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Change in the Andes: Origins of Social Complexity, Pastoralism and Agriculture

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TOWARDS FOOD PRODUCTION AT INCA CUEVA

Lidia Clara GARCÍA

Résumé

*Dans cette recherche, on a travaillé dans une micro-région centrée a la faille d'Inca C*ueva *où nous avons cherché les précoces occupations humaines formatives, étudiées en tant que developpement à partir de l'étape de chasse-récolte. Celle-là, pendant ses derniers moments (cave 7, cave 4) a montré des niveaux d'élaboration complexes et sophistiqués, et, en plus, une liaison avec la forêt à l'est et la mer Pacifique à l'ouest. En même temps, on a proposé l'integration des occupations formatives des caves et des abris-sous-roches avec les sites en plein air dans la zone de Alto Sapagua et Hornaditas où la population se serait apparemment concentreée. Cette unité-espace d'analyse est située dans le departement d'Humahuaca, province de Jujuy, région du Nord-ouest argentine. La période considerée comprend dès 3000 a.p., moment où quelques changements de l'environnement précedants finirent et des conditions semblables à celles d'aujourd'hui se sont établies jusqu'à 1000 a.p., où les evidences montrent que ce procès est vrai, du moment où la population se concentre autour les sites, accompagné d'une pratique agricole de plus en plus intense de même que la continuation de la chasse et de la récolte.*

Abstract

In this investigation, we worked microrregionally, considering the Inca Cueva gorge as its center, where we searched for the early ceramic occupations studied as a development of the hunter - gatherer way of life. The same, in its latest moments (Icc7, Icc4), showed complex and sophisticated characteristics and links of its occupants with the forests and pacific coast areas. Also, the integration of the Formative levels at this gorge's caves and rock shelters with open air sites at Alto Sapagua and Hornaditas were proposed, towards where the population presumably concentrated increasingly along the process from an Initial Lower Formative Period to a Higher one. This analytical spatial unit is placed at the Humahuaca Department, Jujuy Province, North West Argentina. The period considered goes from 3,000 b.p., moment in which former environmental changes ceased and conditions similar to nowadays' were established, upto 1,000 b.p., when small fluctuations at a continental level are tentatively correlated with intensification in agricultural practices, combined within this microrregion with herding, as well as hunting and gathering, which continued.

INTRODUCTION

This paper reports results of an investigation regarding the Formative period at the South-Central Andes, specially at the Humahuaca Department, Jujuy Province, NW Argentina. The general project in which it was included had as a final aim the study of hunter-gatherers adaptations and their transition or replacement by cattle economies based on the domestication of camelids (llamas and alpacas). The understanding of this change was considered as crucial for the study of the cultural process of North West Argentina, as it would constitute the basis of sedentariness at the Puna and its oriental border. Rock art was an indicator to select the sites to be tested after previous research on superpositions and stylistic comparisons. In these studies, relationships were suggested with Doncellas area for the stylistic grup "B", supposedly associated with the early Formative occupations, as well as with the Chinchorro tradition at Camarones 15, Arica, dated towards 3,000 b.p., basically according to the complex cephalic ornaments with feathers of the mummies (Aschero 1979). Many of the ideas here developed were afterwards validated with more evidence, datings, experimentations, laboratory determinations, and a greater precision regarding the characterization of that transition moment.

We decided then to study the formative occupations at the oriental Puna and its border, Jujuy Province, in order to analyze the interrelation between complex- village sites with occupations at caves and rock shelters, the human mobility and the use people made in each case of environment. We also had the purpose of integrating this development moment within a cultural sequence in order to discuss possible reasons and consequences for the changes produced through time. We had the aim also to redefine the Formative as a Pediod at the study area. And to found it as a moment placed within the lapse that goes from 3,000 to 1,000 b.p., in which a system of food production appears and grows firm, and a related settlement pattern develops, with regional variations (herding/agriculture). New technologies appear that did not exist formerly, as ceramics.

THE ENVIRONMENT AND ITS RESOURCES

The environment is typical of the Puna region, defined on the basis of vegetables, fauna, climate and meters above sea level (Ruthsatz & Movia 1975). Altitudes go from 4,170 m.a.s.l. at Tomayoc, 3,700 m.a.s.l. average at Inca Cueva, 3,500 m.a.s.l. at Alto Sapagua, up to 3,300 m.a.s.l. at Hornaditas. This microrregion has several strata with different resources. The vegetation map produced by Ruthsatz & Movia *op cit* show at Azul Pampa the following phytogeographic provinces, represented in decreasing order of importance: Province of Puna, including various types of vegetation, Altoandina, including also patches with different characteristics, and Prepuna. At El Aguilar, we find Altoandina, Puna. After Yacobaccio (1990), based on Ruthsatz & Movia (1975), and considering statistics of the National Service of Metereology, the Puna is not an homogeneous ambience. And even though three environment complexes can be distinguished from a phisiographic and climatic point ov view, these are highly variable regarding the number of microenvironments they include, showing topographic, climatic and soils composition different conditions which influence directly the use that man has made and does of them. Vegetables at the Inca Cueva gorge show a total of 49 species, from shich 39,5% can be used by man. According to this author, rains at the Puna fall in summer, but their annual variation is high. There can be differences between 39% and 51% during one same year at different places and they can vary up to a 60% from year to year. Taking, as an example, rain records registered during 64 years at the northwest area of Jujuy Puna, we have an average of 314.3 mm. per year. Within that period, there were nevertheless 22 years (34,9%) that had different kinds of drought. Inca Cueva Gorge, within his Particular Model, is considered as a Nourishing items concentration zone. This kind of zones:

"are restricted areas in relation with the regional space, and do not provide the total necessary resources to their inhabitants; so, they are not used or colonized continuously, so that (...hunter-gatherers...) exploit several nourishing items concentration zones placed unequally at the regional space. Each nourishing items concentration zone, as a definition, is not a 'closed' area regarding social interaction networks" (Yacobaccio *op cit*, P. 23-25, our translation).

During our ethnoarchaeological work at the place, we made a detailed account of vegetables used at the Azul Pampa microrregion, from the Alto Sapagua site. Most of the species used nowadays come from Inca Cueva and are practically coincident with those that Yacobaccio mentions, as we will consider again in Concluding remarks. This characterization for the Inca Cueva gorge can be made extensive to the kind of use it may have had since *ca* 3,000 b.p. by initial herders/hunters/limited agriculturalists that occupied the territory.

As regards Tomayoc climate, rain registers taken at the place give an average of 394,79 mm. per year, occurring between october and april. Rain report for El Molino shows a great variability from one year to another at this locality within El Aguilar, and also comparing with the data before mentioned. The information is different, even though each case can be evaluated as a microenvironment in itself, of high *risk*, unpredictable.

THE PROBLEM OF PALEOCLIMATE

According to local paleoclimatic studies, made at Sierra del Aguilar, this environment has not changed for the last 4,000 years. At that moment, plants settled locally within the transition High Andes-Puna, around the modern level, suggesting the nowadays environmental regime. Even though since around 2,000 years, and specially as from 500 years ago, overexploitation could explain the decrease of certain plant species, as this has been registered in historical analysis of human impact on semi-arid environments (Markgraf 1985). The author gives three environmental phases: Between 10,000 and 7,500 b.p., climate would have been wetter and colder in comparisaon with nowadays one, with a higher rainfall in autumn. Between 7,500 and 4,000 years b.p., less rain than today, and more fires frequency, and finally the stage mentioned initially. According to another analysis made at Inca Cueva (Lupo 1993 m.s.), present conditions would have been established locally towards the 5,200 years b.p., and human impact on the environment is registered since 2,700 years b.p. Nevertheless, it is necessary to appraise, relate and enlargen this information.

Results obtained at NW Mendoza, Argentina by Markgraf, are different, for example. Markgraf and D'Antoni consider in that paper that it is necessary to make a pollinic atlas of Argentine flora and studies of pollinic rain and present plants at our country, before making local paleoclimatic studies (Bárcena 1982:65-81).

The work made by Lupo, considering surface samples as reflecting nowadays pollinic rain at soils and including the studies of Inca Cueva cave 4 archaeological levels, is coincident with Markgraf's scheme for El Aguilar regarding more humidity and cold 10,000 years ago. Her paleoclimatic interpretation says that within 10,600 and 9,600 b.p. we had a humid environment, with winds from the SE, cold up to 8,000 - 7,000 b.p.;5,200 years before, a drier or subhumid pediod is registered. With conditions similar to those held nowadays. And since 2,700 years up to the present, more puna steppe species and evidences of human impact on environment. As a result, at Icc4, as from the cross section and surface, conclusions are: During the holocene, conditions similar to nowadays. More humidity towards 10,000 - 9,000 b.p. and more arid towards 5,000 b.p. up to the present. During the whole sequence there are little puna steppe

vegetables and richness of types that would indicate low temperatures. This implies that the dates do not agree with Markgraf's sequence, and humidity signalled below present levels by her between 7,500 and 4,000 b.p. are not shown. So, differences between Markgraf and Lupo are important for our specific subject. We should have to see if this has to do with methodology, as Markgraf compares with present distribution of plants, and Lupo studies surface and cross section samples, considering that the first reflect pollinic rain and the second the environment at that moment. Being an archaeological site, we have the bias caused by what its occupants brought there. Lupo calculates also some dates according to an estimated deposition rate. There can also be real differences between the processes at El Aguilar and Inca Cueva. Dates can differ according to the samples, but pollinic rain studies have not really been made in neither of these cases, that would have implied the installation of measurement instruments.

Lupo says that Graf (1992), with data from León Huasi and Huachichocana III predicts between 8,000 and 10,000 b.p. a uniform steppe opposite to the present climate, hotter and more humid. Lupo says that the paleoclimatic scheme she made coincides with that of Graf. This is not so. Markgraf, in ther work of 1992 also says her studies and those of Graf are coincident. But this is opposite to the scheme she settles for Aguilar as can be seen. In effect, they are contrary processes. I have controlled this appreciation with Dr. H. Yacobaccio, who agreed.

For the evaluation of the uniformitarian principle, what is important for the period under study is that there have been no local basic environmental changes since 5,000 or 4,000 years before. But, after Markgraf, the change was 4,000 years ago towards more humidity and according to Lupo 5,000 years ago towards more dryness. Both coincide in the human impact *ca* 2,000 b.p. (Markgraf) or 2,700 b.p. (Lupo). In this last case, we consider that if the date existed, it would be very important for this investigation for what it reports not regarding environment but on early herders at Inca Cueva. Processes signalled by Lupo and Markgraf are given at a world level. It is probable that Aguilar and Inca Cueva, that are differente microenvironments, have reflected in a different way the general changes.

The above expressed is valid to consider the local studies as more useful than general reconstructions made e.g. for all the Northwest region. The real rainfall registers (as expressed above) show a very arid zone, which is not coincident with what is established in them. Those interpretaions are very general, hypothetic and based on analysis of sediments instead of pollen.

Graf (1992) makes his own model, and afterwards, with the pollen data (that is only one indicator, as geoshapes and other indicators should be considered) compares with his model's data. So, this methodology is contrary to that applied by the other authors (Lupo, Markgraf, D'Antoni), as they take the samples and afterwards compare with the present pollen rain, or what they consider so, gathering surface samples. And sometimes they do not even compare with that but with another register like that of Ruthsatz & Movia 1975.

At a <u>macrorregional level</u>, that is within the South Central Andes, pluridiscipline environmental reconstructions like the one made at Atacama Desert in which processes in the water balance have been reconstructed are the most interesting (Grosjean *et al* 1995:585-586). The humidity increase towards the 3,000 b.p. is synchronic (according to the authors) with the registers of 24°S and the Argentine Andes between 32-25°S according to Markgraf 1983 mentioned above for Mendoza province, that as has been said is nevertheless different to the Aguilar register. The authors consider that the "Archaeological Silence" registered between 8,500 and 4,800 b.p. started as a consequence of a dramatic decrease in resources due to arid climatic conditions. The drought peak would have taken place between 3,800 and 3,100 years b.p. and the generally dry conditions with accumulation of sediments continued up to that date as of which the modern climate was established. Needless to say the importance of these recent studies for the subject we are studying, as the dates obtained in our investigation indicate the beginning of the Formative at 3,000 b.p. at Inca Cueva and Tomayoc, which are located in the meridian of the 23 to 24° S in the same line as Susques and San Pedro de Atacama. If the difference is confirmed in the environmental changes at each side of the Andes, that can be marking the contrasts between those systems in co-evolution as was argumented before. In relation with rains in the more arid desert of the world (Atacama), recent controls through instruments registers and stories told for the last two centuries indicate that there is no relation with the El Niño phenomena and that instead, the rain that fell in the south of Peru, Bolivia and central Chile have had importance. As there is no data on rain fallen at the Atacama desert (Great North), there had not been reconstructions of this kind up to now. These studies suggest that the drought that characterizes the El Niño situation at the altiplano areas of south Peru, Bolivia and Chile, would be normally coincident with the rain at the Atacama Desert (Ortlieb 1995:519-537).

Another reconstruction of the rains regime taken from sedimentary registers at three regions of the tropical south of America (SE Amazonia, central Brasil and central Andes) since 7,000 years ago, indicates changes synchronic but sometimes inverse in plants register, being the El Niño events suggested as a cause. These situations were frequent between 5,000 and 4,000 years b.p. (before 5,000 b.p. there were no registers), did not take place between 4,000 and 3,600 as well as 2.800 - 2,500 b.p. and had little frequency after 2,800 - 2,500 years b.p. (Martin *et al* 1995:595 - 605).

Regarding the Andes glaciar lakes and climatic variability since the last glacial period, considering that reconstructions of the most recent processes sometimes obliterate the old ones, a drought is registered during the mid Holocene at the stratigraphy of various lakes, including the Titicaca. The levels of the lakes were going up, and there was neoglaciation at the higher Holocene after the drought phase in the middle Holocene, *ca* 7,250. The authors mention a date of 3,600 b.p., pointing out that an important part of the south base of the Titicaca lake could be dry up to the late Holocene. All this backs the idea that the middle Holocene was a relatively arid period, with little gracial activity.

> "It has been suggested that the drought restricted the development of high agriculture around lake Titicaca, which was important for the Tiwanaku Culture (com. Pers Binford)" (Seltzer *et al* 1995:539-547).

For the climatic and environmental reconstruction during the recent Holocene at the Tropical andes of Peru, studies have been made through the ice cap of the Huascarán col during the last 3,000 years and were compared with the register of 1,500 years of the Quelccaya ice cap. The study considered the insoluble dust, oxygen isotopic ratios considered as temperatures indicator and in one of the cases (Huascarán), nitrate concentrations which is indicative of vegetation fluctuations in the Amazon rainforest. For the last 3,000 years, a general descent of temperatures can be appreciated, accompanied by a descent of biologic activity at the amazonic basin, with minimal values during the Little Ice Age, 200 to 500 years b.p. Afterwards, there was an abrupt increase on rhw oxygen isotopic ratios upto the levels of 3,000 years ago. This abrupt heating extended during two centuries and included both sites. There is a little heating between 1,150 and 900 years b.p., possibly related to the "Medieval Optimum". The register of the Huascarán dust, the constant level during the last 3,000 years, is interrupted by a peak of high concentration between 2,000 and 1,800 years b.p., centered in 1,900 b.p. Smoother peaks can be observed since 1,400 to 1,600 b.p. and 1,300 to 1.030 b.p. This event implies materials accumulated by the winds, made by the same composition of the rocks that form the White Mountains (granodiorite). The most recent peaks are partially synchronic with the greater event, from 1,400 to 1,600 years b.p., discovered at the Quelccaya, which suggests that this event was broad. The most recent register of dust at Quelccaya, dated at 830 to 960 A.D., can be found in minor concentrations at the Huascarán ice caps, and could be an argument more to relate the principle of the dust production at the Quelccaya with the agriculture activities at the Titicaca basin in the Peru southern altiplano. The history of the Holocene temperatures, inferred as of the oxygen isotopic ratios shows that the hotter conditions through all the register occurred between 8,400 and 5,200 years b.p., following a large tendency, towards colder temperatures, that ends in the Little Ice Age, from 200 to 500 years b.p. (Thompson 1995:619-629).

THE IMPORTANCE OF THIS INFORMATION IN OUR CASE STUDY

For all the above expressed, we consider the local reconstructions of Makgraf and Lupo, but only at the level of a hypothetic model. Taking into account that the pollen analysis are not the only information source for paleoenvironment, the doubts mentioned, and considering that there is a lot of work to be done still. According to the present data, the establishment of the modern conditions at Inca Cueva is produced before than at El Aguilar, that is to say in a sequence we would have: Inca Cueva, Aguilar, San Pedro de Atacama. Also, the human impact that could indicate overexploitation for cattle herding, is observed since 2,700 years at Inca Cueva, and since 2,000 at Aguilar. All this, with the necessary precautions, brings us back to Inca Cueva as a center of great interest.

For the model, at a local level, the relevant information is that the period before that we study was dryer. At the Atacama desert, this drought was larger, but also announces the modern conditions. And according to the data for the Peru altiplano, it seems that there was an increasing cold temperature through the last 3,000 years. Environmental conditions previous to the considered temporal period in this study indicate that at a macrorregional level at the Atacama desert there was an extreme drought and little rainfall, with very intense but sporadic storms and a dramatic descent in the lakes' levels. Periodic droughts for the altiplanic areas of south Peru, Bolivia and Chile seem coincident with the occurrence of rains in the Atacama desert. The reconstruction of the rains regime made for the SE of Amazonia, central Brasil and central Andes indicates synchronical but sometimes inverse changes in vegetation. These periods of inversion in the sense of the coast transport, of several tenths duration, were frequent between 5,000 and 4,000 b.p., disappeared between 4,000 and 3,600 b.p. and 2,800 b.p. and were not frequent after 2,800-2,500 b.p. The study of the Andes graciar lakes indicates a drought during the middle Holocene registered at the stratigraphy of several lakes, including the Titicaca, towards 7,230 b.p. through 3,600 b.p., late Holocene.

This reinforces that the middle Holocene could have been a relatively arid period, with little glacial activity. This aridity could have restricted the development of high agriculture at zones as the surroundings of lake Titicaca. Following this reasoning line, the existence of a period of greater drought at the microrregion under study between 7,500 and 4,000 years b.p. (Aguilar) and 5,200 years ago (Inca Cueva) possibly represented a stimulus for the development of cattle raising (replacing as a basic resource hunting and gathering) as a mechanism of adaptation and change in this area of high risk and unpredictability.

The data on the ice caps of Quelccaya and Huascarán, Perú, coincide in signalling a heat peak towards the 3,000 b.p. These heat peaks could have been related with favoring agriculure, according to interpretations given to the existence of another peak around 1,150 to 900 years b.p. and that could be related with the agriculture activities at the Titicaca lake. The rest of the heating data marked at 1,900 b.p., 1,600 to 1,400 b.p., also interest us at a hypothetical level, as the temporal unit selected as analysis unit, includes this dates, always considering that at a microrregional level, changes may have had particular characteristics, as was mentioned before. The tendency towards colder temperatures observed up to the Little Ice Age signalled 500 to 200 years before, coincides with the signalling of possible cattle overexploitation in these regions.

THE MODEL

The environmental changes produced at the region before the period under study would have favored the change by hunter-gatherers towards a herding economy on the basis of which they could better control their resources. This in its turn started the change towards a sedentary way of life on a year basis. It also allowed an increase in population and its placing within the region under study at nourishing items concentration zones. The environment at that place offered ample vegetable resources that covered many of the basic needs. At that nourishing items concentration zone, hunting continued being a nourishing source. The increase of sedentariness in a year basis, the flow of human energy for the aggregation and population increase produced the appearance of new technologies, as ceramics, on the basis of which more elaborated food could be kept and prepared. Lithic technology also changed, varying proportionally the relationship between curated and expeditive technologies. Agriculture started to be experienced at a local level, and the population (basically extended family) started to produce different types of sites placed near agriculture and herding fields in which part of the greater social unit stayed during different periods in order to develop these activities, rotating their occupation along the year and also from year to year, according to the environmental changes. Parallell to this social organization at a local level, there was a flow of information and energy with very distant groups, in plein desert and forest on a regular basis, exchanging specific goods according to mutual needs. Along the time, these networks changed towards a more stable situation, crystallizing many times through marriage alliances in which the post-marital rules were also an adaptation strategy regarding the environment challenges and the need of resist its *stress*.The basic archaeological consequence is the finding of different types of sites with complementary basic economic functions, related between them within a same settlement and subsistence pattern. The degree of permanence at each one, gives it its hierarchy. The use of space at an intra site level contributes to this characterization together with the rest of indicators. Lithic and ceramic technologies are sensitive indicators to these same effects. Partial changes within the termporal considered lapse within the region can be monitored through these indicators, as well as through the use of space at a regional and inter-site level.

THE CASES CONSIDERED

The previous model then, of a regional character and thought in terms of process, took into account as part of this temporal block tentatively called Formative several caves and rock shelters as well as open air sites, considering they were complementary one of the other within the region under study, taking into account several indicators. In some cases, the evaluation followed extra-regional general considerations, and in other, their inclusion as of the radiocarbon data showed they were placed within the lapse chosen. They would be cases of *permanent, semipermanent and on the way* sites, that could fulfill different functions within the same system in the temporal block established, within a microrregion whose spatial limits were variable according to the information we had at that moment and the distribution of the geographic microenvironments. Within the first ones, we considered that to difference them, they should show a higher artifact density and a reoccupation on the same basis, represented in the structure of intra-site space. They should show the greater quantity and diversity of activities developed and different areas for them. Deposit and discard structures as well as plain local manufacture ceramics, and others obtained through the two exchange circuits established through ethnoarchaeological research at a micro and macro ranges. These aspects should be detected initially at the hunter-gatherer sites that gave them origin at the same microrregion and be monitored in their graduation. In this sense, Testard (1982) considers that sedentariness, unequalities and storing interrelated, give the key to cultural change.

The sites considered in the model were:

- Inca Cueva rockshelter 1, layers 5 and 6.
- Inca Cueva cave 5, layer D.
- Tomayoc III.
- Huachichocana III E-1.
- Rockshelter of the Circumferences.
- Antumpa.
- Alfarcito A & B.

The data at caves and rockshelters, supposedly complementary of the type of installations in the middle of agriculture lands above mentioned, were the following:
- Layers 5 and 6 of Inca Cueva rockshelter 1, site from which we started the investigation. Was initially tested by C. Aschero and H. Yacobaccio, there was one ceramic fragment and a projectile point, and a sample of vegetable charcoal. We processed it: 2,900 ± 70 b.p. - Beta 25116.
- Inca Cueva cave 5, layer D, without datings up to that moment, but mentioned as possibly early ceramic (F. Distel 1983). We completed excavations and dated it since 2,120 b,p. (LP-357) through the Inca period (720 b.p. – Beta 59920). All materials and registers are being analyzed now by different students of BA University.
- Level III of Tomayoc rockshelter, that was dated in 2,230 ± 70 b.p. - Gif-7333 -, corresponding to a level with San Pedro black polished ware (Lavallée and García 1992).
- Layer E1 of Huachichocana cave III, dated at 1,420 ± 190 b.p. - P-2477 (F. Distel 1981).
- The Circumferences rockshelter, without datings up to that moment but with data from a test pit where a tomb was found possibly early ceramic (H. Llosas 1987).

For the open air sites:
- At Antumpa, apart from the preliminary observations and test pit made by Dr. A. R. González, the enormous site had been tested by H. Llosas *et al.* As well as the structures considered as characteristic of Formative settlements, layer "B" with ceramics that looked as comparable to those of Ica1 lowest levels, had given a date of 1,360 ± 70 b.p. - LP 105 (H. Llosas *et al* 1983-85), and there was a lower level still, "C", that would be older if in future works it was determined that B and C were different. This was one of the first datings for the Humahuaca gorge at those days, that could be considered at the end of the Early or Formative Period at the South Andes.
- We also considered as comparable for the area, the lowest levels of Alfarcito, corresponding to the Debenedetti areas "A" and "B" (Madrazo 1969), without datings at that moment, but that could be considered as Early ceramic by the author, of the first millenium of this era.

As a synthesis, there were different kinds of sites, two cases at caves, three rockshelters and two open air sites. At caves and rock shelters, at that moment it seemed that we were finding temporary occupations for specific purposes. At the open air sites, instead, permanent occupations consisting of family occupations of simple circular shape, adjacent, disperse between agriculture lands.

RESULTS AND DISCUSSION

Ica1 was considered as occupied by an early agroceramic group, showing evidences of a temporary seasonal occupation, according to the low density of findings and the lack of clear structures.

The activivities developed after the analysis made to the complete archaeological record

At **Ica1** we have as the earlier occupation layers 5 (with two extractions) and 6 (with three). They are considered as recurrent occupations with a same spatial structure. Both layers, with their extractions, are considered as a unit, after plans and materials analysis. The activities developed of which we have traces from the context materias, were:

- Lighting of fire. That implies collection of fuel, as queñoa (*Polylepis tomentella).* Burnt fireplace rocks. Active artifact to light fire through rotative simple friction.
- First step of lithic manufacture. Extraction of chips, which are most of the lithic remains, from the nearby quartzite workshop, where nucleus were extracted. Percussion, using some of them. Expeditive use of bigger chips. Intense extraction of basic shapes and manufacture and repair of quartzite instruments (minimal). Lithic raw materials: silex, phtanite, basalt and obsidian (non local, except for the first one of which a source has been recently found at the entrance of Inca Cueva gorge. It is nevertheless farther that the quartzite quarry: there are no primary or secondary chips nor nucleus in these raw materials). Instead, there is bifacial slenderness and reactivation, mainly. Point heels are the most common. There are no external chips and nucleus. That is why we can consider that the first steps in lithic manufacture was made at the quarry itself. In non local materials there was no extraction and/or shaping through percussion. Instead, we have found microchips of non local raw materias from which we do not have the instruments. There was a curated technology regarding non local raw materials, of excellent quality and great distance to their suply sources. In local quartzite, instead, a refitted nucleus shows shaping through extraction at the site (with which the relationship with workshop “D” is stronger). Some good chips, able to be basis have not been used. This information and the short distance to the raw materials source, as well as the traces of use at the bigger chips, indicate an expeditive behaviour regarding the local raw materials. Possibly, there was a lot more of instruments that continued to be used in the system and that according to it, was not registered at the site.
- Grinding. Mills of different types. Hands. The presence of this kind of instruments refers to site furniture, with the heavier materials left *in situ* foreseeing the recoccupation for the same activities. Their weight make these materials

difficult to be carried out (we also left them at the site), even though in general mills were not upside down but under the protected area of the rockshelter and also at the talus. They were not broken, but could be reused.

- Eating. Presence of parts of ceramic plates of different kinds of red (300 to 460 cm. Diameter). Surface was treated with engobe and possibly tapped which indicates a treatment that produces impermeabilization. Paste analysis shows an expeditive manufacture. It was heated at low temperature. Diffraction analysis shows there were at least two specimens (at the sample taken). Raw materials are those found at the near site of Alto Sapagua, supposedly complementary. Discard of Alto Sapagua versus Inca Cueva raw materials was made through experimentation with both clays and inclusions, and diffraction of results. Experiments also show that dung could be the fuel.
- *Camelidae* different parts (as referred above) representing one rib and parts of two former legs, parts of *Chinchillidae, Rodentia gen et sp indet,* and *Abrocoma sp* were also found near the fireplace. According to some interpretations (Julien 1992), the finding of lithic materials as well as faunal remains here referred contextually evidence an activity of cutting in pieces in a peripheric clear space. Near the fire, the more feasible explanation is that they could be used for food preparation. We consider this explanation is the most possible, considering the rest of indicators of all type, including the use of intra site space.

Faunal analysis (by H. Yacobaccio) showed squeletal parts that could correspond to a herders typically temporary occupation (Yacobaccio *et al* 1998). In these cases, spine and ribs are taken to the temporary site, once the animal has been sacrificed at the residential basis. Activities were as follows:

1)Cutting. Lithic knifes on chips made of local quartzite. 2)Hunting or herdind (it could not be distinguished through the measurement of a *Lama* phalanx, as it was not brought together). 3) Scraping. Scraper. 4) Possible manufacture of rock art. Motives and possible pigments. 5) Hunting. Projectile points of two different types. Possibly functionally related to the type of use common at late archaic with crops - Formative sites. 6) Gathering. Wood.

After this list of activities and the analysis of the distribution of artifacts, ecofacts and structures at the plants, we could appreciate it is the case of a *semipermanent* occupation, possibly of short duration but recurrent, of restricted activities. It was used during the rainy season (from november through march), for living while herding. This restricts the area to be occupied under the protection line, that is where the hearth found in the initial test pit is placed, which structures most of the "*témoins*" of activities around it (Julien 1992). This is obviously through november to march. The faunal analysis seems to show squeletal parts that could correspond to a herders typically temporary occupation (Yacobaccio *et al* 1998). In these cases, spine and ribs are taken to the temporary site, once the animal has been sacrificed at the residential basis.

Also, checking our previous model, considering that there was a greater species diversity at Sapagua in relation with Inca Cueva, comparing with the ethnoarchaeological investigation made at the place (García 2001), we were suprised to learn that we were wrong. Of the 31 plants used at Alto Sapagua nowadays, 21 come from Inca Cueva or Las Peñas, 4 from Abra del Altar, place that links both localities, 5 cases come from Alto Sapagua hill, and 5 from Tilcara (down). Inca Cueva shows high Andes plants patches near. Alto Sapagua and Rodero are part of the Puna province. And at Prepuna we have Coctaca and Tilcara. That is to say, Alto Sapagua shows no more diversity than Inca Cueva. So that the model of a greater diversity at Sapagua regarding resources is not so, from the ethnoarchaeological investigation. This shows a new imput from his kind of search. And this input is a way back.

The comparative case: Tomayoc

In this case, the first occupation level with ceramis, with the same age as layer 5 above analyzed, shows marked differnces with Inca Cueva. The sediments differ very little from the archaic levels in the sense that is equally characterized by the presence of sand beds clinging SW-NE. But this "phase" has been isolated as of cultural criteria (presence of ceramics that we did not find in the preceding levels).This can be shown in the statigraphic final sequence, where we can see the anthopic levels and the sterile sand levels that separate them. The "occupation floors" Dr. Lavallée considers as the worst preserved even than the preceding phase, only appear as isolated and not contemporary fragments: the dates and placing of this fragmentary soils allow us to distinguish three occupation moments (Lavallée *et al* 1997). As a difference with Ica1, where we could observe at the above mentioned pants nearly 30 m2 covered by this first occupation, the first ceramic occupation level of Tomayoc, preserved over some 20 m2, is characterized by two adjacent fireplaces, dated 3,000 and 2,950 b.p. to which were only associated the ceramic fragments analysed and diffracted, five quartzite nucleus that came from the archaic level that are part of one of the fireplaces, 34 chipped stones and quartzite blocks, as well as 109 camelid or non determined great herbivores bones. The level over this occupation, is represented by three residual soils, 8 m2 each, having each one of them a hearth, some cm. below the San Pedro ceramics. The third level of this "Phase III" has only been dated as of some blown charcoal from inside the circular structure, at D11, only associated to a quartzite biface. The grinding stones and more occupation density, start to be found at Tomayoc *a posteriori* of these moments (Lavallée *et al* 1997, p.155-158).

After evaluating Tomayoc evidence in the succession of its occupations, we see that the Achaic level at this site, as well as at Inca Cueva, show the presence of domesticated camelids from contextual bone findings. For the ceramic levels, over the postdepositional phenomena, the sequence above mentioned shows a change towards more sedentariness and population aggregation, as well as the foreseen reoccupation of the shelter towards the initial moments of level IV2c, when the circular construction is made. The same, presents in IV2b, a linking through ceramic refitting between a ceramic piede included in a hearth over the wall and another one in C12. Both hearths were dated at 1,020 and 1,010 b.p. Since this level (which is the same age as the occupation dated at Alto Sapagua), the presence of skeletal parts of camelids changes, towards a greater proportion of head, foot, vertebrae, rib and scapula bones. This would make us think that the Tomayoc rockshelter started to be used as of these levels as a temporary site with more permanency during the annual circuit, as cutting in pieces activities would be reprsented. Activities made, as of these levels from the contextual complete analysis, indicates cooking activities of an ordinary character, inside the circular structure. The analysis of ceramis, in relation with lithic materials, shows a tendency in its proportions relatively similar to that observed at Ica1 towards more recent levels. Grinding stones start to appear at Tomayoc as of these levels. Here, the preferred occupations inside the rockshelter seem to have occurred between december and march, as can be seen through the skeletal remains of young and newly born camelids. And they are considered as repeated but of short duration. This is similar to what has been interpreted before for Ica1 - lower levels - as of the plants analysis, protected area during rainy season and concentration of activities at the interior. So, after the analysis of all the recovered vestiges, the occupation of Tomayoc from early Formative moments to later ones, transformed its function from a site of a possibly occasional use towards a temporary one by herders probably related with groups that made agriculture in lower lands, according to D. Lavallée's interpretation. This interpretation, for its function regarding the later moments is different to ours, that indicate that the same population produces the complementary sites (instead of having two different groups related) at Inca Cueva-Alto Sapagua-Hornaditas, within Azul Pampa.

We consider these could be the earliest moments of an independent system to the one that was developing in those days at northern Chile, even though there could have been some kind of exchange between independent processes. It is possible that Tomayoc was afterwards a station in a route related to San Pedro de Atacama, also during the Early ceramic period, even though this would not reject its use as a site with more permanency degree, related to occupations relatively more stable, placed towards the Humahuaca gorge and used in a complementary way. So, after the excavation and analysis of all the remains and registers, our initial appreciation changed. Also, the connections with the other side of the Andes seem nowadays too distant, when we have coincident data of the same age so near.

CONCLUDING REMARKS

The use of space, that was mentioned initially as one of the indicators to connect the sites within the system, had been considered as a "style". As a result of this investigation, it was useful for the initial ideas at a regional level. At the inter-site one, within the determined temporal block, to see variability. And at an intra-site level, carefully, in relation with the other variables and taking into account the formations processes that at Tomayoc were mainly natural but that at Inca Cueva cave 5 are natural and cultural. That is why redeposition must be considered with the greatest detail. What we tried to do with the sites' typology was to link the remains to the sedentariness degree of each occupation, taking into account that while we are working at a regional level and from the ethnoarchaeological model (García 2001, Rafferty 1985), sedentariness is that of the system as a whole. The ceramic indicator proved useful, in relation with all the rest in this respect. The "model" is a methodological tool, not an end in itself. Nevertheless, we can say that we consider it functions. Results follow:

- The sites that were initially considered as part of the same system regionally within the temporal block have proved they are, according to the register coherence as the investigations made have shown during the last fifteen years. They are Inca Cueva, Huachichocana, Alfarcito, Circumferences Rockshelter, Antumpa, Cristóbal cave, Tulán, Estancia Grande. And we could add Wankarani. The variability in the settlement pattern is given by the characteristics of each occupation in particular within the local circuit. The basic activity at caves and rock shelters was herding and hunting, complementing thus restricted agriculture at the lower level sites within the annual circuit. Agriculture tends to be plein reaching the final moments of the temporal block, when we find greater population aggregation.
- At a microrregional level, there is a strong interaction between the sites of Inca Cueva (as of the ceramic occupations) with those placed at a lower altitude above sea level, towards the East. Caves 5, 1 and 8 as well as workshop "D", are linked through the ceramic indicator with: Churque Aguada, Hornaditas, Tiuiyaco, Huachichocana, Alto Sapagua and Humahuaca.
- Occupations with earliest ceramics within the 3,000 - 1,000 b.p. temporal block are placed at high caves and rock shelters. They continue to be used towards the end of the block. At Sierra del Aguilar, within a herding circuit of micro complementary occupations (even though towards later moments there may be connections with Humahuaca). At Azul Pampa, relating increasingly with Alto Sapagua and Hornaditas, complementing herding

with agriculture, and showing towards these latest moments of the block, greater complexity and population aggregation.

- Finally, the routes that link Inca Cueva with Alto Sapagua and Hornaditas, are in effect used in different periods (nowadays, Inka times, Upper Formative). And the pass through the Abra del Altar seems to have been the selected one.
- The ceramics we considered as "diagnostic" (San Pedro Polished Grey at Tomayoc, corrugated and incise at Inca Cueva), are clearly different from the local ones, which can in turn have been manufactured at Tomayoc or Alto Sapagua, according to the case. The before mentioned analysis are technological. "Diagnostic" ceramics can be showing regular exchange situations that are part of the same system, which make them part of the artifacts expected to form part of the register corresponding to the social organization studied. Their presence does not contradict but backs the model.

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