

## BIVALVES AND GASTROPODS IN THE GULF OF CALIFORNIA: TAKING STOCK ON THE SHORELINES

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*Recent analyses of marine faunal remains on the Gulf of California have revealed which resources sustained human settlement, how they were used, and in what proportions. Bivalves and gastropods showed a balance between species from sandy beach and rocky habitats. Some species with broken shells showed clear evidence of use as food resources, while other shells had flaked edges. In addition to mollusks, resources such as fish were exploited and showed evidence of exposure to fire.*

Undoubtedly, the Gulf of California represents one of the most productive bodies of water, hosting a high diversity of animal species. Among those represented are all taxonomic levels, from invertebrates to higher vertebrates. These resources, which in some cases are easily procured, represented the main economic focus for groups living on the Gulf's shores. Those groups primarily exploited organisms from low-energy environments and ones whose procurement represented a minimal expenditure of effort, as in the case of mollusks and other invertebrates that are stationary or relatively immobile. However, in some cases, it was necessary to develop procurement techniques, such as, perhaps, nets, fishhooks, or even harpoons, to get resources whose capture required a greater investment, such as fish, birds, and some mammals.

The coasts of the Gulf of California were not only attractive for local groups. They also attracted the attention of other groups living beyond these limits. Some of the products taken from the Gulf's waters can be seen today in the heights of the Sierra Juárez (Guía-Ramírez 2005, 2006; Guía-Ramírez and Oviedo-García 2009), in the Great Basin, in Arizona, and in Utah (Bennyhoff and Hughes 1987; Vokes 1987). In addition to food resources, products extracted from the Gulf were desirable as raw materials for manufacturing a variety of artifacts and ornaments, such as beads, bracelets, and pendants, among other things made from shell (Mitchell and Foster 2000; Koerper 1996; Vokes 1987). This shows that these waters' shells acquired an important value, which stimulated relationships and trade between different groups.

The data that are presented here are the results of an archaeozoological project based on the archaeological work undertaken by Antonio Porcayo Michelini at a shell midden to the south of the town of San Felipe. The patterns and frequencies of species present were determined, which in some cases show clear evidence of their use in human activities.

### DESCRIPTION OF MALACOLOGICAL SPECIES

A total of 7,834 faunal elements were identified from two tests units. Of these, 71 percent were bivalves, 18 percent were gastropods, and 11 percent were other faunal remains (Figure 1)

A total of 72 taxonomic groups were recognized. The most diverse group was the gastropods, which accounted for the largest number of species, while the bivalves accounted for the largest number of organisms per species. The species *Glycymeris gigantea*, *Ostrea angelica*, *Cardita affinis*, *Turbo fluctuosus*, and *Cerithium stercusmuscarum*, the genera *Ostrea* and *Crepidula*, and the family Muricidae stand out as major components in this deposit (Figure 2). *Glycymeris gigantea* is characterized by strong, solid shells with a porcelain-like texture. These animals are found in shallow waters, on sandy substrates, below low tide, and they are collected by dredging or diving. Other species such as *Ostrea angelica* and

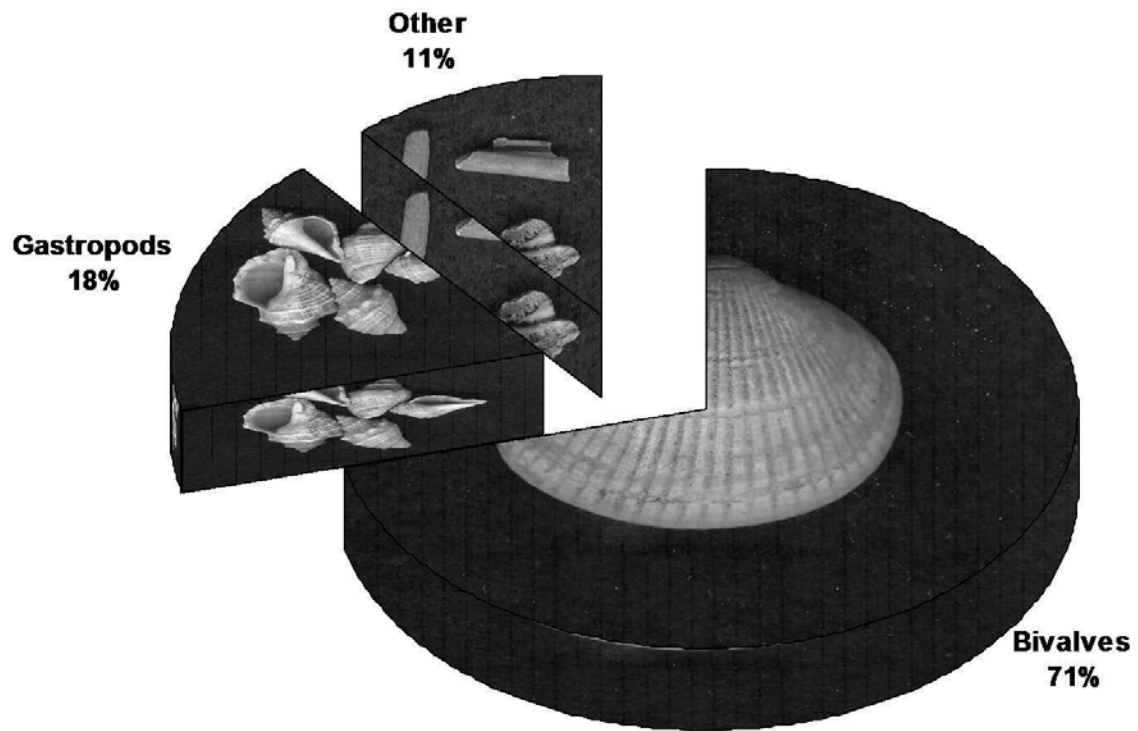


Figure 1. Percentages of mollusk groups.

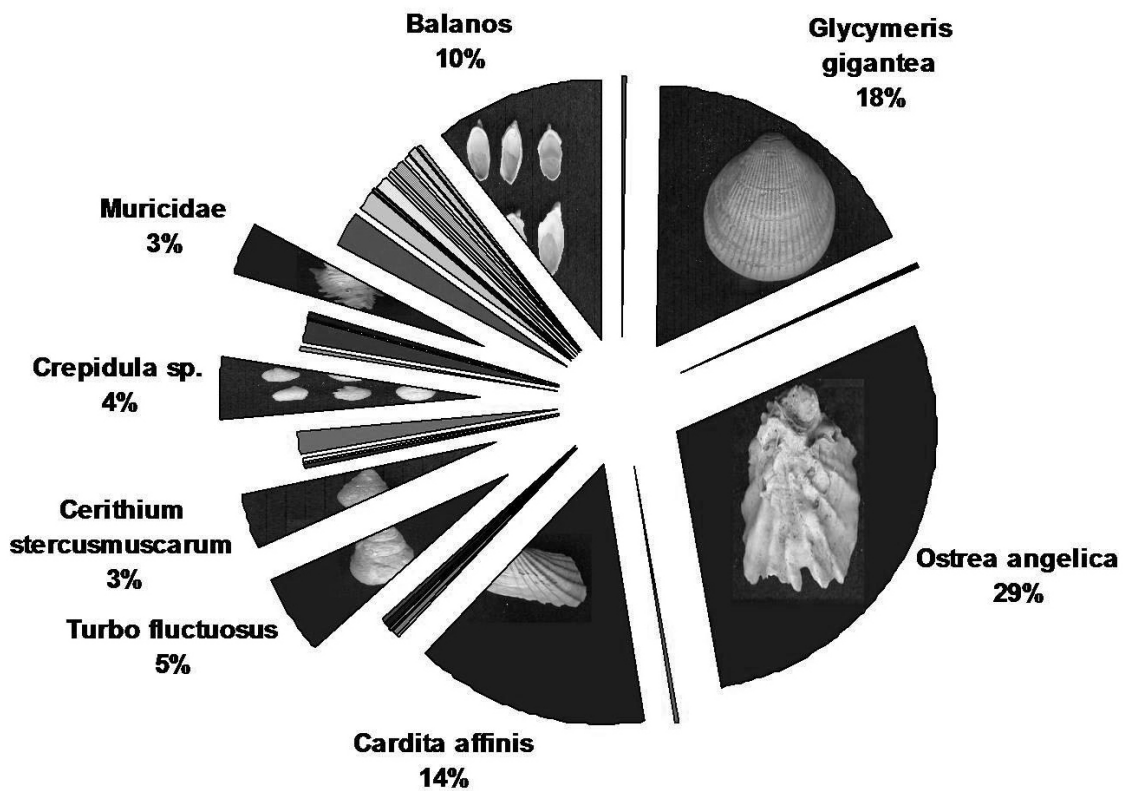


Figure 2. Percentages of principal shellfish species.

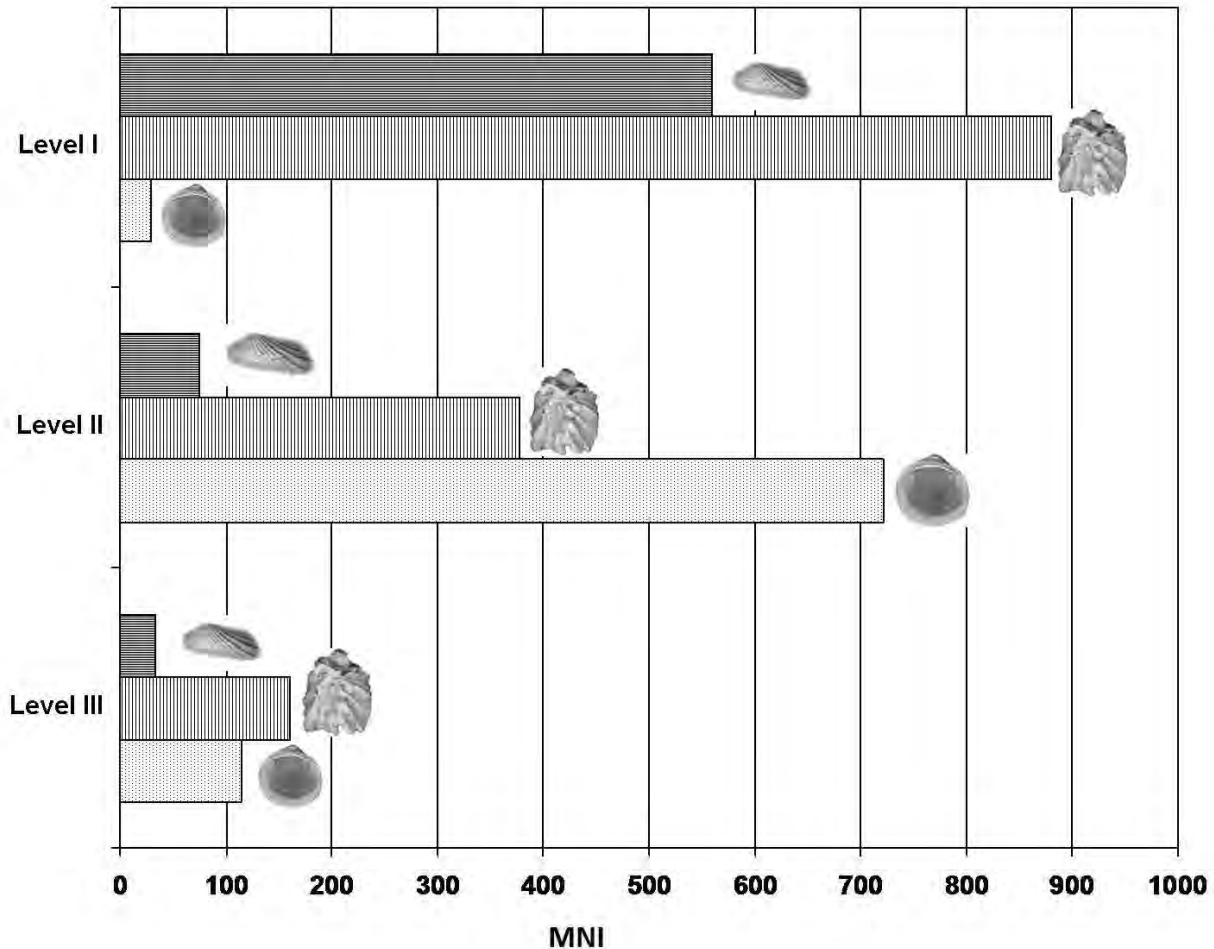


Figure 3. Change through time of three species of mollusks.

other *Ostrea* species, *Cardita affinis*, *Turbo fluctuosus*, *Cerithium stercusmuscarum*, the genus *Crepidula*, and the family Muricidae are preferentially found on rocky substrates, in the intertidal zone, and they are easy to collect. Most of them can readily be observed today, attached to rocks on the shorelines.

### CHANGES THROUGH TIME

A change in the species composition through time was seen, with diversity greater in the deeper levels and decreasing toward the surface. This contrasts with the number of individuals in the major species, which was less in the deeper strata and increased toward the surface. In regard to the three main species, *Cardita affinis*, *Ostrea angelica*, and *Glycymeris gigantea*, it was seen that their numbers were lower in deeper than in shallow levels (Figure 3). However, in the deepest level, the species *Ostrea angelica*, associated with a rocky environment, outnumbered the species *Glycymeris gigantea*, from a sandy environment. This situation changed radically toward the middle stratum, where there was a change in the proportions and the numbers of these species. *Glycymeris gigantea* visibly predominated over *Ostrea angelica* and *Cardita affinis*, both associated with rocky environments. This situation reverted back again in the uppermost strata. This showed an alternation through time between species associated with sandy and rocky substrates.

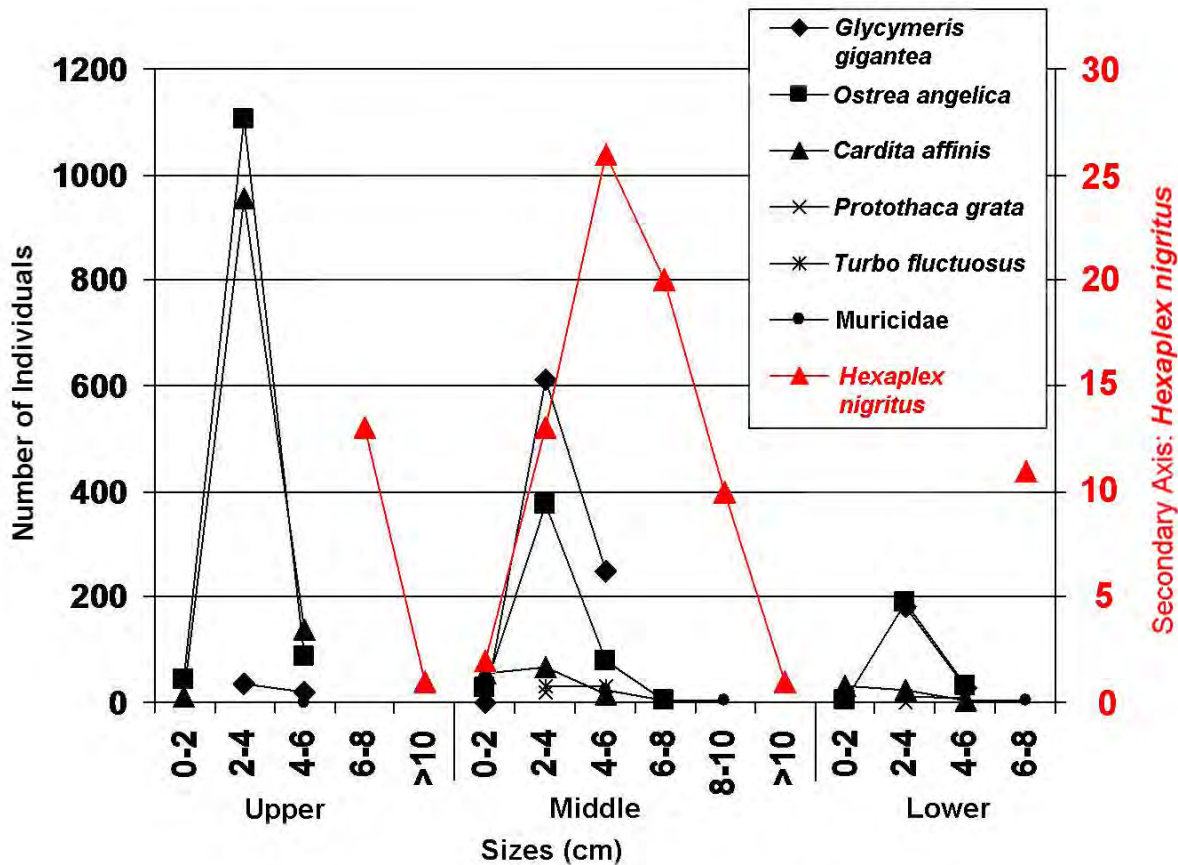


Figure 4. Sizes of the most common mollusks.

### SIZES OF MALACOLOGICAL SPECIES

With respect to recorded sizes, the most common size range was between 2 and 4 cm. The most common species in that range were *Ostrea angelica*, *Cardita affinis*, and *Glycymeris gigantea*. There was not any change in size through the stratigraphic levels. It is interesting to note that for the species *Hexaplex nigritus*, in the deepest level the sizes were exclusively in the range between 6 and 8 cm. In the succeeding stratum, this species was present in practically all sizes, from between 0 and 2 cm up to greater than 10 cm. The most common sizes were between 4 and 6 cm and between 6 and 8 cm. In the highest stratum, a predominance of the size range between 6 and 8 cm returned, with a few individuals larger than 10 cm (Figure 4).

### HUMAN MODIFICATIONS

As to modifications, the most common was exposure to fire, although that was infrequent. This was not a standard way of processing mollusks, or at least it was not a common practice. Although the species that was most often affected was *Glycymeris gigantea*, it was not possible to establish a pattern in consumption based on demonstrated modifications. On some valves, scars on the posterior edge were recognized, produced in order to separate the valves, although it is necessary to point out that few shells showed this, and always on this species. In the case of the gastropods, shells of the family Muricidae and the species *Hexaplex nigritus* and *Oliva incrassata* were broken by blows, which suggests that the breakage was done intentionally to get the animal, and primarily for food (Figure 5).

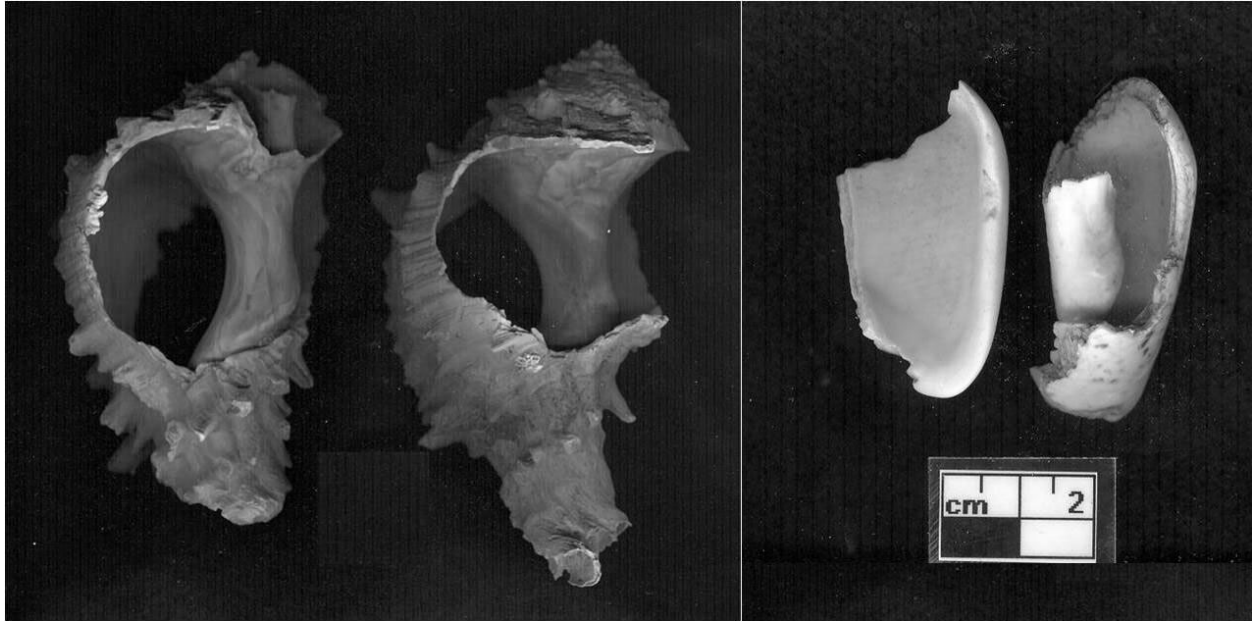


Figure 5. Modifications of *Hexaplex nigrilus* and *Oliva incrassata*.

In the case of large, thick shells, mostly of the species *Dosinia ponderosa*, evidence of flaking on the surface was found, probably with the aim of creating a cutting edge (Figure 6).

#### OTHER REMAINS: VERTEBRATES

Other elements that were fewer in number, but not necessarily less important, were those from vertebrates. One hundred and seventy-eight pieces of bone were recovered from the site, of which 95 percent were assigned to the Teleostei, or fish. They were identified to the subfamily Epinephelinae, the family Sciaenidae, the species *Totoaba macdonaldi*, the family Labridae, the genus *Halichoeres*, and the family Scombridae with the species aff. *Scomber japonicus* and aff. *Scomberomorus sierra*. These fish correspond to varied environments, from endemics like the totoabas to pelagic species that maintain a limited connection with the coast, as in the case of the scomberids. Some of these show clear evidence of modification by exposure to fire, mostly what is called calcining, which suggests human activity in processing food.

The remaining 5 percent is made up of organisms like turtles, which are presumed to represent marine environments based on the characteristics of their carapaces. Also represented are terrestrial mammals of the Leporidae and Sciuridae families and the order Rodentia. For both the turtle and mammal remains, we did not succeed in determining their function within this context, because we did not see any modification of the elements.

#### FINAL COMMENTS

From the results presented, it is possible to establish the following proposition. The analyzed deposit shows the species that were susceptible to being exploited by the inhabitants who came to the coasts of the Gulf of California in order to get the economic resources that allowed them to survive. It shows that marine resources became predominant over resources that were obtained in the interior.

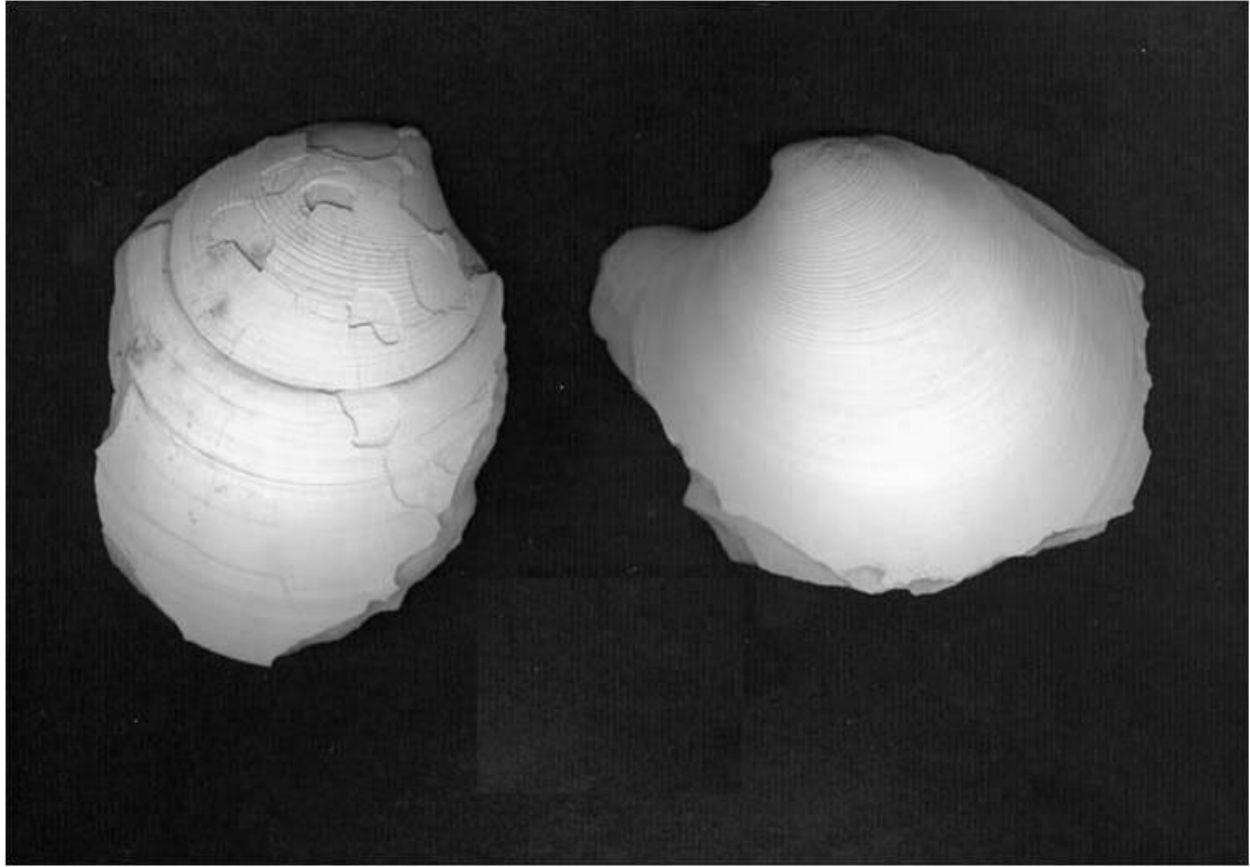


Figure 6. Modifications of *Dosinia ponderosa*.

#### REFERENCES CITED

- Bennyhoff, James A., and Richard E. Hughes  
1987 Shell Bead and Ornament Exchange Networks Between California and the Western Great Basin. *Anthropological Papers of the American Museum of Natural History* 64:79-175.
- Guía-Ramírez, Andrea  
2005 Human-Faunal Relationships in Northwestern Baja California. *Proceedings of the Society for California Archaeology* 18:274-280.  
2006 Coastal and Mountain Resources Use among Semi-nomadic Groups of Baja California, México. Abstracts from the Meeting of the International Council for Archaeozoology (ICAZ), Mexico City.
- Guía-Ramírez, Andrea, and Fernando Oviedo-García  
2009 Los antiguos bajacalifornianos y sus viajes de las costas a la montaña. *Revista CAREM* 6:16-21.
- Koerper, Henry C.  
1996 A *Glycymeris* Shell bracelet from Orange County, California, *Pacific Coast Archaeological Society Quarterly* 32(2-3):82-109.
- Mitchell, D. R., and M. S. Foster  
2000 Hohokam Shell Middens along the Sea of Cortez, Puerto Peñasco, Sonora, Mexico. *Journal of Field Archaeology* 27:27-41.

Vokes, A. W.

- 1987 Shells Artifacts. In *The Archaeology in the San Xavier Bridge Site, Tucson Basin, Southern Arizona*, edited by John C. Ravesloot, pp. 251-269. University of Arizona, Arizona State Museum, Cultural Resources Management Division Archaeological Series No. 271. Tucson.