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Pre-contact human skeletal remains from Useless Loop, Western Australia

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Abstract

A human skull found in 1992 near Useless Loop, Western Australia is described here as being that of a pre-European contact Aboriginal Australian. The skull was that of a gracile male of approximately 50 years of age at the time of death. Teeth recovered with the skull showed heavy wear, and lesions in the alveolar bone of the jaws suggested that the individual possibly suffered from periodontal disease and, probably, at least one painful abscess at the time of death. The morphology of the individual was similar to that of other, contemporary populations of Aboriginal people from the central region of Western Australia.

Determination of the absolute age of a sample of cranial bone by accelerator mass spectrometry yielded a probable age of 2730 400 yr bp. This find therefore represents one of a very few sets of pre-European contact human remains in Western Australia to have been recovered from a known location.

Introduction

Archaeological research in the region of Shark Bay, Western Australia, over the last ten years has revealed a thirty thousand year history of occupation (Bowdler 1990a,b,c, 1995). The evidence has consisted primarily of stone artefacts and food refuse, collected or excavated from open midden and rock shelter sites. Few pre-European human remains were known from the region, and none have ever been excavated from a primary context, or securely dated. The find reported here, while not completely satisfactory in terms of depositional context, at least represents pre-European human skeletal remains from a known location.

In October 1992, a human cranium was found on the track north of the township of Useless Loop which had been graded four months previously (Bowdler, *unpublished observations*). It was presumed that the cranium had been disturbed from its original resting place by the grader, and could have been moved by up to 400 m. The spot of the find was marked by a wooden stake. The skull was found half-buried in a grader windrow on the side of the track. The spot is about 10-15 m above sea level, on a fairly narrow neck of the Prong, and no more than 100 m from the coast in a straight line. It is, in fact, the sort of place where it would not be unexpected to find a prehistoric site, an open midden scatter of the kind common in this region (Bowder 1990a,b). On careful examination near the find, a human incisor was found which, from its state of wear, appeared to be that of a prehistoric Australian Aboriginal person. Fourteen meters to the south, also on the side of the road, were found a chalcedony flake and a piece of baler shell. On the track and its sides, about 50-100 m to the south, was evidence of a scattered midden site, consisting of *Terebralia*, baler, *Turbo*, and other marine shells. The accumulation was not very dense, but was reasonably evident. A few calcrete flakes were noted also. The soil was a light-coloured dune sand; no darker horizon was evident anywhere. Further cranial remains, including the mandible, were recovered approximately six months later within 100 m of the original find. Because the second set of remains matched exactly the expected description of the missing portions of the cranium and mandible, the two sets were assumed to have been originally associated.

We describe here these newly discovered cranial remains and compare them with those of others known from the area, and more widely in Australia. The age is estimated and the significance of the find is discussed. In accord with the wishes of the Aboriginal people in Denham, the skull was re-interred near the spot of its discovery after it had been studied.

Materials and Methods

Morphometry

The cranium (hereafter designated the ULHK cranium) was examined and measured at Useless Loop and again at the Department of Anthropology, University of Western Australia. A standard battery of anthropometric measurements were made on the ULHK cranium for comparison with measurements for other modern human populations reported by Howells (1973, 1989). The cranium was measured using digital calipers, standard spreading calipers, and coordinate calipers. The average value of three measurement trials, rounded to the nearest

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millimeter, is presented in this report. Complete descriptions of the measurements can be found in Howells (1973). An estimate of the cranial capacity of the cranium was made by measuring the volume of the sand that filled the endocranial cavity, using a beaker (to ± 50 cm^3).

The computer software program CRANID (Wright, 1989 / 1992) for the automated comparison of cranial measurements was used to assess the affinities of the ULHK cranium. This program permits comparison of the dimensions of any unknown human cranium with the dimensions of 2524 female and male crania from around the world based on measurements reported by Howells (1973, 1989). The IDCRAN2 routine of CRANID was used to analyse the average values of the measurements. The first analysis in this routine provides a catalogue of the 50 nearest neighbors of the cranium in question. The second analysis in this routine (the K-means cluster analysis) indicates that the composition of the group that is closest in shape to the cranium in question.

Dating

Two dating strategies were employed. First, a radiocarbon date was obtained for marine shell remains (*Terebralia* sp) gathered from the nearby midden site. It seemed a reasonable assumption that the skull could have been associated with the prehistoric site. Second, following consultation with Aboriginal people in Denham, a piece of bone from the nasal area of the skull itself was submitted for radiocarbon dating to the Quaternary Dating Research Centre at the Australian National University. Accelerator mass spectrometry radiocarbon dating with the 14UD accelerator of the Research School of Physical Sciences and Engineering was conducted by J Head. Two fractions, bone apatite and collagen, were dated separately.

Results

Description of the remains

The human skeletal remains consisted of a single human cranium and mandible designated ULHK for purposes of this report. Selected standard views of the ULHK remains are provided in Figures 1-4.

Nearly all elements of the cranium were recovered during the course of the investigation. Because the mandible and fragments of the upper facial skeleton were recovered several months after the cranium had been returned to Useless Loop, no attempt was made to reconstruct the complete skull. The elements of the upper facial skeleton that were separated from the main mass were as follows; the maxilla (except orbital process), the pterygoid plates of the sphenoid, the zygomatic bone and the zygomatic process of the temporal bone. The damage to the cranium that separated the bones of the upper right facial skeleton occurred *post mortem*, and was almost certainly caused by the road grader which disinterred the cranium. The supraciliary ridge on the right side has been punctured *post mortem*, revealing a large frontal sinus (Fig 1). The puncture hole was almost certainly produced by the action of the road grader. No fractures were evident.

A comparison of the measurements of ULHK cranium with those of other samples from Western Australia

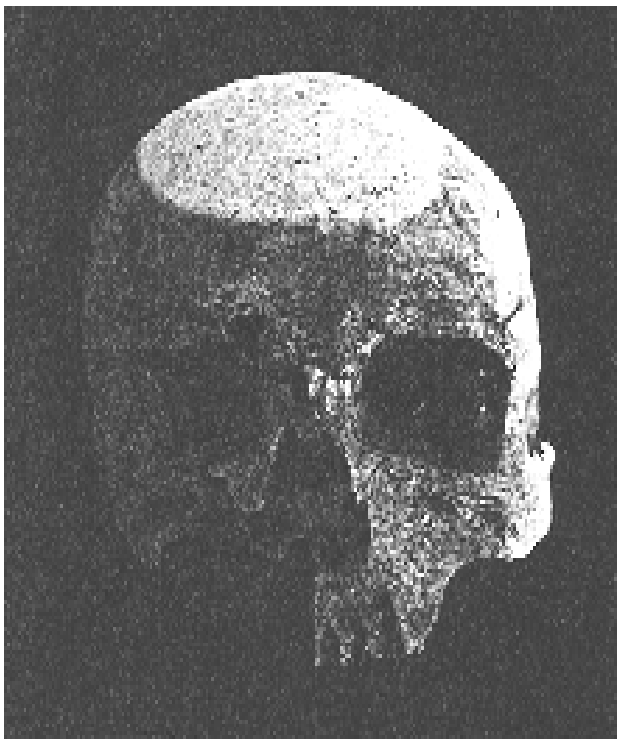

Figure 1. ULHK cranium, *norma frontalis*. Note damage to upper facial skeleton and supraciliary ridge on right side. Approximately one-half actual size.

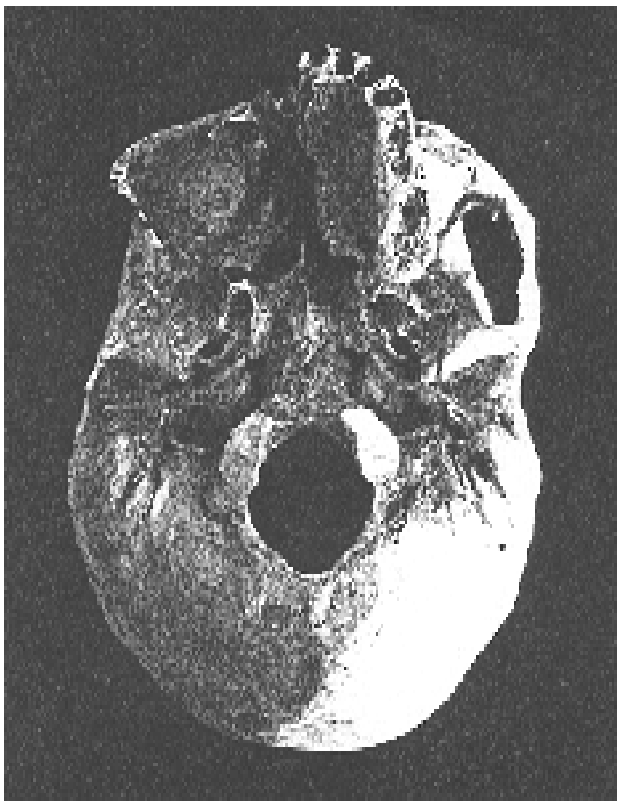

Figure 2. ULHK cranium, *norma basalis*. Note the small hole in the alveolar bone of the maxilla in the molar region possibly resulting from a dental infection. Approximately one-half actual size.

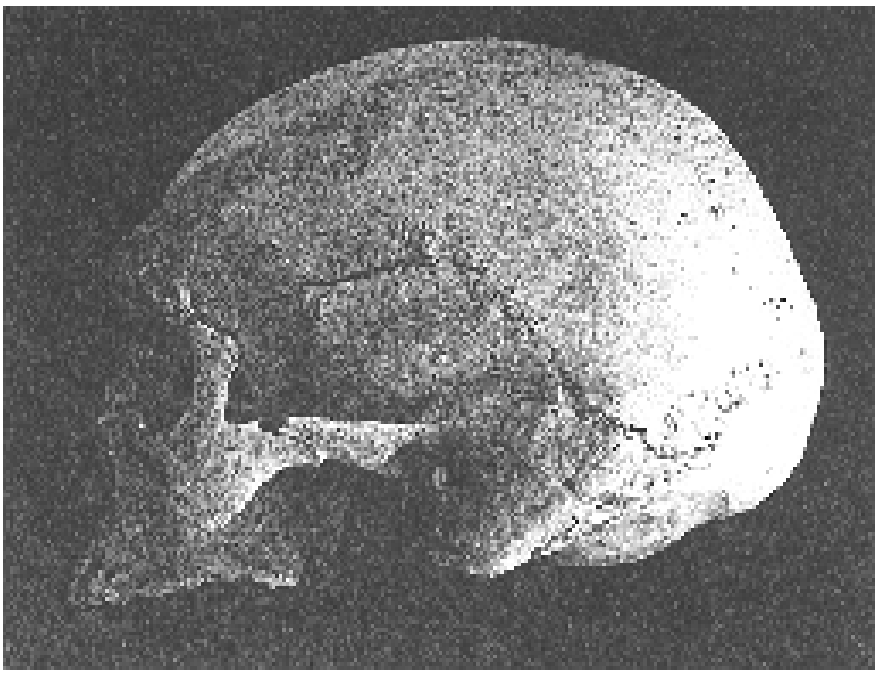

Figure 3. ULHK cranium, *norma lateralis* (left). Note bleaching of bone on top of calvaria and in the occipital region. Approximately one-half actual size.

(Table 1) indicates that the Useless Loop specimen was very similar in size to other males from the state, and especially to those from the central region of Western Australia (defined by Margetts & Freedman (1977) as around Port Hedland, North West Cape, Shark Bay and Cue).

Several teeth were associated with the skull, but only three were measurable (Table 2). In the upper dentition, only the heavily worn stump of the right upper third molar was found in its alveolus. The heavily worn left upper central incisor and left canine were recovered at the site by sieving. The alveoli of the upper left central incisor, lateral incisor, canine, and first premolar were well preserved and clearly held teeth at the time of death. The alveoli of the upper left first molar and third molar were shallow and may have held teeth at death, but the alveolus of the second molar appears to have been resorbed long before death. A small natural opening in the alveolar bone in the second to third molar region (Fig 2) communicated with the antrum of the maxillary sinus; this suggests that one of those teeth may have been abscessed at the time of death or that an oro-antral fistula had occurred following the loss of an infected molar. In one of the fragments of the right facial skeleton that was recovered, a similar lesion was found in the floor of the maxillary sinus above the upper third molar.

The mandible was complete and did not show signs of dental abscesses or excessive periodontal disease. Preserved on the right side of the mandible were the alveoli of the lateral incisor, the canine, third premolar, the fourth premolar, and the first molar. Four heavily worn teeth were recovered on the left side of the mandible; the canine, third premolar, fourth premolar (stump only, worn to the cervix) and third molar. The alveoli of the first and second molars were also preserved. Resorbed alveoli indicated that several teeth had been lost *ante mortem* on the left side, the central and lateral incisors; on the right side, the central incisor, the first or second molar, and the third molar had been lost.

Judging from the advanced state of wear of the teeth and the absence and / or diseased state of the molar teeth, the individual's ability to chew was no doubt compromised.

The cranium was uniformly medium brown in colour except for two areas, on the top of the calvaria and on the left parietal and occipital bones (Figs 1, 3, 4), that appear to have been bleached by recent exposure to the

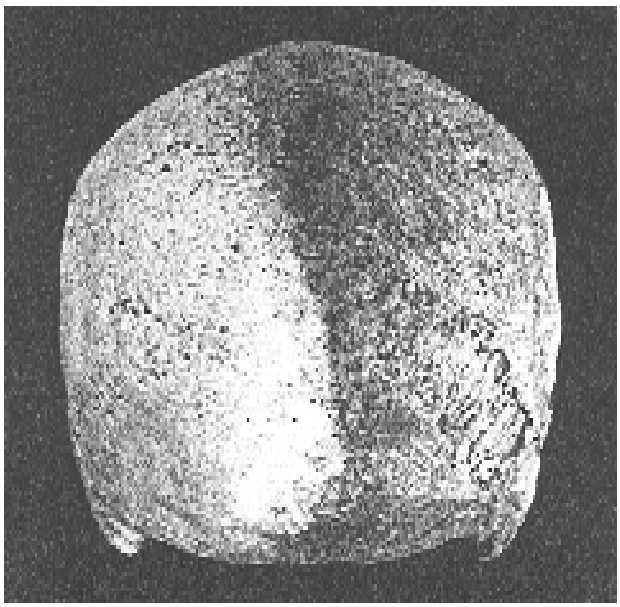

Figure 4. ULHK cranium, posterior view. Approximately one-half actual size.

Table 1

Measurements (in mm) of the ULHK cranium compared to those of the following other modern human cranial samples; 1) the mean and range of Western Australian Aboriginal male and female crania [WA-M and WA-F] reported by Margetts & Freedman (1977); 2) the mean for central Western Australian male crania [CWA-M] reported by Margetts & Freedman (1977); 3) and the centroid of the distribution of populations of living *Homo sapiens* measured by Howells (1973, 1989). The standard abbreviations for the measurements are as follows; glabello-occipital length (GOL); nasio-occipital length (NOL); basion-nasion length (BNL); basion-bregma height (BBH); maximum cranial breadth (XCB); maximum frontal breadth (XFB); biauricular breadth (AUB); biasterionic breadth (ASB); basion-prosthion breadth (BPL); nasion-prosthion height (NPH); nasal height (NLH); orbital height [left] (OBH); orbital breadth [left] (OBB); bijugal breadth (JUB); nasal breadth (NLB); palate breadth (MAB); bimaxillary breadth (ZMB); zygomaxillary subtense (SSS); bifrontal breadth (FMB); nasio-frontal subtense (NAS); biorbital breadth (EKB); interorbital breadth (DKB); cheek height (WMH); nasion-bregma chord (FRC); nasion-bregma subtense (FRS); bregma-lambda chord (PAC); bregma-lambda subtense (PAS); lambda-opisthion chord (OCC); and lambda-opisthion subtense (OCS). The values from Margetts & Freedman (1977) have been rounded to the nearest mm.

	ULHK	WA-M mean (range)	WA-F mean (range)	CWA-M mean	*Homo sapiens* centroid
GOL	192	187 (169-202)	177 (163-191)	188	179
NOL	187	-	-	-	177
BNL	100	101 (91-116)	97 (76-129)	101	99
BBH	133	131 (121-144)	128 (120-143)	130	132
XCB	139	131 (117-143)	130 (120-143)	131	137
XFB	110	-	-	-	113
AUB	122	118 (106-131)	113 (104-127)	-	121
ASB	110	107 (97-117)	104 (94-122)	-	107
BPL	98	103 (95-119)	97 (62-107)	104	98
NPH	73	69 (60-87)	65 (53-75)	70	66
NLH	52	49 (42-77)	46 (40-59)	51	50
OBH	33	33 (28-44)	32 (26-38)	34	34
OBB	40	40 (30-44)	32 (26-38)	40	39
JUB	114*	118 (105-134)	109 (98-125)	-	115
NLB	29*	28 (23-38)	26 (21-30)	28	26
MAB	29*	-	-	-	63
ZMB	96*	92 (80-107)	88 (80-103)	93	95
SSS	20	-	-	-	23
FMB	103	101 (86-110)	97 (91-111)	-	97
NAS	20	-	-	-	16
EKB	100	100 (93-110)	95 (89-101)	-	97
DKB	24	22 (18-28)	20 (17-23)	22	21
WMH	24	-	-	-	23
FRC	108	112 (99-124)	106 (95-116)	-	109
FRS	23	25 (20-31)	26 (21-34)	-	25
PAC	112	116 (104-128)	109 (97-126)	-	111
PAS	23	-	-	-	24
OCC	101	94 (82-105)	95 (85-108)	-	96
OCS	33	-	-	-	28

*denotes a measurement made on the assumption of bilateral symmetry

Table 2

Measurements (mm) of the three measurable teeth from the ULHK remains, compared with mean and range (in brackets) of Western Australian Aboriginal males and females reported by Freedman & Lofgren (1981). Mesiodistal (MD) and buccolingual (BL) dimensions are given.

Tooth	ULHK	ULHK	WA Male		WA Female	
	MD	BL	MD	BL	MD	BL
Upper left lateral incisor	6.52	7.45	7.24 (5.8-8.6)	7.03 (5.8-7.9)	7.10 (5.2-8.3)	6.67 (5.6-7.8)
Upper left canine	7.19	9.67	8.01 (6.8-9.5)	9.18 (7.6-10.1)	7.81 (7.4-8.4)	8.44 (7.6-9.1)
Lower left canine	7.50	11.10	7.28 (6.0-8.4)	8.67 (7.5-9.8)	6.91 (6.2-7.6)	7.79 (7.2-8.7)

sun. The cranial cavity was filled with dry, compact sand, and the rootlets of some plants were found adhering to the endocranial surface, to the orbits and to the outside of the base of the skull. No soft tissues or hair were found. The bone of the cranium and mandible was well preserved and quite sturdy, but there was no indication that fossilization had begun. Relatively little mineral content had been lost during its period of interment, a condition that would have been consistent with burial in a well-drained location. The length of time that the cranium had been in the ground could not be accurately estimated by simple visual examination. The volume of the endocranial cavity was approximately 1450 ml ± 50 ml, which is within the range for modern human males.

Estimation of age at death

Sutural fusion and obliteration on the ectocranial surface of the cranium was advanced and the same appears to have been true on the endocranial surface, as far as could be seen. The central parts of the coronal suture (at bregma), the rostral half of the sagittal suture and the central part of the lambdoidal suture were nearly completely obliterated. Estimation of age at death from the skeletal remains of adults is fraught with uncertainties and is particularly difficult in cases such as this where no postcranial remains (including the potentially useful pubic symphysis) have been recovered. On the basis of the status of the cranial sutures and dentition, the minimum age of this individual is judged to have been 50 years (estimated range 45-55 yr). The sturdiness of the cranial bones and the absence of marked thinning of these bones would further suggest that the individual was not of an advanced age.

Sex of the individual

At the time that the cranium was first examined, the first author judged it to be female because the cranium bore relatively gracile muscular markings despite being sturdily built. Further detailed study, however, suggested that the skull was almost certainly that of a male, after examination of other cranial remains of Aboriginal individuals at the Western Australian Museum (Perth) and the Natural History Museum (London) and after following the methods of sex determination described by Larnach & Freedman (1964). Unfortunately, because no further skeletal remains were found with the skull, confirmation of sex using elements of the postcranium was not possible.

Racial affinity

The presence of a suite of several morphological features of the cranium clearly indicates that the individual was an Aboriginal Australian. These features include the marked development of the supraorbital region, a low forehead rising gently to bregma, a broad interorbital region, rectangular orbits, short nasal bones, a large nasal opening, a calvaria showing a "gabled" or "barn-roof" outline (Fig 4), and the presence of an occipital "bun" (Fig 3). These results of visual inspection of the cranium were reinforced by the quantitative analysis.

Unusual features

In the lambdoidal suture were found six sutural (wormian) bones or Ossa Incae, two of which can be clearly seen in Fig 3. Such bones represent accessory centres of ossification and are present as common variations in human crania world-wide.

The cranial base was slightly asymmetrical. The right occipital condyle bore a posterolateral extension not seen in its antimer (Fig 2) and the space occupied by the jugular bulb was about 50% larger on the right than on the left. Such asymmetries are common to all human groups and probably had no effects on the individual during life.

Quantitative morphological analysis

The measurements of the ULHK cranium were compared to those of other Aboriginal crania from Western Australia as compiled by Margetts & Freedman (1977) and to the centroid of the distribution of Howells' (1973, 1989) entire sample of crania from modern human groups. In most cases, the raw measurements of the cranium ULHK fit comfortably within the range for male crania from Western Australian Aborigines.

The first analysis of the IDCRAN2 procedure indicated 50 crania from Howells' sample that were most similar to the ULHK cranium (note that the comparative sample of Howells' on which CRANID is based includes measurements from southern and eastern, but not western Australian Aboriginal skulls). This list revealed that the ULHK cranium was similar to that of many diverse human groups; the single nearest "morphological neighbor" of the ULHK cranium was a female cranium from the Tolai population in New Britain but this should not be construed to indicate that the ULHK cranium was of an individual from New Britain. This similarity is not surprising in light of the recognized morphological similarities of Melanesian and Aboriginal Australian populations (Howells 1973, 1989). The K-means cluster analysis indicated clearly that the groups that best matched the ULHK cranium were South Australian and Tasmanian Aboriginals, although the cranium also showed strong affinities with groups from New Britain and East Africa.

The results of the quantitive morphological analysis support the visual assessment presented in the previous section that the ULHK skull was that of a male Australian Aboriginal.

Absolute age of the ULHK remains

Dating of the marine shell from the midden site gave an age of 7400 ± 70 bp, which if corrected for the oceanic reservoir effect produces a date of 6950 ± 70 bp. This date is entirely consistent with many other midden sites in the Shark Bay region with *Terebralia* shells. We cannot, however, assume that the skull was in fact associated with this site.

With respect to bone from the skull itself, the apatite fraction gave an age of 2730 ± 400 yr bp, and the collagen fraction produced an age of 750 ± 250 yr bp. The older of the two bone dates would be generally considered the better date because most contamination comes from younger sources of carbon (J Head, Australian National University, *personal communication*).

The shell-derived date is, technically speaking, a more reliable date for the event which it dates, which is the gathering of these particular molluscs. It also fits well

with other dates from these shell species collected and excavated from shell midden sites in the Shark Bay region. The bone date must be preferred, despite its technical imprecision, as a date for the death of the individual from which the bone was derived.

Discussion

The results of visual analysis of the ULHK cranium and analysis of the measurements of the cranium using CRANID indicate that the ULHK skull was that of a male Aboriginal Australian, who was probably about 50 years old at the time of death. The state of preservation of the bone of the cranium was generally good, and all the damage sustained to the cranium on the right side of the facial skeleton and right supraciliary ridge was consistent with damage caused by the road grader which unearthed the cranium. The ULHK cranium represented an individual who suffered from extreme dental wear and reasonably serious dental disease near the time of death.

Measurements of the ULHK cranium were found to be very similar to those of other samples of male crania from Western Australia. In their comparative study of a large series of modern Aboriginal crania from Western Australia and coastal New South Wales, Margetts & Freedman (1977) noted progressive morphometric separation between equivalent parts of the two states. That is, greater similarities between the northern populations, and progressively fewer between the central and southern populations, were found. This result, they indicated, was suggestive of a north to south migration down the east and west coasts. An alternative explanation can also be offered. The greater similarities between the northern populations of eastern and western Australia may have been due to greater genetic interchange between these populations because of fewer major ecogeographical barriers between them. The increasingly greater differences between central and southern populations may have been due to a greatly reduced chance of genetic interchange between the populations resulting from greater distances and more severe ecological barriers separating them.

The ULHK skull appears to represent an individual who was buried at the top of a hill in such a way that the skull came to protrude from the side of the track cut through the crest of the dune. It was then scooped up by the grader and redeposited at the spot of the find in the track. It is likely that the postcranial remains remain *in situ* in the side of the track. Recommendations made in an original (Bowdler, 1992, *unpublished*) report to the former Aboriginal Sites Department (Western Australian Government, Perth) included the future possibility of finding further skeletal materials at the same site.

The ULHK skull was found close to a midden dated to about 7000 yr bp, but the skull itself appears to be around 2700 or possibly even 750 yr old. Whichever date is more accurate, the skull clearly predates the arrival of Europeans in Western Australia. Illustrated descriptions of such finds are rare. The ULHK skull represents an important example of central Western Australian Aboriginal morphology that contributes to our understanding of human variability as it existed in Australia during the Holocene, prior to European settlement.

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