ARCHAEOLOGICAL OCCURRENCES OF ANDEAN LAND SNAILS

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Introduction

Air breathing land snails have critical moisture requirements that make them sensitive indicators of the environment in which they live. This creates an apparent paradox when they appear in great numbers at various places in the hyperarid maritime coastal desert of western South America. Occasionally, archaeologists have interpreted their presence in the stratigraphic record as evidence for moist conditions brought about by climate changes that are not substantiated by other environmental indicators. This paper addresses the problem and suggests that these accumulations of empty shells represent death assemblages caused by short term conditions not necessarily in effect at the excavation site. The paper also discusses several examples of Andean tree snails used in a ceremonial context and a previously unrecognized ceremonial function of a large *Strophocheilus* species is identified as probably an object of transandean trade from areas near the Atlantic coast.

Andean land snails

Most Andean terrestrial snails belong to the Family Bulimulidae which evolved from an ancestral stock with representatives in both Africa and South America. New World genera extend from Argentina to Florida, where vividly colored arboreal *Liguus* species have attracted considerable attention from collectors. However, with the exception of Fernández (1973) and Schade (1973), modern taxonomists have done very little work with any of the Bulimulidae of South America. As a result, details of snail ecology and population dynamics are often lacking, although the work of Parodiz (1957) is an exception.

My own interest in Andean land snails dates to an early publication of Lanning (1967: 48, 51) in which he proposed drastic changes in environmental conditions at Ancón, Peru, based on great numbers of empty snail shells which he found in his excavations. He knew that this snail was associated with *Tillandsia* (*lomas*) vegetation and since none can be found there today, he assumed that these dead snails were testimony to a failure of the fog-supported vegetation to survive a severe climatic desiccation.

Work on environmental problems in adjacent areas has demonstrated very long-term environmental stasis that does not include any profound Holocene climatic changes in the coastal desert. Elsewhere, I have provided a cultural explanation for the missing *lomas* near Lima (Craig 1968) and described the mechanism that causes empty snail shells to accumulate far from the habitat where they lived. European livestock swiftly destroyed the slow-growing *lomas* and desert winds transport shells over long distances, concentrating them in depressions.

Ossa and Moseley (1972) later reported the presence of many unidentified land snails from the pre-ceramic Quirihuac excavation, implying that they might be a deliberately gathered resource from this extremely early period. I have not been able to inspect this site, but Ossa (personal communication) indicates that a quantity of snail shells was involved. The species has not been determined, but it seems unlikely that they were deliberately gathered for food. Elsewhere in this paper I suggest that they may represent a natural death assemblage or thanatocoenosis triggered by an ancient El Niño event.[1]

[1] El Niño rains create ideal conditions for the reproduction and rapid growth of dormant land snails and their buried eggs. During the succeeding 2-3 year period of anomalous vegetation growth and high soil moisture, entire cohorts of snails suddenly appear, only to die in great numbers when the coastal desert returns to its normal hyperarid condition.

ANDEAN PAST 3 (1992): 127-135.

Ecological considerations

Large arboreal snails like those once gathered by the Moche are still found today (Figure 2, first three from left) in northern Peru along a narrow altitudinal band at approximately 2600 m elevation. Here, they hide in the depauperate remnants of the original forest cover that now survives only along the steep slopes of quebradas (Figure 1). Elsewhere, with the possible exception of the relict rain forest found in the upper Zaña Valley (Craig 1985b), repeated burning of cropped fields has virtually destroyed all remaining tree snail habitat.

The former range of Strophocheilids cannot be reconstructed with great certainty because their habitat was essentially the same as Tosi's (1960) "bosque montano bajo" series that was once much more extensive, during pluvial intervals of the Late Pleistocene and perhaps the first few millennia of the Holocene. However, these zones later became compressed (both vertically and horizontally) by increasing dryness and finally disappeared altogether toward the south in a biotal hiatus created on either side of the center of aridity near Arica. For at least 1500 km on either side of this point, the preferred habitat of the tree snails failed to develop.

Along the desert coastline from Copiapó, Chile to Chiclayo, Peru, the genera *Bostryx* and *Scutalus* and their many phenotypes can be found wherever there is sufficient fog (usually between 800-1000 masl) to support *lomas* vegetation. Within the *camanchaca* fog zone of Chile, cactus, especially *Eulychnia* sp., is dominant and snails feed on the numerous epiphytes they support. Northward into Peru, cacti are replaced by bromeliads, particularly species of the genus *Tillandsia*. Snails estivate on these plants (Figure 3) and in rock crevices after the winter *garua* fogs disappear. A strong mucus seal attaches the snail to the leaves of the *Tillandsia*, where they are believed capable of surviving several years of reduced moisture levels.

Tillandsias have special "hold-fast" structures designed to break away when caught in the hair of animals. Thus, it is possible for estivating snails to be carried from one *lomas* community across totally barren desert to another fog community while tangled in the fleece of guanacos. Until recent years, these camelids were commonly found in the more remote areas of coastal mountains in Chile and Peru. They are the leading candidates for the faunivectal dispersal of land snails across utterly barren areas the snails could not traverse by their own means.

Thanatocoenosis

At various locations along the Atacama coastline, vast numbers of snails have been found near sea level, well below nearby fog zones (Craig 1985a). Such an accumulation, or thanatocoenosis, has been observed in the Atacama Desert near the former port of Cobija. Here, an entire snail cohort suddenly appeared and died. Evidence suggests that they were brought down from a fog zone in adjacent hills by mudslides caused by rare rainfall from an antarctic polar front. I have noted a similar accumulation at the Las Haldas archaeological site in northern Peru under circumstances that remain unexplained.[2]

An unidentified fly parasitizes *Scutalids* and may be responsible for death of the adult specimens seen in Figure 4, located in a robust *Tillandsia* community at the summit of Cerro Reque, near Chiclayo, Peru. Here, desiccation does not seem to be the cause of an *in situ* death assemblage, and it is perhaps more appropriate to refer to it as a biocoenosis.

Archaeologists have long known about the extensive coastal shell mounds of Santa Catarina Province in Brazil that were formed along the shores of paleolagoons but are now some distance from the sea. On, in, and around these *sambaquis*, there are now multitudes of empty shells of the large pulmonate Bulimulid snail shown in Figure 5. Why these terrestrial snails are concentrated around the

[2] For specialized nomenclature on such events, see Kidwell (1986).

prehistoric mounds of marine and brackish-water clamshells has not been determined, but the obvious need for substantial calcium uptake may be the answer. The species illustrated in Figure 5 is closely related to the specimens that were recovered from burials at San Pedro de Atacama shown in Figure 1 (extreme right).[3] If Brazil was the source of these shells (which have yet to be found living on the western side of the Andes), then we may be confronted with an interesting example of long-distance trade conducted from the Atlantic coast, across the Chaco, and over the Andes to the Atacama Desert.

Snails in ceremonial contexts

Several better-known archaeologically oriented examples of land snails can be found in their use as themes for Moche ceramics, particularly Phase IV bottles. In the recent publication by de Lavalle (1985: 53), we find a vivid representation of costumed men gathering *Strophocheilid* tree snails in the heavily vegetated Andean foothills. Various snail hunters in special regalia are using long sticks to remove the snails from overhead branches in a hilly landscape which contains both cactus and trees (Figure 7). Hanging from their arms are small net bags, presumably for transporting the catch.[4]

Another Phase IV bottle from this same publication (de Lavalle 1985: 112) shows six snails with anthropomorphic faces perched on spires surrounding a feline deity (Ai-Apaec) holding a staff (Figure 8). A further supernatural association can be seen in the Phase IV bottle published by Benson (1972: Figure 4-12), where she identifies snails with "monster heads". In this unusual example, snails are depicted in both bas-relief and line drawings. They are shown in hilly, vegetated terrain similar to that being searched by the snail hunter in Figure 1. Donnan (1978) has published a zoomorphic stirrup-spout vessel in the form of a land snail which he identifies as a Scutalid (small, fragile, white, and easily crushed). But I suspect that it was intended to be a much larger *Strophocheilus* species (Figure 2), which is dark-colored and thick-shelled and still found in a few isolated areas of northern Peru. These are very likely the tree snails which were sought by the Moche hunters.

But it is in northern Chile where we find the most curious supernatural use of land snails. From the prehistoric cemeteries of San Pedro de Atacama, and at several adjacent coastal sites (e.g., Punta James, Morro Moreno), we find a specially prepared snail shell (Figure 6) incorporated among the grave goods of some early burials. These are a large *Strophocheilus* sp. with the columella carefully removed so that the entire interior can be filled with finely ground, rouge-like hematite. A source of this ocher, at least for the coastal sites, has been traced to a small, open pit mine near Antofagasta.[5] It is tempting to interpret the brilliant red color of powdered hematite as representing blood and assume that it was intended somehow to benefit the corpse, but this does nothing to explain why only a certain kind of land snail shell was required for a receptacle. Probably, we shall never know with certainty why Andean land snails were linked with supernatural beliefs. All we can say is that

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[3] A reviewer has suggested the possibility that these snails were present as scavengers of organic material in a manner similar to the "grave snails" in Mid-East burial sites.

[4] To date, no plastic representations of land snails on objects dated either before or after the Moche IV interval have come to my attention, and we must wonder why snails were selected as a motif during this particular period.

[5] This "mine" is a small (2 x 3 m), shallow depression in an otherwise featureless desert surface near the base of Cerro Moreno. There are many scattered cobbles of discarded, off-color limonite surrounding a conspicuous flat anvil stone where the ocher was broken out and crushed. A very faint footpath terminates at this pit and can be traced a considerable distance across the desert in a northerly direction toward Cobija.

these beliefs varied through time and place. The technique of removing the columella to form a hollow receptacle seems to have been a trait restricted to northern Chile.[6]

Conclusions

Andean land snails have not been studied in detail by malachologists, and very few reliable field observations have been published. This is unfortunate because archaeologists are increasingly aware of the presence of such shells both as paleoenvironmental indicators and as artifacts.

In this paper, I have demonstrated that the presence of land snails in a hyperarid desert is not a paradox in spite of their substantial moisture requirements. They thrive only in the limited habitat of *lomas* vegetation when it is supported by winter fog, and estivate during periods of desiccation. Unusual events may suddenly displace these snails into hostile environments where they perish in great numbers. El Niño events provide anomalous moisture that may cause snails to proliferate, but the cohorts perish within a short time when normal conditions return and desiccation prevails.

Strong desert winds commonly create accumulations of empty shells in areas far removed from the natural habitat of the living snails. When this phenomenon is encountered in a stratigraphic context, it can lead to the mistaken conclusion that moist conditions once prevailed at the site of the excavation.

The anomalous distribution of land snails across impassible desert barriers and in other isolated sites is not a reflection of climatic changes that have stranded them in these locations. Their ability to perform long-term estivation and their accidental transport by camelids are factors that better explain these cases.

Andean land snails were involved in various forms of ceremonialism, used for personal adornments, and continue to be collected for use in magic rites. But there is no direct evidence that they were a prehistoric food item.

Modification of large land snails as ocher receptacles to accompany burials can be demonstrated in archaic graves in northern Chile. Since no local source of these snails can be identified, they may have been acquired through long-distance trade with the Atlantic coast of South America, where they are found in association with prehistoric sites.

References

Benson, Elizabeth P.
1972 *The Mochica: A Culture of Peru.* New York: Prager.

Craig, Alan K.
1968 *The Paracas Papers* 1(2). Boca Raton: Florida Atlantic University.
1985a A Speciation and Age Revision of the Atacaman Snail *Bostryx variabilis* Herm. *Quaternary Research* 23: 382-387.
1985b Cis-Andean Environmental Transects: Late Quaternary Ecology of Northern and Southern Peru. In *Andean Ecology and Civilization: An Interdisciplinary Perspective on Andean Ecological Complementarity*, edited by Shozo Masuda, Izumi Shimada, and Craig Morris, pp. 23-44. Tokyo: University of Tokyo Press.

[6] It is lamentable that the unscientific excavation methods and curatorial practices of LePaige prevent us from adding any information about the burial context of these snails, their relationship to other elements associated with the burials, or even the time interval of the practice as it occurred in the cemeteries of San Pedro de Atacama.

de Lavalle, José Antonio
1985 *Arte y tesoros del Perú, Culturas precolombinas: Moche.* Lima: Banco de Crédito.
Donnan, Christopher B.
1978 *Moche Art of Peru.* Los Angeles: Museum of Cultural History, University of California, Los Angeles.
Fernández, D.
1973 Catálogo de la malacofauna terrestre argentina. *Monografías Comisión Investigadora Científica Provincia de Buenos Aires* 4. Buenos Aires.
Kidwell, S.M.
1986 Taphonomic Feedback in Miocene Assemblages: Testing the Role of Dead Hardparts in Benthic Communities. *Palaios* 1: 239-255.
Lanning, Edward P.
1967 *Peru before the Incas.* Englewood Cliffs, NJ: Prentice-Hall.
Ossa, Paul P. and Michael E. Moseley
1972 La Cumbre: A Preliminary Report on Research into the Early Lithic Occupation of the Moche Valley, Peru. *Ñawpa Pacha* 9: 1-16.
Parodiz, J.J.
1957 Catalog of the Land Mollusca of Argentina. *The Nautilus* 70(4): 127-135, 71(1): 22-30, 71(2): 63-66.
Schade, Francisco H.
1973 The Snails and Mussels of the State of Guaira, Paraguay. In *Paraguay: Ecological Essays.* Miami: Academy of the Arts and Sciences of the Americas.
Tosi, Joseph A., Jr.
1960 Zonas de vida natural en el Perú. *Boletín Técnico* 5. Instituto Americano de Ciencias Agrícolas de la OEA, Zona Andina.

Figure 1. Modern snail hunter (note arrow) in depauperate montane forest, upper La Leche River Valley, northern Peru. Elevation: 2634 masl.

Figure 2. Large (note cm scale) Peruvian Strophocheilid tree snails, La Leche Valley, north Peru (first three on left), and Brazilian Bulimulid from coastal shell mound, Santa Catarina (extreme right).

Figure 3. Estivating *Scutalus* sp. (note pen pointer) on robust *Tillandsia* sp., summit of Cerro Reque (835 masl) near Chiclayo, northern Peru.

Figure 4. Cohort death assemblage of Scutalids in a *Tillandsia* community, summit of Cerro Reque, near Chiclayo, northern Peru. Note uniform size of the specimens.

Figure 5. A large (note pen for scale) terrestrial snail associated with prehistoric shell mounds (*sambaquis*), Santa Catarina Province, Brazil (see also Figure 2, extreme right).

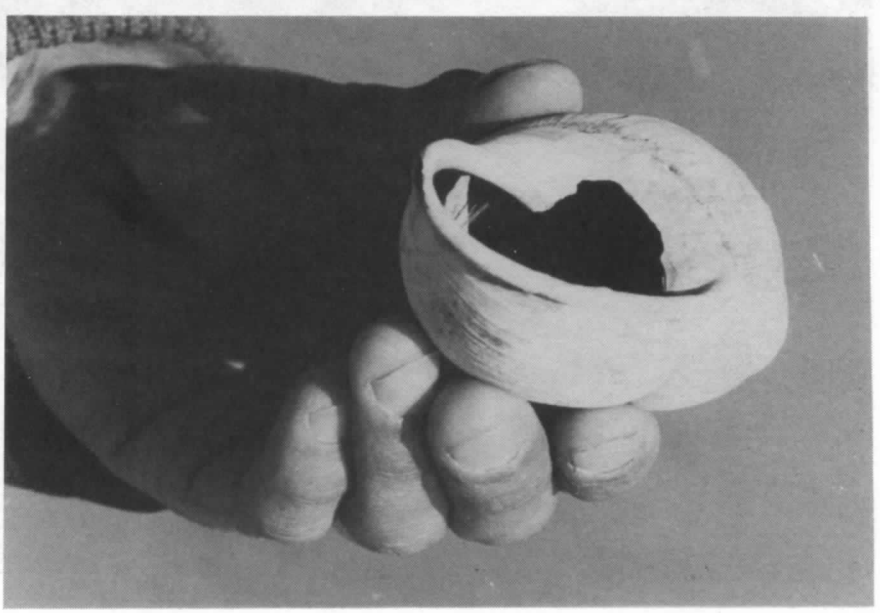

Figure 6. Land snail converted to ocher receptacle by removal of the central columella. From the LePaige excavations, San Pedro de Atacama, northern Chile.

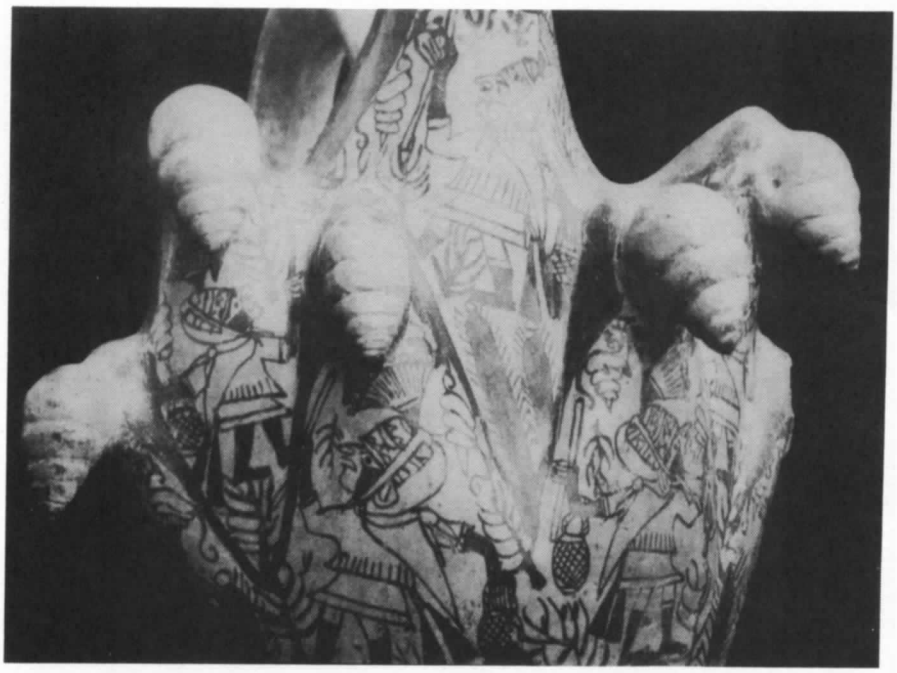

Figure 7. Mochica snail hunters dressed in regalia collecting tree snails by means of long sticks. Photograph courtesy of I. Shimada. Source: de Lavalle (1985).

Figure 8. Snails surrounding the feline deity Ai-Apaec. Photograph courtesy of I. Shimada. Source: de Lavalle (1985).