últimas décadas.

De esta forma en la sesión plenaria de la décima reunión del ICAZ celebrada en México, D. F., en 2006, los representantes de Argentina, Bolivia, Brasil, Chile, Colombia, Cuba, Ecuador, México, el Caribe y Panamá (junto con Costa Rica y Nicaragua) mostraron un panorama de la situación actual de la disciplina y plantearon las perspectivas futuras en sus respectivos países o regiones mayores.

Este libro es el resultado de dicha reflexión y con ello se espera dar una visión amplia y balanceada de los estudios arqueofaunísticos en Latinoamérica.

## *Estado Actual de la Arqueozoología Latinoamericana* *Current Advances for the Latin-American Archaeozoology*

Estado Actual de la Arqueozoología Latinoamericana  
Current Advances for the Latin-American Archaeozoology



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## ADVANCES IN ANIMAL BONE ARCHAEOLOGY IN ARGENTINA: GENERAL TRENDS AND SOME PROSPECTS FOR THE FUTURE

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**ABSTRACT.** During the last 30 years archaeofaunal studies have gradually occupied a prevalent role in Argentine archaeology. This marks a contrast with the previous history of the discipline that shows prolonged gaps although its origin dates from the end of the XIX century. The main factors that have triggered and strengthened the recent growth of zooarchaeology have been the feedback between specialists of the natural sciences and those of the social sciences and humanities, the ongoing change in paradigm in Archaeology that was initiated during the late 70's and the supportive interaction with foreign colleagues.

However, while this transformation has been positive it is necessary to evaluate the recent advances in the different subject areas from a more global perspective. This is particularly important if we wish to contribute with new ideas as well as data to this already established worldwide field of inquiry.

Finally, this brief review will focus on some theoretical and methodological issues that are related with the development of the archaeozoological studies in this country, as well as with current tendencies, taking into account our present knowledge and needs.

**Key words.** History, research stages, animals studies, Argentina.

**RESUMEN.** Durante los últimos 30 años los estudios arqueofaunísticos han ocupado de manera gradual un lugar prevalente en la arqueología de la Argentina. Esto marca un contraste con la historia previa de la especialidad que, aunque es posible rastrear su origen a fines del siglo XIX, muestra algunos prolongados vacíos. Varios factores han disparado y fortalecido el crecimiento reciente: la retroalimentación entre los especialistas de las ciencias naturales y aquéllos de las ciencias sociales y humanidades, el aún en curso cambio de paradigma de la arqueología cuyo inicio data de fines de los 70 y el demostrado apoyo de los colegas extranjeros.

Sin embargo, si bien esta transformación ha sido positiva es necesario evaluar los avances recientes en las diferentes temáticas cubiertas desde una perspectiva más global. Esto es particularmente importante si nuestro deseo es aportar tanto nuevas ideas como datos a un campo del conocimiento ya establecido en escala mundial.

Por lo tanto, esta apretada mirada se centrará en algunos de los aspectos teóricos y metodológicos que se relacionan con el desarrollo de los estudios arqueofaunísticos en nuestro país y con las tendencias vigentes, considerando tanto nuestro conocimiento actual como nuestras necesidades.

**Palabras clave.** Historia, etapas de la investigación, animales estudiados, Argentina.

### A brief history<sup>1</sup>

It was by the end of the XIX century that animal bones associated with archaeological remains started to occupy the attention of local natural scientists in Argentina (figure 1). A central figure at this time was Florentino Ameghino (1854–1911). His celebrated book “*La antigüedad del hombre en el Plata*” (1880) summarized most of the evidence recovered at several Pampean localities sustaining his innovative ideas concerning the antiquity of humans in this region. These were certainly challenging at the time, although they were going to be severely criticized in the following decades.

The discovery of unexpectedly well preserved organic remains of some extinct species at Mylodon Cave (Last Hope Inlet, Chile) contributed with new evidence supporting the coexistence and interaction of extinct mammals and humans at these southern latitudes. Several scientists from the recently founded Museo de La Plata (officially opened to the public in 1888), fulfilled leading roles in the study of these important collections (e. g. several articles by Robert Lehmann-Nistche; see Mengoni Goñalons 2007, for full references).

These famous findings and novel ideas were going to be overshadowed by the negative reaction to the evolutionism of the beginning of the XX century. This reaction lasted several decades and was characterized by an absolute lack of concern for temporality. Historicism and diffusionism became the dominant paradigms in Argentina. By 1930 the Culture-Historical school of thought was established in our country and promptly became the hegemonic paradigm (Politis 2003). Under these general circumstances, the study of animal bones had no place in archaeology and therefore, with only a few exceptions became meaningless (Mengoni Goñalons 2007).

Fortunately, the 70's were witness to an important change both in attitude and perspective. Some palaeontologists began to collaborate closely with archaeologists, and animal bone collections were again considered an important source of information. This feedback was fundamental because it prompted several young graduate archaeology students to begin analysing archaeofaunal materials but from an anthropological perspective. As a consequence, the beginning of Zooarchaeology in Argentina can be considered, with absolute certainty, as dating from the second part of the 70's.

1. As the space of this article is limited, the emphasis has been more on the present situation and, therefore, complements a recent paper with a more detailed account of the history of archaeofaunal studies in Argentina (Mengoni Goñalons 2007). Those wishing to learn about the specific literature produced on any particular subject in any period may find more detailed references in that paper.

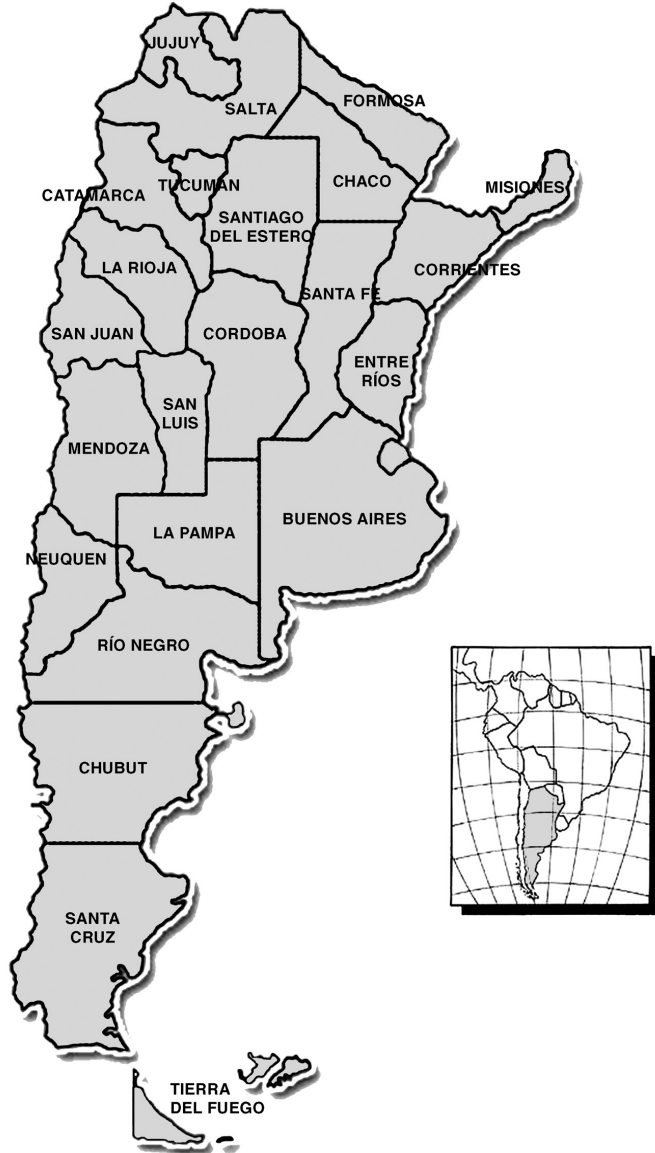


Figure 1.

During the 80's, zooarchaeological studies gradually began to consolidate grounded on an evident change in paradigm from a Culture-Historical approach to a processual perspective. During this decade there were several research issues, and among them methodological issues were considered of primary importance. Identification and quantification standards, as well as criteria for studying bone fracturing and surface modifications, are some examples. Low magnification and high resolution (SEM) studies were developed showing their complementary character. Actualistic studies were also initiated, particularly economic anatomy studies, a line of research that would grow significantly in the next decade. The first doctoral

dissertations that made ample use of faunal information, or were centred on them, also date from this decade.

Some of the aforementioned papers appeared in a special volume collecting presentations made at the first seminar on faunal analysis organized in our country in 1988 by the Universidad de Buenos Aires, in which colleagues from the Universidad de La Plata participated (see Mengoni Goñalons 2007, for details of the different authors and contributions).

Also at this time, a major concern for conducting taphonomic studies was recognized. It was understood that it was fundamental in documenting the variety of agents and the complexity of the processes that may generally contribute to the accumulation and modification of bone deposits. In this sense, a taphonomic approach provided the conceptual framework for evaluating the integrity and comparability between assemblages. These general considerations triggered most of the research undertaken during the succeeding decade.

In addition to the subjects already mentioned, case studies and the first regional syntheses for the Pampas and Patagonia were produced based on the available contemporary data, each emphasizing different aspects of the archaeology of these major areas. In parallel, zooarchaeological studies were also initiated in Central-West (or Cuyo) and Northwest Argentina. The latter region would grow substantially during the 90's while the former grew notably during the last ten years.

During the 80's we also started to actively participate in international meetings. This turned out to be a very stimulating and encouraging experience for many of us, although, in the long term, this participation was rather erratically sustained.

By the 90's Zooarchaeology was an already established field of inquiry. This decade was characterized by an exponential growth of the discipline. This significant growth is coincident with the appearance of a new generation of analysts who graduated during this period. In parallel, several postgraduate (master and doctoral) dissertations dealing with zooarchaeology and taphonomy were completed during this period.

During the 90's several colleagues participated in predoctoral and doctoral fellowship programs abroad that, in some cases, lead to the development of joint research projects. Exchange and cooperation with foreign colleagues and institutions was definitely of great importance in the growth of our discipline.

The output of publications increased considerably, both in number and subject coverage. Study problems were

diverse in theme and focus. The first edited volumes entirely dedicated to faunal issues were produced during this decade (Elkin *et al.* 1994, 1996; Lanata 1993).

In this decade methodological aspects were also an important issue. Bone modification studies were expanded at the same pace as methodological developments worldwide, particularly in the documenting, recording and analysis of different bone modification agents and processes. Actualistic studies grew significantly. Experimentation with bone fracturing and cooking techniques, economic anatomy and densitometry studies for camelids were undertaken and applied to the analysis of bone assemblages. Ethnoarchaeological studies focusing on animal utilization, among other relevant subjects, were also initiated in NW Argentina and in the tropical forest of Colombia. Taphonomic studies also grew considerably in different environmental settings ranging from the Puna down to Tierra del Fuego. Diagenetic research was also initiated.

Zooarchaeological research in the Pampas and Patagonia provided a vast body of knowledge about the groups that lived in the hinterland and coastal areas. Most of these studies were devoted to subsistence issues that benefited greatly from a renovated perspective using new general models, frames of reference, and more elaborated ways of analyzing and interpreting data. Also in the Cuyo region zooarchaeological studies were continued with analyses at the local scale.

Faunal analyses in NW Argentina also accompanied the overall trend in significant expansion during this decade. Publications covered the different periods of human occupation of the region, dealing with Holocene hunter-gatherers, early pastoralist and farmers and also with more complex societies including the Inkas. One subject that ceaselessly drew attention was the development of camelid utilization along time and the timing of the appearance of domesticated forms.

In 1995, the Working Group *Zoarqueología de Camélidos* (GZC) was officially recognized by ICAZ. The workshops we were able to organize over the years, were an excellent experience, both from the social and scientific point of view. As a result several books were published (Elkin *et al.* 1994, 1996). At the same time, we also learned that maintaining the cohesion of a working group is not that easy, even when the subject studied is central for many of the contributing members. Editing and publishing is not a minor effort, especially when it is based on scanty funds afflicted by the ups and downs of our local economy. However, the group has survived and hopefully this meeting marks the reaffirmation of the founding ideas that were originally the basis for its creation.



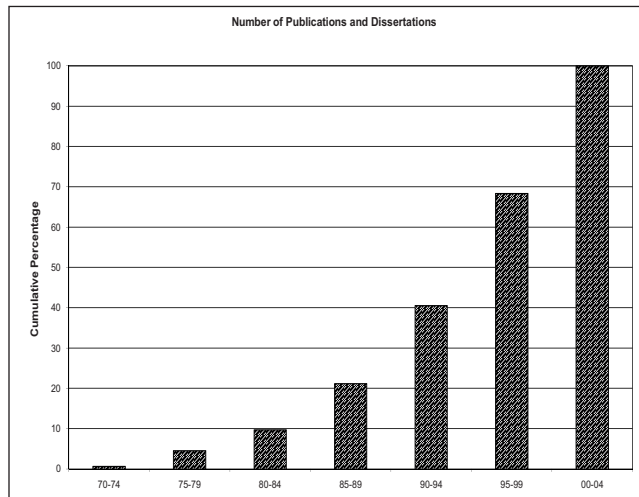


Figure 2. Number of publications and dissertations (1970-2004).

### Scientific production in perspective

Now that we are entering the second half of this new decade it is interesting to look back and see where we are currently positioned. The overall balance is certainly positive.

Several measures can be used to evaluate the development and progressive interest in the study of archaeofaunal remains in our country. A simple one is to see whether the number of articles has steadily grown. The following figure (figure 2) illustrates the general trend. The bibliographical data base (ca. 500 titles) includes all the articles that have appeared either in journals, book chapters, as books, or meeting proceedings. Additionally, it includes both graduate and doctoral dissertations defended locally and abroad on zooarchaeological issues that concern our country.

It is important to state that nearly half (50%) of the whole production is concentrated in the 90's, while around a third (30%) of the overall production corresponds to the recent period 2000-2004. This gradual growth is coincident with a progressive increase in the number of researchers.

During the present decade there has been a remarkable increase in the number of contributions to international journals, as well as the amount of book chapters and even edited books published abroad. This indicates a progressive interest in reaching out to a wider audience and a gradually more assertive level of participation on a global scale. At the same time publishing in local or national journals has remained a constant as it is something essential for interacting with our own research community.

The number of graduate and postgraduate (doctoral) dissertations has also increased. Many of those who graduated during the 90's have already obtained their

doctorates during these last years while others are well on their way to completing this important milestone in their academic career. This is certainly a good signal in a country where traditionally humanities and social scientists obtained their doctorates at a much later stage in their formation compared with graduates from the natural sciences. Switching from one system to the other has not been simple but the tendency now is to obtain this degree when still a young graduate.

### Other research and academic activities

It is my belief that the role of ICAZ has been vital in the whole process. At the meetings held during the 80's our participation was minimal, although significant compared to the total absence of native colleagues from other South American countries. Definitely, Washington D.C. in 1990 marked a turning point as several co-nationals were not only able to attend the meeting but also the workshops hosted by the Smithsonian Institution. This was a great opportunity to personally meet other colleagues from Latin American countries, such as, Mexico, Panama, Ecuador, and Peru.

The Konstance 1994 and Victoria 1998 meetings also counted with Argentine participants. And it was paradoxical that while still reeling from the devastating economic crisis that struck our country at the end of 2001, several Argentines were able to attend the conference at Durham 2002, due to the generous financial support from the organizers. Once again, we were, surprisingly, the most represented country of South America, and this time had the chance of reuniting with colleagues from Brazil, Chile, Peru, Panama, and Mexico. An important outcome of this meeting was the creation of the Ibero-American Network of Archaeozoology (RIA, [www.rediris.es/list/info/riarqzoo.es.html](http://www.rediris.es/list/info/riarqzoo.es.html)) whose aim is to promote integration and exchange on issues of common interest to those working in the Ibero-American region.

### Research agendas: themes investigated during the last years

Methodological issues have been a major concern since the very onset. This was an essential step and necessary for the development of archaeofaunal studies in our country. Great efforts have been made to keep pace with the discussions on methods of quantification or on techniques for documenting and interpreting bone modifications.

But each research problem requires a conscientious evaluation of the most appropriate tools for answering the questions we have in mind. There is no denying that

standardization of methods is an important step, yet is always necessary to choose among the many current options. Thus, I do not hesitate to state it is fundamental to define our units and scales of observation and analysis in order to determine the procedures that best fit our case studies. It is possible to illustrate these aspects with several examples, based on the progress achieved during the study of different groups of animals.

*Extinct and modern fauna: A short overview*

Interpretation of the role of Pleistocene megafauna in human diet has changed over the years. This has been concordant with the nature of the evidence available at the time. During the last three decades new megafaunal finds have been made, which in some cases have been directly dated. When possible this has been complemented with more precise criteria for establishing the nature of the association with cultural remains together with a more detailed analysis of the modification traces commonly used to show that bones, artefacts and features are in an interactive context.

At the same time, the late Pleistocene record shows an interesting variability that allows us to have a clearer comprehension of the subject. There are several challenging scenarios. For example, some localities only show the presence of extinct fauna without any association to human artefacts. In several of these same sites, the earliest human occupations are only associated with modern fauna and, therefore, would postdate the probable extinction of the megafauna in that same area. Yet, in other sites the contemporaneity and association of megafauna and humans is clear. However, an interactive context is certain for just few species and this specific relationship cannot be extended to the rest of the megafaunal spectrum defined either as associated, based on depositional criteria, or as contemporary, based on purely stratigraphic criteria.

These particular sites have changed our ideas about the significance of extinct fauna for early hunters. At least some species, for example the native horse in Patagonia or some glyptodonts in the Pampas, are now considered to have been a more important resource for human subsistence (Alberdi *et al.* 2001; Politis and Gutiérrez 1998) than previously thought. In the case of the native horse the evidence is in agreement with that from Chile.

Another related aspect, is evaluating the role of humans in the extinction of the Pleistocene fauna. The subject is still under debate, especially if we bear in mind that eventual extinctions of the different mega and mesofaunal species took place over several millennia. Additionally, we have to

consider the dissimilar timing of these events along the Andes (e. g. Patagonia) and the Pampas (Borrero 1997; Politis and Gutiérrez 1998).

This leads us to consider that additional contexts with high resolution, well controlled direct dating of bone remains and more detailed analyses of the spatial structure of the deposits that encapsulate the occupations are certainly needed before we can obtain a more precise answer to these issues. In the meantime, the balance between our present knowledge and ignorance is what makes this particular subject so fascinating, as with so many others in Zooarchaeology.

South American Camelids (SAC) have received great attention from the very start of Zooarchaeology in our country. This is related to the central role this group of ungulates has had all along our Andes from the Puna to Tierra del Fuego, and also across the Pampas and the Central Highlands of Argentina. For more than 10,000 years SAC have been of an extreme importance for hunters-gatherers, pastoralists and farmers from an economic, social and symbolic point of view.

The zooarchaeological record has shown that in precolonial times wild and domesticated camelids were more widely distributed. Their present distribution is now restricted to some particular areas of our territory. Even in the wilderness of Patagonia, guanaco herds are now less abundant than they were as reported in early historic accounts. Therefore, it is reasonable to suppose that their present status differs greatly from that of the remote past. Something similar may be assumed for the vicuña, now restricted to discrete areas of the highlands of northwestern and western Argentina. The zooarchaeological and paleontological record of Patagonia and the Pampas has also shown that at the end of the Pleistocene there existed some forms of now extinct camelids with no present counterparts (Martínez and Gutiérrez 2004; Miotti and Salemme 2005). This indicates the existence of a greater richness of camelid forms probably concomitant with the particular climatic conditions that characterized the end of the Pleistocene.

During all these years our knowledge about the interaction between camelids and human society both in the past and present has grown significantly (Mengoni Goñalons *et al.* 2001). It is important to highlight that in a great amount of archaeological assemblages they appear as the dominant species (De Nigris and Catá 2005; Fernández 2001; L'Heureux 2003; Madero 2004; Martínez and Gutiérrez 2004; Mengoni Goñalons 1999; Mengoni Goñalons y Yacobaccio 2006; Miotti 1998; Miotti and Salemme 1999;



Muñoz 2001; Neme and Gil 2002; Yacobaccio 2001), even in contexts where other ungulates or animals are also present (De Nigris 2004a; Muñoz 2004a).

Camelids were the only large herd mammals that were domesticated in the Americas; therefore, the appearance of domesticated forms has been one of the research objectives of the zooarchaeological research since the 80's. As a result, the evidence produced in NW Argentina has contributed gradually to the understanding of the overall domestication process (Olivera 1997; Yacobaccio 2001; Yacobaccio *et al.* 1997-8). And more recently, based on all this data and that from other sites of the South-Central Andes, it has been possible to offer a different perspective to the continental level discussion as to whether one or several centers of origin of domestication existed in the Andes, and as well as to the timing of the first domesticated forms (Mengoni Goñalons and Yacobaccio, 2006).

Several research lines have been developed, mainly centered on osteological issues. Recent osteological studies have concentrated on fusion stages for constructing age profiles (Kaufmann 2004). Osteometric studies have provided with new standards for discussing size changes along time in wild and domestic forms (Mengoni Goñalons and Yacobaccio 2006) or allowed us to explore the morphometric evolution of a particular wild species (L'Heureux 2005). Fiber research also provided with an independent marker (Reigadas 20002), although more research on this issue needs to be made.

As a consequence of the general relevance of these animals, a lot of work has been devoted to their taphonomy, diagenesis, and densitometry (Borrero 2001; Elkin 1995; Gutiérrez 2001; Kaufmann and Gutiérrez 2004; Rindel and Belardi 2006; Savanti *et al.* 2005). They are also the group of South America animals on which more studies on economic anatomy have been developed (De Nigris and Mengoni Goñalons 2005; Mengoni Goñalons 2001; Olivera 2001).

It interesting to note that the information produced by zooarchaeologists has regularly been used by natural scientists who also study SAC when in need of giving temporal depth to their viewpoints. And definitely all the literature produced from a biological perspective has been many occasions both archaeologists and biologists have worked in cooperation or in a collaborative way and even published jointly.

All these recent studies need to be continued and expanded. Their significance surpasses the limits of our country, and at this stage it is important to consolidate the ties with other foreign colleagues who are also interested in these animals. In this sense, the role of the GZC is an

important venue for enhancing the exchange of information and international cooperation.

Although there are several species of deer in Argentina it is rather recently that we have started to learn about their zooarchaeology. Those species from which we have more information are the pampas deer (*Ozotoceros bezoarticus*), the marsh deer (*Blastocerus dicotomus*) (Loponte and Acosta 2004; Martínez and Gutiérrez 2004) and the huemul del sur (*Hippocamelus bisulcus*) (De Nigris 2004b). We also know that the huemul del norte (*Hippocamelus antisensis*) was hunted in NW Argentina both by Archaic hunter-gatherers but also during Late Period and Inka times (Madero 2004). Therefore, more studies need to be conducted to assess the importance of particular genera (e. g. *Mazama*) in certain areas and the general role of these ungulates.

Rodents are a general category that encompasses a wide number of species ranging in size from the capybara (*Hydrochoeris hydrochoeris*), the largest rodent in the world, to a host of small field mice. Rodents have long been recognized as paleoenvironmental markers, yet several species had made a significant economic contribution during pre-colonial times (Acosta and Pafundi 2005; González de Bonaveri 1997; Santiago 2004). Several of these same species have had a great importance as a staple for past and present rural communities. Nowadays, some species have an important commercial value for their fur, as the chinchilla (*Chinchilla laniger*), and there are ongoing government programmes for their sustainable management and use. Some examples are the capybara (*Hydrochoeris hydrochoeris*) and the coypu (*Myocastor coypus*) (Bolkovic and Ramadori 2006).

In order to take full advantage of the information that rodents may provide, we still need to move forward on several issues. We need good reference collections that include cranial and postcranial material and that need to be readily accessible to researchers. The great richness of rodents puts limits on possessing complete reference materials for all the relevant species at the different research centers. Some kind of network should be developed, perhaps through the web, to guarantee the contact between researchers interested in this reference material. A necessary development should also be comparative osteological identification keys. Collections and keys are complementary, as they are essential tools for aiding the study of the usually disarticulated and broken bones that characterize archaeofaunal assemblages. We also need more consensus on the criteria for differentiating natural from cultural deposits. The taphonomy of owl pellets, that generally includes rodent bones and other microvertebrates, is certainly important (Gómez 2005),

but, for example, practically no literature exists on some large rodents from an ethnoarchaeological point of view, stressing their social and ritual significance beyond their economic importance. This is an information gap we need to fill in the near future.

Some carnivores such as foxes and puma have received considerable attention (Mameli and Estévez 1999–2001; Martín and Borrero 1997; Mondini 2002, 2005) as they are considered an important taphonomic agent. They can generate bone accumulations or modify previous ones, by addition or subtraction of bone specimens, besides being also predators and potential competitors with humans. Yet, hardly anything has been written about the role of dogs, a domesticated species we know was present during pre-colonial times in several areas of our country. Experimentation and control samples are needed to establish whether there is a clear difference between their tooth marks and those produced by wild terrestrial carnivores.

Pinnipeds and cetaceans are another group of mammals that have been widely studied from a zooarchaeological and taphonomic perspective (Borella 2004; Borrero 2004; Muñoz 2004b; Schiavini 1993). But, for example, we need to expand our zooarchaeological knowledge by considering sex identification, especially for certain species that have a marked sexual dimorphism. We know this may ultimately entail different behavioural constraints and, therefore, may potentially involve adjusting procurement tactics and economic expectations of those who exploited them regularly or occasionally. Also studies on different aspects of their economic anatomy would be useful.

The literature on birds has grown considerably during the last years from a taphonomic and zooarchaeological perspective (Belardi 1999; Cruz 2001, 2005; Mameli and Estévez 2004). Densitometry (Cruz and Elkin 2003; Fernández *et al.* 2001) and economic anatomy studies (Giardina 2006) have been carried out on rheids, a bird group that has had great importance all along the Andes and the eastern grasslands and the Patagonian steppe of Argentina.

Although fish studies were initiated some time ago, it has been rather recently that they began to be studied more thoroughly (Acosta and Musali 2002; Campán and Manzi 2000; Zangrando 2003). This is a promising line of research that will allow us to establish the role of marine fish in coastal occupations and that of fresh water species (González de Bonaveri *et al.* 2003) in the hinterland of Argentina, but also to explore other subjects, such as the relationship with economic, social and ceremonial practices (Fiore and Zangrando 2006).

Reptile remains have also been analyzed from a zooarchaeological perspective, showing their role as an importance resource during rather recent times in certain areas of the Pampas (Quintana *et al.* 2002). Their taphonomy has also been considered (Kligmann *et al.* 1999). These studies are certainly promising and interesting. It is important also to recall that these vertebrates (e. g. lizards) appear prominently as motifs in decorated pottery and in the rock art in different areas of Argentina.

Molluscs and other invertebrates have also been studied. This is a research subject that was initiated during the early 80's (see Mengoni Goñalons 2007, for some early references) and, after an inexplicable lapse, have fortunately recently restarted (Orquera and Piana 2000, 2001; Zubimendi *et al.* 2005) since shell middens are conspicuous and important in some sectors of our Atlantic coast. Also freshwater molluscs need attention, especially in the low wetlands of our country.

Bone, as a material for making tools, is also a subject that has been investigated (Scheinsohn and Ferretti 1995). This research line needs to be expanded and more studies are needed in other contexts besides those from the marine coast. One area that is lacking these kind of studies is NW Argentina where bone material has been commonly used to make different classes of artefacts and goods.

### Some prospects for the future

Although the aspects I have briefly outlined are extremely positive and encouraging, it is important to evaluate our contribution to the discipline by adopting a wider global perspective.

A lot of energy has been devoted to subsistence studies and related topics. To follow the general pace of our discipline we need to progress in exploring other attractive subjects that deal with social, political and symbolic issues. It is my ultimate belief that we need to be more open minded and curious if we want to be creative, innovative and productive at the same time by exploring new approaches and research subjects.

Formation process studies at different temporal and spatial scales are also a continued necessity. Therefore, a closer integration between zooarchaeology and taphonomy is urgently needed. By integration, I mean applying actualistic information to the analysis of archaeozoological case studies, thereby contributing to the discussion of archaeological research problems. Taphonomic issues, standards in collection retrieval, analysis and curation are concerns that must be incorporated from the very start in all research designs that may potentially involve animal bones and other tissues.

Systematic experimentation on certain matters is still pending. This gap could best be remedied by means of joint collaborative projects (e. g. Working Groups).

Doing zooarchaeology involves a learning process. Consequently, all the knowledge we have gained during all these years is surely the best indication of where our future is leading us. Being certain of what we have learnt is definitely important because it alerts us to our potential areas of ignorance. What we need to avoid at all costs is to remain oblivious of our deficiencies.

The years to come are challenging, results might be uncertain, but it is my feeling that, in order to advance, working in cooperation will be fundamental. Mutual support and assistance between foreign and local researchers should be established by means of different mechanisms. One approach would be to expand our local training programmes by hosting foreign students or teachers, whenever possible, thus favouring exchange and integration.

We all know that in some sense, bones will always remain as a puzzle. And, in the long run, their study needs the concerted effort of all those who are fully compromised with learning about the interaction between humans and animals.

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