AMS radiocarbon dating of bone collagen: Establishing a chronology for the Swanport Aboriginal burial ground, South Australia

F. Donald Pate[1,2], Timothy D. Owen[1] and Ewan Lawson[3]

Abstract

The Swanport Aboriginal skeletal population has played a significant role in physical anthropological research in Australia. This paper provides the first chronometric dates for this important burial population. AMS radiocarbon determinations on bone collagen from six individuals showed a calibrated 2σ range from 1027 BC to 1521 AD. On the basis of this sample, the Swanport population appears to pre-date all European contact in Australia. These dates contradict previous assumptions that associated the Swanport burial population with a recent protohistoric period or a discrete period of time related to historic smallpox epidemics in the 19th century. The current chronometric range of approximately 2500 years for inhumations at Swanport indicates the use of the site as a burial ground over an extended period of time during the late Holocene.

Introduction

Past research has demonstrated extreme morphological variability in late Pleistocene and Holocene Australian Aboriginal skeletal remains (Campbell 1925; Fenner 1939; Macintosh and Larnach 1972; Brown 1973; Howells 1976; Thorne 1976; Thorne and Wilson 1977; Thorne and Wolpoff 1981; Pietrusewsky 1979, 1984; Brown 1989; Wolpoff et al. 1994). One of the primary limitations in relation to explanations for this variability is the lack of well-dated skeletal populations. At present dated burial populations are restricted to a small number of sites including Broadbeach, Queensland (Haglund 1976), Coobool Creek, New South Wales (Brown 1989), Kow Swamp, Victoria (Thorne and Macumber 1972), Lake Mungo, New South Wales (Bowler et al. 1972; Webb 1989a; Harvey et al. 1998; Thorne et al. 1999) and Roonka, South Australia (Pretty 1977; Pate et al. 1998).

One of the largest Aboriginal burial grounds, Swanport, containing approximately 136 individuals, has not yet been dated. The Swanport site (Fig. 1) was discovered in 1911 by workmen, while constructing levy banks along the Lower Murray River, near Murray Bridge, South Australia (Stirling 1911a). Most of the skeletal material was recovered by Professor E. Stirling, Director of the South Australian Museum, and his colleague Mr. R. Zietz, from a large hole adjacent to the levy bank, where the bones had been collected together by the project foreman. Thus most stratigraphic and contextual information pertaining to the skeletal remains was unfortunately lost. Zietz subsequently supervised the excavation of 16 complete skeletons (Stirling 1911b).

In contrast to the larger Murray Black skeletal collection which was recovered over a 20 year period from a number of Aboriginal burial grounds along a 250 km stretch of the Central Murray River between Renmark, South Australia and Euston, New South Wales, the Swanport collection is restricted to a single vicinity and thus provides a better representation of a population (Howells 1976:165; Molnar et al. 1989; Webb 1989b). In this regard, Swanport is similar to the large prehistoric Aboriginal skeletal collection excavated from the Roonka site approximately 100 km upstream near Blanchetown, South Australia. At the Roonka burial ground, a majority of the 216 individuals recovered date to the past 5000 years (Pate et al. 1998). In comparison to the Roonka population, the Swanport skeletons are more gracile (Brown 1989) and have smaller teeth (Smith 1982). On the basis of metric and non-metric cranial traits (Pietrusewsky 1984), the Swanport sample generally clusters with coastal South Australia and Victoria; whereas, the Roonka sample is associated with populations from the central Murray River Basin.

Speculation regarding the antiquity and provenance of the Swanport collection has produced a range of interpretations over the past 90 years. Initial enquiries by Stirling hypothesised that the entire burial population was the result of a smallpox epidemic that decimated the Ngarrindjeri population in South Australia circa 1820. After an examination of Swanport's stratigraphy, this notion was discounted by Stirling (1911a:15) because of the long-term accumulation of skeletal remains coupled with the depth of burial and associated grave goods. In addition items of European origin were not recovered with any

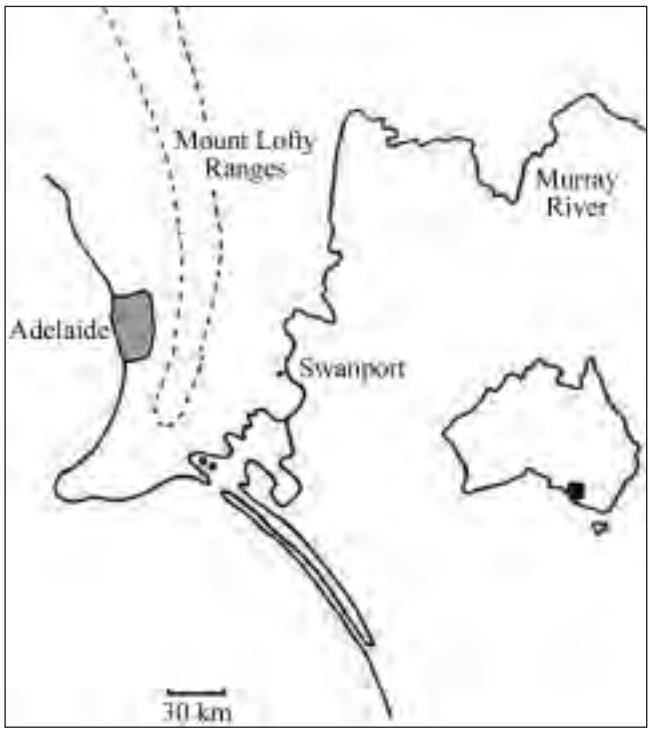

Figure 1 Map showing location of the Swanport Aboriginal burial ground, lower Murray River Basin, South Australia.

1 Department of Archaeology, Flinders University, Adelaide, SA 5001, Australia. Email: donald.pate@flinders.edu.au

2 Department of Anatomical Sciences, University of Adelaide, Adelaide, SA 5005, Australia

3 ANTARES Mass Spectrometry, Australian Nuclear Science and Technology Organisation, PMB 1, Menai, NSW, 2234, Australia

of the skeletal material. Pretty (1977:323) and Pate (1997:106) argued that the Swanport burials spanned the late Holocene on the basis of sedimentary stratigraphy and mortuary practices. Unfortunately Swanport's association with a single catastrophic episode of inhumation associated with smallpox epidemics in the 19th century or a recent protohistoric period has dominated the literature (cf. Howells 1973:21, 1976:164, 1989:95; Hobson and Collier 1984:239; Richards 1984:7; Pietrusewsky 1979; 1984:6; Smith et al. 1988:35; Brown 1989:8; Molnar et al. 1989; Webb 1989b:13, 1995:16).

A determination of the time span for the Swanport burial site is essential for a variety of research areas including morphological variability, paleopathology, paleodiet and Ngarrindjeri occupation history in South Australia. This paper provides the results of AMS radiocarbon dating of bone collagen for six individuals from the Swanport skeletal collection.

Materials and methods

Six bone samples were selected for dating. These samples were obtained from different femora and crania in order to ensure that individuals were selected for dating. In order to maximise the range of dates obtained from the Swanport burial site, five femora were selected on the basis of relative density and bone coloration. The sixth sample was taken from a single cranium (South Australian Museum number A54) exhibiting dental caries; suggesting a diet including simple carbohydrates, possibly associated with post European contact. Cranium A54 was one of four examples of dental caries among individuals in the Swanport collection (Smith et al. 1988).

The femora were sampled by taking a 8mm diameter core from the mid-shaft (Owen 2002). A portion of the zygomatic arch was removed from the single cranium. Bone samples were submitted to the Australian Nuclear Science and Technology Organisation (ANSTO) AMS dating facility (Lawson et al. 2000) for standard extraction, target preparation, $\delta^{13}C$ analysis and AMS radiocarbon dating. Acid insoluble extracts were identified as collagen by measuring C/N ratios (DeNiro 1985). Calendar ages were determined using the calibration program calibETH (Niklaus et al. 1992) and the INTCAL98 tree ring data set (Stuiver et al. 1998). The cumulative probability distribution was used.

Results

The results of the AMS radiocarbon dating are summarised in Table 1. Calibrated dates exhibit a 2471 year range from 976 BC to 1495 AD (1σ) or a 2548 year range from 1027 BC to 1521 AD (2σ). The sample taken from the individual with dental caries is at least 1712 years old.

Conclusions

On the basis of this sample the Swanport burials appear to pre-date all European contact in Australia. The earliest evidence for European presence in South Australia derives from Dutch exploration in 1627, followed by mapping of the coastline in 1802 by Matthew Flinders and Nicholas Baudin, with more extensive contact in relation to sealing and whaling during the early 1800s (Lawrence and Staniforth 1998). Thus, the arguments that the Swanport burials resulted from a single European introduced smallpox epidemic or are restricted to a recent protohistoric period are not supported by the chronometric dates.

The presence of dental caries at Swanport at a time well before European dietary influence supports previous research indicating limited incidence of caries in prehistoric Aboriginal populations (Smith et al. 1988; Molnar and Molnar 1990; Pretty and Kricun 1989; Webb 1991:2). Although there is a significant increase in the incidence of dental caries associated with agricultural and later diets with greater proportions of refined and processed carbohydrates, there is extensive evidence for the presence of caries in pre-agricultural populations (Cohen and Armelagos 1984; Reinhard et al. 1989; Larsen 1995, 1997).

Large Aboriginal burial grounds become common throughout the Lower Murray River Basin after 7000BP, with most dating to the last few thousand years (Pardoe 1988, 1995; Littleton 1999). Many of these burial sites are associated with Holocene dune systems adjacent to the floodplains of the river. Consequently, Swanport may represent a burial ground associated with late Holocene population expansion and increased population density. However, on the basis of these six radiocarbon dates Swanport may not show the same time depth as other Aboriginal burial grounds in the Lower Murray Valley, e.g. Roonka. At Roonka the existing radiocarbon dates, on a sample of 17 individuals, extend from approximately 7500 BP

SA Museum No.	Radiocarbon Lab No.	Uncalibrated Date	Calibrated Date 1σ range 2σ range		$\delta^{13}C$ per mil	% Modern Carbon pMC	1σ error
A25331	OZF395	420 ± 40 BP	1444 AD	1495 AD	-14.47	94.88	0.39
			1419 AD	1521 AD			
A24580	OZF396	820 ± 40 BP	1192 AD	1255 AD	-14.88	90.31	0.39
			1161 AD	1287 AD			
A25115a	OZF394	1230 ± 40 BP	732 AD	856 AD	-19.94	85.81	0.33
			670 AD	918 AD			
A54	OZF391	1900 ± 70	BP 38 AD	206 AD	-21.55	78.97	0.68
			46 BC	290 AD			
A125	OZF392	2300 ± 50 BP	394 BC	248 BC	-20.75	75.13	0.48
			467 BC	175 BC			
A25221	OZF393	2790 ± 40 BP	976 BC	875 BC	-18.78	70.67	0.29
			1027 BC	825 BC			

Table 1 AMS radiocarbon results for six individuals from the Swanport Aboriginal burial ground, lower Murray River Basin, South Australia.

to 220BP and the presence of a range of grave goods of European origin indicates burials during the period of historic contact for this region of the Murray River, ca. 1840AD (Pretty 1986; Pate et al. 1998). Additional dating will be required to determine whether the time span for interments at Swanport is similar to that exhibited at Roonka.

In conclusion, the current chronometric range of approximately 2500 years for inhumations at Swanport indicates the use of this site as a burial ground over an extended period of time during the late Holocene. In relation to bioarchaeological and physical anthropological research, Swanport provides the only significant excavated prehistoric burial population for the lower Murray River Basin south of Roonka. Thus, this research provides important chronological data for the numerous past studies involving the Swanport population and will contribute to ongoing physical anthropological research in Australia.

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