
Archaeological Stone of Easter Island

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With the scarcity of other resources, stone assumed great importance in the culture of Easter Island. The volcanic rocks display a compositional continuum paralleled by changes in physical characteristics. The most abundant rock type, porphyritic hawaiite, was the least useful as it is poorly jointed and difficult to work. Mugearites and benmoreites usually have a flaggy structure and were used as dressed stone in the early ahu, in the houses of Orongo and in stone implements. Rhyolitic obsidian was used for scrapers, knives, and a variety of weapons, especially the tanged mataa. Statue carving reached its zenith on Easter Island largely because of the availability of a suitable rock type, the Rano Raraku tuff. The tuff was not erupted from the present Rano Raraku crater but from another vent southeast of the surviving portion of the cone. Red scoria from Puna Pau was quarried for the topknots. © 1993 John Wiley & Sons, Inc.

INTRODUCTION

Although poorly endowed with natural resources Easter Island nevertheless possesses a great variety of volcanic rocks. The islanders made extensive use of the stone that was available, putting specific rock types to particular uses. This paper explores the relationship between the physical properties of the rock types, their chemical composition, and their specific utilization in a stone age culture. Petrographic and geochemical characteristics of each of the main categories of archaeological stone are documented.

There is good radiocarbon evidence indicating that Easter Island was inhabited by the seventh century A.D. but less reliable indications of occupation in the fourth century A.D. The latter is based on a date of A.D. 386 ± 100 (Smith, 1961:391). However, in view of the advanced culture that had apparently developed by that time, Mulloy (personal communication, 1974) thought it likely that Easter Island was settled about the time of Christ. With its roots in southeast Asia, Polynesian culture reached Samoa, Tonga, and the Bismarck archipelago, extending subsequently to Hawaii, New Zealand, the Marquesas, and Easter Island (Bellwood, 1980), where there were probably intermittent influxes of new Polynesian settlers. Spasmodic contact with Europeans dated from Roggeven's visit in 1722. The population of the island was decimated by Peruvian slavers in 1859 and 1862 and later by disease. Gradual recovery followed Chilean annexation in 1888, but it is only within the past few decades that regular contact has been established with the outside world.

Archaeologists (e.g., Smith, 1961) have divided the history of Easter Island into three main periods. The Early Period (A.D. 400–1100) was a period of

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settlement following the arrival of King Hotu Matua and was noted for the construction of ahus with altars of fitted masonry. The Middle Period (1100–1680) saw the culmination of statue carving and the development of rivalry between the Long Ears and Short Ears populations, ending with the massacre of the former at Poike Ditch. The Late Period (1680–1868) was marked by widespread tribal conflict, the overthrowing of statues (*huri moai*), cannibalism, and the use of obsidian spearheads or *mataa*. It ended with the arrival of missionaries and the conversion of the population to Christianity.

Easter Island or Rapa Nui (Big Paddle) lies 3700 km west of Chile and is some 500 km east of the crest of the East Pacific Rise. It has an area of 140 km² and is triangular in shape with a maximum width of 23 km. The island has been built around three volcanoes and their parasitic cones over the last 3 Ma (Figure 1). While there are no records of historic activity, it is quite possible that early inhabitants witnessed an eruption at Roiho, near the west coast. Eruptive products are dominantly effusive and belong to the sodic branch of intraplate ocean island volcanics, characteristic of those situated relatively close to spreading axes. The lavas range from tholeiitic basalt through hawaiiite, mugearite, benmoreite, and trachyte to comenditic rhyolite. Baker et al. (1974) classified the lavas according to the Differentiation Index (Thornton and Tuttle, 1960) and normative plagioclase, and on this basis more than 50% were designated hawaiiites. However, many of these hawaiiites would be classified as basalts using the total alkali-silica (TAS) scheme of Le Bas et al. (1986). Chemical composition exercises a strong influence on the physical characteristics of the rock types which in turn determine the use to which they were put.

Whole-rock chemical analyses presented in this report were performed by X-ray fluorescence spectrometry (PW 1400) at Nottingham University. Mineral chemistry and glass compositions were determined at Leeds University using a CAMECA SX-50 microprobe fitted with three wavelength dispersive spectrometers and a LINK 10/55S energy dispersive system.

AHU

On Easter Island the term “ahu” refers to the entire ceremonial center comprising a stone platform or altar, together with a ramp or terrace. Elsewhere in Polynesia it refers specifically to the stone platform at the end of an enclosed ceremonial site, known as a *marae*. The alters of the Early Period are notable for their precisely fitted masonry, achieved by carefully shaping large blocks along their visible edges to form a neat fit with adjoining blocks: the altars faced onto sloping terraces or rectangular courts. The most remarkable of such structures is Ahu No. 1 at Vinapu, on the coast at the easternmost end of Rano Kau volcano. The location is no coincidence since it is at the center of the readily accessible differentiated lavas, mugearites, and benmoreites. These flows have well-developed orthogonal joints, smooth surfaces, and a blocky or slabby aspect. Their features probably developed as a consequence of the moderately high viscosity and consequent flow banding created by the subparal-

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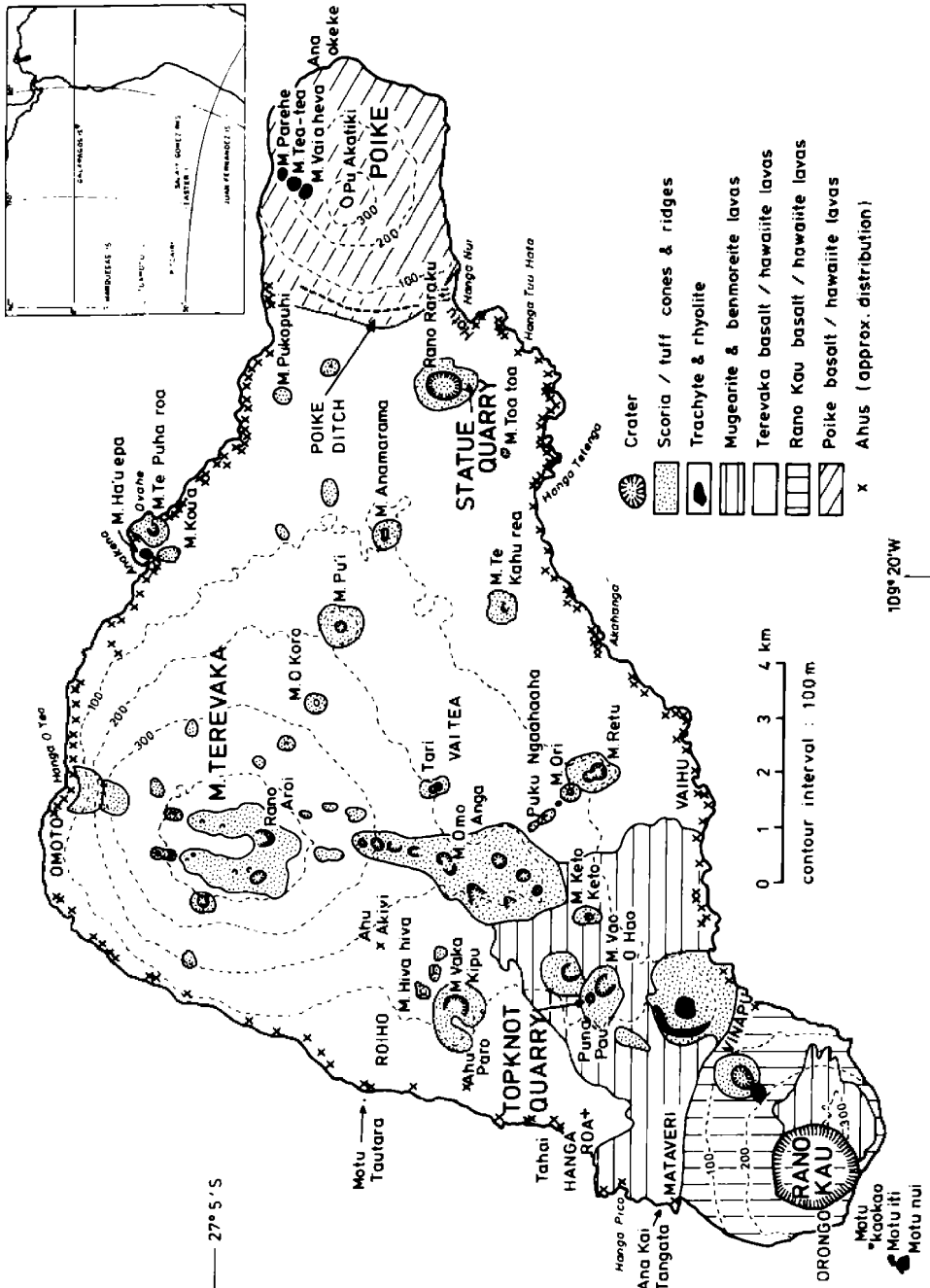


Figure 1. Map of Easter Island showing main geological and archaeological features. Inset shows location of island.

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lel alignment of plagioclase laths. In more basic lavas, the lower viscosity and more fluid motion inhibits the development of flow banding. In more acid lavas, the high viscosity, limited nucleation, and slow diffusion restrict crystal growth and the development of a platy structure. The mugearites and benmoreites were the only lavas ideally suited for construction in the style seen at Vinapu.

Ahu with statues are referred to as "image ahu" in recognition of the fact that not all ahu had statues on them. In the Middle Period, the emphasis was on the statues or moais that were erected on the ahu, and much less attention was devoted to the architectural style of the structures or to the masonry. During this period, the ahu tended to be rather crude structures, where the builders had simply utilized whatever stone was on hand with relatively little working. Usually this was the highly porphyritic and vesicular hawaiiite, the most common rock type on the island, which did not in any case lend itself to the careful dressing that had characterized the material used in the former period. The largest of the ahu, Tongariki, was built in the Middle Period. Although there was a sequence in which the architectural and constructional style of the ahu changed with time, some of the older pre-existing ahu were modified to conform with the new styles and their components reassembled. During the turbulent and generally destructive Late Period, no new ahu styles were developed. The ahu became burial sites and were littered with fallen statues and masonry rubble. Chemical analyses of typical ahu stones are given in Table I.

MOAIS

There are more than 1000 stone statues or moais, of which about 100 remain in the vicinity of the Rano Raraku quarries. Almost all of the statues on the island have been carved from the Rano Raraku tuff, although there are a few instances, where attempts were made to shape images from red scoria and lava. The present crater of Rano Raraku is occupied by a fresh-water lake with totora reeds, but the tuff did not originate from here. In fact, Rano Raraku is a composite cone or doublet and the crater from which the tuff was formed had been largely removed by marine erosion prior to the remnant being encircled by lava flows from Maunga Terevaka (Figure 2). The pyroclastic deposit that formed the tuff was evidently emitted from a crater that lay immediately to the southeast of the present Rano Raraku summit. The Rano Raraku tuff deposit was overlain by red ash emitted from the younger center that developed on its northwestern flank. For this reason, the statues are confined to the southern half of the composite structure, where they are to be found on both the inner and outer slopes of the present cone.

The Rano Raraku deposit is a weakly stratified and moderately lithified sideromelane tuff, slightly altered to palagonite, which gives the hand specimen a yellowish or khaki color, although a small proportion of individual fragments are dark brown or black. Most fragments are in the lapilli-size range and are vesicular. Individual glass particles are mainly cellular and sometimes streaky,

but there are also clear blocky grains. Crystalline components in the tuff are olivine ($\sim\text{Fo}_{56}$), augite ($\sim\text{Ca}_{44}\text{Mg}_{38}\text{Fe}_{18}$), plagioclase ($\text{An}_{54}\text{-An}_{52}$), and ilmenite. The characteristics of this deposit are quite distinctive, and the material is interpreted as having been erupted from a shallow submarine volcano, which grew slightly above sea level and thus emitted lapilli of both submarine and subaerial origin. It is likely that sea water had access to the vent throughout most of its brief eruptive history. The cone probably formed within a time span of several days to perhaps a few weeks. The Rano Raraku tuff thus contrasts with material from almost all other cones on Easter Island which are formed of red or black subaerial scoria and cinders. The only exception is an isolated remnant to the SW of Rano Raraku called Maunga Toa, which was probably formed in similar circumstances during the same eruptive phase. The bulk density of the rock is variable but relatively low. Specific gravity measurements range between 1.66 and 2.48 with an average of 1.99 (Mulloy and Figueroa, 1978). The tuff is thus relatively amenable to carving and more easily transported than denser lava. But there are disadvantages, the main one being that the tuff contains some fairly large cognate xenoliths or blocks of basaltic to mugearitic composition. During carving operations these blocks were liable to emerge in unwanted places, and there are instances of statues having been abandoned because of the appearance of such basaltic "warts."

Statues are to be found in every stage of carving and transportation. There was a tendency towards the production of ever larger moais and not surprisingly the largest remain in the vicinity of Rano Raraku with some still attached to the bedrock (Figure 3). Many of the statues left around Rano Raraku have been partially buried in waste from subsequent quarrying activities, sometimes to a depth of several meters. Statues were transported from Rano Raraku along a network of prehistoric tracks, for distances of up to 15 km, to their allotted ahu. The main damage seems to have been broken necks, and several statues were abandoned en route because of this. Moais that were successfully erected on ahu may be as much as 80 tons in weight, and there has been some debate as to the means by which they were transported (Heyerdahl et al., 1961). Initially the eye sockets were merely notches or triangular indentations, and it was not until the moais were raised on the ahu that they were more realistically represented as circular pits, perhaps with obsidian eyes. Mulloy (personal communication, 1974) suggested that this was done as a mark of respect so that they were unable to witness the indignity of being dragged to the ahu. Almost all of the statues have an angular and stylized form, and there was no attempt to portray individual characteristics. It seems that they were intended to enshrine and harness the manaa or good fortune possessed by tribal leaders or particular individuals during their lifetimes. One statue recovered by Heyerdahl's team from the debris on the southern side of Rano Raraku has a very different form and is quite unlike any others found on the island. It is a bearded figure, kneeling on its heels and has a more natural, rounded shape. Unlike

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Table I. Chemical analyses of archaeological stone from Easter Island.

Sample No.	17551	17587	17568	53627	17748	17512	17532	17725	17691	53626	17518
SiO ₂	49.16	49.50	51.86	54.57	57.03	61.71	67.52	71.91	72.42	72.83	72.90
Al ₂ O ₃	13.78	16.55	13.53	14.41	14.57	14.29	15.39	13.19	12.90	12.66	12.79
TiO ₂	3.40	3.00	2.54	1.95	1.52	1.47	0.53	0.20	0.21	0.19	0.20
Fe ₂ O ₃	14.66	12.46	13.96	13.03	11.82	9.41	5.31	3.44	3.49	3.15	3.18
MgO	4.22	4.09	3.18	2.59	1.84	1.23	0.00	0.00	0.03	0.00	0.04
CaO	8.02	10.30	6.26	6.27	5.26	3.92	0.74	0.85	0.65	0.64	0.64
Na ₂ O	3.47	2.81	2.13	4.35	4.37	4.83	5.46	5.20	5.36	5.61	5.16
K ₂ O	0.97	0.62	1.12	1.48	1.76	2.36	4.06	3.75	3.90	3.84	3.92
MnO	0.22	0.18	0.25	0.23	0.19	0.17	0.12	0.07	0.05	0.07	0.05
P ₂ O ₅	0.63	0.37	0.95	1.00	0.66	0.38	0.01	0.01	0.01	0.01	0.01
LOI	1.00	0.00	3.92	0.00	0.54	0.10	0.73	1.15	0.84	0.43	0.91
Total	99.53	99.88	99.70	99.88	99.56	99.87	99.87	99.77	99.86	99.43	99.80
ppm (bd = below detection limit, nd = not determined)											
Ba	148	74	196	260	260	318	514	481	479	474	458
Ce	87	52	97	nd	129	121	177	190	194	nd	205
Co	54	39	46	36	39	11	6	bd	29	9	3
Cr	15	74	bd	4	bd	5	bd	bd	bd	bd	bd
Cu	29	65	12	26	15	14	4	4	11	8	4
La	36	31	37	nd	44	127	30	83	84	nd	83
Nd	39	30	58	nd	65	128	34	90	86	nd	91
Ni	bd	29	3	4	2	9	2	6	5	3	5
Nb	45	27	46	55	53	79	143	118	122	129	123
Pb	11	7	bd	3	5	6	12	9	9	8	9
Rb	16	11	20	29	31	44	85	74	78	82	80
Sm	7	7	9	nd	11	11	9	13	15	nd	19
Sr	292	329	291	271	240	190	50	45	27	24	25
Th	3	2	2	10	4	7	12	9	10	16	10
V	328	325	148	57	72	110	5	bd	4	bd	bd
Y	56	37	72	79	75	143	59	142	150	147	151
Zn	147	96	153	157	148	129	157	203	205	193	205
Zr	356	221	411	483	549	757	1169	794	939	925	949

17551: Red basaltic scoria, topknot quarry, Puna Pau; 17587: Porphyritic basalt, 1.8 km south of Anakena; 17568: Tuff, statue quarry, south side of Rano Raraku; 53627: Mugearite artifact (toki); 17748: Mugearite lava, coast at Vinapu; 17512: Benmoreite lava, Orongo, Rano Kau; 17532: Trachyte, Maunga Parehe, Poike; 17725: Rhyolitic obsidian, N.E. side of Motu iti; 17691: Rhyolitic obsidian, N.W. side of Maunga Orito; 53626: Rhyolitic obsidian artifact (mataa); 17518: Spherulitic rhyolitic obsidian, N.E. side Rano Kau

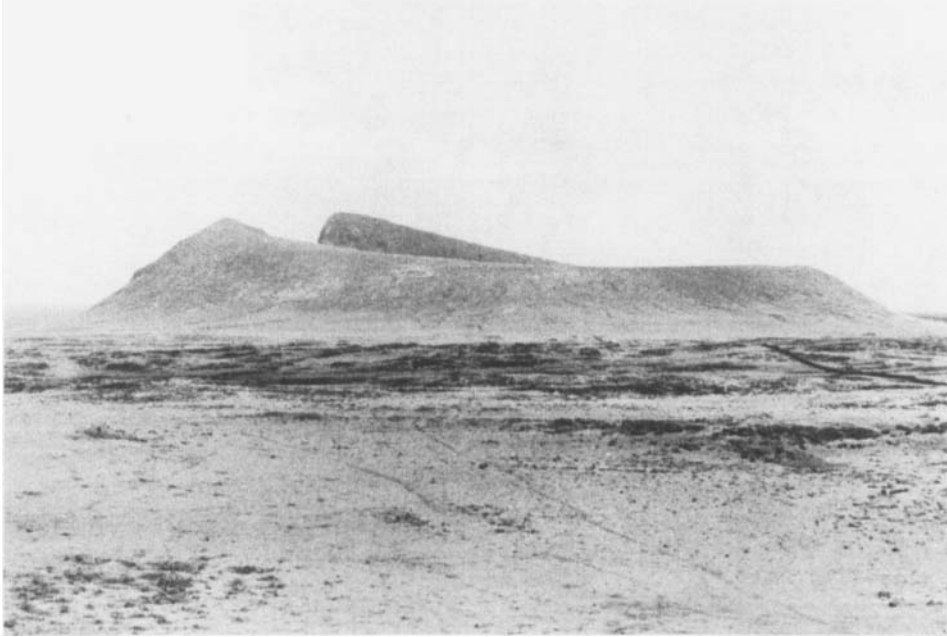


Figure 2. View of Rano Raraku showing elevated southern rim, which is the location of the statue quarries. This is the only surviving portion of the original Rano Raraku cone that was severely eroded by the sea and then partially engulfed by younger Terevaka lavas.

the other moai, it has short ears. Skjölsvold (1961) states that it resembles a carving from Tiahuanaco in the Andes.

TOPKNOTS

Red cylinders of basaltic volcanic scoria were placed on the heads of some of the moais after they had been erected on the ahu. They have been variously interpreted as baskets, crowns, hats, or hair and are referred to as pukao, topknots, or hau hitirau moai, the statue hats of red stone. The topknots, which are thought to have been added at a later stage, are mostly about 2 m in diameter and 1.5 m thick, although the largest are as much as 3 m across. All of the topknots were carved at Puna Pau quarry near Hangaroa, some 12 km from Rano Raraku. Again, it was fortuitous that a rock type suitable for this purpose was available on Easter Island. While there is a good deal of red scoria, particularly along the fissure system of Maunga Terevaka, most of it is unconsolidated material. The Puna Pau scoria is a moderately welded and coherent rock, amenable to carving. It was probably the product of a brief episode of fire-fountaining along the rift zone. A chemical analysis of the Puna Pau scoria is given in Table I.

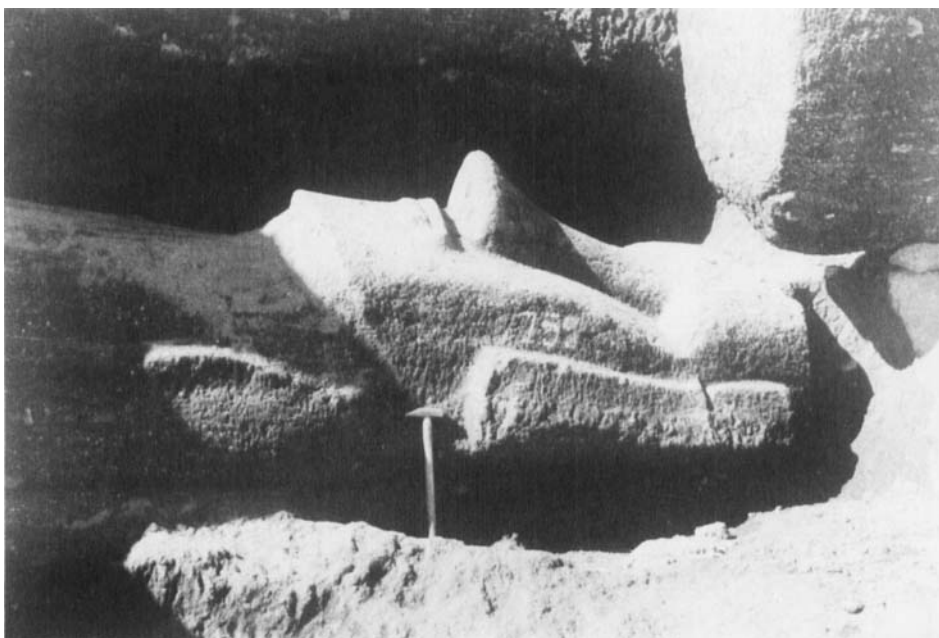


Figure 3. A large moai, still attached to bedrock tuff at Rano Raraku.

HOUSES

Orongo was the most important ceremonial site on Easter Island and in later years was devoted to the birdman cult and worship of the god Makemake. Several houses occur at the site which is on the western rim of Rano Kau crater. The Orongo houses are distinguished by corbel-vaulted roofs and long narrow entrance tunnels. The interior surface of the walls is faced by slabs of stone. The plan of these houses is rectangular to oval, and they were constructed around pits excavated in the hillside. Their design is linked directly to the availability of slabby benmoreite lava at Orongo. Such an architectural style could not have been utilized in most other parts of the island where blocky hawaiite lava is generally the only material readily available. The nature of the stone determined the evolution of the construction style at Orongo. An analysis of the Orongo benmoreite is given in Table I. Most of the differentiated lavas are interpreted as products of fractional crystallization of basaltic magma. However, disequilibrium features in the Orongo benmoreite suggest it results from the mixing of basic and acid magmas, perhaps associated with the collapse of Rano Kau caldera (Baker et al., 1974).

Tall masonry structures known as tupa probably served as watch towers for observing turtle or fish. There are other walled enclosures that may have been groups of houses that had thatched roofs or may simply have been used for

storage. Piles of blocks apparently came to serve as chicken houses. The birds could retreat through small passageways underneath the rubble, avoiding capture by thieves. In all these instances, the hawaiiite lava blocks immediately at hand were used in construction, and no attempt was made to work the stone.

The most common type of dwelling at the time of the earliest visits by Europeans was the boat-shaped thatched house. Holes were drilled in elongate blocks of lava in order to support a series of vertical poles and a wooden framework, which in turn supported a thatch of totora reeds. Ferdon (1961:334) reviews the house styles of Easter Island. In particular, he draws attention to the masonry buildings, which do not occur elsewhere in Polynesia, with the possible exception of Hawaii. He suggests that this is an influence from South America. However, it may simply be that the shortage of timber on Easter Island obliged the inhabitants to devise other house building techniques, and they thus resorted to the most widely available material, which was stone.

Caves were used as temporary refuges and in some instances for longer term habitation. They certainly served as hiding places when there was an external threat. The labyrinth of lava tunnels below Roiho seems to have been ideal for this purpose as were the caves of Anakena and other places around the coast.

TOOLS AND WEAPONS

The most abundant artifacts on Easter Island are mataa or obsidian spearheads. They are typically either kidney-shaped or heart-shaped, with tangs that allowed them to be inserted and bound into hafts or lashed to sticks. They were then used either as pikes for thrusting or spears for throwing (Heyerdahl et al., 1961:398). An alternative suggested by Mulloy (1961:153) is that a series of tanged obsidian spearheads may have been arrayed along the edge of a wooden club. Dating of associated material (Heyerdahl et al., 1961) indicates that the tanged mataa were a development of the Late Period, although obsidian was utilized earlier than this for a variety of knives and scrapers. Outcrops of obsidian are restricted to the SW corner of Easter Island in the immediate vicinity of Rano Kau. It occurs on Maunga Orito, at a small center on the northern slopes of Rano Kau and on Motu iti, one of the offlying islets. The Rano Kau obsidian is distinctly spherulitic and immediately distinguishable from the other occurrences. Compositionally, the obsidians are remarkably uniform in both major and most trace element concentrations such that it would be impracticable to determine the precise provenance of artifacts on this basis (Tables I and II). Nevertheless, from the whole-rock analyses of Table I the sample from Motu iti islet (17725) appears to have a small but significantly lower concentration of Zr and higher Sr than the other obsidians. This is also supported by older analyses of the same samples (Baker et al., 1974). However, variations in Zr content will be sensitive to the distribution of the small sparse zircon crystals, and the samples analysed may be insufficiently representative in this particular respect. Occasional small olivines occur in the obsidians, and

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Table II. Electron microprobe analyses of glasses from Easter Island archaeological stone.

Sample No.	17575	17725	17518	17518	17691	17691	17691	17691	53626	53626	53626	53626
SiO ₂	54.71	73.48	74.45	74.66	73.82	73.68	74.48	74.50	74.60	75.69	73.87	
Al ₂ O ₃	14.42	13.37	13.27	13.30	12.84	12.65	12.88	13.53	13.06	13.56	12.83	
TiO ₂	2.21	0.27	0.24	0.17	0.16	0.22	0.27	0.22	0.18	0.14	0.19	
FeO	12.65	2.78	2.42	2.58	2.59	2.52	2.71	2.06	2.16	2.96	2.65	
MgO	2.79	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.01	
CaO	6.87	0.77	0.46	0.43	0.41	0.40	0.44	0.41	0.41	0.48	0.44	
Na ₂ O	2.96	5.44	5.24	4.77	5.07	4.98	5.17	5.12	5.39	4.58	5.66	
K ₂ O	1.27	3.75	3.94	3.72	3.98	4.12	3.96	3.96	3.85	3.82	3.81	
MnO	0.28	0.01	0.00	0.18	0.04	0.10	0.04	0.08	0.01	0.11	0.07	
Total	98.16	99.88	100.02	99.81	98.93	98.68	99.96	99.87	99.67	101.35	99.54	
Recalculated to 100%												
SiO ₂	55.74	73.57	74.44	74.80	74.62	74.67	74.51	74.59	74.85	74.68	74.21	
Al ₂ O ₃	14.69	13.39	13.27	13.32	12.98	12.82	12.88	13.55	13.10	13.38	12.89	
TiO ₂	2.25	0.27	0.24	0.17	0.17	0.22	0.27	0.22	0.18	0.13	0.19	
FeO	12.89	2.78	2.42	2.58	2.62	2.56	2.71	2.06	2.17	2.92	2.66	
MgO	2.84	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.01	
CaO	7.00	0.77	0.46	0.43	0.41	0.41	0.44	0.41	0.41	0.47	0.44	
Na ₂ O	3.02	5.44	5.24	4.78	5.12	5.05	5.17	5.13	5.41	4.52	5.69	
K ₂ O	1.29	3.76	3.94	3.73	4.02	4.18	3.96	3.96	3.87	3.77	3.83	
MnO	0.29	0.01	0.00	0.18	0.04	0.10	0.04	0.09	0.01	0.10	0.07	

17575: Rano Raraku tuff
Obsidians
17725: Motu iti
17518: N.E. slope Rano Kau
17691: N.W. side Maunga Orito
53626: Artifact (tanged mataa)

all are virtually pure fayalite. The associated clinopyroxenes are ferrohedenbergites ($\text{Wo}_{42}\text{En}_0\text{Fs}_{58}$), and the feldspars are albite with a rather uniform composition of about $\text{Or}_{13}\text{Ab}_{84}\text{An}_3$. The most commonly used source of obsidian is likely to have been Maunga Orito as this seems to be the best quality material and is from a readily accessible sites. On the other hand, if this was to be tested rigorously, it would be necessary to analyze many more samples of both artifacts and naturally occurring obsidian.

Stone blades or toki are very common. Some of these were hafted adzes and others were probably handheld. They are usually 12–17 cm long (Heyerdahl, 1961:402) and tend to conform to two common shapes, one having a rounded cross section and the other having one flat side; some are pointed at both ends. While some were used for chipping or carving, others may have been utilized in polishing the moais. these implements tend to be made of aphyric lava of hawaiiite or mugearite composition. Some were derived from the cognate xenoliths in the Rano Raraku tuff, but others came from the mugearite lava flows along the south coast. Mineral compositions in the toki lie between those of the tuff and obsidians. Olivines are $\sim\text{Fo}_{45}$, the pyroxenes are pigeonite or subcalcic augite ($\text{Ca}_{12}\text{Mg}_{48}\text{Fe}_{40}$ to $\text{Ca}_{20}\text{Mg}_{45}\text{Fe}_{35}$), and the feldspars An_{47} to An_{36} .

A wide variety of statuettes or figurines were carved from wood and stone. Small stone heads and birds are the commonest of the stone images. These so-called house images may have served the function of protection against demons. Trachyte, known as maea teatea (white earth), from the parasitic domes on Poike was popular for these small images since it is relatively soft and easily carved. Vesicular aphyric hawaiiite or mugearite and red scoria were also chosen, no doubt for a similar reason, but generally it does not permit working in such fine detail as the trachyte. Stone fish and lizards have also been found. Other artifacts include bowls, lamps, and grinders.

CONCLUSIONS

Overpopulation and the depletion of timber probably forced the Easter Islanders to rely increasingly on stone for a variety of purposes. The diversity of volcanic rock types and their distinctive physical characteristics enabled them to be put to a range of uses. Hawaiiite, the most abundant rock type, is not easily worked and was used in rudimentary building where other, more suitable, stone was not available in the immediate vicinity. Intermediate lavas, mugearites, and especially benmoreites are most abundant in the southwestern part of the island. The blocky nature of some of these flows made them ideal for the fitted masonry of the finest ahus, notably at Vinapu. The flaggy benmoreite of Rano Kau was well suited to the distinctive style of the buildings at Orongo. The extraordinary proliferation of statue building on the island was largely a function of the availability of a rock type ideally suited for that purpose. The indurated sideromelane/palagonite tuff at Rano Raraku is a rock that could be carved with stone implements and transported, albeit with difficulty, over considerable distances. The Rano Raraku tuff did not come from the crater

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that bears its name but from another crater, immediately to the southeast. The cone in which this latter crater was set was largely removed by marine erosion and engulfed by lavas from Terevaka. All that remains is the area occupied by the statue quarries.

The intermediate lavas with their platy jointing and hardness were the main source of heavy stone implements such as picks and adzes. Obsidian was a vital resource in the stone age culture and was widely employed in the production of knives, scrapers, and weapons. Apart from the spherulitic obsidian of Rano Kau, the other obsidians are indistinguishable and were almost certainly erupted in a single episode associated with a NE–SW fissure through Rano Kau. The softer white trachytes of Poike were used for carving small household images. Almost all the rock types were put to some purpose or other, with the most abundant hawaiites being the least useful.

Statue building, which was poorly developed elsewhere in Polynesia, flourished on Easter Island because of the availability of an ideal rock type. Heyerdahl et al. (1961) emphasize the South American influence on Easter Island culture and Heyerdahl (in 1948) had already demonstrated the practicability of migration from the South American continent to Polynesia. In contrast, others (e.g., Bellwood, 1980; Diamond, 1988) consider Polynesian origins to be in Indonesia, with a migration route via the Bismarck archipelago and Samoa to the Marquesas and Easter Island. Nevertheless, since Polynesians had been migrating intermittently eastwards for several centuries before settling on Easter Island, it seems inevitable that groups should have moved on again and reached the shores of South America. Later, some are likely to have made the return journey to Easter Island and introduced cultural influences from the continent.

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