

# STUDY OF HUMAN REMAINS DISCOVERED IN 2001 AT AHU 'O RONGO, RAPA NUI

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## INTRODUCTION

From July 1934 to April 1935 a Franco-Belgian expedition to Rapa Nui was led by archaeologist Henri Lavachery of the Royal Museums of Art and History (RMAH) and the Swiss ethnographer Alfred Métraux (Lavachery 1935). This team undertook the first extensive ethnographic study (Métraux 1971), started a petroglyph survey (Lavachery 1935b), and excavated some funerary monuments. They also brought back to Europe a *moai* representing the god Pou Hakanononga which joined the collections of the RMAH (Lavachery 1938).

In March 2001, a new Belgian expedition (Archaeological Investigations on Rapa Nui) took place. It was supported by the National Geographic Society and directed by Nicolas Cauwe and Dirk Huyge of the RMAH.

In order to better define the chronological context of the *moai* Pou Hakanononga, Cauwe and Huyge undertook excavations at the site from which this statue was removed. The site, called Ahu 'o Rongo, is a large ceremonial center on the south-west coast of Rapa Nui (Figure 1) near Hangaroa village. Several platforms were uncovered in the excavations and these correspond to various phases of use. West of the monument, in a structure delimited by un-hewn stone blocks and the seaside wall, charcoal and many fragments of human bones were discovered. The radiocarbon dating allocates the deposit to the later part of the 13<sup>th</sup> century or to the 14<sup>th</sup> century, which makes these human remains the oldest dated so far (Huyge *et al.*, 2002). Their anthropological study is presented here.

## INVENTORY OF THE SKELETAL REMAINS

The material recovered is incomplete and fragmentary (Figure 2). Only teeth and small bones such as metacarpals were intact. After reconstitution and assembling, the total number of remains amounts to 440. Two thirds of these had been submitted to heat in the process of cremation. The adult bones that were not burnt are the most brittle.

### Minimum number of individuals

The adults represent 63 % of the determined remains. The presence of two different unheated upper lateral incisors indicates that there were at least two individuals. Two heated right second upper premolars indicate that two adults were cremated. One cannot however be sure if the total number of adults amounts to four or to two with, in this case, partially burnt individuals.

To estimate the number of children, the individualization of the skeletal remains was made on the basis of their stages of development. A minimum of four juveniles were counted.

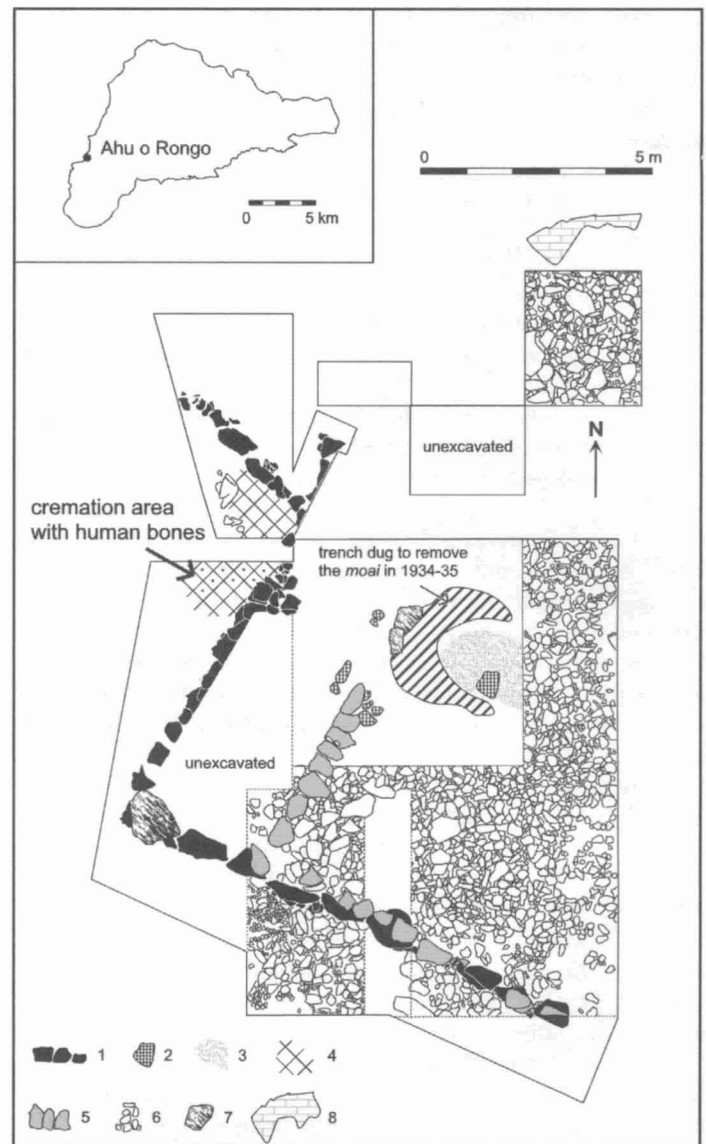


Figure 1. Location of Ahu 'o Rongo on Rapa Nui and plan of the excavation in 2001 (from Huyge *et al.*, 2002). 1 : Ahu I walls; 2: Ahu I platform cobbles; 3: indurated surface initially covered by Ahu I pavement; 4: 'cremation' area; 5: Ahu II walls; 6: stone filling; 7: displaced stones of *ahu* walls; 8: bedrock outcrop.

### Sex determination and estimations of age at death

Unfortunately, the coxal bones and the skulls are too fragmentary for any observation in relation to sex determination. The age of the four children has been estimated by means of several methods (Table 1). The youngest was a newborn, one was about 3.5 years of age, another had reached the age of six years and the oldest was about ten years old.

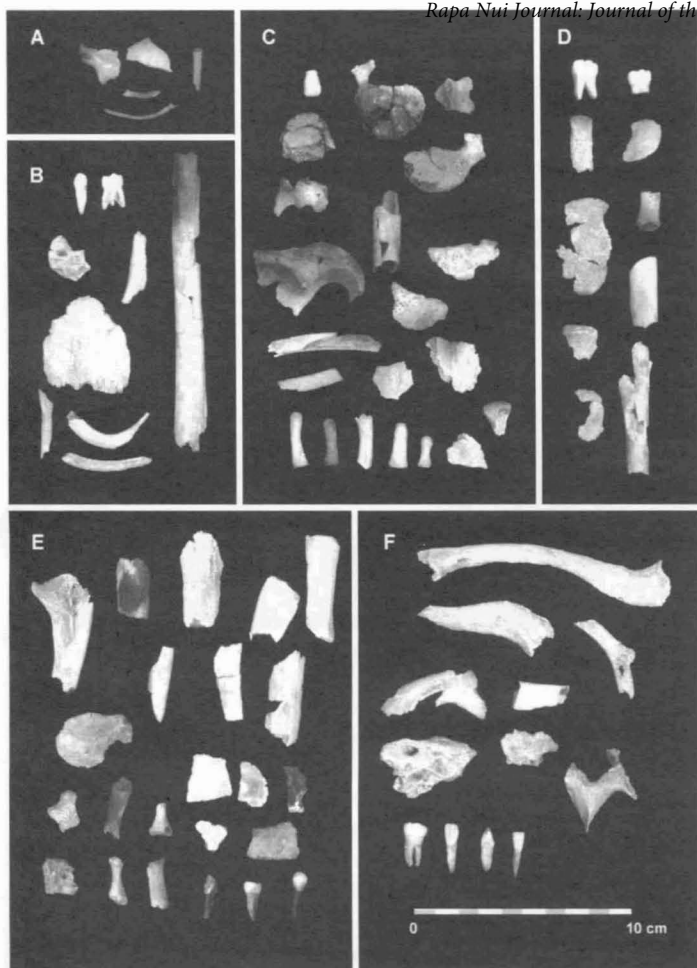


Figure 2. Some of the human bones and teeth discovered at Ahu 'o Rongo belonging to : A: child 1; B: child 2; C: child 3; D: child 4; E: burnt adults; F: unburnt adults.

Only isolated teeth were available for the adults (Table 1). According to the dental wear of unheated teeth, one adult died at around twenty years; another reached 24-35. The heated teeth belonged to at least two individuals aged 18-22 and 35-40, respectively. These age estimations are, however, tentative because dental wear is heavily dependent on diet.

#### CREMATION PRACTICES

In order to obtain information on the temperature of cremation fires, we used the scale of Susini *et al.* (1988) based on the color of the bones. Most of the children's bones were light brown and some were black (Figure 2 A-D): they must have been heated at temperatures between 300°C and 400°C. On the contrary, the adult bones display a wider range of colors: most of them were white, some were brown, some gray and a few were black or blue (Figure 2 E). This indicates that they were submitted to varying temperatures, rising up to above 700°C.

This temperature might appear to be high but experiments have showed that the temperature of a simple campfire can rise to between 900°C and 1000°C. However, for a corpse to reach this temperature, it must remain on the fire for at least two hours (Shipman *et al.*, 1984).

In order to determine if these corpses were incinerated or

if the cremations took place a long time after death, i.e. on dry bones, Guillon's method (Guillon, 1986) was used. This method can only be applied on bones that were heated at high temperature. We are, therefore, unable to give any information concerning the treatment of the children. Most of the adult long bones that were heated at more than 500°C display only longitudinal splitting, indicating that they were probably cremated after decomposition. Only six of them (9 %) present transverse and longitudinal intersecting cracks (Figure 3), which implies that they were incinerated "fresh". Nevertheless, none of them display the warping or twisting typically observed when flesh-covered bones are burned (Ubelaker 1989: 36). These results match with the observations of Routledge (1919) quoted by Métraux (1971:115) according to which the dead were usually exposed and then transferred to a vault of the *ahu* once they were decomposed. It also corroborates the results of the anthropological study of Ahu Tahai made by Ayres and Saleeby (2000), according to which 99.9 % of the remains show cracking patterns representative of the cremation of defleshed bones.

#### Peculiarities, pathologies and cutting marks

The upper incisors of adults show wear not only on the incisal edge but also on the lingual surface (Figure 4). This peculiar type of wear, called "lingual surface attrition of the upper anterior teeth" (LSAMAT), is related to a coarse diet (Irish and Turner 1997). This type of wear may result from long-term shredding or sucking of raw tuber roots between the upper teeth and the tongue. Observations of the first explorers and also ethnographic data indicate that prior to European contact, the diet of the Rapanui people included different tubers (Flenley 1993; Pollock 1993). Most of them were usually cooked, such as sweet potato, taro and yam, but sweet potato was sometimes eaten raw in order to quench the thirst (Métraux 1971:154). The turmeric root (*Curcuma longa*) was also chewed in order to extract the juice for cloth dyeing (Métraux 1971:237). LSAMAT is often associated with high caries rates, as tuber roots are rich in carbohydrates (Irish and Turner 1997). However, no caries were recorded on the twelve teeth that were discovered at Ahu 'o

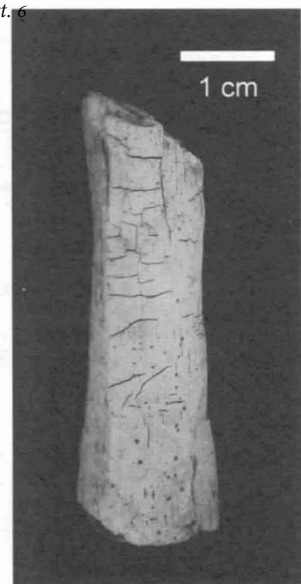


Figure 3. Bone with transverse and longitudinal intersecting cracks.



Figure 4. A permanent upper incisor showing a lingual surface attrition (LSAMAT).

Table 1. Estimations of the age at death of the individuals buried in Ahu 'o Rongo (I<sub>1</sub> = lower central incisor, I<sup>2</sup> = lateral upper incisor, P<sup>4</sup> = second upper premolar, M<sub>2</sub> = first lower molar, M<sub>3</sub> = third lower molar, dc = deciduous canine, dm<sup>2</sup> = deciduous second upper molar).

Children	Method	Author	Observation	Age
child 1	length of the <i>pars lateralis</i>	Fazekas and Kósa, 1978	~ 25 mm	newborn
child 2	stage of development of teeth & length of the deciduous	Ubelaker, 1989, p. 71		3 y ± 12 m
		Liversidge <i>et al.</i> , 1998	dc = 19.14 mm	3.4 y
child 3	stage of development of teeth & length of the permanent	Ubelaker, 1989, p. 71		5 y ± 16 m
		Liversidge <i>et al.</i> , 1998	I <sup>2</sup> = 11.46 mm	6.38 y
child 4	stage of development of teeth & length of the permanent	Ubelaker, 1989, p. 71		9 y ± 24 m
		Liversidge <i>et al.</i> , 1998	M <sub>2</sub> = 10.25 mm	9,8 y
<b>Adults</b>				
unheated	dental wear	Lovejoy 1985	individual A I <sub>1</sub> : phase C I <sup>2</sup> : phase C	18-22 y 18-22 y
			individual B I <sup>2</sup> : phase E	24-30 y
heated	dental wear	Lovejoy 1985	individual A (or C) P <sup>4</sup> : phase C	18-22 y
			individual B (or D) P <sup>4</sup> : phase G	35-40 y

Rongo. This absence might be related to the beneficial effect of a diet rich in fluorine, such as marine food (Hadjimarkos and Bonhorst 1962).

The deciduous teeth (canine and second molar) of the 3.5 year-old child present a brown horizontal line on their crowns (Figure 5). This line probably results from a disruption of mineralization at the maturation stage (Hillson 1996:171). It was probably opaque initially and became brown-stained later (by taking up color from food, for example). A mild level of fluorosis (excessive fluoride intake) may have produced these opacities. As the hypocalcification is localized on the sec-

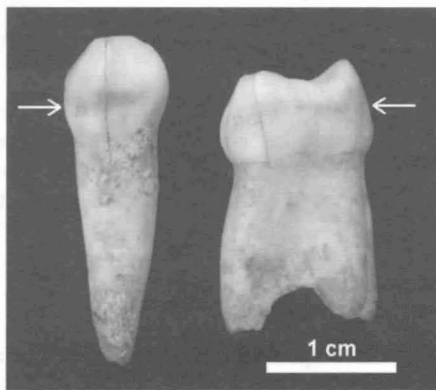


Figure 5. Buccal view of the canine and mesial view of second deciduous molar of the child 2 showing a brown horizontal band (→).

ond third of the crown, this defect occurred between the first and the second year of life.

Marginal osteophytes (bone spurs) can be observed on one articular facet of a heated adult thoracic vertebra (Figure 6). These indicate a degeneration of the spine and are a common finding that increases with age and the level of activity (Mann et Murphy 1990:47-48) but can also be related to fluorosis (Rogers and Waldron 1995: 26).

The surface of several fragments of long bones belonging to a child (probably the 3.5-year-old) shows increased porosity, marked striation and new bone formation (Figure 7). This remodeling of the periostum (tissue that

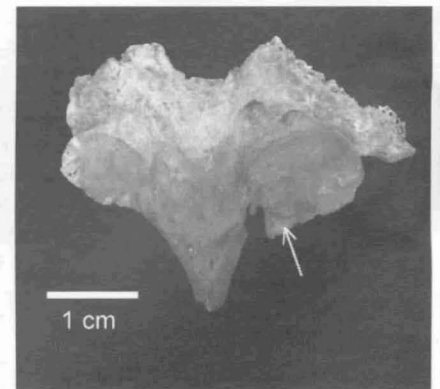


Figure 6. One fragmentary adult thoracic vertebra with marginal osteophytes.

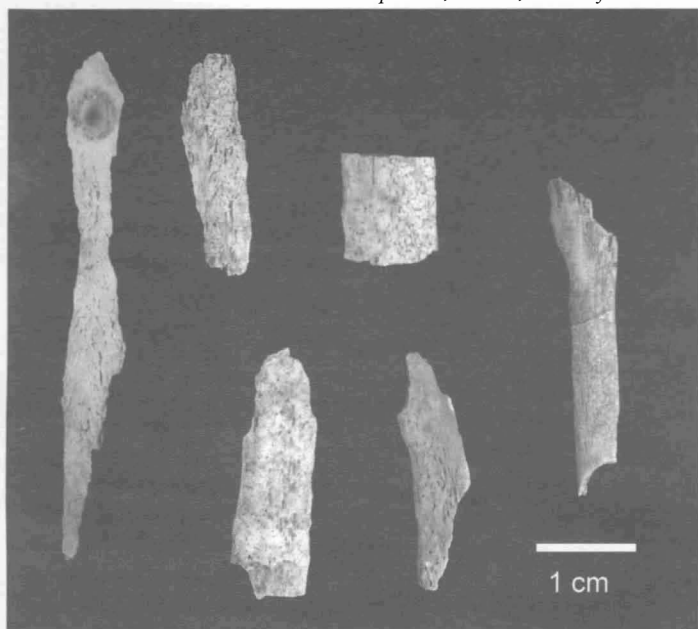


Figure 7. Periostitis on several long bones probably belonging to Child 2.

surrounds bone) probably reflects an inflammation (periostitis). It can result from trauma, nonspecific or specific infections such as syphilis, scurvy, and a host of other factors (Mann and Murphy 1990:109; Ortner and Putschar 1981:129-138). As several bones of this Rapanui individual were affected, the cause of this periostitis would rather be an infection. However, care must be taken concerning the aetiology; in the case of children, normally remodeling bone may simulate a pathologic condition (Mann and Murphy 1990:135-138).

The proximal fragment of the left ulna belonging to the ten year-old individual displayed two series of transverse cutting marks that were located at the level of the insertion of the *flexor digitorum profundus* (a muscle that flexes the medial four digits and assists with flexion of hand and wrist (Figure 8). These cutting marks can clearly be distinguished from rodent gnawing marks that are present, for example, on the femur of the 3.5-year-old child (Figure 9).

These cut marks suggest that the corpse was defleshed with a sharp object prior to cremation and interment. They

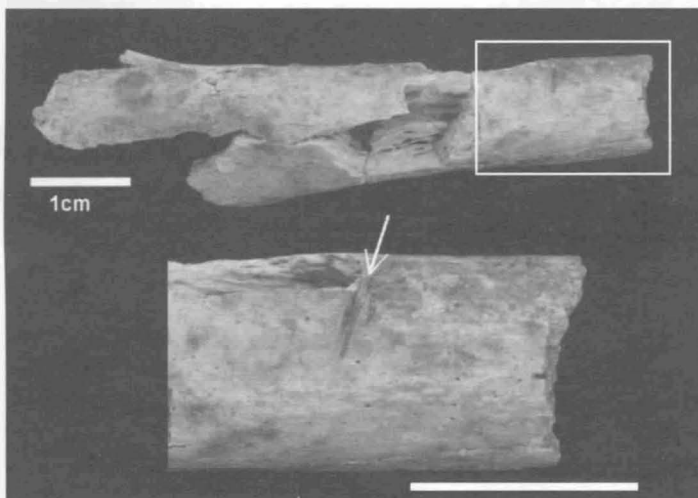


Figure 8. Cutting marks on the ulna of Child 4.

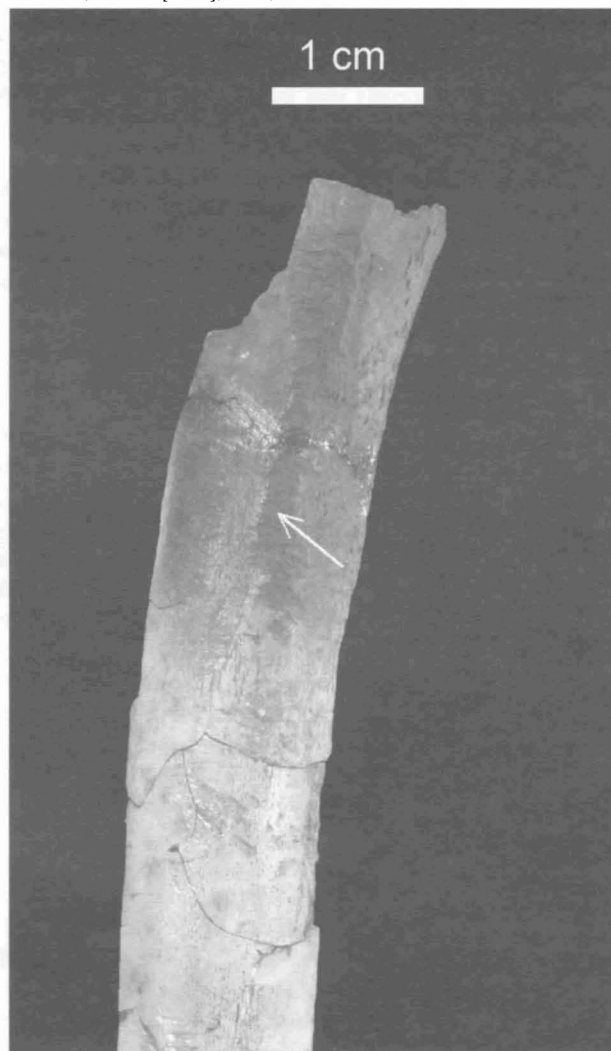


Figure 9. Gnawing marks on femur of Child 2.

might result from a ritual treatment of the deceased before transfer from the original burial location to the *ahu*. On the other hand, they could also point to cannibalistic or sacrificial practices. Both are mentioned in oral tradition for recent periods (Métraux 1971:151, 329-330), but it is possible that they could also date back to the later part of the 13<sup>th</sup> or the 14<sup>th</sup> century.

#### CONCLUSION

A minimum of two adults and four children ranging from newborn to about ten years of age were buried on the seaward side of *Ahu 'o Rongo*. Most of the adult bones and teeth and all the children's remains were cremated. Only adults were heated at high temperature (>700°C) and probably a long time after the death, i.e. on dry bones.

No severe pathology or trauma that could indicate the cause of death of the adults has been observed. In children, the 3.5-year-old individual might have died from an infectious disease.

The peculiar wear of the incisors indicates the consumption of a coarse diet such as one including raw tuber roots. As this wear is not associated with a high rate of caries, it might be

due to the beneficial effect of a diet rich in fluorine such as marine food. This hypothesis is corroborated by two pathologies possibly related to fluorosis: the hypocalcification on the teeth of the 3.5-year-old child and the marginal osteophytes on an adult heated thoracic vertebra.

Even though this study was achieved on a small quantity of cremated bone, it allows us to make statements concerning the minimum number of individuals, along with the general age range of these individuals, their pathologies and the probable cause of death, as well as the cremation practices.

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