"Twenty years of Ethnoarchaeological research in Tierra del Fuego: some thoughts for European Shell-Midden Archaeology."
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IN:
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Introduction
Twenty years of ethnoarchaeological research in Tierra del Fuego on hunter-fisher-gatherers (Fig. 1) has led us to reflect on some of the assumptions made in coastal archaeology, and specifically on the interpretation of mesolithic shell midden. Contrasting the results from archaeological and ethnographic work on the same group is a way to of reviewing the potential weak areas in our methods and theories, because archaeological conclusions are almost always based, in an epistemological sense, on ethnographic analogies. These reflections are concerned with field methodology and the general theory of HFGs and are presented here as a point of reference for discussing inferences about prehistoric littoral societies.

Objectives of research in Tierra del Fuego
In the 1980s advances in archaeological method and theory allowed developments in the study of the palaeoeconomy (conceived of as the subsistence system) of prehistoric hunter-gatherers, using insights from archaeozoology, palaeoenvironmental analysis and taphonomy. However, there was still a lack of ways in which to approach an understanding of social organization, that is the social relationships through which people organised their subsistence system. Social organization was established by extrapolating from general theories of present day HFGs, and assuming a perfect correspondence or mutual adaptation between the subsistence system and the social system, or by searching around for some ethnographic examples that corresponded with conclusions already drawn from the archaeological data. Since 1986, our team has set up a number of Spanish-Argentinean research projects financed by the Spanish and Argentinean Research Councils, the Spanish Ministries of Culture and of Education and by the European Union.

Our principal aim (Piana et al. 1992) is to develop archaeological methods and theory which will allow us to examine social organization directly from the archaeological evidence, rather than relying on an assumed correspondence between social and economic systems or assumed similarities between prehistoric and present day hunterfisher-gatherer societies; assumptions that we believe to be unfounded. Specific objectives are to:

- Test methodologies of recovery and analysis
- Use these to test inferences and explanations used in European hunter-gatherer archaeology (Vila and Estevez 2000)
- Contrast the ethnographic record with the archaeological record from some of the sites in Tierra del Fuego dating to the period of European contact
- Verify the general characteristics and laws of the hunter-gatherer mode of production, and the extent to which the particular example of Tierra del Fuego society corresponds with existing generalisations about hunter-gatherer social organization
- A more specific aim is to examine the final period of existence of the Yamana Indians of Tierra del Fuego, both to gain an objective reconstruction of the last group of HFGs to live on the coast of the Beagle Channel, and to provide a case study in the analysis of the extinction of a hunter-fishergatherer society.

Background
Tierra del Fuego offers an optimal set of conditions for this study. First of all there is good, long-tenn ethnographic information, and this has often been influential in developing huntergatherer explanatory paradigms. Ethnographic records extend from the early and comprehensive report in 1624 of the Nassau Fleet (by J'IHermite) to the accounts of the last surviving people as recorded in missionary journals (by T. Bridges from 1863). Most of this information was brought together in 1937 in Pater Gustin's ethnographic work (Gusinde 1937) with a more recent compilation by Orquera and Piana (1999a). Secondly there are also extensive collections of ethnographic material in European and American museums that can be studied with archaeological methods. This means that we can study the complete set of items of these people and evaluate what we would say about them if we had found them preserved in the archaeological record. At the same time we can see what items are normally missing in the archaeological record and whether it is possible to infer their presence in an archaeological context.

Thirdly, there is excellent preservation (Fig.2) and high visibility of archaeological sites, which obviates the need for extensive survey, and which also makes it possible to excavate the archaeologically preserved materials of a society that is also described in the ethnographic record at the time of European contact. We were also able to use the large amount of archaeological work on the oldest settlements in the northern Beagle Channel coast carried out by our Argentinean colleagues (Orquera and Piana 1999b), which shows a continuous sequence of settlement extending back to the Tunel 1 site dated at about 6900 BP.

Finally, Tierra del Fuego is an island, which has undergone little environmental change since preindustrial times. We believe that studying societies in island environments increases the experimental resolving power of archaeology as a social science, because it allows some control on the variables involved in the analysis of social behaviour. Tierra del Fuego became an island around 9000 BP, shortly after the first human settlement. This restricted access to the island and limited the extent of
external influences. In addition it provides a context within which to examine the persistence of similarities between non-canoe-using peoples on both sides of the Magellan Strait (Fig.1).

Tierra del Fuego is also the largest island in the southernmost part of America, with a surface area of more than 21,390 km². This means that there is less likelihood of human and animal populations suffering from the sorts of effects that can occur as a result of isolation on smaller islands, and makes it a good example to use in this experimental study (Estévez et al. 2002).

**Research Projects in Tierra del Fuego**

Since 1986 we have developed a series of successive and related projects. In the first project (1986-1994 "archaeological contrast of the ethnographic image of me Fuegian canoe people on the northern coast of me Beagle Channel") we began by studying the ethnographic image of the people of Tierra del Fuego (Estévez and Vila 1996). We collected and critically analysed all existing ethnographic sources. This allowed us to search for contradictions, evaluate the theoretical positions and particular aims of different ethnographic observers, and establish the accuracy and significance of the various observations. At the same time we carried out an archaeological study of the material collected during ethnographic study and stored in European Museums, using archaeological techniques of analysis. This provided us with a complete set of information about the potential "material culture". From this, we could consider what could be recovered, deduced or inferred from a "normal" archaeological record (one that has undergone loss of all organic soft tissues as a result of the usual taphonomic processes).

Finally, we conducted computer assisted modelling of social relationships using KIPA, a computer program to analyze the social position of women in hunter-gatherer societies (Barceló et al. 1994).

The next step was the excavation of the Tunel VII site, dated to the period of European contact. Together -with our Argentinean colleagues- we developed an excavation system for dissecting the stratigraphy and recording very fine and subtle layers of deposition in shell midden. This entailed the development of systematic techniques and methods of sampling, soil micromorphological analysis, and archaeological recovery. In the course of excavation we undertook a set of experimental reconstructions and taphonomic observations in order to better understand site formation processes and the production techniques that could be recognized from the study of the tools and the by-products.

In the archaeological deposits, the accumulation of shell residues resulted in rapid sedimentation that makes it possible to peel back the different components of an apparent palimpsest, and to isolate and excavate very thin stratification subunits, further confirmed by soil micromorphology. This method of excavation allowed us to recognize latent structures of spatial organization and reoccupation of the same place. In the Tunel VII site a circle of 3.5 m of dark humic soil was surrounded by the deposition of shell-midden material (Figs. 3 and 4). Some postholes around the limits of the inner circle mark the position of structures which can be interpreted through the ethnographic record as the walls of the hut of a single social unit, -with superimposed fireplaces that document 10 reoccupations of the same place from the end of the 17th century to the end of the 19th century (Estevez and Vila 2000).

A programme of experiments and archaeological reconstruction of the huts allow an understanding of the dynamics and the durability of the hut structure and explain the ethnographic descriptions, as well as the practice of their reoccupation on successive occasions follo-wing minor maintenance work.

The next project "Marine resources in the Beagle Channel prior to industrial exploitation: an archaeological evaluation", carried out from 1994 to 1997 had the following objectives (Vila et al. 1997): to build a seawater palaeotemperature curve covering the last 6000 years and establish the marine reservoir effect. Intensively survey, sample and date sites along the Beagle Channel to produce a settlement pattern and the general pattern of resource exploitation over time.

Excavate two archaeological sites of the same age as Tunel VII but in different locations to evaluate variability in settlement patterning and resource management and adjustments to micro biotope conditions.

Compare the marine resource system as represented in the archaeozoological record -with that recorded ethnographically and at the present day, evaluating biases and any changes that have taken place over longer periods.

Analyse the causes of change in marine resources and their implications for the final decline of the indigenous population.

Our research demonstrated an overall stability in ecosystems on the island and on shorelines over the past 6000 years. The archaeozoological analysis showed little change in resource exploitation through time, and such variability as occurred was due to slight variations in local conditions as to seasonal factors. The system could be described as a 'specialization' towards a nonspecialized subsistence system. This is a system -with a broad but very specialized set of tools and techniques that allowed the Yanamas an easy access to the whole spectrum of available resources and enabled them to profit from the microregional variability (Estevez et al. 2001; Gassiot and Estevez 2005). The composition of artefact assemblages in terms of artefact types remained stable although there were minor variations of shape and decoration. However, there is evidence of episodes of crisis, and of experimentation -with new inventions or adoption of new elements (Estevez et al. 2002).

The next project "Ritual and society of the last hunter-gatherers of the Beagle Channel", in 2001, analysed archaeological evidence related to the process of social reproduction. Ideological practices that reinforce sexual-social roles are central to the maintenance of the social system, and the archaeology of funerary practices is of critical importance in providing relevant information. Our first task, then, was to excavate a ritual context such as one of the ritual huts noted by the ethnographer Martin Gusinde. Secondly, an excavation of a funerary context was carried out at a rockshelter where a burial had taken place during the period of European contact (Vila 2004; Vila, et al. 2006).

The aim of the next project "Development of new 3D recovery systems" in 2002 was to excavate a fourth settlement using GIS and computer aided methods and digital imagery to facilitate 3D recovery, evaluation and representation of the finely resolved stratigraphic subunits described above. Given the complexity and slowness of the recording system, we considered this project essential to improve the application of the recording system and to facilitate its wider use (Barceló et al. 2003).
Once of the most interesting objectivecs came to the fore during the projects carried out between 2002 and 2005. We can characterize this as a look "beyond the frontier". A key issue in Tierra del Fuego is the coexistence on the same island of at least four different human groups as described by the early travellers and ethnographers, and two different subsistence strategies (Fig. 1). Two groups, Yamana (or Yaghan) and Alakuluf, used canoes and were oriented towards the exploitation of littoral resources, while the Selk'nam and perhaps the Haush (if they were indeed different from the Selk'nam) concentrated more on hunting and gathering of inland resources. Apparently they spoke different languages and were different in appearance, but on the basis of the ethnographical materials and all the descriptions of rituals, there appear to have some striking similarities.

The objective was to carry out excavations of Selk'nam ritual and settlement places near the northern coast of Tierra del Fuego, in order to analyse patterns of variability and identify differences that might allow coastal and inland groups to be distinguished from evidence in the archaeological record (Vila Mitjà, 2004).

All these Research projects have stimulated our thinking and developed our understanding about the ways in which this type of HFG society works. Inferences and deductions about prehistoric HFGs are constructed for the most part on the basis of ethnographic information and middle range theory. Very often "a priori" patterns derived from remote analogies are apparently recognized in archaeological records and are then used to confirm or to reinforce conclusions drawn from the archaeological data. The HFG societies of Tierra del Fuego have had an important influence on the development of general ideas and definitions of HFG societies. Our work has led us to rethink the use of ethnoarchaeology, the possibilities and limits of archeological inference, and the limitations of ethnographic analogy used in an ad hoc way to confirm archaeological hypotheses. We believe these conclusions as illustrated by our work in Tierra del Fuego can serve as a point of reference for research on other HFG societies.

Discussion.
Technical issues
Our work has led us to change some of our technical procedures. First of all it was possible to critically examine the character of the palimpsest of shell middens, which is some times to easily assumed. We adopted a careful excavation technique that involved peeling away successive layers of deposit using a, detailed and standardised description of sedimentary structure and contents. In this way we were able to distinguish minor stratigraphic subunits within the accumulations of mussel shells, which were probably due to discrete, very short depositional events. The subunits were identified during excavation through stratigraphic discontinuities (e.g. thin layers of humus, aeolian dust and layers of compressed mussel) and were later confirmed by image analysis, soil micromorphology, and the statistical analysis of the contents of a 4 litre sample taken from each stratigraphic subunit. It is not easy to establish the time of duration of each subunit, but it is possible to estimate that most of them correspond to a single episode of rubbish accumulation.

We could relate these subunits to single episodes of occupation through their stratigraphic relationships with respect to superimposed central hearths and the humus layers that separate them (see Fig. 3). Indeed, it is considered that a hearth represents a period of occupation, and all the subunits related to a hearth (by for example, stratigraphy, bone refitting and skeleton rearticulation, etc.) correspond to that single occupation. In this way 172 subunits composed of shells and consumption residues have been related to 10 periods of occupation. The whole site occupation spanned about a maximum of 100 years, calculated by the presence of European material and dendrochronology. This is a mean of 17 sub-units for each episode of occupation, with a mean of 13 litres of uncompressed sediment. The overall contents and the total quantity of subsistence debris (e.g. a maximum NMI of 27 sea lions that were young or shared individuals) match well with the ethnographic sources that refer to a mean of 15 days for a normal occupation of a hut. It was however, proved difficult until now to estimate the temporal span of each of the occupations as we are outside the chronological tolerance of radiocarbon dating and there are few possibilities to employ dendrochronology.

We established the importance of extensive excavation to search for horizontal patterning and relationships between obvious structural evidence (postholes, fireplaces, hut boundaries) and latent structures (statistically identified patterns in discarded materials) within shell accumulations and between stratigraphic subunits. We were also able to isolate successive occupations in the same place and establish intrasite patterns of spatial organisation, and the degree of recurrence and variability in the sequence of occupations (Fig.5). In Tunel VII for instance we identified at least ten successive occupation episodes through a microstratigraphic analysis of the superimposed central fireplaces and the humus layers stratified between them (Estévez and Vila 2006).

The system of column sampling is a method normally employed in shell-midden archaeology to evaluate and quantify the composition of the deposits. We developed a sampling system, not based on column sampling, but more appropriate to extensive excavations and to the identification of patterns of spatial organization. At the same time we noticed important differences in the composition of the individual shell accumulations that make up the shell midden as a whole, depending on varying patterns of consumption by different people in different parts of the site. The distribution of items and residues (including molluscs) in this type of open-air settlement is neither random nor homogeneous. Therefore, any conclusions about the consumption of resources will depend critically on the size and position of the samples selected to evaluate the problem (Estévez 2000).

Ethnoarchaeology usually only provides simple descriptions rather than explanations of the actions and behaviours observed. Some of the issues critical for archaeological reconstruction can only be clarified by contrasting the ethnographic descriptions with experimental replication procedures. The replication experiments on production processes that we undertook were also essential to understand the formation of the archaeological record as well as the ethnographic descriptions. For example, we were able to understand how people abandoned their huts without destroying them and then reoccupied exactly the same spot some years later. In our sites the first occupation of a place conditioned all the further occupations of the same place because it created a slightly elevated ring-shaped mound.
This in its turn attracted subsequent occupations on the same spot because it provided protection against the wind and because the branch structure that remained standing for years after abandonment could easily be repaired.

The careful fullness of site structure and biostratigraphy has also helped to explain some unusual features. The persistence of fragile bones in the site deposits can only be explained by the absence of scavenging activity by foxes because these carnivores in Tierra del Fuego completely destroy bird carcasses. However foxes were present and should have been able to access abandoned human camps, and we have in fact documented the presence of tooth marks of Canidae on some of the bones [including some bird bones]. This had no easy explanation until we observed the relationship between the behaviour of foxes and domestic dogs. This showed that the presence of dogs on campsites is critical in inhibiting the action of foxes. Dogs were indeed always present in Yamana campsites according to the ethnographic sources. We thus interpret the tooth marks as evidence of dog gnawing, but its limited extent and the fact that it is usually confined to the same specific parts of the skeleton also tells us that humans controlled the dogs and restricted their access to carcasses (Mameli and Estevez 2000). This example in fact gives us a detailed insight into the relationship between people, domestic dogs and wild foxes.

Replication experiments were also important in explaining how some items (such as harpoons) were made with the available tools (Clemente 1997; Brill 2004). We can quantify the relative value of items as a function of the effort involved in their production and in the different strategies of managing resources (Grup Devara 2006).

We see the need to combine several analytical methods in order to achieve significant conclusions. Sometimes archaeological practice led to the analysis of the spatial distribution of some classic archaeological categories, treated in isolation, such as "lithic industries", "retouched flakes", "unretouched flakes", "flaking debris", "mammall bones", etc. We believe it is necessary to change some variables and methods at this practical analytical level and to look at spatial and density analysis in terms of variables that actually bring together categories that are often treated separately, in terms of the way in which various materials and objects are consumed and disposed of. We need to integrate and relate the results of use wear (Fig. 6), raw material and technological analyses of lithic und bone residues, analysis of faunal resources, soil micromorphology, chemical and phylolith analysis of sediments and seasonality deduced from osteology and growth structures in bones, teeth and mollusc shells (Estevez and Vila 2006). Arrow shaped lithic pieces, for instance, were some times used for scraping bird bones to make necklaces, or a discarded by product or an actual arrow tip broken in use and abandoned during the butchering of an animal carcass (Briz, et al. 2005).

**Some general thoughts**

Ethnographic analogy should only be used at the stage of formulating hypotheses because contrasting the ethnography and archaeology demonstrates that the ethnographic record is biased, subjective and changes over time. Tierra del Fuego people, as is probably true for most HFG societies, were dynamic, flexible and capable of rapid change, even prior to the period of European contact and ethnographic observation. Far from being static and despite an unchanged object of labour, there are signs of social adjustments. There is no simple, stable and successful adaptation but a dynamic attempt to maintain stability in the social system. Therefore it is dangerous to extrapolate from ethnographic sources general ideas about the general behaviour patterns of HFGs, which are then used to support archaeological inference.

Direct inference from ethnography or from logical assumptions does not always conform to reality. For instance, trace analysis of bones and stone tools demonstrates that some unexpected and less than optimal hunting techniques were sometimes used in occasional close encounters between people and prey. We have established, for example, that hunting of sea lions was usually carried out from canoes with very specialised harpoons, but that bows and arrows were also used in the hunting of sea mammals, perhaps in opportunistic encounters -with these animals while they were sleeping on the beach. We have to conclude that, in the case of the coastal people we have studied, switching from specialized hunting using the full repertoire of specific tool types to opportunistic hunting was quite normal. However, ethnographic descriptions tend to generalize and simplify organizational strategies in a nonstatistical and subjective manner, emphasising the norm rather than the variations (Mameli et al. 2005).

**More specific issues to keep in mind for prehistoric HFG studies.**

Despite the impression conveyed by some ethnographic accounts, Fuegian people did not constitute an egalitarian society, and that is probably true of most hunter-gatherer societies (Vila and Ruiz 2001). Sexual division of labour was the basis for inequality and discrimination against women, ultimately the result of the need to control reproduction (Estevez et a. 1998). This feature -was rarely remarked on by ethnographers, usually men and specifically missionaries heavily influenced by a Christian and Victorian society. For instance, some important activities (such as collecting firewood) are less visible than others, but require far more effort and time (Pique 1999), even though they were socially less valued (by the native people as well as by European ethnographers). Often, as is the case in Tierra del Fuego, women are in charge of such activities, but on the other hand they have less power of decision making within the group.

This indicates the need to investigate sexual division of roles and the subjective value of labour, because social relationships cannot be directly deduced from biology, economy or analogy. In the Yamana society, following a critical evaluation of the ethnographic information, we conclude that social relationships (the relations between people to reproduce the system) dominated the system, while the system in its turn was determined limited by subsistence relationships (the relations between people and resources, that is the subsistence strategies in the sense of Estevez et al. 1998).

In the Yamana case, we have shown that the system of social reproduction was less flexible than the subsistence strategies. The system, after 6000 years of accumulated experience, arrived at some equilibrium between population and exploited resources. The technology for obtaining resources documented archaeologically and described ethnographically changed very little after the introduction or development of the bow and arrow (see Orquera and Piana 1999b). Population size (estimated at some 3000 people at the time of arrival of the Europeans) must have been maintained through a controlled social restriction on human reproduction like that documented in the ethnographic record (Vila and Ruiz 2001). Nevertheless the local people quickly realized the technological advantages of the raw materials and some of the tools introduced by European technology and swiftly adopted them. Glass, for example, was a better material than flaked stone for implements -with a short life span.
like arrows or scrapers. Metal -was used for items -with a longer use life (like daily knives) or for items that needed extra strength. The Fuegians obtained iron from European ships to provide the edges of knives used for butchering large prey, traditionally made on shells of Aulacoma mussels. At first, they made these knives following the traditional shape with a transverse edge, but later they changed to a longitudinal working edge like the European ones (Fig. 7). European nails were substituted for traditional awls made from bird or mammal bone, which are more fragile materials. The introduction of metal axes changed the strategies for exploiting the resources of the forest. Firewood and timber for huts could be obtained more easily, resulting in a change in the form of the huts. The traditional hut of hemispherical shape became less common and was replaced by a conical hut form, which was more effective for allowing smoke to escape. Even the construction of canoes changed: bark was replaced by planks or hollowed trunks. People also quickly recognized the advantages of European boats. Captain Fitz Roy, the first European recorded as sailing along the Beagle Channel, reported the theft of one of his boats by Fuegians.

But social organization could not react as quickly as technological strategies. The impact of industrial society on marine resources was catastrophic and its effect added to the consequences of disease introduced by Europeans and the concentration of people in camps or their dispersal (Vila and Estevez 2002). This caused heavy population losses amongst maritime collectors. But the restrictions on human reproduction did not change quickly enough to make up for population decline caused by European violence, illness and industrial exploitation of resources, because the main social effort was traditionally directed towards the restriction of human reproduction. All these indicators have led us to conclude that the system of social reproduction was more conservative than the operation of subsistence strategies.

Final Thoughts

A very important issue that has arisen from our ethnoarchaeological approach is with reference to the social organization of HFGs. Prehistorians generally assume the existence of ethnic group divisions as a given. This is also derived from ethnographic descriptions. Archaeologists consider "material culture", type fossils or even subsistence patterns as markers of ethnic groups. Even if we agree on some elements (such as subjective self-description, sense of belonging, language, belief) used by ethnographers to define an ethnic group or culture, we have to agree that these are difficult to document archaeologically and we need to accept that there has been too little discussion about the existence of discontinuities in these different elements or their true significance.

We have to keep in mind that sometimes the existence of boundaries is simply the result of projections of political misconceptions arising from a particular anthropological theory (notably the particularism of the German school of Cultural History). In the case of Tierra del Fuego, the main ethnographic study was performed by this perspective: Gusinde defined at the outset his objective of research as the study of the different ethnographic groups of Tierra del Fuego. Actually the conclusions of his work are the consequences of a historical and chronological sample drawn from particular times and places, which he presented as a static view of the norm for each "culture".

Functionalist approaches began with the assumption of at least two "cultures" or "adaptations": inland hunters on the one side, and littoral and maritime canoe-using hunters on the other, assuming continuity in resources over time and a significant discontinuity in the geographical dimension. But the archaeological and ethnographic records indicate another possibility. They actually show that very few elements cannot be found in one or other of the areas defined in ethnographic accounts as belonging to different groups. The differences attributed to the so-called terrestrial and maritime adaptations are not visible in artefacts or in consumption goods. All the groups share most of them. The shape and form of artefacts is very similar from the north to the south of the whole area; only in some cases are there slight and statistically identifiable variations in size or morphology. There was an intensive circulation of raw materials from one extreme to the other of Tierra del Fuego (Terradas 2001; Prieto et al. 2005). We see, for example, the arrival of European materials coming from the Magellan Strait some centuries before the Europeans discovered the Beagle Channel (Prieto et al. 2000). There is also evidence of contact over long distances in the written sources as well as in pictures (Prieto et al. 2000). In some of these contacts the Fuegians used the so-called "pasos de indios" (Indian paths). These were prepared land bridges (cleared pathways, paved -with trunks and evened out over short distances on land) that connected fiords and were used to avoid long journeys by sea (Prieto et al. 2005). Finally, in comparing earlier and later historical accounts, it is clear that the classification of the groups and their names changed over time (Gusinde 1937). In the same text one finds descriptions of anatomical and language differences and later on statements that there are no boundaries but a constant flow of people and items between different zones as well as a command of both languages by some of the neighbouring people, who in addition shared fundamental rituals and beliefs (Hyades and Deniker 1891; Gusinde 1937). From all these contradictions we can conclude that there was no real territorial exclusivity, and the problem that arises is how and why these language distinctions persisted over millennia when there were no political barriers and a constant flow of people, ideas and items. Given all these considerations, our proposal is to consider this situation as the consequence of differing and fluctuating degrees of intensity in social exchange and the needs of social reproduction. This kind of situation is not necessarily equivalent to that of other hunter-gatherers or of early farmers, who maintained exclusive rights over some parts of the territories they used for resource exploitation.

Therefore it is not always appropriate to speak in our case about a correlation between archaeological assemblages and culture groupings, whether we conceive of these as different adaptations or different ethnic categories. By extension, it is even less appropriate to extrapolate in a simple or mechanical way such presumed correlations to prehistoric societies. The Fuegian example shows that the social and economic systems amongst HFGs are each subject to different and particular tolerance levels against external changes. They are resilient to external changes up to a point and within different limits, and these are highly dependent on the time scale involved. This implies that one must take account of and evaluate the influence of changes that are sudden and of high frequency, for these may exceed the tolerance limits for change, resulting in catastrophic consequences on the whole system. As an example of a catastrophic short-term change, we can cite the introduction of new diseases, which caused the collapse of Yamana society because the social system was structured to impose long-term restrictions on reproduction (Vila and Estevez 2002).
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Fig. 1. Map of the sites locations of Tierra del Fuego with the supposed ranged of each group and pictures of three men of the different groups characterized by ethnographers
Fig. 2. (Top) detail of an articulated bird skeleton and (bottom) some bones of a minke whales from the site of Lanashuaia
Fig. 3: (Top) top of an occupation surface at Tunel VII: white arrows show the marks of postholes and the white lines show the limits of the structure and central fireplace, (bottom) two of the central fireplaces at Tunel VII one superimposed over the other.
Fig.4: General view of two moments in the excavation of Tunel VII showing two occupation surfaces (White lines show the limits of the isolated stratigraphic sub-units and white arrows show the sequence of superimposition of these units).
Fig. 5: Distribution map of the first occupation episode
Fig. 6: (Top) hide scrapers from Tunel VII (Ph. by I. Clemente), (bottom) two scrapers refitted from Lanashuaia
Fig. 7: Three ethnographic knives: the traditional shell knife (top); a transversal cutting edge metal knife (middle); and a European -like metal knife (bottom).