Analysis of the Context of Burials in the Plaza of Ahu Tongariki

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Introduction

Between 1990 and 1993, the Ligabue Study and Research Centre of Venice, in collaboration with the Centro de Estudios Isla de Pascua of the University of Chile, the Museo Isla de Pascua Sebastiano Englert and the Italian Precolumbian Archeological Study and Research Centre, three successive missions to Rapa Nui were made with the aim of increasing knowledge of the inhabited and ceremonial settlements on the island. The purpose of this was to make a more comprehensive analysis including the Marquesas Islands, Fiji, Samoa and Tonga, the most probable route of the Polynesian migration.

Under the co-direction of Giuseppe Orefici, Claudio Cristino F., Patricia Vargas C. and the paleontologist Giancarlo Ligabue, the studies were mainly carried out on the sites of Puna Marengo, Hanga o Teo, Akahanga and in the area of the ceremonial complex called Ahu Tongariki. The studies concerning the latter were performed under the "Project for reconstructing Ahu Tongariki" in which the Italian Mission was invited to participate by project coordinator Claudio Cristino F. and the Ambassador of the Consejo de Monumentos, Oscar Pinochet de la Barra.

After an initial phase in 1990 to familiarize ourselves with the chosen areas, a group of specialists began work (archeologists, geologists, speleologists, lithologists, architects, restorers, botanists, physical anthropologists and paleozoologists). Operating in a interdisciplinary way, these scientists have helped to improve the knowledge of the historical and archeological development of Easter Island. The Project was carried out with the aid of the Italian Ministry for Foreign Affairs and the company 3M.

During the initial phase, mainly based on the surveys carried out in the preceding years by Claudio Cristino F., Patricia Vargas C., Reginald Budd P., Roberto Izaurieta San Juan and Lilian Gonzales N., the whole island was studied in order to verify the chronology of the settlements and the modifications the inhabited complexes had undergone both in style and typology. Furthermore, an attempt was made to single out the most ancient architectural nuclei and their relationship with the ceremonial structures. In the area of Puna Marengo, attention was concentrated on a complex of buildings which showed evidence of having had many functions. Here were *hare paenga* with external flooring in *poro* and over 15 *umu pae* which had no apparent relationship with the habitations. The presence of a *hare moa*, a group of six *manavai*, tombs, a number of polissoirs and petroglyphs completed the archeological evidence. In the area of Hanga o Teo, the main subject of study was the outermost inhabited area near the slopes of Terevaka, a cave with fireplaces on the surface of the ground, and a large number of residual obsidian chips. In the Hanga o Teo sector the most important discovery was considered to be a large area with *poro* flooring, and the presence of *hare umu* and of *tupa*, the use of the latter being uncertain even today.

The 1991 excavation, the purpose of which was to search for data on the recent use of the two areas, was carried out within the *hare paenga* of Puna Marengo and Hanga o Teo, as well as in the *umu pae* in the first sector. Inclined pole-holes were found in the stratigraphy under the anthropic ground, permitting us to hypothesize that here there had been a settlement of conical shaped dwellings with no stone base and which date back to before the *hare paenga*. Excavations in Hanga o Teo (Ana o Hihi) cave also supplied data on its recent occupation and the cultural items, both relative to the post-theocratic phase. This data confirmed the conditions of economic and social degradation that the island underwent towards the end of its autonomy and which continued after contact with Europeans in 1722 with the destruction of its cultural traditions due to the deportation of the population to the Peruvian territory.

During the 1992-93 campaign, archaeological excavations were effectuated in the inhabited area as well as in the ceremonial complex of Tongariki (fig. 1), with the aim of comparing the results with the data that had been collected in preceding missions and of verifying the interrelation between the inhabited area and the monumental sector. The fact that the excavations were carried out by archeologists of the University of Chile at the same time as the removal of surface material by Claudio Cristino and Patricia Vargas, together with the parallel opening of trenches in the perimetral area of the *ahu* and in its platform, all contributed to making the study of the complex called Ahu Tongariki more rapid and efficient.

The Tongariki 14-548 Site

The first excavation sector was set up in the south west zone of the archeological complex, in an area with evidence of domestic occupation due to the presence of *hare paenga* and *umu pae*. The aim of this study was to verify the relationship between the monumental area and the belt of inhabited land which was apparently used at different times and probably contemporary to the architectural evolution of the ceremonial complex.

Particular interest was taken in a trench (Site 558 Section D12) which connected two *umu pae* situated near a group of *hare paenga* which had been greatly destroyed since the lithic material was recycled to construct an enclosure for animals during the Company period. We took interest in the *umu pae* because we were certain we would find a considerable quantity of charcoal and of partially burnt organic material which could be used for C^{14} analysis and for our botanical studies. The dating obtained will be particularly useful to verify the parallelism between Ahu Tongariki, to which the dwellings were certainly related, considering that the edifice arrangement is a constant throughout the whole of Easter Island. During excavation it was possible to identify a sequence of three different anthropic strata, with the superimposition of ashes and charcoal layers belonging to different, but more or less recent, periods. The abundant remains of obsidian dressing tell us that an intense productive activity was carried out. Among the most significant findings were five *mata'a* (two of which are incomplete), as well as a nucleus and several scrapers (Site 558b layer B). Following this, work began inside the ceremonial sector, in the Site 548-14A (Sector F4-03) and 548-14B (Sector F5-00), in correspondence with a *moai* head covered with earth and a *pukao,* both of which had been intentionally interred before the seaquake that completely destroyed the architectural complex in the 1960's (fig. 2).

The analyses carried out on the archeological surface of Ahu Tongariki were performed during a preliminary phase, before the Italian Mission arrived, under the direction of Claudio Cristino and Patricia Vargas. The topographic survey carried out by Roberto Izaurieta was useful for the studies regarding the situation of the *ahu* before the seaquake. This was done with the help of photographic reconstruction on the basis of Katherine Routledge's documentation in the same way as the preliminary reconstruction project, carried out by Reginald Budd P., served as a base for planning the recovery of the lithic blocks belonging to the megalithic platform. The aanalysis highlighted at least three successive reconstruction phases of the monumental complex, with extensions both in a

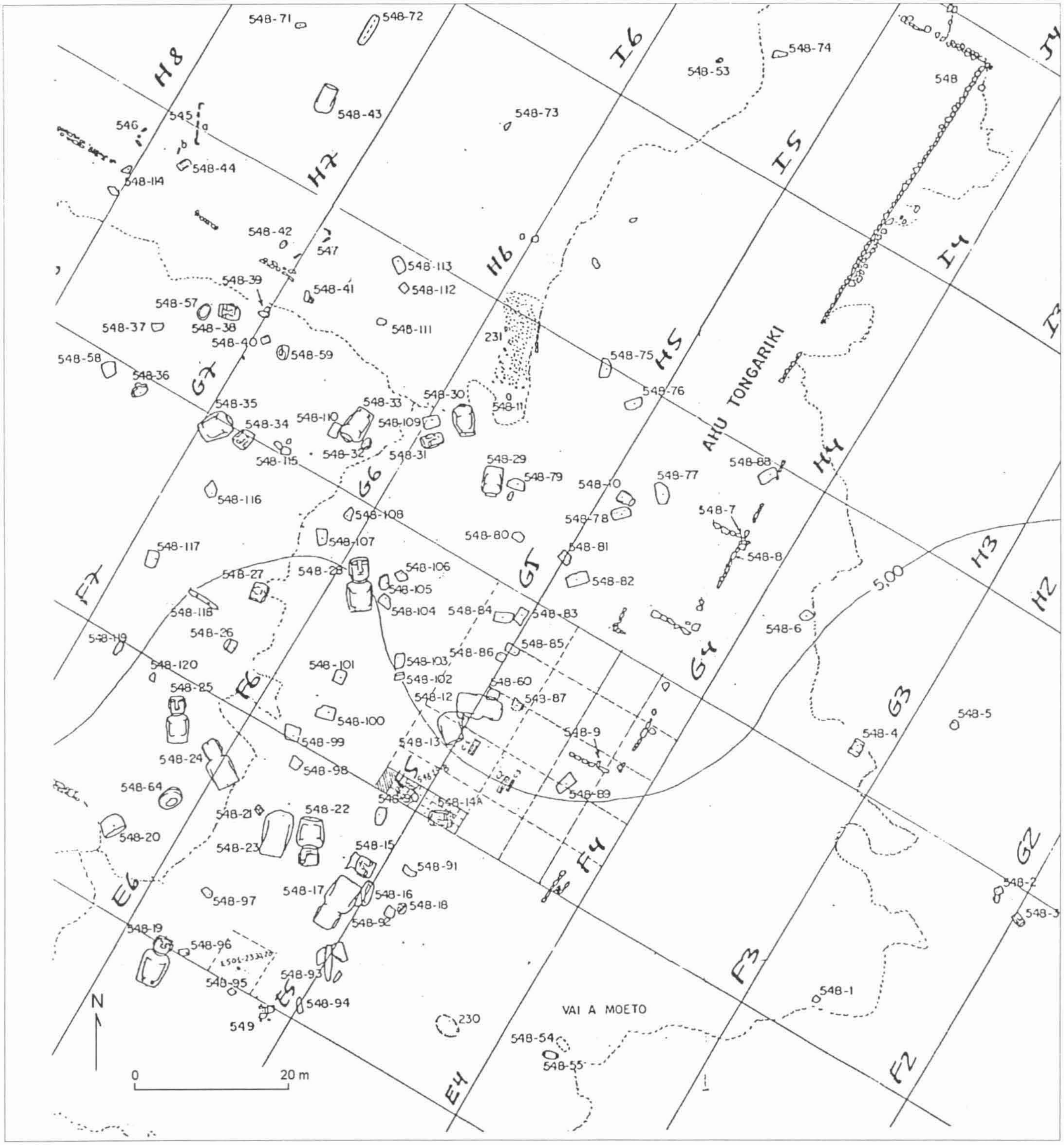

Figure 1. Tongariki 14-548: the situation of the sectors studied in the F4, F5 and E5 sections.

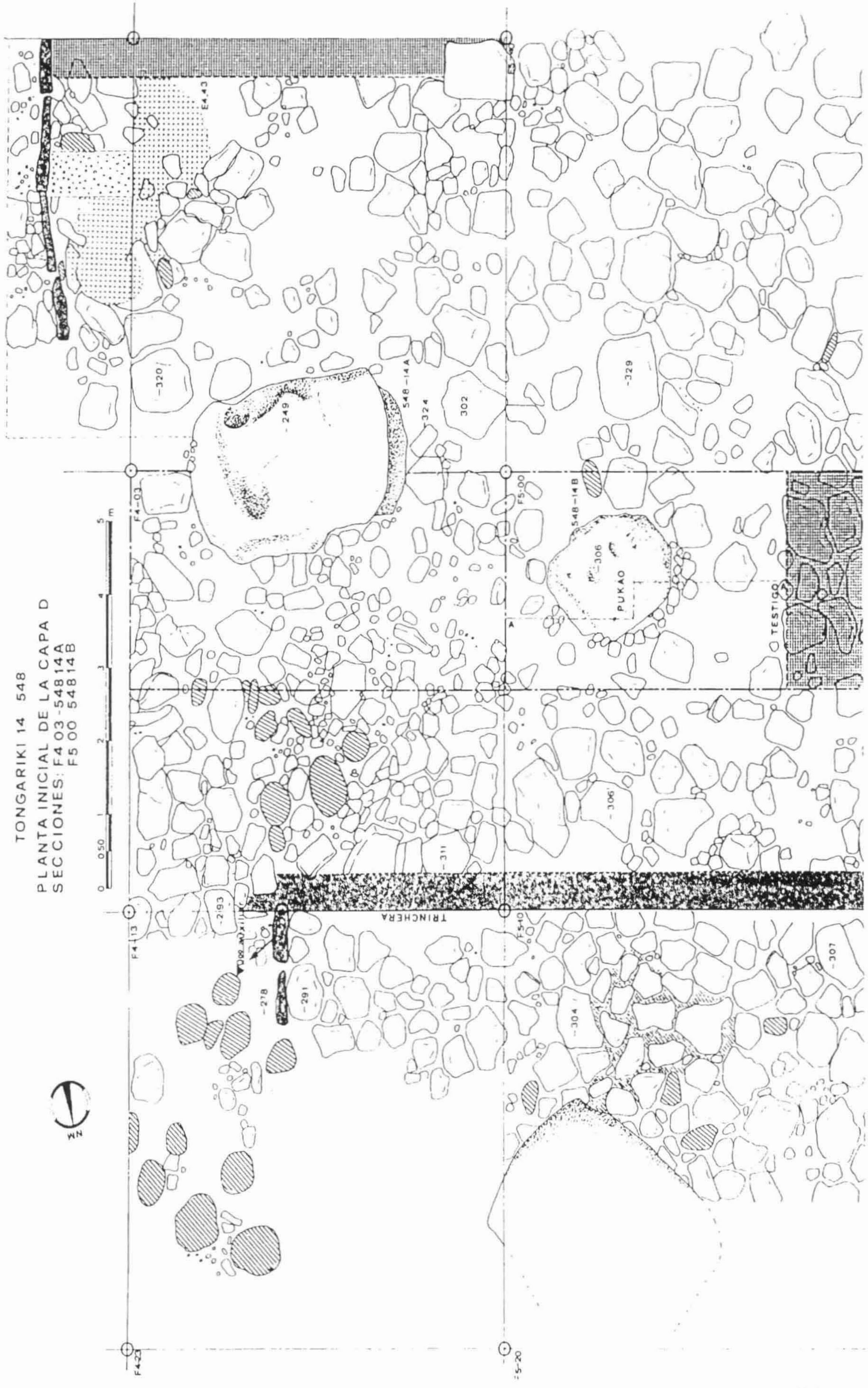

Figure 2. Tongariki 14-548: the plan of the sector F4-03/F5-00 stratum D.

longitudinal and transversal direction, allowing more ancient *ahu* (probably three) to be identified, together with their successive inclusion in the large structure built later. The base of the platform lay on an artificial embankment made out of large and irregular blocks of volcanic stone above which lay a pavement of flat stone. This pavement bore evidence of successive modifications and it was clear that it had been superimposed over an older element of the same sort, constructed with a slightly different technique and related to a more archaic *ahu*. The same construction procedure could be observed in the existing part of the perimetral delimitation of the *ahu* and the area occupied by the more recent ramp where a part of the pavement underlying the base packing of the more recent ceremonial building was observed. A probable older phase could be seen on the south side of the excavation, in connection with a part of the flooring covered with melted volcanic tufa, of the same kind found in the quarry of Rano Raraku. Evidence that the older structure had been extended was also found in the area excavated by Cristino, where part of the more recent pavement appeared. The open space (square) in front of the *ahu*, where the *moai* transported by the seaquake currently lie, brought to light flat stone alignments which ran obliquely with respect to the monument, allowing us to suppose that portions of the older pavement had been recycled.

The situation which had been determined by the work carried out before the Italian Mission's excavations highlighted a construction sequence made up as follows:

1) Construction of the most ancient *ahu* whose perimetric remains can be found in the East area;

2) Laying of the pavement sealed with ground tufa;

3) Construction of the *ahu*, the base of which is towards the West, situated above an existing pavement;

4) Pavement outside the *ahu*;

5) Construction of the most recent *ahu* which incorporates the first two structures;

6) Construction of the access ramp in *poro;*

7) Extension of the *ahu* towards North (various phases);

8) Extension of the *ahu* towards South (various phases).

Furthermore, it could be observed that the pavement of the square in front of the *ahu* was inclined since it had sunk due to the weight of the outermost perimeter wall, to which a new pavement had been added.

The Italian Mission's excavation

The Italian Mission's excavation was carried out in an area of the square which had been interfered with. A *moai* head lay horizontally and partially covered with earth on a level with the pavement in an area where the stone slabs had been removed. On the basis of an agreement made with our colleagues who had carried out prior archeological works, the floor was called Layer D, having called the superficial lithic material brought in by the seaquake Layer A, the underlying *kikiri* Layer B and the sandy material including small stones, Layer C. The first aim of the excavation was to verify the existence of an underlying pavement, a hypothesis that was not confirmed due to evidence that the artificial base had been refilled at one time only by means of large lithic blocks. The second aim was to verify the reasons of the almost total

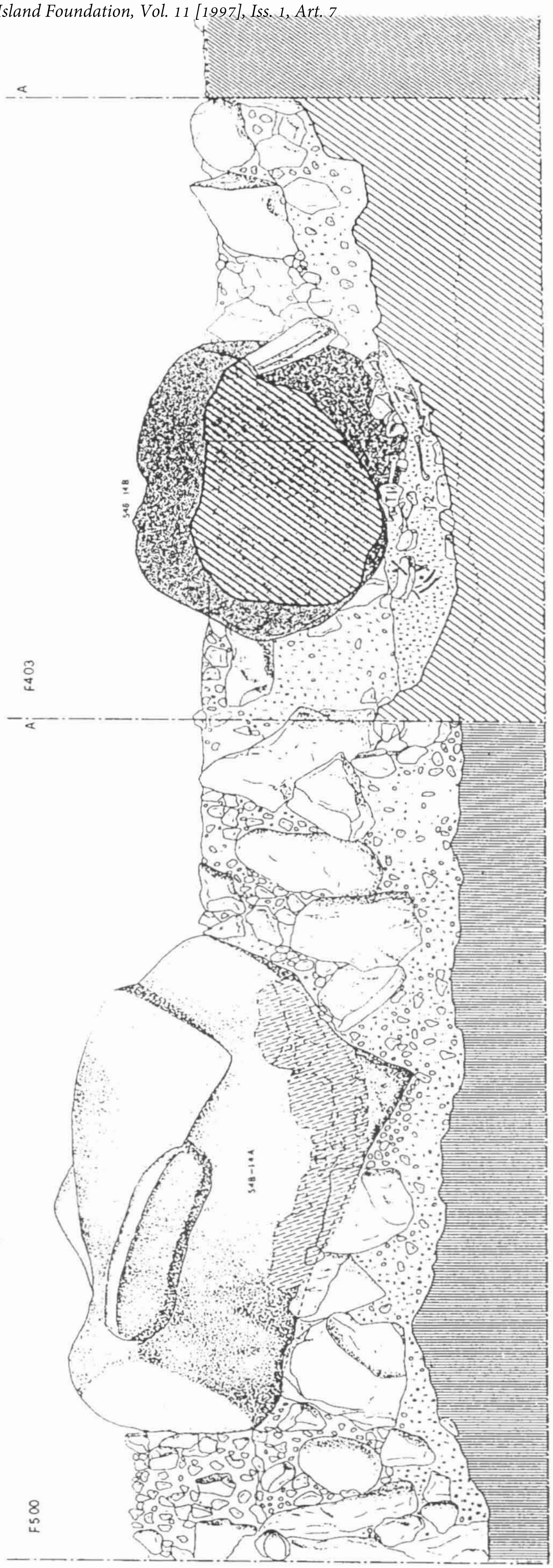

Figure 3. Tongariki 14-548: the stratigraphy of the southern side of the F403/F5-00 sector with the A-A section showing the skeletal remains below the *pukao*.

interment of the *moai* head and of the *pukao*, assuming that it was done on purpose in order to attempt to level out the inner pavement. A further hypothesis, which was proved later, had the aim of searching for burials in connection with the *moai* head and the *pukao*, on the basis of previous works carried out by Cristino in the Vai Mata sector.

In Sector F4 work began to remove Layer D on a level with the surface of the pavement that had been interfered with, confirming that the *moai* head had been interfered with by humans. We were able to register the presence of a considerable quantity of malacological remains, animal bones, coral and some modern objects such as a button (F4-0315) and a piece of glass (F4-0312 and F4-0304). Among the artifacts, we registered two *mata'a* (F4-0322 and F40323) and a considerable number of *toki*, indicating a working activity in the same area as the *ahu*. The fact that no matrixes were found near the *moai* head, lead us to believe that the skeletal remains found close to the large sculpture and belonging to Layer E, mostly made up of refilling comprised of large lithic blocks and brown earth which formed the base of the paved area, belong to a single stratum. The presence of medium-sized stones mixed with the earth and gravel in the *moai* head area, confirmed that the pavement had been disturbed with the aim of excavating close to the sculpture, burying it and placing the bones close to it. Many elements of cultural items were discovered in the earthy layer and, as well as obsidian chips, we found the bones of three individuals who had been buried on a second occasion. Unfortunately, the intrusion of modern materials within the refilling layer of large lithic blocks made it very difficult to identify the materials belonging to two different cultural times from a chronological point of view (D and E). The inhumation complex, called TI (fig. 3), showed that it was probably re-used for the same purposes at other times. At the bottom of Layer D we identified a support made up of small, rounded stones which was part of the cist construction model, as we had the chance to see in the burials excavated in sectors F4 Trench 3 (Cist I and 2), F4 Unit 12 (Cist 1), F4 Unit 02 (Cist 1). Among the cultural material present, we registered the finding of a small *moai* eye made of obsidian as well as the same sort of material found in the layer described above.

In Sector F5, Layer D was made up of substantially-sized gravel mixed with small stones, probably corresponding to the material transported by the seaquake. The stratigraphic sequence was very irregular around the *pukao* due to the destruction of part of the pavement and to the artificial refilling having been excavated in order to bury the lithic element, having first removed part of the large basalt blocks. This layer included a large quantity of cultural items, among which various *toki*, *mata'a* and a stone hook. Once Layer D had been removed, the closure of the entrance to a space excavated underneath the *pukao* could clearly be seen. This space partially involved the same lithic artifact that had lost almost all of its lower half.

Layer E, similar to that of Sector F4, was mainly made up of large stone blocks and a considerable quantity of brown earth. The thickness of this layer varied according to the alignment of the foundation rock.

In the space which had been formed by the removal of part of the *pukao* and by the elimination of the corresponding refilling material, it was possible to identify the tomb called T I (figures 4 and 5). This lay on top of a flat stone base which formed the bed of the tomb and contained human bones belonging to at least three individuals. An almost complete adult skull and several vertebrae belonging to infants were discovered on a level with the *pukao* on the eastern side of tomb no. 2. In this same burial context, probably utilized at different times, the remains of at least six people were discovered, probably placed there during a second burial. Excavations began to remove all the bone material, leaving the foundation rock, which lay under the earthy layer, exposed.

Physical anthropology

The physical anthropological investigation of the Late Period skeletal samples from Easter Island will contribute to estimating the range of variation of a number of morphometric characteristics as well as contributing information concerning the life-style of the later islanders. Data could also serve as a preliminary source for interpreting the changes that have occurred in some features since the early period. Unfortunately, chronology in Easter Island can not be substantiated with either archaeological records and skeletal data: the evidence is mostly overshadowed by previous settlement structures and it is difficult to differentiate the sequences of the superimposed anthropic strata. The settlements of Ahu Tongariki add a further gap, since the 1960 *tsunami* destroyed perhaps the biggest and most important ceremonial Centre of the entire island.

Recent studies on Easter Island skeletal collections belonging to different sites were performed by Gill, Owsley and Baker, 1983; Gill and Baker, 1986; Gill and Owsley, 1993. The authors suggested the presence of an endogamous breeding population during the Late Period having confirmed the frequency of some congenital anomalies. Others findings regard skeletal injuries and the high incidence of caries (27.1%). Intra-island cranial variation was also studied, together with a re-evaluation of craniofacial measurements, frequency of the rocker jaw, frequency of shovel-shaped incisors and other cranial discrete traits. No data are available in literature regarding postcranial bones morphometrics, stature and stress indicators such as enamel hypoplasia, alveolar reduction and porotic hyperostosis.

Skeletal conditions and research methodology

The human skeletal remains of the 14-548 site were found scattered in an area of some 5000 m^2. The skeletons were mostly incomplete and fragmented, the bone tissue was generally dry and brittle, and the physicochemical erosion in situ had given the periosteal surface a heavily weathered appearance. Several bones were covered by lichens, as Imbelloni (1951) has already noted; others were destroyed by plants and rodents. The study of diagenetic changes demonstrated the traces of the decay process resulting in extensive bone damage, such as parallel and transverse cracks, pits, fissures, together with soil concretion deposition. These observations had been carefully evaluated to avoid possible misinterpretation of pseudo-pathological bone changes (Wells 1967; Beherensmeyer 1978; Rodriguez and Bass 1985; Henderson

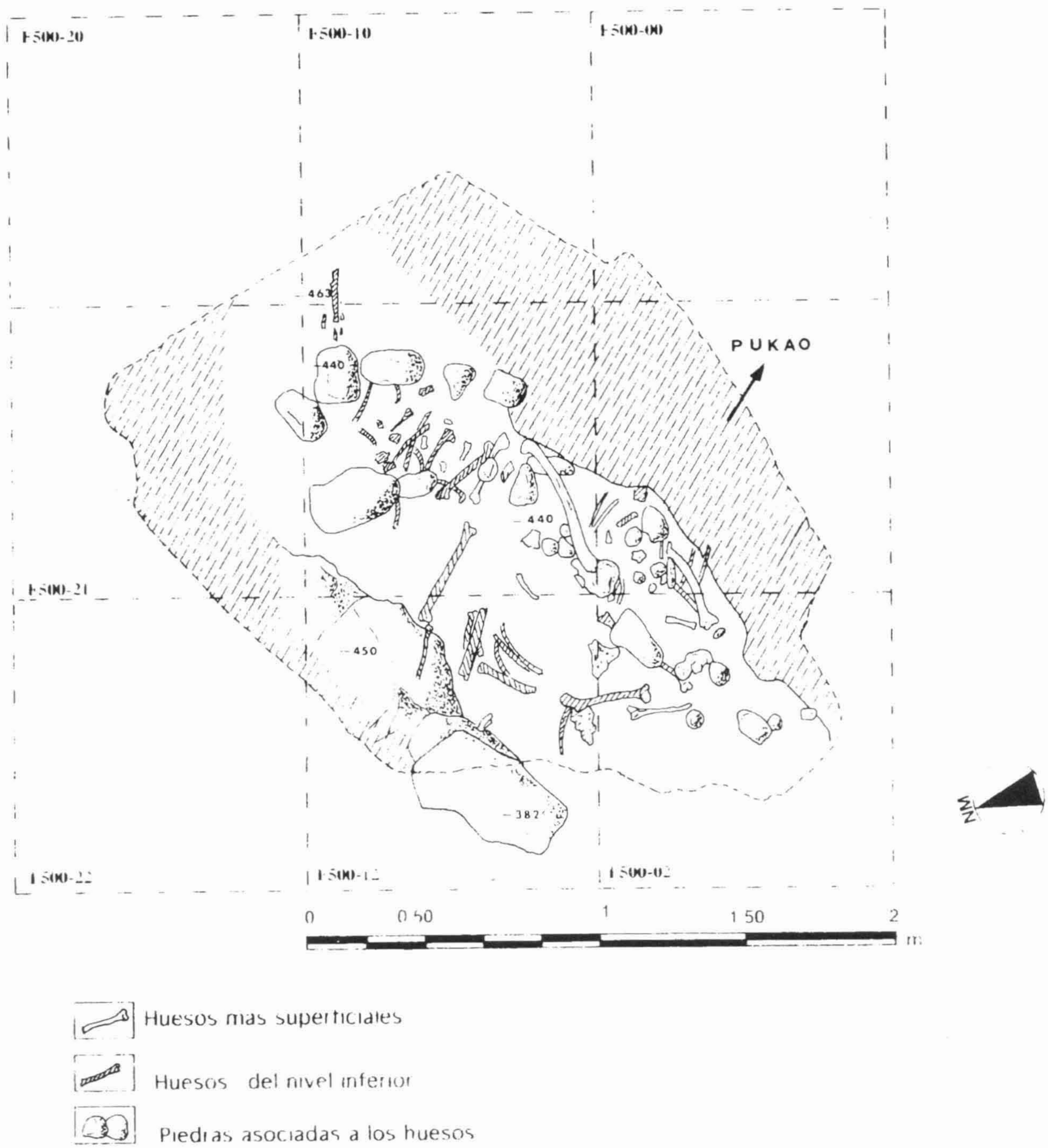

Figure 4. Tongariki 14-548: skeletal remains discovered in the cavity below the *pukao.*

1987; White and Folkens 199 1; Maat 1993). The poor condition of the bones seriously limited the anthropological study: moreover, only two primary burials (D5-31 and F4T3-Cist 2) were present at Tongariki, since the bone assemblage was always related to collective secondary burials.

The skeletal material objects of the present study belong to 428 bags containing thousands of bone fragments (both human and animal), the most significant anatomical parts of which were collected and studied. Skeletal remains were studied partly in situ and partly at the Museo de la Isla de Pascua S. Englert. During the excavation, we particularly worked on the burial site related to the head of the *moai* and the *pukao* partially interred at pavement level (site 548-14A, sector F4-03, and site 548B, sector F5-00). As the reconstruction of individual skeletal complexes was impossible, the analysis was performed on the isolated bones and teeth. Age and sex were assigned following the most authoritative anthropological literature (Bass 1987; Krogman and Isgan 1987; Reichs 1986; Stewart 1979; Workshop of European Anthropologists 1980; etc.). Anthropometric measurements were performed according to Martin (1988) and Olivier (1960). Racial affinity was determined according to Gill

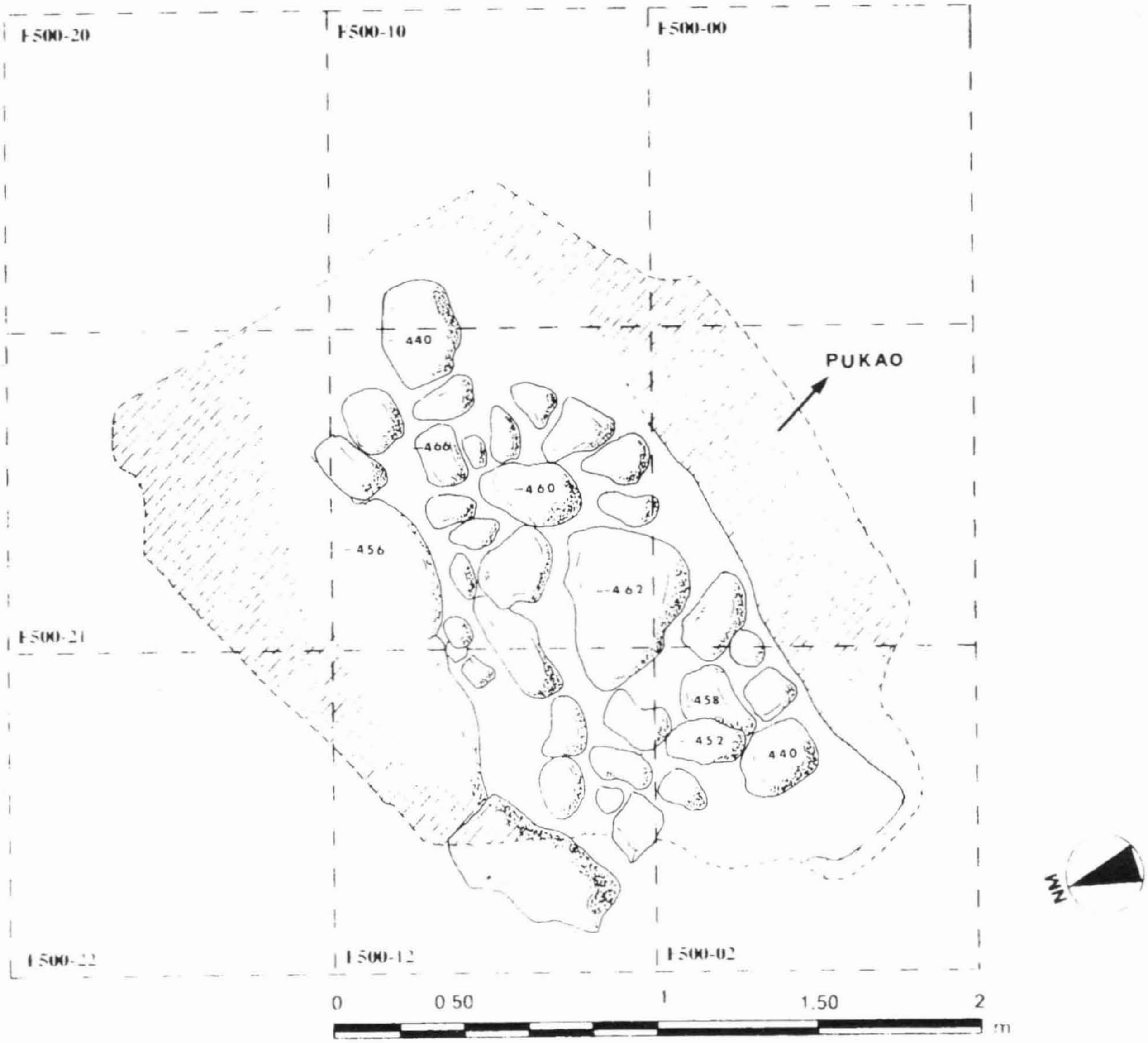

Figure 5. Tongariki 14-548: artificial stone base below the skeletal remains buried underneath the *pukao.*

(1986) and Woo and Morant (1934).

Results

Skeletal conditions ranged from poor (63.2% of the whole material) to fair (36.3%) to good (0.5%). A minimum number of 34 individuals (NMI) was determined sorting the assemblage of bones according to White and Folkens (1991) (table 1).

Several animal bones were found in association with the human skeletal remains: of these, 58.9% were mammals, 15.7% birds, 14% rodents, 3.4% shell, 2.9% fish, 0.4% cetaceans, and 4.7% indetermediate. Some of the great mammals must belong to recent times.

The skull

Only few skulls were available for measurement (table 2): we used the same measurements as Gill and Owsley (1993) for comparison. A skull, belonging to an adult female (E50123), showed a vertical post-mortem incision on the frontal bone (figures 6 and 7). Another skull (D5304460), belonging to an adult male, showed a post-mortem incision on the frontal bone (49.5x27.0 mm) and the enlargement of the *foramen magnum,* perhaps the result of cannibal practice (figures 8 and 9).

Craniofacial traits analysis carried out in a small number of specimens confirmed the data previously scored by Gill (1986): the results are shown in table 3. We found a rather low frequency of the rocker jaw (50.0%, n=16), confirming the data of Gill and Owsley (48.5%, n=167). The platopy indices (only 3 cases) showed a polynesian-melanesian affinity. The percentage of the mandible's *ponticulus mylohyoideus* is near to the data of Pietrusewski (1977, 1984) for prehistoric Hawai'i, New Caledonian recent Melanesians, and Australians.

Preliminary data on dental analysis are shown in table 4. We remark the low incidence of caries (both in decidous and permanent teeth), and the low percentage of some stress indicators, such as enamel hypoplasia (1.51%), calculus

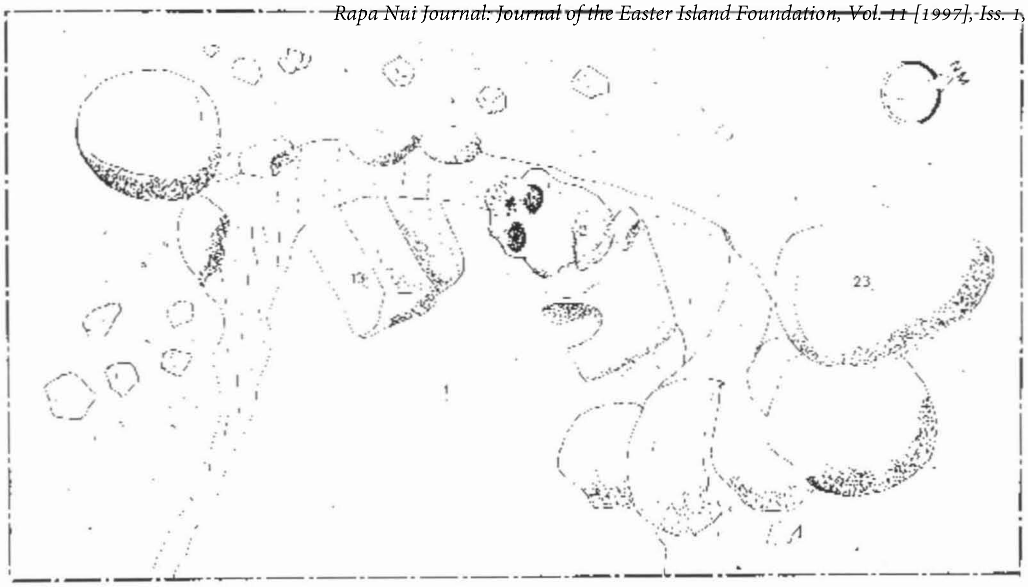

Figure 6. Tongariki 14-548: the situation of the skull E50123.

Table 1
Tongariki 14-548: minimum number of individuals (MNI) according to the most significative bones.

BONES	MNI
Skull	32
Mandible	34
Humerus	24
Radius	21
Ulna	29
Femur	34
Tibia	25

(8.030/o) and alveolar reduction (only 7 individuals shown the II and III stage according to Bennike 1985). Ectocranial porosity *(cribra orbitalia)* was present in only one individual, an infant about 4-6 years old.

The postcranial skeleton

Postcranial bones found at Tongariki were very fragmented and only few could be subjected to anthropometric measurements. Only the long bones were preserved to a certain degree, so we will report basically upon them. It is important to note the potential error sources in determining the degree of sexual dimorphism. As Hamilton (1982) points out, the use of size in sexing decisions could potentially bias the outcome, since the degree of size dimorphism in *Homo sapiens* is frequently low. In many cases, the choice of measurements will be determined by the fragmentary nature of the skeletal sample, and sometimes a comparison with other samples is not possible. However, within the postcranial skeleton, long bone lengths will yield significant differences, and articular surfaces, bone diameters, and circumferences are even more significant. In our sample we applied the approach of subjective evaluations of muscle robusticity for structures such as the humerus deltoid tuberosity (Hamilton 1982 score distributions); furthermore, we used the long bones standard metric evaluations (tables 5 and 6).

Table 5 shows the values of the humerus and the femur robusticity index for males and females (Martin 1988): for the femur the difference is not statistically significant (P=0.05).

The deltoid tuberosity, robusticity index and other evaluations of muscularity could offer insights into activity patterns. For this sample, little difference in male and female arm muscle mass may be related to a similar activity, even though these speculations require collaboration from more archaeological records. The humerus muscular attachments prevail on those of the weaker radius and ulna. The arm muscles most involved in work activity were the *m. pectoralis major,* the *m. teres major,* the *m. latissimus dorsi* and the *m. deltoideus.* These muscles were more developed in men.

One of the most important variations of the humerus, the perforation of the coronoid-olecranon septum, or septal aperture (Bass 1987) showed an incidence of 20.4% (11/54), the large pattern being more frequent (both sexes combined). The percentage is quite low compared to the 48% of the American Indians (Olivier 1965; but Hrdlicka 1932, reported a percent-

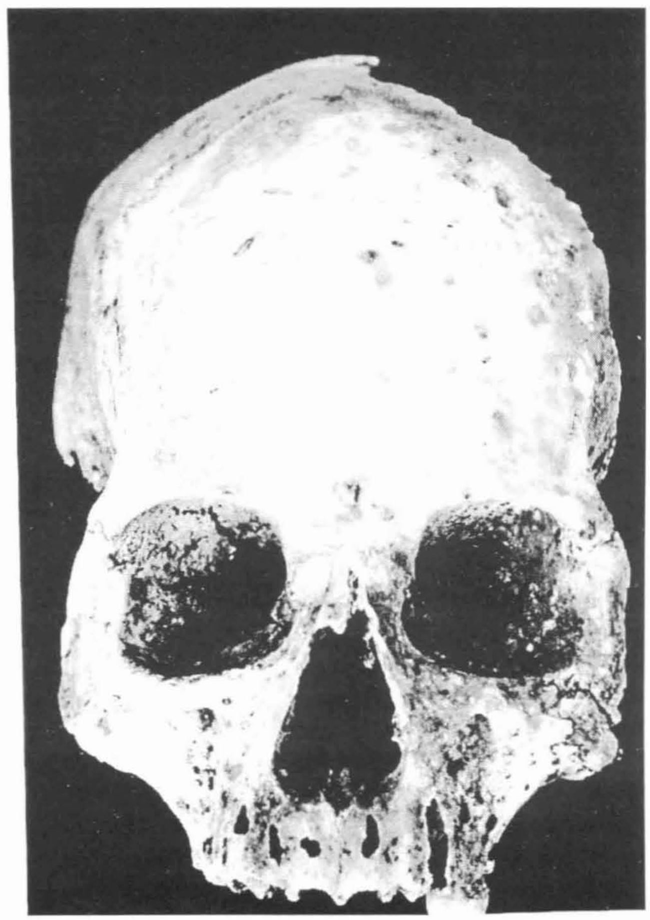

Figure 7. Tongariki 14-548: the skull E50123 belonging to an adult female,

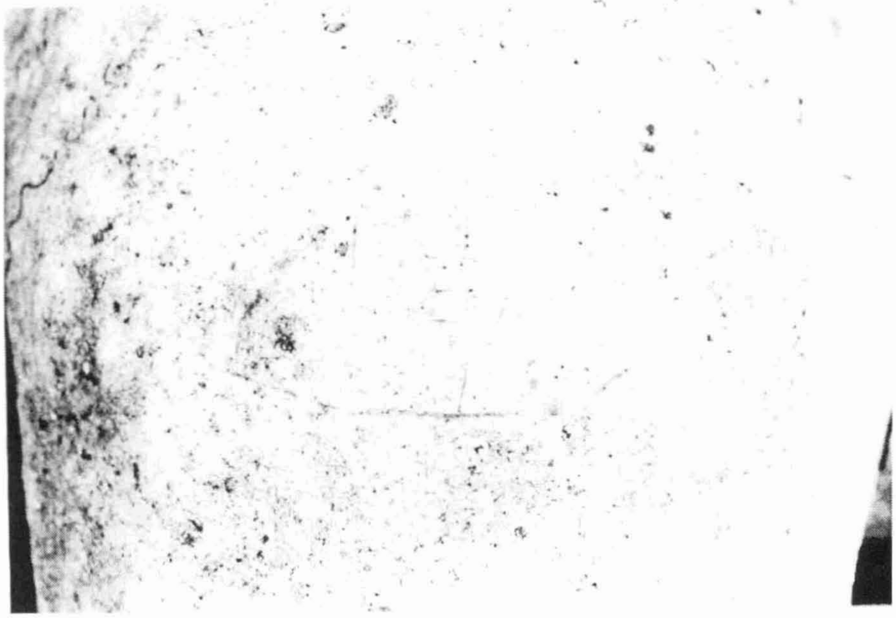

Figure 8.Tongariki 14-548: the skull D5304460 belonging to an adult male, showing a post-mortem incision (49.5x27.0 mm) on the frontal bone.

age of 29.6%) and to the 34% of the Polynesians (Olivier 1965); the overall average for the Japanese is approximately 17% (Bass 1987), for Caucasians only 4.2% (Trotter 1934). The femur showed a considerable variation especially for males, in size, robusticity, markings of muscle attachments, and proportions and angles of the different anatomical parts. *Index pilastricus* average values were 112.91 (SD 7.61) in males and 93.83 (SD 11.82) in females: Student's t showed a significant difference at P = 0.05. So only the male sample showed a well developed *linea aspera* (the *linea aspera* is a primary origin site for the *m.m. vastus lateralis* and *medialis and m.m. adductor longus, brevis* and *magnus* of the hip). Most femurs of both sexes showed a fusiform shaft extending the *linea aspera* toward the head, and corresponding to the *tuberositas glutaea:* above it, a third trochanter was often found. The femoral third trochanter is the insertion for part of the *m. glutaeus maximus,* an extensor and lateral rotator of the thigh at the hip bone that originates on the posterior half of the os coxae, sacrum and coccyx. It was present in 35.38% of cases, but as many femurs were damaged at the third superior of the shaft, we consider these data as preliminary. Only 65 femurs displayed the peritrochanteric region, and 23 of them presented a more or less developed third trochanter. The racial significance of the third trochanter is still not clear (Olivier 1965), but we must point out that the frequency found at Tongariki is very near to the prehistoric populations (38%): in the present populations the frequency is about 30% (Testut 1971).

Table 2. Tongariki 14-548: measurements of the skull.

MALES					
	Spec.N. F4T3C2	SpecN F5T2	Spec.N D5304460	Mean	SD
MAX L	180.0	-	192.0	186.0	8.5
MAX BR	125.8	-	124.8	125.3	0.7
BAS BR	-	-	-	-	-
MIN FR	92.5	-	94.8	93.6	1.6
BIZY BR	-	-	-	-	-
NAS PR*		76.9		76.9	
*Nasion-prostion instead of NAS ALV.					
FEMALES					
	Spec.N E50123	Spec.N D5-31		Mean	SD
MAXL	-	185.2		185.2	-
MAX BR	-	128.0		128.0	-
BAS BR	-	133.5		133.5	-
MIN FR	89.0	97.5		93.2	6.0
BIZY BR	-		-	-	-
NAS PR*	64.9	62.7		63.8	1.5

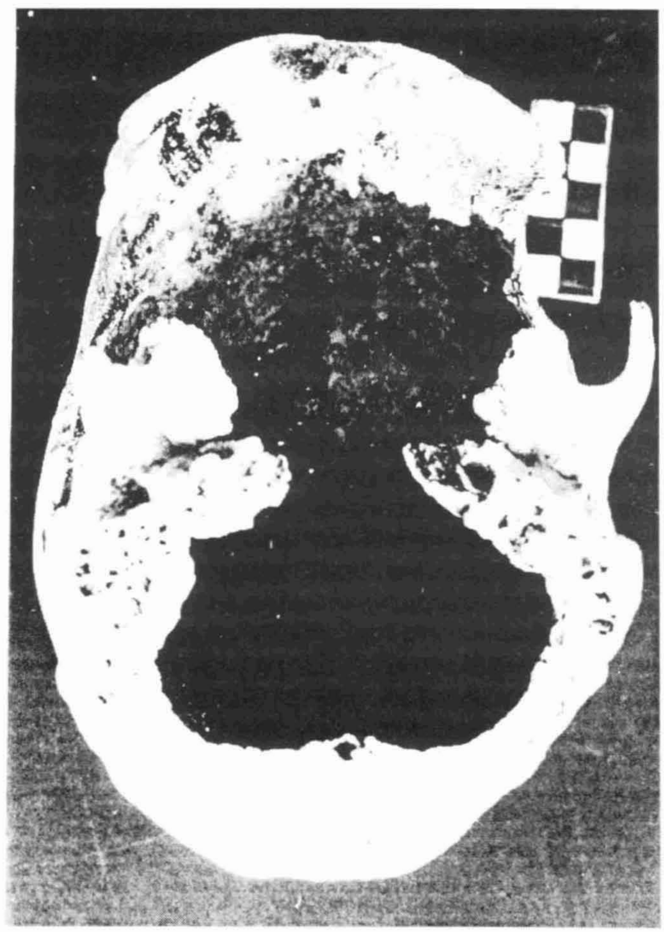

Figure 9. Tongariki 14-548: the skull D5304460 showing the enlargement of the *foramen magnum.*

Table 3 - Tongariki 14-548: preliminary results on craniofacial analysis and racial affinty.

CRANIAL FORM	variable
SAGITTAL OUTLINE	medium
PARIETAL BOSSES	prominent
NOSE FORM	medium
NASAL PROFILE	concave/concave-convex
INCISOR FORM	shovel*/blade
FACIAL PROGNATHISM	moderate
MALAR FORM	n.d
PALATAL FORM	parabolic/elliptic
ORBITAL FORM	rhomboid
MANDIBLE	robust; rocker form 50.0%: no *ponticulus mylohyoid*. **
CHIN PROJECTION	moderate
CHIN FORM	median

* Incidence: Tongariki 62.7%; Melanesian 67.0% (Hrdlicka, 1920); living Polynesians 74.0% (Suzuki & Sakai 1964).

**Incidence: Tongariki 11.1%; Prehistoric Hawaii Islanders: 5.6%; recent Melanesians (N.Caled.) 6.5%; Australians (Prehist. and near cont.) 7.5% (Pietrusewsky 1977, 1984).

WOO & MORANT (1934) PLATOPY INDEXES	N. cases
POLYNESIAN RANGE	3 (75%)
PAPUA-MELANESIAN RANGE	1 (25%)

Table 4. Tongariki 14-548: preliminary data on teeth analysis.

TOTAL NUMBER OF IDENTIFIED DECIDUOUS TEETH = 119	
SHOVEL-SHAPED INCISORS (17/21,80.9%)	
marked	11.76%
semi-marked	76.48%
m+s-m	88.24%
trace	11.76%
double shovel	0.00
CARIES 3/119	(2.52%)
TOTAL NUMBER OF IDENTIFIED PERMANENT TEETH = 1195	
SHOVEL-SHAPED INCISORS (102/169, 60.3%)	
marked	21.57%
semi-marked	49.02%
m+s-m	70.59%
trace	29.41%
double shovel	0.00
TEETH WITH COMPRESSED CROWN 24 (2.01%)	
ENAMEL PEARLS 3 (0.25%)	
TAURODONTISM 1 (0.080%)	
CALCULUS 96 (8.03%)	
ROOTS WIT'H DEVELOPMENTAL DISTURBANCES 9 (0.75%)	
ENAMEL HYPOPLASIA 18 (1.51%)	
INTEROCCLUSAL PITS/GROOVES 16 (1.34%)	
CARIES 83/1195 (6.94%)	
UNIDENTIFIED TEETH = 183	
GERMS = 79	

Table 5. Tongariki 14-548: humurus and femur robusticy index in males and females.

	Sex	N	mean	range	SD	SE	t	P
HUMERUS	M	15	20.82	17.91-22.93	1.62	0.42	4.09	0.01
	F	7	19.20	16.90-20.81	1.29	0.49		
FEMUR	M	7	12.28	11.56-13.22	0.56	0.21	1.39	0.05
	F	5	11.91	10.86-12.26	0.59	0.26		

Stature reconstruction

Stature could be reconstructed by the length of the available isolated long bones of both sexes using regression formulae for white males and females, and for mongoloid males (Trotter and Gleser 1958, 1977). We had at our disposal 21 humerus (15 males and 6 females), 17 radii (11 males and 6 females), 9 ulnae (5 males and 4 females), 13 femurs (6 males and 7 females) and 8 tibiae (only males). Average statures in the males ranged from 169.07 cm (fibia) to 170.75 cm (ulna) with the formulae for Mongoloids. For the females, the range was 153.00 (humerus) to 159.00 (ulna) using the fonnula for Whites (table 7). No significant difference was found between the estimates obtained with the formulae for Mongoloids and those obtained with the formulae for Whites. The tallest individual was an adult male of 177.23 cm from a 343.0 mm humerus. The combined average stature for the male sample was 170.61±1.18 cm, and 156.12±2.46 for the female sample (all bones considered), so the latter was about 8.5% smaller than the male sample: the results are consistent with a relatively tall population. Since stature can be considered a non-specific health indicator, a comparison with bones of previous historical samples will be useful.

Pathology

The majority of pathological features evident in the individuals from Tongariki is not associated with hostility. Their pathology includes mainly caries, vertebral arthrosis, and bone fractures. It is interesting to note that acquired oral pathologies in this sample did not include expressions of enamel defects such as hypoplasia, and that pre-mortem tooth loss and caries frequency were quite low. Porofic hyperosthosis *(cribra orbitalia)* was present in only one individual. Two adult fibulae showed a healed fracture of the proximal diaphysis, and one metacarpal and one III metatarsal (all adults) showed some exostosis of the shaft, which were probably healed fractures as well. Arthrosis was found in some cervical, thoracic and lumbar vertebrae, the stages ranging from I to IV (according to Hantske Chapman 1972), and in one II metatarsal.

Table 6. Tongariki 14-548: long bones sexual dimorphism.

	Sex	N	mean	range	SD	SE	t	P
HUMERUS								
Max. length	M F	10 5	324.63 283.30	297.0-343.0 270.0-293.0	15.72 9.03	4.96 4.02	4.27	0.01
Head vert. diam.	M F	3 1	46.47 42.40	43.2-48.8 -	2.91 -	1.67 -		
Head trans. diam.	M F	5 0	41.28	38.3-44.4	2.82	1.25		
Biepiconylar width	M F	3 1	59.60 49.60	58.4-60.2	1.04	0.58		
Least shaft circumf.	M F	17 9	67.02 55.67	60.0-75.0 49.0-59.0	4.37 3.58	1.06 1.19	3.86	0.01
FEMUR								
Max. length	M F	5 6	455.00 418.17	423.0-475.0 407.0-425.0	20.84 7.78	9.30 3.18	6.97	0.01
Head vert. diam.	M F	6 4	46.02 40.05	43.6-49.3 38.0-42.2	2.15 1.75	0.86 0.85	5.21	0.01
Midshaft circumf.	M F	11 23	90.73 82.06	88.0-93.0 73.5-88.0	1.42 3.93	0.42 0.81	3.59	0.01
Bicondylar width	M F	4 3	77.0 71.33	75.8-77.6 64.5-75.4	0.81 5.95	4.00 3.41	4.24	0.01
TIBIA								
Nutrient foramen	M	10	98.00	89.0-105.0	5.46	1.74	7.47	0.01
circumference	F	2	81.50	80.0-83.0	2.12	1.48		

for this reason that individuals of different sexes and ages were buried close to these elements belonging to Ahu Tongariki. It is probable that the partial burial of the two large lithic elements can be related to a period when the emblems associated to the cult of the ancestors were concealed, as has been shown in similar situations found on Poike and in the cave beneath the *ahu* of Papa te Kena. The fact that the *pukao* was re-used is probably related to the necessity of burying people belonging to the clan that used the Tongariki area: even in the phase following the political and social organization of the theocratic type, this group of humans kept up the traditions and rituals that had characterized the earlier period. It is possible that the burials near the *moai* head and the *pukao* belonged to individuals who could be placed high up on the hierarchic scale and to their relatives, considering the choice of site.

Forthcoming research

Forthcoming research on the Tongariki skeletal sample include total osteometric and dental data processing, dental microwear assessment with scan electron microscopy, detecting trace metals for bone diagenesis, micromorphology of bone histological sections, and arnplification of informative mitochondrial DNA markers from the bones. These data, together with the study of a larger sample of skeletons, will allow us to enrich the information emerging from this preliminary study.

Conclusions

The part of the square in front of the base of the Ahu Tongariki was the subject of a period of re-utilization after the ceremonial area had stopped being used. This was most certainly before the *ahu-moai* period when the large statues belonging to the last stage of architectural transformation had already been pulled down. Evidence that a large portion of the pavement around the *moai* head and the *pukao* were missing, showed that this area had been interfered with for the purpose of burying.

The Italian Mission's excavation has allowed us to confirm the burial pattern previously indicated in the studies of Cristino in Vai Mata, also found in the tomb structure system brought to light in Puna Marengo. It is evident that, during the post theocratic phase, the concepts of *mana* and sacredness in relation to the *pukao* and the *moai* head were kept alive; it was

Table 7. Tongariki 14-548. Average statures calculated from the isolated long bones (cm).

MALES	
HUMERUS	170.29 (Trotter & Gleser, Mongoloid)
	170.50 (Trotter & Gleser, Whites)
RADIUS	169.26 (Trotter & Gleser, Mongoloid)
	172.00 (Trotter & Gleser, Whites)
ULNA	170.75 (Trotter & Gleser, Mongoloid)
	173.00 (Trotter & Gleser, Whites)
FEMUR	170.22 (Trotter & Gleser, Mongoloid)
	170.00 (Trotter & Gleser, Whites)
TIBIA	169.07 (Trotter & Gleser, Mongoloid)
	171.00 (Trotter & Gleser, Whites)
mean	170.61
SD	1.18
FEMALES	
HUMERUS	153.00 (Trotter & Gleser, Whites)*
RADIUS	156.00 "
ULNA	159.00 "
FEMUR	156.50 "
TIBIA	-
mean	156.12
SD	2.46

* Formulae for mongoloid not available for females

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