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Shell Remains from the Quebrada de Topará, Peru--Proyecto Topará, Instituto Arqueológico Alemán-KAVA

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Daniel H. Sandweiss (The University of Maine, daniels@maine.edu and **María del Carmen Sandweiss** (The University of Maine, maria.sandweiss@maine.edu) offer previously unpublished data on shell remains from the Quebrada de Topará collected in the 1980s.

INTRODUCTORY NOTE

In the mid-1980s, I (DHS) was working on my dissertation project at Lo Demás, a Late Horizon fishing site on the north side of the Chincha Valley (Sandweiss 1992) (Figure 1). At the same time, Wolfgang Wurster, from the German Commission for General and Comparative Archaeology (KAVA) in Bonn, was working in the Quebrada Topará, just north of Chincha (Wurster 1984 [1985], 1986, 1988). We met several times and, eventually, he asked my wife María and me to study the collections of shells he had recovered from sites in the Quebrada. Later, he asked for a report to include as a chapter in a planned book on his work in Quebrada Topará. Sadly, the book never materialized before Wolfgang passed away in 2003 (Prümers 2004). The manuscript reproduced below is that report, which bore a handwritten date of 4 March 1987. The version here is unchanged from the original except for: correcting some typos; adding a new Table 1 and changing the numbering of the original tables; adding accent marks (difficult in 1980s word processing); adding footnotes 1, 2, and 3, making the original footnote 1 footnote 4, making the table footnotes footnotes 5 and 6; adding references; and updating the molluscan species names *Donax peruvianus* to the precedent name *Donax obesulus*, *Protothaca thaca* to *Leukoma thaca*, *Thais chocolata* to *Thaisella chocolata*, and *Thais haemastoma* to *Stramonita haemastoma*. The following paragraphs of this introduction provide some relevant updates.

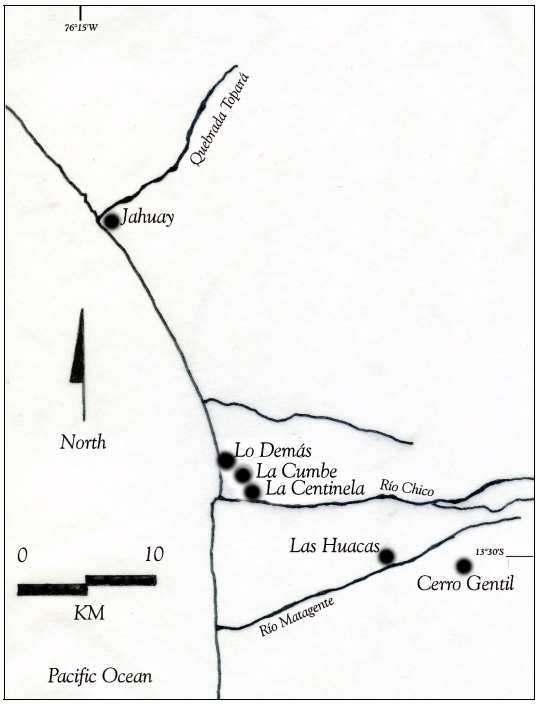

Figure 1: Sites and geographical features in Chincha mentioned in the text.

One of the key findings of the original report was the confirmation of other regional studies at the time, which showed that in archaeological sites of the Chincha Valley region, the predominant molluscan species was *Donax obesulus*, a small surf clam that can be easily fished in abundance using simple but effective technology (Sandweiss 2024). One of the unusual features of the Chincha archaeological record is that no sites predating the Initial Period (~3600–2800 cal BP) have been identified or studied, despite the resource richness of the valley and the presence of much older sites on the Paracas Peninsula just twenty-five kilometers to the south of Chincha. Table 1 summarizes data on the presence of mollusks at four of the Chincha

sites that have been reported since the original 1987 report (Cerro del Gentil, La Cumbe, Jahuay [at the mouth of the Quebrada Topará], and Las Huacas), along with data from Lo Demás and the combined Quebrada Topará survey and test excavation dataset. As in the Quebrada Topará sample, *Donax* was the predominant species at Jahuay (late Early Horizon/early Early Intermediate Period; Weinberg *et al.* 2022), Lo Demás (Late Horizon; Sandweiss 1992), and Las Huacas (Late Horizon; Dalton 2020). However, at Cerro del Gentil (Early Horizon; Zorogastúa *et al.* 2017), the earliest of these sites and the farthest from the shore, *Donax* accounted for less than two percent of the reported sample, while the small, intertidal, rock-dwelling mussel *Semimytilus algosus* was the most common species at ~68 percent. In the Early Horizon component of La Cumbe, close to Lo Demás and about 1.5 kilometers from the modern shore, *Semimytilus* was most abundant (~78 percent) while *Donax* was a distant second at ~4 percent (Aragonéz 2022). During the 1984 excavations at Lo Demás, we uncovered late Paracas rooms with abundant *Semimytilus* shells, adding to the number of Early Horizon sites at which this small mussel was the predominant molluscan species.

In the later sites, *Semimytilus* ranked second at Lo Demás (Sandweiss 1992), second in most contexts at Las Huacas (Dalton 2020), and fourth at Jahuay (Weinberg *et al.* 2022). Both *Semimytilus* and *Donax* are easy to collect in large quantities, and both recover quickly from El Niño events. At Lo Demás, *Donax* was the most abundant species, followed by *Semimytilus*. An interesting feature of the record in Sector I of the site was a strong predominance of *Donax* in the earliest stratigraphic complexes, with a reversal to *Semimytilus* predominance in the final stratigraphic complex (Sandweiss 1992). This paralleled a shift from anchovy (*Engraulis ringens*) to sardine (*Sardinops sagax sagax*) predominance that we now believe was related to an increased frequency of El Niño at about 1500 C.E. (Sandweiss *et al.* 2004). Shifting dominance of *Donax* and *Semimytilus* on both long and short temporal scales merits further attention.

A decade and a half after the Quebrada Topará work, a review of *Donax* and other mollusks through time from sites along the Peruvian coast led to the hypothesis that El Niño increased in frequency at the end of the Initial Period (Sandweiss *et al.* 2001, 2020). This change was reflected in the kinds of mollusks that were fished along the coast– north of 10° S, *Donax* become the most common species, while larger mollusks such as *Mesodesma* and *Choromytilus* disappeared. By the end of the Early Horizon, *Donax* had also become the major mollusk at least as far south as Chincha (~13.5° S). The Topará and Chincha data from the 1980s were in Dan's mind in developing this hypothesis, and the confirmed importance of *Donax* at more sites in Chincha (Table 1) is consistent with those data.

The new data also generally support the finding in the 1987 report that the diversity of mollusks in sites in this region decreases with distance from the shore (Table 1). As Bird *et al.* (2002) explain in their study of Australian shell middens and modern foragers, this pattern may be explained in part by trade-offs involving field processing of shell meat and transport costs of shucked and unshucked shellfish.

Patterns become apparent as data are compared and contrasted. Sometimes more data confirm the patterns we think we see, and sometimes more data lead to new interpretations. It is with this in mind that we present the 1987 report on the shell data from the Quebrada Topará.

ORIGINAL REPORT, 4 MARCH 1987

During field seasons in 1984 and 1985, members of the Proyecto Topará of the Instituto Arqueólogico Alemán-KAVA Bonn made surface collections of marine shells at eight sites in the Quebrada de Topará, 13°20' south latitude (Wurster 1984 [1985]). During the 1986 season, Topará Project personnel excavated at two sites in the Quebrada (Wurster 1986). The authors of this report analyzed the shell remains from the surface collections and the excavations; the results of this analysis are presented in the following report.

Methodology

For each surface collection or excavation unit, the authors first identified the shell remains according to genus and/or species, then counted the MNI (Minimum Number of Individuals, see Sandweiss 1982:212) and weighed the shell material for each taxon. The surface collections represent a very preliminary assessment of the molluscan remains potentially present at the sites, as they were collected from the surface in an adventitious manner during survey and mapping work. Given the nature of the surface samples, relative frequencies of the different species within and between sites cannot be assessed accurately. Only presence/absence will be reported here, and it must be kept in mind that species not encountered in the study samples may well be present at the sites, either in areas that were not collected, or in unexposed subsurface deposits. The frequency data for the shells from the two excavations are more reliable indicators of real frequencies at the sites. However, one of the excavations was made in a tomb structure and probably does not represent a primary deposit (see Sandweiss 1982:213–214 for a discussion of primary and secondary midden deposits), while the other excavation was quite small and was made in pits of uncertain origin. Surface collections were not made at the two excavated sites, so direct comparison of shell frequencies from surface collection and excavation units are not yet possible. Better information on shell remains from the Quebrada de Topará sites will come from excavations of primary midden from habitation sites planned for future seasons (Wurster 1986:19).

Surface Collections

The shell data from surface collections at eight Quebrada de Topará sites are summarized in Table 2. The sites are ordered in this table by distance from the sea, which also correlates with altitude above sea level. There is an apparent variation in species diversity between these sites, with the greatest diversity (Sites T7, T19, and T34) occurring between 14 and 17 kilometers from the shore, at altitudes ranging from 350 to 470 meters above sea level. Two sites (T2 and T4) within this range show the decreased diversity characteristic of the three sites (T46, T50, and T55) furthest from the sea at the highest altitudes. Two of the high-diversity sites (T7 and T34) were collected on two separate occasions, and at T7, the second collection was pulled from an eroding midden deposit. This collection procedure may have biased the results presented in Table 2. Furthermore, at this writing, no dates are available for the sites, so the observed variation in species diversity, if real, could reflect chronological, functional, and/or preferential differences. With all of these caveats in mind, we can state as a working hypothesis that the diversity of species transported inland in the Quebrada de Topará decreases with distance from the shoreline. This proposition can be tested through the analysis of mollusks from controlled excavations of habitation midden at sites located at various distances from the shoreline, such as those planned for future seasons of the Proyecto Topará. Chronological placement of the sites is also necessary, so that contemporaneous sites can be compared

to one another and to other groups of sites from different time periods, in order to discern both synchronic and diachronic variation. As discussed in the following section, the two excavations carried out in 1986 provide a partial and ambiguous test of the distance/diversity hypothesis.

Excavations

Excavations were carried out at two sites, T43 and T46, during the 1985 field season. At T 43, two small, rectangular pits associated with a low wall were excavated (Hernán Carrillo, personal communication). Two hearths were found in one level of one of the pits, but it is unclear if the deposits are primary midden. The pits contained few shell remains, totaling only 33 grams and 27 individuals (Table 3). Of the eight species present, *Donax* and *Semimytilus* predominate. T43 lies about 19 kilometers from the shoreline and would fit at the far end of the high diversity group defined from the surface collections, both in altitude and distance from shore and in the number of species present (see above and Table 2). No date is available for this site.

At Site T47, Topará Project personnel excavated a tomb that had previously been looted (Wurster 1986:19). Although several levels were defined during the excavation, the whole structure was built during one phase of construction. Therefore, although the shell material was initially analyzed by area and level, only summary data for the entire excavation are presented here (Table 4). The context for most of the remains was construction fill of unknown date. However, Wurster (*ibid.*) states that "la cerámica pintada pertenece al período de la cerámica Chincha-Ica a principios del período Intermedio Tardio", while a standing human figurine had late Middle Horizon characteristics. The tomb probably dates to the Late Intermediate Period, but the fill may be slightly earlier. Some of the remains, notably a shell bead and worked fragments of imported, warm-water *Spondylus* shell, were apparently part of the grave goods associated with the occupant of the tomb. Overall, the amount of shell material from the T47 excavation is not large (179.0 grams, 164 individuals). As at T43, the two dominant species were *Donax* and *Semimytilus*, but at T47, *Semimytilus* enjoyed a clear superiority.

T47 lies 20.5 kilometers from the shoreline. However, despite this geographic location at the near end of the low diversity group defined by the surface collections (see above and Table 2), T47 has a greater species diversity than any other site recorded in the Quebrada Topará. This fact suggests that the observation in the surface collections of decreasing diversity correlated with increasing distance from the shoreline is a product of collection procedure, and argues for caution in the analysis of molluscan surface collections.

Discussion

In the Quebrada de Topará surface collections, only one species of mollusk, *Donax obesulus*, was found at all of the sites. Along with *Semimytilus algosus*, *Donax* was the most common species from the excavation at T43. *Donax obesulus* ranked second in the excavated material from T47. This small clam lives in the subtidal zone in sandy beaches such as the beach at Jahuay, where the Quebrada de Topará reaches the shore (see Table 5). Of the next two most common species in the surface collections, *Mesodesma donacium* lives at a slightly greater depth in the same environment. *Semimytilus algosus,* a small mussel, lives in the intertidal zone on rocks such as may have been found at the mouth of the Quebrada. *Semimytilus* was the most common species at T47 and, along with *Donax*, at T43. The majority of the other, less common species are rock-dwellers. All of the

species, with the exception of *Spondylus*, are indigenous to the cold waters of the Peruvian coast. *Spondylus* comes from the warm waters of Ecuador, and was extensively traded in the Andes in Pre-Columbian times (*e.g.*, Paulsen 1974). The Quebrada de Topará *Spondylus* came only from the excavations in the tomb at T47; no whole valves were found, and most of the recovered pieces had been worked. As Wurster (1986:19) points out,

> El hallazgo de restos de *Spondylus* trabajado en la tumba confirma para la zona de Topará por primera vez la importación de estas conchas a base de hallazgos arqueológicos.[1]

The Donax Hypothesis

Donax obesulus, the most common species in the Quebrada de Topará sites, is ubiquitous in the later sites in the neighboring Chincha Valley, for instance at the Late Horizon site of Lo Demás (Sandweiss 1983:40, 1985a; Rodríguez H. 1984). The antiquity of extensive *Donax* use in the Chincha-Topará region is unclear; Wallace (1971:41) mentions one site in Chincha, PV 57-51, at which he collected "conchas (algunas almejas, la mayoría pequeñas)".[2] These small clams are surely *Donax*. The principal exposed midden layer at this site has Early Horizon Paracas Cavernas sherds, but pottery dating as late as the Late Intermediate Period Chincha Tardío phase is also present, so the site does not provide clear evidence for Early Horizon *Donax* use. It would be instructive to know which species were recovered from the Early Horizon sites of Jahuay (Lanning 1960: 394–398),[3] at the mouth of the Quebrada de Topará, and San Pablo (Lanning 1960:412–414; Wallace 1971:42), on the southern side of the Chincha Valley.

On the North Coast of Peru, *Donax* does not become common until the Early Intermediate Period (Pozorski 1976, 1979). On the Central Coast, *Donax* were completely absent at the Initial Period site of Garagay (Sandweiss 1982) and at earlier, Preceramic Period sites in the Ancón/Chillón region, such as El Paraíso (Sandweiss 1985b) and sites around Ventanilla Bay (Moseley 1968, 1975). As early as 1954, R. Tucker Abbott of the Smithsonian Institution commented on "the absence of the smaller species of clam" at the Tank Site in Ancón (quoted in Willey and Corbett 1954:142). This site was occupied from the Late Preceramic Period through the Early Horizon, and more recent excavations there have confirmed the absence of *Donax* (Moseley 1968, 1975). In the Chancay Valley, just north of Lima, Sandweiss (unpublished data, 1980) did not find any *Donax* shells in midden excavated by Rogger Ravines and Daniel H. Sandweiss at the Early Intermediate Period Lima Phase 7 (see Patterson 1966) site of Pampa San Juan. Several valleys further north, in Supe, Feldman (1980: Appendix II) found minimal traces of *Donax* in Late Preceramic contexts at Aspero. In the Huarmey Valley, north of Supe, Bonavia (1982: Cuadro 24, p. 385) reports very small amounts of *Donax* in in the Preceramic Period site of Los Gavilanes (PV 35-1) and in two Middle Horizon sites (PV 35-4 and PV 35-5). In the Chilca Valley, to the south of Lima, *Donax* were absent at the Preceramic Period sites such as Chilca Village 1 (Donnan 1964) and Paloma (Reitz 1985). Data on molluscan species from later Chilca sites are not available.

[1] The discovery of worked *Spondylus* remains in the tomb confirms, for the first time, the importation of these shells for the Topará zone, on the basis of archaeological finds.

[2] Some clams, the majority small.

[3] Weinberg *et al*. (2022) report that *Donax* is the most abundant species at Jahuay in the Early Horizon/Early Intermediate Period deposits (see Table 1).

From this brief survey of the distributional data on *Donax obesulus*, it would appear that *Donax* is only found in any quantity in sites dating after the Early Horizon. It may never have been collected along the Central Coast. On the South Coast, around Chincha and Topará, *Donax* was common in late sites, but there is no unequivocal evidence for its use prior to the Late Intermediate Period.

The other principal molluscan species found during the Topará survey are common occurrences in sites of all periods on the Central and South-Central coasts of Peru. Nevertheless, based on the ubiquity of *Donax*, we would propose as a working hypothesis that the Quebrada de Topará sites where the shell samples were collected are all late, almost certainly more recent than the Early Horizon, and probably dating to the Late Intermediate Period and the Late Horizon. In this context, it is important to note that the one dated Quebrada de Topará site (T47) has both a Late Intermediate Period date and a significant proportion of *Donax*. For the other sites, analysis of associated ceramics and/or carbon-14 analysis of associated organic material, or of the shells themselves, should provide adequate tests of this hypothesis, though it is possible that shells found on the surface of the site were dropped there after the site was abandoned. Molluscan remains from excavation contexts, such as those from T47, are necessary for final confirmation of the *Donax* hypothesis.

Conclusions

A total of twenty molluscan taxa were identified in the remains collected from the surface of eight sites and excavated from deposits at two sites in the Quebrada de Topará.[4] Although the nature of the samples does not permit strong inference, our analysis has suggested two working hypotheses that can be tested through continued field research:

1) *The number of molluscan species transported inland decreases with distance from the shore*. If this hypothesis is proven correct, factors influencing the selection of species for long-distance transport could have included availability, preservability (the length of time that the meat remains edible), and the ratio of meat weight to shell weight. These factors can be assessed through experiments on modern mollusk specimens; some experimental data have already been collected (Sandweiss 1979, 1985b). However, cultural preference may also have influenced selection for transport, and this factor is much harder to identify in the archaeological record.

The distance/diversity hypothesis was originally formulated from the surface collection data. The shell data from the two excavated sites in Topará are equivocal in regards to this hypothesis: T43 fits within the pattern discerned from the surface collections, while T47 deviates from the pattern and suggests that the correlation of decreasing diversity with increasing distance from the shore is more apparent than real.

2) *The presence of* Donax obesulus *in Quebrada de Topará sites may be an indicator of late prehistoric date in the Quebrada de Topará*. Dating of the sites by independent methods will test this hypothesis; for the moment the one dated site, T47, provides support for the late dating of *Donax*-bearing sites in the Quebrada de Topará.

[4] *Balanus* spp. (barnacles) are crustaceans, though they are often found associated with mollusks, both naturally and in archaeological sites.

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Site	***Cerro del Gentil (EH) Zorogastúa et al. 2017***	***La Cumbe (EH) Aragonéz 2022***	***Jahuay (late EH-early EIP) Weinberg et al. 2022***	***Q. Topará sites (LIP?) This report***	***Lo Demás (LH) Sandweiss 1992***	***Las Huacas (LH) Dalton 2020***
Distance from shore	17 km	~ 1.5 km	<1km	variable	<1km	9 km
Species:						
Donax obesulus	X	X	X (most abundant, ~94%)	X (most abundant)	X (most abundant, ~49%)	X (most abundant, ~90%)
Mesodesma donacium		X	X	X	X	
Leukoma thaca		X	X	X	X	X
Mulinia edulis	X	X	X	X	X	X
Euromalea rufa		X	X		X	
Petricola dentata		X			X	
Semimytilus algosus	X (most abundant, ~68%)	X (most abundant, ~80%)	X	X		X
Perumytilus purpuratus			X	X	X	
Brachidontes sp.	X		X			
Aulacomya ater	X	X	X	X	X	
Choromytilus chorus	X	X	X	X	X	X
Argopecten purpuratus	X	X	X		X	
Stomonita delessertiana			X			
Thaisella chocolata		X	X	X	X	
Stramonita haemastoma		X		X		
Thais spp.	X			X	X	
Xanthochorus sp.		X (*X. buxea*)	X			
Concholepas concholepas		X	X	X	X	X
Prisogaster niger	X	X	X	X		X
Tegula atra	X	X	X	X	X	
Tegula euryomphala	X	X				
Tegula tridentata	X					
Crepipatella spp.	X (*C. lingulata*)	X (*C. dilatata)*	X	X	X	
Acmaea spp.					X	
Fissurella spp.	X	X (*F. peruvianus*)	X		X	
Acanthina crussilabrum		X				
Aeneator sp.			X			
Mitrella buccionides		X	X			
Filifusus filamentosus			X			
Nassarius sp.		X (*N. dentifer*) X (*N. gayi*)	X			
Mitra orientalis			X			
Oliva sp.				X	X	

... cont'd.

Table 1. Molluscan data from five sites in or near Chincha and summary data on mollusks from the Topará sites reported here.

Site	***Cerro del Gentil (EH) Zorogastúa et al. 2017***	***La Cumbe (EH) Aragonéz 2022***	***Jahuay (late EH-early EIP) Weinberg et al. 2022***	***Q. Topará sites (LIP?) This report***	***Lo Demás (LH) Sandweiss 1992***	***Las Huacas (LH) Dalton 2020***
Distance from shore	17 km	~ 1.5 km	<1km	variable	<1km	6 km
Species:						
Calyptraea trochiformis/ Trochita trochiformis	X	X	X		X	
Polinices uber			X		X	
Xanthidae						X
Spondylus sp.				X	X	
Scutalus sp.	X		X	X	X	
Chiton					X	
Balanus spp.	X		X	X	X	
Total marine mollusk species	***15***	***24***	***25***	***n/a***	***21***	***7***

Table 1. Molluscan data from five sites in or near Chincha and summary data on mollusks from the Topará sites reported here.

Site	***T2***	***T4***	***T7***	***T19***	***T34***	***T46***	***T50***	***T55***
Distance from shore	14 km	14.5 km	14 km	16 km	17 km	20.5 km	21 km	25.5 km
Altitude	350 m	390 m	350 m	460 m	470 m	700 m	720 m	880 m
Donax obesulus	X	X	X	X	X	X	X	X
Mesodesma donacium			X	X	X		X	
Leukoma thaca			X					
Mulinia edulis			X	X	X			
Semimytius algosus		X	X	X				X
Perumytilus purpuratus			X		X			
Aulacomya ater	X		X	X	X			
Choromytilus chorus			X					
Thaisella chocolata			X	X				
Concholepas concho-lepas			X					
Prisogaster niger			X					
Crepipatella spp.			X	X				
Balanus spp.			X		X			

Table 2. Molluscan species from surface collections at sites in the Quebrada de Topará.

Species	***Weight***	***% Weight***	***MNI***	***% MNI***
Donax obesulus	13.8	42.2	8(1)	29.6
Mesodesma donacium	0.5	1.5	1(1)	3.7
Mulinia edulis	0.1	0.3	1(1)	3.7
Semimytius algosus	13.9	42.1	13	48.1
Perumytilus purpuratus	0.3	0.9	1(1)	3.7
Choromytilus chorus	3.8	11.5	1(1)	3.7
Unidentified gastropod	0.3	0.9	1(1)	3.7
Scutalus spp.	<0.1	-	1(1)	3.7
Balanus spp.	0.3	0.9	-	-

Table 3: Total shell remains from Site T43. Numbers in parentheses refer to whole valves. Scutalus *is a land snail.* Balanus *is a crustacean and not technically a mollusk.*

Species	*Weight*	*% Weight*	*MNI*	*% MNI*
Donax obesulus	38.7	21.6	26(2)	15.9
Mesodesma donacium	6.2	3.5	4(3)	2.4
Leukoma thaca				
Mulinia edulis	8.5	4.7	6(1)	3.7
Semimytius algosus	61.6	34.4	94(1)	57.3
Perumytilus purpuratus	2.1	1.2	6(3)	3.7
Aulacomya ater				
Choromytilus chorus	8.4	4.7	5(4)	3
Thaisella chocolata	0.9	0.5	1(1)	0.6
Thais haemastoma	6.3	3.5	3(1)	1.8
Thais spp.	0.1	<0.1	1	0.6
Concholepas concholepas				
Prisogaster niger	1.4	0.8	6	3.7
Tegula atra	2.2	1.2	2	1.2
Crepipatella spp.	0.2	0.1	1	0.6
Oliva sp.	1.9	1.1	1(1)	0.6
Calyptraea trochiformis	0.1	<0.1	1	0.6
Spondylus sp.	31.6	17.7	4(4)	2.4
Unidentified fragments	1.3	0.7	-	-
Unidentified clam	1.1	0.6	1(1)	0.6
Unidentified bivalve	2.4	1.3	1(1)	0.6
Scutalus sp.	<0.1	-	1(1)	0.6
Balanus spp.	3.8	2.1	-	-
Shell bead	0.2	0.1	-	-

Table 4. Total shell remains from Site T 47. Numbers in parentheses refer to whole valves. Scutalus *is a land snail.* Balanus *is a crustacean and not technically a mollusk.*

Species	*Substratum*	*Shore Zone*	*Common name*
Donax obesulus	sand	subtidal	marucha, mejillón
Mesodesma donacium	sand	lower subtidal	macha
Leukoma thaca	sand	subtidal	almeja
Mulinia edulis	sand	subtidal	almeja
Semimytius algosus	rock	lower intertidal	chorito
Perumytilus purpuratus	rock	upper intertidal	chorito
Aulacomya ater	rock	subtidal	choro
Choromytilus chorus	rock	subtidal	choro zapato
Thaisella chocolata	rock	subtidal	caracol
Thais haemastoma	rock	subtidal	caracol
Thais spp.	rock	subtidal	caracol
Concholepas concholepas	rock	intertidal/subtidal	loco, pata de burro
Prisogaster niger	rock	intertidal	caracol turbante
Tegula atra	rock	intertidal	caracol turbante
Crepipatella spp.	rock	intertidal	pique
Oliva sp.		subtidal	-
Calyptraea trochiformis	rock	intertidal/subtidal	-
Spondylus sp.[5]	rock	subtidal	mullu
Scutalus sp.	land	lomas	caracol de tierra
Balanus spp.[6]	rock, other shells	intertidal/subtidal	pico de loro

[5] Unlike the other species found in the Quebrada de Topará sites, all of which are cold-water, Peruvian taxa, *Spondylus* is a warm-water species from Ecuador.
[6] *Balanus* (barnacles) are crustaceans, not mollusks.

Table 5. Habitats of mollusks from sites in the Quebrada de Topará.