Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

1

THE ARCHAEOLOGY OF SHELL MATRIX SITES

Molluscs have served humans in numerous ways for thousands of years. Many gastropod and bivalve species have been modified into ornaments, tools, and money. Shells left in archaeological sites attest to the use of the flesh for human food and for bait, and to the search for pearls. Shells have been used as fill, building material, burial layers, and containers; they have been treated to extract their color; cut up for inlay, cameos, buttons, beads, trinkets, pearl nuclei; and crushed for pottery temper, poultry feed, medicine, and fertilizer. Archaeologists have been interested in shell artifacts and shell matrix sites for over 200 years. We have determined when the shells were harvested, the growth environment, past cataclysmic environmental events, the stretch of coastline whence trade shells originated, the contribution of shellfish to the diet, and human competition with other predators, by analyzing shells. In this chapter, I will explore anthropological and archaeological knowledge about human use of shellfish by presenting archaeological data on the antiquity of shellfishing and the uses of shell and flesh, and by presenting the history of archaeological interest in this material. I will also present a number of different research topics that shells can be used to address and the potential shells have for generating research topics as well.

1.1 A brief archaeological history of human use of molluscs

Although hominids have been present on earth for over 3 million years, our interest in shelled creatures appears to be relatively recent. The 300,000-year-old French site of Terra Amata has the earliest evidence both of housing and of shell collecting (Lumley 1972:37) but shells at even this relatively late date in human development are uncommon elsewhere in France and the world. Several South African cave and open air sites have a shell matrix dating from 130,000 to 30,000 years ago (Singer and Wymer 1982, Volman 1978). Spain's Cantabrian coast has deposits of shells as do several locales around the Mediterranean (Gibraltar, Haua Fteah in Libya) dating to the period 50,000 to 40,000 years ago. There are numerous deflated sites with freshwater shells in southern Egypt as early as 22,000 BC (Gautier 1976). In Asia, the earliest shell matrix sites are to be found on the Viet Nam coast, part of the Shonvi culture, dated 33,000 to 11,000 years ago. In the Lake Mungo area of Australia (western New South Wales), piles of freshwater

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

shells associated with human occupation are as old as 35,000 years (Meehan 1982).

The majority of shell-bearing sites worldwide – freshwater or marine – appeared during the Holocene (the past 10,000 years), when sea level rise, which eroded and inundated earlier shell-bearing sites, slowed considerably and modern shorelines were established allowing for quiet water habitats to form and river siltation to slow. The Hoabinh culture of Viet Nam is notable for its shell heaps of 11,000 to 7,000 years ago. China's earliest shell matrix sites appear along with the earliest farmers, ca. 13,000 to 10,000 years ago in the provinces of Kwangsi and Yunnan. Early pottery, some of which is shell tempered, is found in the series of freshwater shell matrix sites along the Yung-chiang River, in Kwangsi (Chang 1986:85–86). Shellfishing appears to have greatly intensified at 9,000 years ago along a 60-km section of the Cantabrian coast of northern Spain (Bailey 1983c).

It is after 10,000 years ago that shell matrix sites are preserved in the Americas. The earliest dated Pacific marine shell matrix sites in the western hemisphere are currently found in Peru (Quebrada Jaguay 280 site, 8250 BC, Ring site, 8,575 BC) and California (a site on San Miguel Island, 8300 BC) and on the Atlantic are found in New York (Dogan Point site – 5000 BC). Increased sea level, erosion, and storms are responsible for the loss of sites older than 5,000 years along much of the Atlantic. For instance, the several hundred sambaquis of Brazil (particularly from the states of Espírito Santo and Santa Catarina), exhibiting a range of shapes and sizes and containing five dominant species, are no older than 5,250 years (Suguio et al. 1992:92).

1.2 Shells and archaeologists

Large piles of shell on land were clearly in need of explanation. Early speculators attributed their creation to wind, water, and humans, with geologists and natural scientists often the last people to credit them to humans (Christenson 1985). Recognition of these sites as the product of human activity proceeded rapidly throughout the nineteenth century. Japetus Steenstrup in 1837 (Morlot 1861:291), and later Charles Darwin (1839:234), specified criteria for human made shell heaps observed in Denmark and Chile. Vanuxem talked about oyster deposits in New Jersey (US) in 1843, Gunn discussed the shell heaps on the shores of Tasmania in 1846, and the Danish government assembled the famous kjokkenmoddings (kitchen middens) study group in 1848. By the publication of Morse's Omori (Japan) report in 1879, human made shell heaps had been identified in England, Scotland, Ireland, France, eastern US, Mississippi Valley (US), California, British Columbia (Canada), Aleutian Islands, Chile, Ecuador, Australia, Tasmania, Malay archipelago, and Japan. But the concerns of these investigations during the nineteenth century were more sophisticated than simply questioning the source of their accumulation.

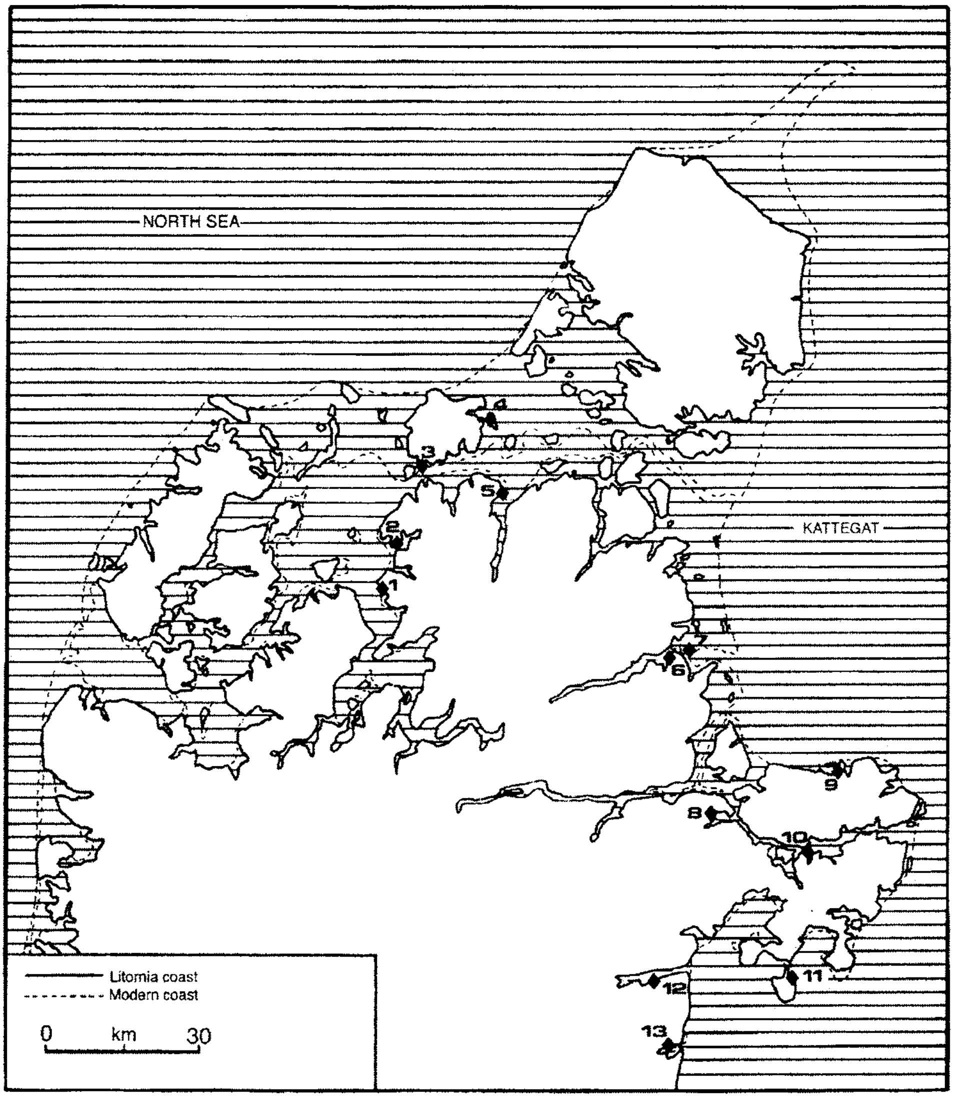

Fig. 1 Ertebølle site distribution in Jutland, Denmark.

Toward the goal of examining the human adaptation to and any changes in the paleoenvironment, the Danish government sponsored an interdisciplinary project, beginning in 1848, with three professors from the University of Copenhagen: Steenstrup, a biologist; Worsaae, "the most celebrated prehistoric archaeologist in Europe" (Trigger 1986:xii); and Forchhammer, a geologist. The project studied the shell matrix sites of Jutland (Figure 1) and published six annual reports (Forchhammer et al. 1851–1857). Its summation in German by Morlot and then translation into English in 1861 had several impacts (after

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

Christenson 1985:239): (1) awareness on an international scale of this type of site and its probable great age, (2) elevation of the explorations of and conversations about this type of site to a higher status in science, and (3) shift from interest by geologists and natural scientists to interest by archaeologists. Trigger (1989) sees a stark contrast between the archaeological concerns of the Danish in the mid-nineteenth century and Paleolithic archaeology as practiced in England and on the Continent. The Paleolithic archaeologists working at the same time in Europe recognized in artifacts only dating capabilities.

Many investigators saw obvious implications for sea level changes and climate changes in shell matrix sites evident in their location and in their fauna. Morse, excavating the Omori mound near Tokyo, typed the species, recorded abundance, size changes, and changes in metric proportions. To complete his examination he made collections of living fauna as well as making market purchases to identify the edible species. He linked the differences noted between the site fauna and the modern fauna with environmental alterations, in one case specifically naming a change in salinity (Morse 1879:24). Fifteen years earlier he had turned to a study of the land snails in a shell matrix site in Casco Bay, Maine to reconstruct the surrounding local environment. His mentor, Jeffries Wyman, had similarly discussed the paleoenvironment for the Florida freshwater molluscan deposits using snails (Wyman 1875).

Within the US, archaeologists working on shell matrix sites were largely following the example set by the Danish project and the review of that project supplied by Morlot (1861), which were steeped in the perspective of evolutionary change. The model of European evolutionary thinking presented in the Danish investigation predisposed its US readers to a precocious recognition (within North America) of the significance of stratigraphy as well. With a recognition of stratigraphy came a recognition of sequential changes in stone and ceramic technology, and an early use of typology as a basis for understanding micro-changes. In fact, Wyman produced the first ceramic typology in North America utilizing the sherds from the Florida freshwater shell heaps. Shell mound interpretation within the US was the one area of archaeological interpretation before 1900 where native peoples were credited with a history of progressive change (Trigger 1986:xxii).

Dating was of concern for the early shell-heap studies and was attempted during the period 1840–1920 using deposit stratigraphy, shell characteristics, and artifact attributes. Wyman employed a crude form of dendrochronology to assess the passage of time since the heaps in Massachusetts and Florida had accumulated. He also noted the poor preservation of shells in the lower levels of Massachusetts sites and thought it indicative of advanced age. Morse imputed significant time depth to the appearance of the shells at Omori – he commented on their yellowness, chalkiness, and the "characteristic appearance of the nacreous portion, generally seen in shells long buried in the ground" (Morse 1879:36). He made estimates of the age of the Omori heap from species ratios and shell metrics assuming that changes in ratios could be rapid while changes in metrics would require greater time. To quantify the amount of time, he examined shells from a 250-year-old dredge spoil and found many more similarities in condition, species ratios, and metrics with a modern assemblage than with the archaeological assemblage.

Other aspects of these early studies demonstrate concern with native processing techniques, accidental inclusion of specimens of some species, and the geographical distribution of heaps. Dall, Morse, Matthew, and the Danes before them, recognized that artifacts were essential clues to the past lifestyles of a mound's creators. Matthew (1884) noted ceramic ornamentation, recognized house pits, defined the types of tool in each stratum, the distribution of chips and house pits, and even offered an estimation of the population that generated a heap in New Brunswick, Canada (Trigger 1986). He and others also noted the environmental information implied by the land snails (Bobrowsky 1984:78).

Shell heaps were also subjects for early attempts at estimating the rate of garbage accumulation. Dall (1877) may be the earliest to have estimated the number of years (Waselkov 1987:140) over which a mound built up. Statham (1892) calculated the quantity of oyster shells (*Saccostrea commercialis*) in a mound in Australia and then predicted that the mound was 1,770 years old based on oyster yields garnered in the 1880s. Subsequent radiocarbon dates were remarkably similar in estimate (Bailey 1993:2). The California school of shell-heap quantification (1940s) elaborated on the work of Dall, to calculate not just total time of mound accumulation but also length of each occupation, number of occupants, and the relative contribution of foodstuffs to their diet. Experiments were occasionally employed to derive numerical solutions for some of the variables. In spite of obvious stratigraphic subdivisions, the California school workers steadfastly viewed the 425 San Francisco Bay sites as homogeneous and employed small samples for their investigations.

But for many decades following this early period little attention was paid to the shells in sites. Species identification was rare and the recognition of strata or microstrata was virtually absent. Arbitrary levels reflected a belief that there was no meaningful internal stratification in a shell matrix. A remarkably sophisticated study was produced around the end of the era, that by Willey and McGimsey (1954) of the Mongarillo Culture of Panama. These authors devised a relative chronology based on species ratios, argued that the greater the variation in the contents of a heap the larger and more frequent the samples needed to be, and targeted the single stratum of refuse as the appropriate sampling universe in addition to addressing the culture history of this little-known area.

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

1.3 Contemporary research

The languid interest in the shells themselves dissipated under the influence of the writings of three authors in the late 1960s. From New Zealand Wilfred Shawcross in 1967 initiated a second wave of quantitative research in shell matrix sites. A publication by William Ambrose (1967) specified the research potential of these sites for dietary information, relative chronology, paleoenvironmental reconstruction (specifically water temperature estimates and terrestrial environment), and information about collection strategies. Ambrose urged readers to consider the shell matrix as a research domain and to sample at the level of a single dump, lens, or scatter, while disapproving of Shawcross' (1967) revival of the California school with all its unsupportable assumptions.

Research concerns 1968–1990

The greatest impetus for a renewed interest in dietary reconstruction and shells in sites, however, came from Lewis Binford's (1968) hypothesis that the late Paleolithic population in coastal and riverine areas of the eastern Mediterranean incorporated first shellfish and then grass seeds into the diet because of a scarcity of both land and preferred foodstuffs. Binford's hypothesized relationship between coastal and inland ecology, carrying capacity, human diet, and agriculture ushered in three decades of research into ecology and human population pressure. This hypothesis gave shellfish and shell matrix sites a central role in the argument and a research agenda (e.g. Bowdler 1976, Voorhies 1976, Waselkov 1987, Yesner 1981).

Binford (1968) posited that the increased harvesting of molluscs evident in the tremendous number of new shell heaps created during the Holocene was triggered by population pressure brought about by either restriction in territory or reduction in the quantities of foodstuffs. This argument was predicated on the archaeological record of eastern Mediterranean cultures at the Pleistocene–Holocene transition, and, in subsequent applications by other authors, on the record in Mexico, Europe and Japan (see presentation and evaluation in Waselkov 1987). In those cases the coincidence of shell matrix sites and the appearance of domesticates is potentially explained by population pressure. But the mounds of shell (Figure 2) and rings of shell (Figure 3) elsewhere in the United States suggest other hypotheses, as does the coincidence in Australia, and in several American countries, of initial human occupation and the oldest shell matrix sites, far earlier than population pressure on resources or domesticates can be posited. The search for a single explanation for the appearance of large numbers of shell heaps after the Pleistocene or for the domestication of plants had ended, by 1990, in failure.

The research concerns for excavators of shell matrix sites in the 1970s–1980s period were:

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

Fig. 2 Upper strata in shell platform mound at Pineland, Florida, Calusa culture.

(1) dietary reconstruction – nutrition, meat weights, vertebrate proportions
(2) seasonality of shellfishing
(3) paleoenvironmental reconstruction
(4) variation in types of shell-bearing sites
(5) forager or collector settlement patterns
(6) formation processes

Once again Lewis Binford stimulated much research at shell matrix sites during this era with his distinction between forager and collector exploitative patterns (Binford 1978, 1980), evident in research collections such as that edited by Bailey (1983a). Another important stimulus to work in the New World was Michael Moseley's thesis that maritime resources underwrote complex civilization in the Andes (Moseley 1975).

New techniques attended the new research questions. Before the decade of the 1960s was over growth lines in shells were being examined to determine activity and site seasonality, and methods of sampling were being compared (see Ambrose 1967). In the 1970s column sampling was popular in shell matrix sites (often to the exclusion of any other type of exposure), and screening became common. Site catchment analysis was being applied to shell matrix sites throughout Europe (e.g. Rowley-Conwy 1983, numerous chapters in

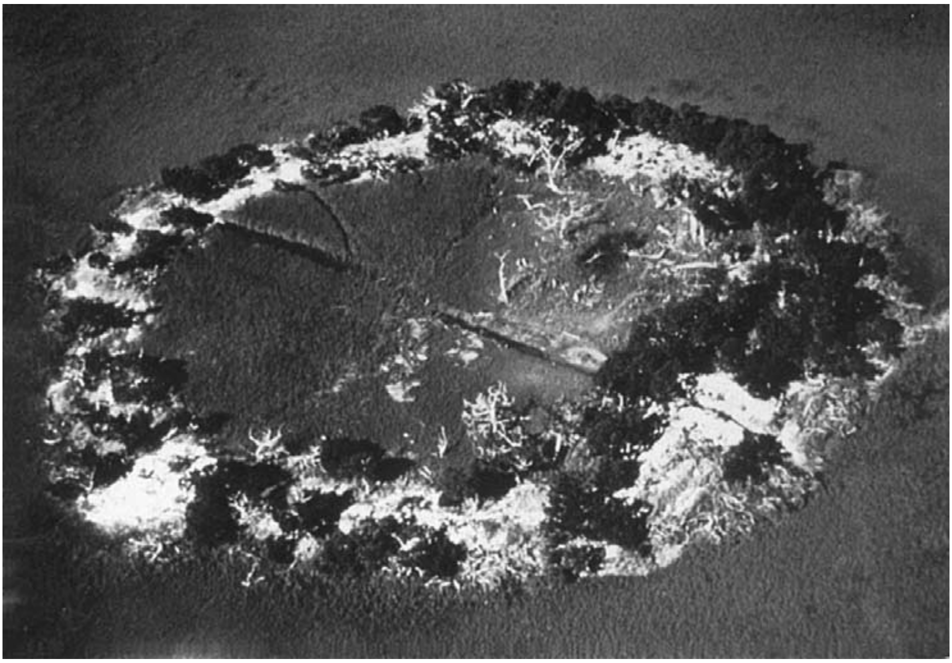

Fig. 3 Shell ring, coastal South Carolina.

Bailey 1983a). In the 1980s, "new" techniques included the use of natural levels (although arbitrary levels remain the norm even in the 1990s) and the recognition of microstrata, the use of multiple exposure types, coring to determine original topography and component distribution, and various types of geophysical sensing devices. Throughout the 1970s and 1980s it was common to identify shells to species, predict dietary contributions of various taxa, examine shells macroscopically for environmental information as well as to assay amino acids for predicting temperature and/or age. Soil chemistry and soil texture analyses informed on formation processes. Radiocarbon dating of marine shell became more controversial as did growth line and oxygen isotope estimates of harvest time. Experimentation reappeared as a technique to investigate formation processes. Dozens of researchers took up land snail analysis to reconstruct local and even regional climate and vegetation. The landmark book for this endeavor was and is still John Evans' (1972) *Land Snails in Archaeology.*

For the English-reading world, the exemplary shell matrix site study prior to 1990 was Paul Mellars' (1987) *Excavations on Oronsay*. This project on Oronsay Island, Scotland exemplifies many of the concerns of researchers working in the 1970s and 1980s. Five shell heaps were excavated from 1970 to 1979 under the direction of Paul Mellars with publication in 1987. Motivating Mellars' interest in these sites was his interest in coastal adaptations of hunter-

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

gatherers within one region. He wanted to gather information about the subsistence strategies, the size of the human group(s) and their frequency, and duration on these mounds, the distribution of these sites, and what caused the abrupt end to their accumulation after 700 years of use. The report begins with five chapters on the present and past environment drawing on land mollusc data in part, and on radiocarbon-dated shells from beach sediments. One chapter each is devoted to sampling concerns, to a presentation of macro-stratigraphy at each of four sites, to human, and to non-human bone. Curiously, shells figure little in the data or conclusions presented in this volume but are discussed in earlier reports (e.g. Mellars 1978).

Dietary reconstruction

Articles written during this period concerning excavation at sites with at least some shell are replete with questions and assumptions about gathering behavior, consumer behavior, systemic types of shell-bearing deposits, and uses for shells. It was to wildlife conservation and ethnoarchaeology – the study of living peoples by an archaeologist – that we began to turn for information on these topics. Why we have done so little ethnoarchaeology may be due to the normative assumptions that pervade research centered on shell-bearing sites: there is so much uniformity in systemic context that little could be learned through observation. The handful of projects that were conducted in this era, however, invite the reader to question much of what has been assumed in archaeological reconstruction (e.g. Bigalke 1973, Durán et al. 1987, Kayombo and Mainoya in Msemwa 1994, Meehan 1982, Moreno et al. 1984, Msemwa 1994).

The most significant advance in the reconstruction of diet came from the various ethnographic accounts of modern shellfishers. These studies identified and examined the variables involved in dietary reconstruction. For anyone working with shell matrix sites, the single most important publication to appear in the period 1970–1997, based on citations, was Betty Meehan's ethnoarchaeological account of the shellfishing activities of Anbarra women of north Australia (Meehan 1982).

Like all early works of ethnoarchaeology, Meehan's ethnography served as a cautionary tale to those who would depict shellfishing as drudgery, its nutritional value as negligible, and its participants as desperate. This report, more than any piece of archaeological detective work, contradicted the voices from the "why-would-anyone-have-ever-started-shellfishing?" school. Meehan detailed the amount of time Anbarra women spend shellfishing, why they do and do not shellfish, the calories consumed, including when and where, shellfishing as a route to high social status, and other topics.

The most extensive project undertaken to date to understand human adaptation to and utilization of shellfish is that on the Transkei coast of South Africa. For two decades archaeologists, anthropologists, and ecologists have

Cambridge University Press
978-0-521-57852-3 - Shells
Cheryl Claassen
Excerpt
More information

studied the past and present patterns of exploiting the intertidal molluscan resources of this 260 km long shoreline. These papers present ethnology (Bigalke 1973, Hockey and Bosman 1986, Mills 1985, Siegfried et al. 1985), ecological studies (Hockey et al. 1988, Lasiak 1992, Voigt 1975), nutritional studies (Bigalke 1973), and excavations in modern sites (Voigt 1975). The ecological studies present data on intensity of harvest, recovery rates for prey species, and numbers, gender, and age of gatherers.

Msemwa (1994) sought to understand the constraints under which both urban and rural shellfishers worked on the coast of Tanzania. Urban women of three ethnic groups collected shellfish on as many days a month as possible for sale to city restaurants. Msemwa investigated when shellfishing occurred and who did it, transportation distance, tidal height influence on gathering and discard, ownership of shells and hearths in common processing stations, and some formation processes of the processing midden.

My own work among fishermen of San Salvador Island in the Bahamas demonstrated the important role of shellfish, both flesh and shells, as fish bait. Conch (*Strombus gigas*) offal, chitons, bleeding teeth (*Nerita* sp.), top shells or magpie shells (*Cittarium pica*), land crabs, and hermit crabs were all used when angling for bait fish and for table fish. Large numbers of conch, top shells, and land crabs were used to bait fish traps. At one boat landing, five fish traps awaited cleaning and use. They contained eleven top-shell shells, twelve conch shells, eleven triggerfish skulls, four triggerfish post-cranial skeletons, one boxfish, eleven crab carapaces, and one *Thais* shell. It is easy to imagine a sizable shell "midden" containing numerous shells and fish bones accumulating as fish traps are emptied of their spent bait on land, which is done when the traps are brought ashore, yet none of the contents of that "midden" would represent human food debris.

Types of shell-bearing sites

In northwestern Mexico, in Marismas Nacionales, there are four types of shell-bearing sites: 48 linear mounds dominated by *Ostrea corteziensis* and devoid of artifacts, 20 *Tivela* deposits (*Tivela byronensis*), 557 oyster piles found inland with sherds, bone, charcoal, etc., and 2 *Anadara grandis* mounds, one of which is a pyramidal temple mound (Shenkel 1974:59–60). Each of these site types may be related to different types of human behavior, not simply the daily accumulation of food debris discarded at home. Variation in the shell-bearing sites in Peru has been interpreted as different classes of sites: casual, habitation, processing, workshops, and secondary (Sandweiss 1996:130), meaning that the human behavior responsible for the accumulation of shells differed in each place.

The ethnographic record provides many examples of systemic uses for discarded shell and reasons for intentionally accumulating shells in one place. These reasons include industrial waste (e.g. shell button, cameo, dye, porcelain,