

On matters of precocity and scale

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This wide-ranging review of prehistoric shell-fishing on the South African coast is a fascinating read and raises several important issues of local and global importance. Over nearly two decades, Jerardino has championed a combination of quantitative and qualitative approaches to site formation processes in coastal shell middens, including ties to technology and variation in site function. She shows through this approach and a review of others' work in South Africa that the archaeological record of shell-fishing is a window on to something far more interesting and nuanced than the mere presence or absence of shellfish in human diets.

In the interest of pushing the discussion farther still, I shall be provocative by raising a handful of issues for additional consideration. Two issues that relate specifically to the earliest known records of shellfish exploitation in South Africa and the Mediterranean Basin are the geological obstacles to comparing the deep history of coastal occupations in distant regions and what early variations in shellfish exploitation may imply about hominid cognitive abilities.

As Jerardino recognizes, geological data on sea level and shoreline changes suggest that much of the archaeological record is now submerged or has been lost to erosion associated with marine transgression. The "earliest" demonstrated case of shellfish exploitation in the Mediterranean Basin dates to about 110,000 years ago, during the early Middle Paleolithic (MP), at the site of Grotta dei Moscerini on the coast of west-central Italy (Stiner, 1994: 180-192). Is this when hominids first looked to marine environments for food? The fact that archaeological sites containing the remains of edible shellfish (e.g. limpets, mussels, oysters and turbanes) tend to form close to the coast presents us with a problem. Today's interglacial conditions have created high shorelines in the Mediterranean and elsewhere, not unlike the situation during MIS 5. Coastal sites dating to cooler climate phases, includ-

ing those prior to the Last Interglacial, therefore may have been scoured clean or inundated by rising seas. Short of unique situations of localized tectonic uplift, the chances of our finding cases dating to before MIS 5 are very poor. It could be for reasons of geological history and climate change (rather than hominid behavior) that evidence of shell-fishing before 110,000 years ago is lacking in the Mediterranean area. Hominids had been collecting slow or stationary prey on land for at least the last 400,000 years (e.g. Blasco, 2008; Stiner, 2005; Stiner *et al.*, 2009). Whether collecting shellfish from marine shores was a major conceptual leap for late Lower Paleolithic foragers may be an impossible question: we can only say with confidence that hominins were exploiting shellfish since the Last Interglacial in the Mediterranean area; we have little or no grounds to argue that they were not doing so before this time. Recently obtained dates for Middle Pleistocene shellfish exploitation at PP13B in South Africa are fascinating and unprecedented. This case also implies a unique geological situation where an early coastal record is unusually well protected from marine transgression. PP13B could represent the earliest marine foraging by hominids anywhere in the world, but there is no way to be certain of this. Moving on to inferences about hominin behavioral thresholds for marine foraging between the two distant regions therefore seems premature.

A second issue concerning early marine foraging is what these data can or cannot tell us about shifts in hominid behavioral complexity. Specifically, how might variation in the types and quantities of shellfish exploited relate to changes in cognition, if at all? Other kinds of information lend some perspective on such a question. We know from hominid skeletal evidence that the last phase of brain expansion (corrected for body mass) ended by about 250,000 years ago (Rightmire, 2003; Klein, 1989), around the time that the MP came into being. Considerable planning capability is indicated not so much from the final forms of the artifacts produced by MP humans but from the many pathways by which core working techniques could produce the forms of flake or blade blanks and the quantity of usable edges that could be generated (compare Boëda, 1994; Bourguignon *et al.*, 2004; Delagnes & Meignen, 2006; Kuhn, 1995). Though not a “modern” technological system, Eurasian MP stone-working involved complex sequences of actions and decisions. In fact, MP lithic reduction systems tend to be a good deal more complex—and the outcomes certainly more elegant—than most MSA systems for working stone. Zooarchaeological data meanwhile demonstrate that MP hominins hunted a variety of large herbivores on a regular basis, including some very aggressive species. These hunting practices no doubt also required considerable knowledge, forethought and cooperation. I do not pretend to be a MP apologist or claim that MP adaptations were essentially “modern”. But given the facts outlined above, how much more complicated would it be for other early hominins, such as MSA folk in South Africa, to dig small shellfish with their toes while wading waist-deep in the surf, with or without a friend holding a bag? We don’t know, moreover, that these MSA people had containers for shellfishing, but even if they did, we don’t know that flexible or improvised containers were lacking in the Eurasian MP. We only know that hard containers made of durable materials come later.

Recent, compelling findings on the MSA from the African continent, such as early shell ornaments (Bouzouggar *et al.*, 2007; Henshilwood *et al.*, 2004), have primed us to expect precocious behavioral patterns in this part of the world more generally. In the interest of debate one may ask why, for example, the “first uses” of marine sponges or the practices of fashioning *Meretrix* (= *Callista*) shells into scraping tools between 110,000 and 78,000 years ago at Grotta dei Moscerini in Italy (Vitagliano, 1984; Stiner, 1994: 187-188; see also Palma di Cesnola, 1965; and at Kalamakia Cave in Greece, Darlas, 2007: 360-361) hardly register in the story of “revolutionary” human developments, or are conveniently rejected without a good knowledge of the facts (e.g. Szabó *et al.*, 2007; and Erlandson & Moss, 2001 on early cases of shellfish exploitation in Italy). We must avoid the “regions of precocity” trap if we are to learn more about the nature and causes of hominin behavioral diversity within and across circumstances.

In addition to the question of cognitive ability in foraging, there is the independent issue of why people might shift to a less familiar pattern of foraging or “less profitable” prey. A strictly economic point of view, specifically the prey choice model (Stephens & Krebs, 1986), holds that foragers should use lower-return resources more heavily in situations where the availability of high-return resources is diminished. Some zooarchaeological applications of the prey choice model rely on great differences in prey body size to trace changes in foraging efficiency (e.g. the artiodactyl index, Broughton, 1997). This approach has been very useful in some world regions but not for studying Paleolithic diet change in Mediterranean Europe and the Near East (Stiner, 2001), with the exception of the final Paleolithic (Davis *et al.*, 1994; Munro, 2004; Stiner, 2005; Tchernov, 1998). Evidence for significant expansion in dietary breadth beginning around the MP-UP transition in the Mediterranean region instead comes from data on small animal exploitation. This approach relies on differences in capture costs among small animal types—slow-moving or stationary animals (tortoises, shellfish, ostrich eggs, legless lizards), fast running small mammals, birds that fly, and free-swimming fish (Stiner *et al.*, 2000; Stiner & Munro, in press). Important to the success of this approach has been a consideration not only of differing return rates but also very significant differences in foraging costs for some small animals that can only be mediated technologically. Finer differences within these broad prey categories—slow vs. runner, fliers or fast swimmers—must also exist but may be too subtle for building inferences about economic thresholds in evolutionary time.

In this sense, the *Donax serra* hypothesis seems problematic. Jerardino and Marean (in press) propose that a significant expansion in diet breadth and planning capability may be indicated by the addition of *D. serra* to a diet that already included other shellfish. They go on to propose that this addition to shell-fishing practices ca. 110,000 years ago permitted a significant demographic expansion along coastlines northward into Eurasia. If such a thing occurred, these expanding Africa MSA populations would soon have bumped into Mediterranean Neanderthal groups who were already collecting mussels, limpets and turban shells from hard rocky surfaces and digging for clams buried in the sand. The idea that the coast was a main corridor for colonization will be disputed in any case, since the

Levantine evidence suggests that early geographic expansions of “modern humans” from Africa occurred principally inland via the Jordan Rift (e.g. Bar-Yosef, 2000; Tchernov, 1992, 1994); in fact most of the Levantine coast south of Lebanon lacks good shell-fishing areas. Perhaps the idea that shell-fishing could provide a staple food supply for rapidly growing populations over large stretches of coastline is being conflated here with the well-documented fact that rich shellfish beds have supported local concentrations of foragers.

Jerardino’s account of the growing scale of shellfish exploitation is compelling and no doubt will resonate with archaeologists’ experiences in other world regions (e.g. Clark & Straus, 1986; Mannino & Thomas, 2009; Shackleton, 1988). It also raises the question of how best to relate rising quantities of shellfish to hypotheses about economic and social reorganization. Other classes of archeological evidence tend to provide the answers, simply because variation in the numbers of shells in archaeological deposits could reflect changes in the number people on site, length of stays, frequency of visits, or the relation between shell and sediment accumulation rates (Jerardino, 1995). To be sure, the quantities of shells in coastal sites rise spectacularly toward the recent periods, whereas quantities are low in most MSA and MP sites. This contrast between early and late forager periods cannot be explained by slowed sedimentation rates. Looking back to the MP and MSA, however, it may be fruitful to explore just how much denser (or not) MSA shell accumulations are than those in MP coastal sites. Without controlled data on time intervals and sediment accumulation rates, inter-regional comparisons cannot speak to questions of whether shell-fishing became a staple protein source.

A final issue concerns the distances over which whole shellfish were transported by early foragers. Jerardino notes that transport of these animals in their shells generally is limited in South Africa, and this is true for much of the Mediterranean as well (Colonese *et al.*, in press). Greater transport distances are made possible by shucking shellfish near the collection sites and smoking or drying them for later use. Coastal reconstructions have been essential to developing the shellfish transport/distance models, as has been undertaken recently in South Africa (Fisher *et al.*, n.d.). The pioneering work of Shackleton (1988), van Andel and Lianos (1983), van Andel and Tzedakis (1996), and Lambeck (1996) in the Aegean has set an enduring standard for related studies worldwide.

To the extent that the above comments may prove useful, they merely reinforce the point that shellfish are a rich and unique source of information on past human behavior. Long-term research programs, such as Jerardino’s, have been particularly valuable, as they provide detailed information on local and diachronic changes in the nature of human existence and the geological history of marine coastlines.

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