mechanisms in insects, and the review by T. M. and R. M. Rizki of hemocyte surface changes in *Drosophila* during encapsulation is authoritative. The review of the biochemistry of arthropod agglutinins by H. D. Hapner and M. R. Stebbins and the review by J. S. Chadwick and G. B. Dunphy of antibacterial and antiviral hemolymph factors are also well done. On the other hand, J. G. Stoffolano's contribution pertaining to nematode-induced responses is strictly descriptive, with very little on the molecular basis of nonself recognition or the mechanisms governing the types of host response—the areas where the most significant advances have been made during the past five years.

Two additional contributions require comment. In the chapter dealing with transplantation immunology, A. Lackie champions her own interpretation that insects cannot recognize allografts. She bases her argument primarily on the nondestruction of implanted nervous tissues and neurosecretory organs reported in the literature. Although additional studies are required, it may be that such tissues are less stimulatory than others and that her conclusion is biased and premature.

In the chapter dealing with crustacean agglutinins and lectins, G. A. Amirante makes the strong appeal that the terms "lectin" and "agglutinin" should not be employed interchangeably. The latter term should be reserved for those molecules that react against an antigenic determinant not characterized by a specific group or one sugar. This is a point well taken.

In conclusion, this is a most useful book for those who wish to be initiated into the fascinating subject of invertebrate, especially arthropod, immune mechanisms. It should be required reading for scientists interested in the application of biological control agents against destructive insects and those concerned with prevention of diseases of economically important arthropods.

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Archeology in the Andes

Telarmachay. Chasseurs et Pasteurs Préhistoriques des Andes I. DANIÈLE LAVALLÉE, MICHÈLE JULIEN, JANE WHEELER, CLAUDINE KARLIN, and six others. Editions Recherche sur les Civilisations, Paris, 1985. In two volumes. 461 pp., illus., + maps. Paper, F. 317.79. "Synthese," no. 20.

The cold and windswept high-altitude puna grassland of Peru may seem an odd place to find abundant evidence of early South American hunters and herders or large international teams of archeologists in pursuit of early sites. A series of books and articles, however, of which the Telarmachay report is the latest and most impressive, testifies to the importance of this environment in Andean prehistory. The centrally located Puna of Junín is dotted with cave sites rich in stone tools and animal remains and promises to be a key natural laboratory for understanding early Andean hunting adaptations and the shift to herding of the llama and alpaca. This book focuses on the preceramic levels of the Junín site of Telarmachay, excavated from 1974 to 1980 by a French-led international and interdisciplinary team. The first volume consists of six major sections describing and interpreting the artifacts and their distributions. An appendix of specialist studies covers pollen analysis, lithic use-wear, and human skeletal remains, among other topics. A second "volume" consists of loose maps showing the distributions of different materials in Telarmachay levels.

The Telarmachay site is an unimposing shallow rock shelter located at an altitude of 4420 meters, yet it was the subject of the most meticulous and well-documented excavations yet published on the Peruvian preceramic period of around 10,000 to 2,000 B.C. An area of 35 square meters was exposed through seven major stratigraphic units by the "decapage" method, which laboriously leaves all notable objects in place. These are then mapped and photographed, providing an extremely detailed record of each sublayer of a stratum. Thus the Telarmachay reports contain oversize maps and photographic mosaics of the most important preceramic layers at 1:10 scale, showing animal bones and stone tools in cases so tightly packed that only a jumble of overlapping forms can be appreciated.

What is the reason for so many cold months of field time spent on this detailed work? Lavallée, primary author and leader of the project, in keeping with trends in French prehistory, hopes to document the use of space within the shelter area. How was daily life organized, and where were activities like cooking, sleeping, butchering, and tool preparation performed? The primary evidence is the visual impression of artifact distributions, and the interpretation is quite direct: where there are concentrations of objects there was either dumping of garbage or debris-producing activity. Notably sparse areas are interpreted as cleaned floor surfaces of habitation structures, and notable changes in densities of remains are often assumed to be caused by structure walls. In some layers postholes seem to confirm this assumption, and the classes of material found around hearths seem logically related to cooking and manufacturing.

In the rush for "paleo-ethnographic" detail, however, there is a danger. When can we be sure that any given pattern of remains represents any specific prehistoric human behavior? A couple of decades of research examining recently abandoned hunter-gatherers' camps has shown a complex relationship between human activity and material deposits. Notably absent in Lavallée's interpretations of Telarmachay's organization are references to this work. Perhaps she is leaving the task of considering regularities that would help span the gap between the observed distributions and past daily life to others, but any quantitative reanalysis will require laborious measuring of artifact positions from maps, since no numerical spatial data are presented. Nevertheless, her map-based approach does give a general vision of what these ancient surfaces looked like at the time of their abandonment.

The Telarmachay report concentrates on the shelter area, an important but limited part of the site. The excavations document subtly changing space use within a pattern that shows surprising constancy in the placement of structures, hearths, and some activity areas. Very significant is the detailed delimitation of primary living surface and outside area, and Lavallée is careful to note the degree to which the contents of any particular level are determined by the proportion of living, outside activity, or dumping surfaces. This understanding is crucial if the remains are to be interpreted in a comparative chronological manner, since major assemblage differences across time could simply be an effect of the surfaces sampled and not represent changes in the overall character of the prehistoric society. In this regard it would have been useful to have a sample of remains from the more distant talus slope areas, which may have witnessed whole ranges of activities not present in the shelter.

Lavallée's vision is not restricted to details of site organization but encompasses the origins of camelid domestication. The approximately 400,000 animal bones, of which one-third have now been analyzed, offer a detailed record of changes in animal exploitation. Important among these is an apparent shift from hunting to herding around 4000 B.C., taken by paleozoologist Jane Wheeler to imply that Telarmachay was a locale of alpaca domestication. The lack of forms intermediate between wild and domestic leaves room for doubt about the actual site of this transition. The primary evidence for herding comes from an increasing presence of newborn camelids, which

account for an astounding 73% of the camelid bones in the terminal preceramic period, possibly as a result of high newborn mortality in muddy, disease-ridden corrals. The same data also indicate a predominant occupation of Telarmachay in the rainy season, the birth time of camelids. One wonders what part of the neonate percentage is due to seasonality of occupation, as opposed to domestication. A suggestion that domestication is not the predominant factor comes from the remains of the never-domesticated deer, 40% of whose bones are from newborn animals on the average. Some very specific activities may have been carried out at Telarmachay that are not representative of the larger puna area.

This raises the major issue of where Telarmachay fits within the context of other known puna preceramic sites. Lavallée clearly identifies Telarmachay as a seasonal occupation, varying from light to rather intensive utilization by a relatively small group of hunters or herders. The quantity of remains in the site and the site size generally confirm this assessment; many Junín preceramic cave sites offer much better shelter and have archeological deposits of much greater extent and content. This apparent secondary camp status may further limit the validity of using Telarmachay as the sole basis for a general model of early puna prehistory.

Telarmachay is located quite close to lower-altitude zones and shows evidence of having been a seasonal element of a settlement system that spanned considerable environmental variety below the puna. This is in notable contrast to other sites more centrally located in the Junín puna, which seem to reflect a more local subsistence pattern and year-round occupation. This variety in Junín settlement patterns needs to be explored, and not taken as representing mistaken interpretations.

What is most impressive in this landmark publication is the richness of the data, which is a product of meticulous excavation and detailed reporting. Lavallée provides an analysis of the chipped-stone tool assemblage that is unparalleled in the Andean area and extensively ponders the thorny issue of the use of different stone tool classes. She assembles both microwear and technologist collaborators to detect tool function but remains necessarily cautious on most assignments. Hunter-gatherer period archeologists will be gratified to know, however, that she has found overwhelming evidence that the classic endscraper or "grattoir" form is indeed predominantly a hidescraping tool, often associated with the use of hematite as a probable tanning agent.

Overall, Lavallée has assembled ten highly qualified archeologists and specialists to provide a level of expertise across the range of recovered remains which has never been seen for the Andes, and rarely in the New World. Her promise of more volumes on the later levels of the site and the faunal remains makes this dedication to a single site all the more impressive. It will take similar work at many other early Andean sites to place Telarmachay in a broader perspective, but this volume clearly provides a model for others to follow.

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(Continued on page 1688)