Quaternary International xxx (2015) 1–12

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Water-worn shell and pebbles in shell middens as proxies of palaeoenvironmental reconstruction, shellfish procurement and their transport: A case study from the West Coast of South Africa

Antonieta Jerardino [a, b]

[a] ICREA/ Department of Experimental & Health Sciences, Universitat Pompeu Fabra, CaSEs Research Group, Ramon Trias Fargas 25-27, 08005 Barcelona, Spain
[b] Department of Anthropology & Archaeology, University of South Africa, PO Box 392, UNISA, Pretoria, South Africa

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Geoarchaeology
Marine sediments
Mussels
Molluscs
Coastal foraging
Netting bags

ABSTRACT

Geoarchaeological studies today are a vital component of archaeological research. The sedimentary environments of coastal settings in particular are highly dynamic and governed by a variety of factors among which changes in sea level play an important role. The object of such studies often involves the study of sediments deposited by natural factors in overlapping geological and anthropogenic contexts. Archaeomalacological studies conducted on shell middens along the West Coast of South Africa in the last two decades have also identified the presence of additional natural components that became incorporated into archaeological sites through active but inadvertent human agency. These sediments are relatively large particles (2–20 mm) of water-worn shells and water-worn pebbles (WWSP) that became entangled among the byssus threads that rocky shore mussels use for attaching themselves to hard substrate. Prehistoric shellfish foraging and subsequent transport of rocky shore mussels along with their byssus contents to campsites ensured the inclusion of WWSP into archaeological middens. This study shows that WWSP abundances and the proportion of their organic fraction (water worn shell) can be used as proxies for coastal palaeoenvironmental reconstruction and as a complement to archaeomalacological studies for inferring technologies involved in shellfish collection and transport. Conclusions presented here probably apply to other similarly configured shorelines and shell assemblages of comparable age from elsewhere in southern Africa and beyond. Follow-up studies from this sub-region and beyond might confirm and/or qualify the use of WWSP observations in other coastal settings.

1. Introduction

Sediment analyses and taphonomic studies provide archaeologists with a better understanding of environmental changes, site stratigraphy and site formation processes, as well as routinely supplying important clues on possible post-depositional disturbance and the use of space through the identification of activity areas (Stein, 1992; Butzer, 2006; Goldberg and Macphail, 2006). In a similar vein, archaeomalacological analyses have also contributed to palaeoenvironmental reconstructions based on the particular ecological requirements of mollusc species, and also towards the interpretation of depositional sequences through the study of shell fragmentation and weight loss (Waselkov, 1987; Ford, 1992; Mowat, 1994; Claassen, 1998; Faulkner, 2011; Jerardino, in press). Studies that would be able to combine both of these approaches are thus expected to increase the reliability and accuracy of behavioural and environmental inferences and make important methodological contributions to the analysis of archaeomalacological assemblages.

The study of micro-sediments and mollusc assemblages from archaeological sites in the Elands Bay and Lamberts Bay areas (Fig. 1; hereafter referred to as 'the study area') in particular have aided in reconstructing the local cultural sequence and palaeoenvironmental changes (Butzer, 1979; Miller, 1987; Jerardino, 1993). Larger marine sediments (2–20 mm) termed here "water-worn shells and water-worn pebbles (WWSP)" have also been identified in shell middens several thousand years old, and have added new directions to the interpretation of the past (Jerardino, 1993; Miller et al., 1995). As revealed by observations on freshly collected mussels, the presence of WWSP has been explained as a

E-mail addresses: antonieta.jerardino@upf.edu, amsjerardino@gmail.com.

http://dx.doi.org/10.1016/j.quaint.2015.06.057
1040-6182/

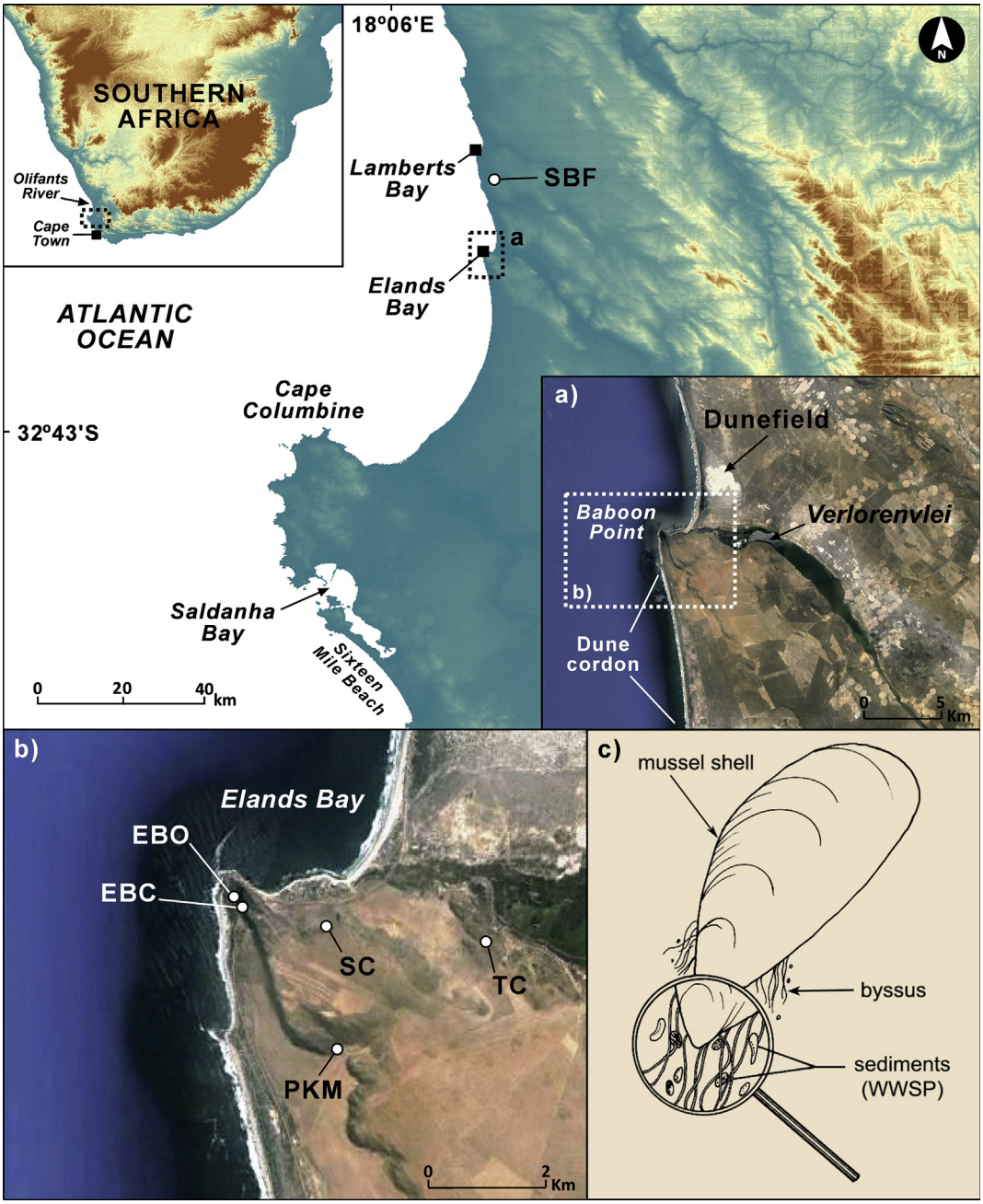

Fig. 1. Geographic setting and location of research area; a) and b) sites and places mentioned in the text: Elands Bay Cave (EBC), Elands Bay Open (EBO), Spring Cave (SC), Pancho's Kitchen Midden (PKM), Steenbokfontein Cave (SBF), and Tortoise Cave (TC); c) representation of a rocky shore mussel and its byssus sediment content (WWSP). Aerial photographs and maps are from Google Earth and SRTM (v4.1), processed by CGIAR-CSI (http://www.cgiar-csi.org).

result of having arrived in coastal sites attached to mussel threads (byssus, plural: byssi) of rocky shore mussels collected from nearby reefs (Yates, 1989). Variation in quantities of these marine sediments were initially interpreted as probably reflecting different modes of mussel collection, whereby larger quantities of these marine sediments reflected mass harvest (stripping off mats of mussels) as opposed to collecting beach-stranded mussels or targeting those growing in small clusters, both of which would have less associated quantities of byssus threads and sediments (Yates, 1989, pp. 16–18; see also; Parkington et al., 2014, p. 231). However, in terms of our current and local knowledge, mass harvest is only possible with iron technology such as spades, hoes and axes as seen today in the East Coast of South Africa (Hockey and Bosman, 1986; Kyle et al., 1997). This technology was not available in the Western Cape until European colonization. Actualistic studies also show that stranded mussels would have been an unlikely source of food for coastal dwellers (Jerardino, 2014). Moreover, on the basis of Tortoise Cave and Pancho's Kitchen Midden observations (Jerardino, 1993, 1997) (Fig. 1), it has become clear that changes in the abundance of these sediments coincided with periods of sea level changes and coastal sediment instability. Although a good case was made in this regard around two decades ago, these results needed to be checked against data obtained from additional shell midden material analysed since then. The objective of this paper is thus to

Please cite this article in press as: Jerardino, A., Water-worn shell and pebbles in shell middens as proxies of palaeoenvironmental reconstruction, shellfish procurement and their transport: A case study from the West Coast of South Africa, Quaternary International (2015), http://dx.doi.org/10.1016/j.quaint.2015.06.057