Early Settlement of Rapa Nui (Easter Island)

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HELÈNE MARTINSSON-WALLIN AND SUSAN J. CROCKFORD

RAPA NUI, THE SMALL REMOTE ISLAND that constitutes the easternmost corner of the Polynesian triangle, was found and populated long before the Europeans "discovered" this part of the world in 1722. The long-standing questions concerning this remarkable island are: who were the first to populate the island, at what time was it populated, and did the Rapa Nui population and development on the island result from a single voyage? Over the years there has been much discussion, speculation, and new scientific results concerning these questions. This has resulted in several conferences and numerous scientific and popular papers and monographs. The aim of this paper is to present the contemporary views on these issues, drawn from the results of the last 45 years of archaeological research on the island (Fig. 1), and to describe recent fieldwork that Martinsson-Wallin completed on Rapa Nui.

Results from the Norwegian Archaeological Expedition to Rapa Nui in 1955–1956 suggest that the island was populated as early as c. A.D. 400 (Heyerdahl and Ferdon 1961: 395). This conclusion was drawn from a single radiocarbon date. This dated carbon sample (K-502) was found in association with the so-called *Poike* ditch on the east side of the island. The sample derived from a carbon concentration on the natural surface, which had been covered by soil when the ditch was dug. The investigator writes the following:

> There is no evidence to indicate that the fire from which the carbon was derived actually burned at the spot where the charcoal occurred, but it is clear that it was on the surface of the ground at the time the first loads of earth were carried out of the ditch and deposited over it. (Smith 1961: 388)

This sample is dated to 1570 ± 100 B.P. and it is so far the earliest date from an excavated site on the island. Using a calibration program, this date is estimated to be cal A.D. 320–670 at the 95 percent confidence interval. (This date and the following A.D. dates were calibrated using the computer program Oxcal. v.2.18 at two sigmas.)

Two worked obsidian pieces, five obsidian chips, three sling stones, a basalt sinker or anchor, and three adzes were found during the excavation of the ditch, but none of them was found in direct association with the early dated carbon sample. The butt end of a chipped adz with triangular cross section (type 2-A)

Helene Martinsson-Wallin is an associate professor at the Kon-Tiki Museum in Oslo, Norway, and Susan Crockford is employed by Pacific Identifications, Inc., Victoria, British Columbia.

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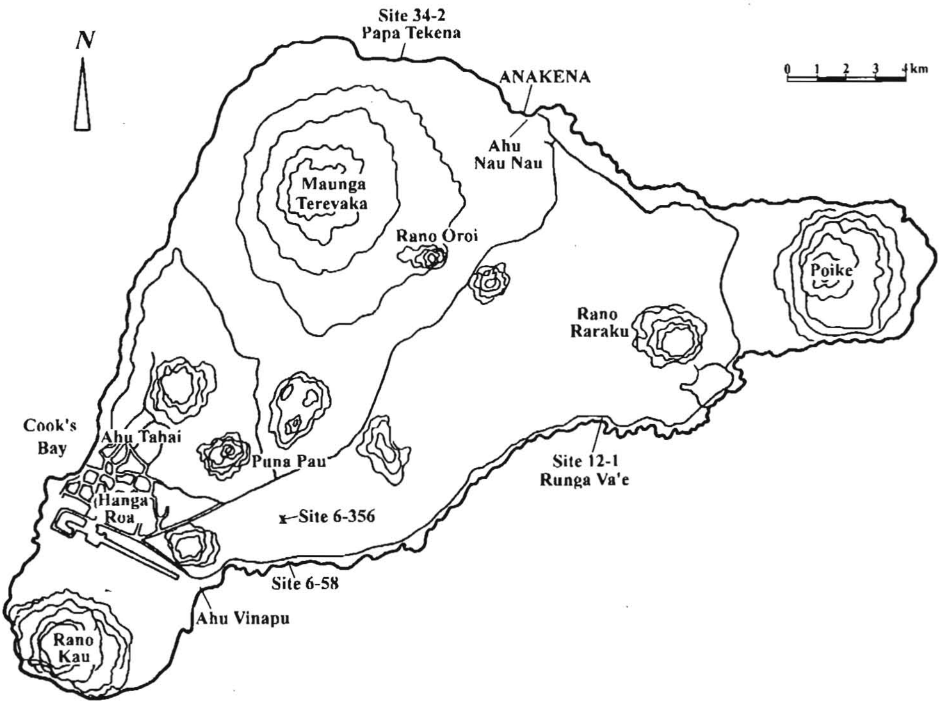

Fig. 1. Rapa Nui (Easter Island).

and a worked piece of obsidian, probably a side scraper, were found in the mound that covered the early dated carbon sample. Another carbon sample (K-501) from the middle section of the ditch is dated to 280 ± 100 B.P. This corresponds to a date of cal A.D. 1450–1890, which is more congruent with the oral traditions concerning the use of the ditch during the war between the "long ears" and "short ears" (Englert 1974:98). A long-standing idea is that the ditch actually was used in this war between the two groups of people on Rapa Nui. However, the investigator of the ditch, Carlyle Smith, has presented a new idea suggesting that it may have been used for irrigation and as earth ovens for the workers in the quarries of Rano Raraku (Smith 1990). In 1991, Patricia Vargas of the University of Chile carried out a new excavation of the ditch, but so far no dates or other results have been published from this excavation (Van Tilburg 1994:78).

During the past 45 years, there have been several archaeological excavations on the island that have broadened knowledge about its prehistoric society. To date, well over 100 ^{14}C dates and many more obsidian hydration dates have been performed on samples of prehistoric relevance (Tables 1–3). Among these dated samples, there are only three that date prior to or near A.D. 400. Investigators have rejected two of these early dates. The third date derives from the *Poike* ditch, which has been discussed above. For the period A.D. 400–800, there are four dated samples that may fall into this range. One comes from *ahu* (masonry foundations used to support *moai*, or the carved statues) Tahai I (A.D. 500–1050), another was found in association with *ahu* Vinapu II (A.D. 600–1250), a third was from a sample in a rectangular house near the crater lake Rano Kao

TABLE 1. RADIOCARBON DATES OF SETTLEMENT SITES AND CAVES ON EASTER ISLAND

SITE	LAB. NO.	SAMPLE	YEAR	B.P.	^{13}C	CAL. A.D. ± 1 SD	CAL. A.D. ± 2 SD	COMMENTS
Akahanga Cave 7-1	I-7517	Charcoal	1973?	220 ± 80		1640–1700 **1720–1880**	1620–1950	
Akahanga Settlement	Beta 099354	Charcoal	1995	390 ± 110		1440–1640	1300–1950	Sample from cooking area
	Beta 099333	Charcoal	1995	340 ± 60		1510–1650	**1440–1670** 1770–1800	Sample from cooking area
	Beta 099334	Charcoal	1995	320 ± 60		1510–1660	**1450–1680** 1740–1800	Sample from cooking area
	Beta 099330	Charcoal	1995	220 ± 70		1640–1700 **1720–1820**	1522–1570 **1628–1950**	Sample from cooking area
	Beta 099343	Charcoal	1995	220 ± 70		1640–1700 **1720–1820**	1522–1570 **1628–1950**	Sample from cooking area
	Beta 099353	Charcoal	1995	200 ± 50		1660–1700 **1720–1820**	**1650–1890** 1910–1950	Sample from cooking area
	Beta 099352	Charcoal	1995	10 ± 60				Sample from cooking area
	Beta 099330	Charcoal	1995	80 ± 50				Sample from cooking area
Anakena cultural layer	T-7341	Charcoal	1987	900 ± 120		1030–1240	890–1310	Sample from bottom of Trench C
	T-6679	Charcoal	1986	1170 ± 140	−26.1	710–1020	600–1200	Sample from bottom of Trench C
	Ua-1740	Bone (aquatic bird)	1990	1290 ± 100	−21	950–1170	820–1260	Sample from bottom of Trench C (−300 yrs.)
	Ua-3007	Bone (rat)	1993	1015 ± 65	−21	980–1160	890–920 **940–1210**	Sample from bottom of Trench C
	T-7959	Charcoal	1988	510 ± 40	−26.1	1411–1443	1320–1340 **1390–1480**	Sample from bottom of Trench C (questionable date)
	Ua-4626	Bone	1994	710 ± 75	−17.30	1260–1320 1340–1400	1210–1420	Sample from bottom of Trench C or from *ahu*
	T-7343	Charcoal	1987	750 ± 100		1200–1400	1040–1320	Sample from bottom of Trench E
	T-7975	Charcoal	1988	710 ± 40	−26.1	1270–1310 1360–1380	1260–1320 1340–1400	Sample from *umu* in top of bottom layer Trench D

	T-7974	Charcoal	1988	540 ± 60	−26.1	1320–1350 1390–1450	1290–1480	Sample from bottom of Trench A
	T-7344	Charcoal	1987	600 ± 140		1270–1470	1160–1650	Sample from upper cultural layer of Trench E
	T-7349	Charcoal	1987	550 ± 150		**1280–1520** 1600–1620	1150–1800	Sample from mixed residue Trench K bottom
	T-7350	Charcoal	1987	710 ± 80		1260–1320 1340–1400	1190–1420	Sample from mixed residue Trench K upper
	T-7958	Charcoal	1988	340 ± 100	−26.1	1450–1660	**1410–1700** 1720–1880	Sample from mixed residue Trench U bottom
	T-7976	Charcoal	1988	789 ± 90	−26.1	**1160–1300** 1360–1380	1040–1400	Sample from cultural layer in Trench M
	T-7977	Charcoal	1988	220 ± 80	−26.1	1640–1700 **1720–1880**	1515–1595 **1620–1950**	Sample from mixed residue Trench U upper
	T-6680	Charcoal	1986	370 ± 90	−26.1	1460–1640	**1410–1690** 1740–1810	Sample from cultural layer in Trench C 1986
	Beta-47169	Charcoal	1988	900 ± 80	−25.5	1040–1230	1020–1270	Sample from Steadman Trench Level 8 (bottom)
	Beta-47170	Charcoal	1988	900 ± 60	−26.7	1040–1230	1030–1260	Sample from Steadman Trench Level 8 (bottom)
	Beta-47171	Charcoal	1988	660 ± 80	−24.7	1280–1400	1250–1440	Sample from Steadman Trench Level 2 (upper)
	Beta-47172	Charcoal	1988	170 ± 110	−27.5	1670–1770 1790–1890	1515–1595 **1620–1950**	Sample from Steadman Trench Level 2 (upper)
	Beta-47173	Charcoal	1988	860 ± 100	−26.7	1040–1090 **1120–1270**	**1000–1310** 1350–1380	Sample from Steadman Trench Level 3 (upper)
	T-7345	Charcoal	1988	810 ± 80		1170–1280	**1030–1310** 1350–1390	Sample from trench N settlement Nau Nau East
	T-7346	Charcoal	1988	810 ± 70		1170–1280	**1040–1310** 1360–1380	Sample from trench N settlement Nau Nau East
	T-7973	Charcoal	1988					Sample from trench N 2.5 ± 0.5% activity
Anakena uphill	T-7960	Charcoal	1988					4.1 ± 1.0% activity than normal
	T-7961	Charcoal	1988					1.1 ± 1.1% activity than normal

(Continues)

TABLE 1. *(Continued)*

SITE	LAB. NO.	SAMPLE	YEAR	B.P.	^{13}C	CAL. A.D. ± 1 SD	CAL. A.D. ± 2 SD	COMMENTS
Anakena 35-8, *hare paenga*	UGa-630	Charcoal	1973?	395 ± 75		1450–1530 1560–1640	1410–1660	Sample predates the *hare paenga*
Anakena E2 circular dwelling	K-522	Charcoal	1956	430 ± 100		1420–1640	1380–1680	
Hanga Hoʻonu	Beta-099345	Charcoal	1995	610 ± 80		1290–1410	1270–1450	Sample from cooking area
	Beta-099346	Charcoal	1995	160 ± 50		1680–1750 **1800–1890**	1660–1950	Sample from cooking area
	Beta-099355	Charcoal	1995	150 ± 50		1680–1740 **1800–1890**	1670–1950	Sample from cooking area
	Beta-099344	Charcoal	1995	80 ± 70				Sample from cooking area
	Beta-099349	Charcoal	1995	60 ± 50				Sample from cooking area
	Beta-099350	Charcoal	1995	10 ± 70				Sample from cooking area
	Beta-099357	Charcoal	1995	60 ± 50				Sample from cooking area
Hanga Tuʻu Hata Cave 14-1	UGa-631	Charcoal	1973?	395 ± 60		1450–1530 1560–1630	1430–1650	Dates early use of cave
Orongo Complex B	K-506	Charcoal	1956	220 ± 100		1528–1554 **1634–1950**	1426–1950	
	K-514	Charcoal	1956	380 ± 100		1450–1640	**1390–1700** 1720–1820	
	K-520	Charcoal	1956	540 ± 100		1290–1470	**1270–1530** 1550–1640	
	M-708	Charcoal	1957	100 ± 200				
	T-194	Charcoal	1956	470 ± 70		**1400–1520** 1600–1620	1320–1350 **1390–1640**	
Orongo	Beta-099336	Charcoal	1995	320 ± 70		1490–1660	**1440–1690** 1730–1810	Sample from fuel waste
	Beta-099342	Charcoal	1995	240 ± 60		1630–1700 **1720–1820**	1510–1600 **1620–1950**	Sample from fuel waste
	Beta-099339	Charcoal	1995	250 ± 50		1630–1690 **1730–1810**	1510–1600 **1620–1880**	Sample from fuel waste

	Beta-099347	Charcoal	1995	210 ± 50	1650–1700 **1720–1820**	**1640–1890** 1910–1950	Sample from fuel waste
	Beta-099356	Charcoal	1995	200 ± 50	1660–1700 **1720–1820**	**1650–1890** 1910–1950	Sample from fuel waste
	Beta-099348	Charcoal	1995	30 ± 80			Sample from fuel waste
Poike Ditch	K-501	Charcoal	1956	280 ± 100	**1490–1690** 1730–1810	**1450–1890** 1910–1960	Sample from ditch
	K-502	Charcoal	1956	1570 ± 100	410–610	250–300 **320–670**	Sample from ground surface beside the ditch
Rectangular house 1-187	WSU-1146	Burnt veg. material	1970	1180 ± 230	770–990	660–1040	Obsidian date indicates early 12th century
	WSU–1147	Plant material	1970	350 ± 220	**1410–1700** 1720–1820	1295–1365 **1375–1950**	Obsidian date indicates early 12th century
Runga Va'e Cave 7-1	I-7515	Charcoal	1973?	190 ± 80	1650–1890 1910–1950	1670–1950	Dates early use of cave
Site 10-241	Beta-47366	Carbonized wood	1989?	480 ± 65	1400–1510	1310–1350 **1390–1640**	Sample from large, shallow pit F39

Note: Boldface numbers show higher level of statistical certainty.

Table 2. Radiocarbon Dates of Ceremonial Structures on Easter Island

SITE	LAB. NO.	SAMPLE	YEAR	B.P.	^{13}C	CAL. A.D. ± 1 SD	CAL. A.D. ± 2 SD	COMMENTS
Ahu Akivi	M-1370	Charcoal	1960–70	425 ± 100		1430–1530 1550–1640	1380–1680	Sample from north wing
	M-1371	Bone + Charcoal	1960–70	350 ± 100		1450–1660	1410–1700	Sample from crematorium
	M-1374	Bone + Charcoal	1960–70	580 ± 100		1290–1440	1260–1520 1580–1630	Sample from crematorium
	I-456	Charcoal	1961	460 ± 75		**1410–1520** 1590–1630	1320–1340 **1390–1650**	Sample from south wing
	TBN-348-1	Charcoal	1970–75	2216 ± 96		**380 B.C.–160 B.C.** 140 B.C.–120 B.C.	410 B.C.–A.D. 20	Questionable date
Ahu Ature Huki	T-7979	Charcoal	1988	510 ± 80	−26.1	1310–1360 1380–1500	1290–1530 1560–1640	Sample from ramp fill
	Ua-1144	Charcoal	1988	580 ± 85	−25	1300–1360 1380–1440	1260–1500	Sample from crematorium
Ahu Hanga Kio'e 1	Gak-4504	Charcoal	1973	180 ± 55		1720–1880	1620–1946	
Ahu Hanga Kio'e 2	Gak-4505	Charcoal	1973	70 ± 80				Out of range
Ahu Heki'i 1	Ua-11700	Burnt nuts	1997	705 ± 45	−22.20	**1270–1310** 1350–1390	1260–1400	Sample from small fire under plaza/ramp fill
	Ua-11701	Burnt nuts	1997	700 ± 45	−23.88	**1270–1310** 1350–1390	1260–1400	Sample from pit close to *ahu* wing
	Ua-11702	Burnt nuts	1997	465 ± 45	−22.77	1420–1480	**1400–1520** 1580–1630	Sample from small fire close to *ahu* wing
	Ua-11703	Burnt nuts	1997	555 ± 50	−22.17	1320–1350 **1390–1440**	1290–1450	Sample from cultural layer preceding wing
Ahu Huri a Urenga	Gak-4506	Charcoal	1973	840 ± 90		1050–1080 **1120–1280**	**1020–1300** 1360–1380	
	Gak-4503	Charcoal	1973	40 ± 70				
Ahu Ihu Arero	Gak-4617	Charcoal	1973?	480 ± 90		**1390–1520** 1570–1630	1300–1650	Sample from foundation level

Ahu Ko Te Riku	Gak-2862	Charcoal	1970	910 ± 90		1040–1230	990–1280	Sample from fill in north wing
	Gak-2863	Charcoal	1970	880 ± 70		1050–1090 **1120–1260**	1030–1270	Sample from secondary fire pit in wing
	Gak-2864	Charcoal	1970	1010 ± 90		970–1170	880–1250	Sample from bottom of associated mound
	Gak-2865	Bone (human)	1970	780 ± 90		**1160–1310** 1360–1380	1040–1400	Sample from cremation pit in plaza
Ahu Nau Nau I	T-6678	Charcoal	1986	860 ± 130	−26.1	1040–1280	960–1400	Sample from the early plaza fill
	T-7342	Charcoal	1987	710 ± 70		1260–1320 1340–1390	1220–1410	Sample from top of the early plaza floor
Ahu Nau Nau II	T-7347	Charcoal	1987	720 ± 120		1220–1410	1040–1440	Sample indicating phase II of construction
Ahu Nau Nau III	Ua-617	Charcoal	1987	610 ± 85	−2.5	1290–1420	1260–1460	Sample from plaza fill
Ahu Nau Nau IV?	T-7348	Charcoal	1987	200 ± 80		1650–1700 **1720–1880**	1630–1950	Sample from Trench 6 disturbed layer
Ahu Ra'ai	Ua-13163	Charcoal	1998	135 ± 60	−23.83	1810–1930	1670–1950	Sample in the plaza fill
	Ua-13164	Charcoal	1998	515 ± 60	−26.02	1320–1340 **1390–1470**	**1290–1520** 1590–1620	Sample from crematorium
	Ua-13165	Charcoal	1998	570 ± 50	−26.67	1310–1350 **1380–1440**	1290–1450	Sample from platform fill
	Ua-13166	Charcoal	1998	635 ± 50	−26.49	1290–1400	1280–1410	Sample from small fire under wing
	Ua-13167	Charcoal	1998	645 ± 50	−21.73	1290–1400	1280–1410	Sample predating the wing
Ahu Orongo	T-193	Charcoal	1960	540 ± 70		1310–1360 **1380–1450**	1280–1510	
Ahu Rongo I	GrN-26318	Charcoal	2001	715 ± 35			1270–1400	Cremation area *ahu* I
Ahu Rongo	GrA-18378	Charcoal	2001	655 ± 30			1290–1410	Between *ahu* I and II
Ahu Rongo I	GrA-18380	Charcoal	2001	655 ± 30			1290–1410	South wall of *ahu* I
Ahu Tahai I	Gak-2866	Charcoal + earth	1970	1260 ± 130		**660–900** 920–940	550–1040	Sample from fill under *poro*-pavement

(Continues)

TABLE 2. *(Continued)*

SITE	LAB. NO.	SAMPLE	YEAR	B.P.	^{13}C	CAL. A.D. ± 1 SD	CAL. A.D. ± 2 SD	COMMENTS
	Gak-4507	Charcoal	1973	200 ± 70		1650–1700 1720–1820	1630–1950	Questionable date
	Gak-2867	Bone (human)	1970	810 ± 80		1160–1290	**1030–1310** 1350–1390	Sample from cremation pit in ramp
Ahu Tautira	Ua-13161	Charcoal	1998	220 ± 50	−22.79	1650–1690 **1730–1810**	1640–1890	Sample from late building phase
	Ua-13162	Charcoal	1998	720 ± 50	−26.95	**1260–1310** 1350–1390	1240–1400	Sample from crematorium
	Ua-13284	Charcoal	1998	475 ± 60	−15.76	1410–1510	1390–1640	Sample from under *ahu*
Ahu Tepeu 1	M-870	Bone (human)	1959	330 ± 150		1440–1680 1740–1810	1411–1950	Dating of burial
Ahu Tepeu	M-732	Totora reed	1958	1640 ± 250		100–700	200–1000	Questionable date
Ahu Vai Teka	I-455	Charcoal	1961	340 ± 75		1480–1650	1430–1680	
	M-1372	Charcoal	1970?	330 ± 100		**1460–1670** 1780–1790	**1420–1700** 1720–1880	
	TBN-348-2	Charcoal	1975?	399 ± 76		1440–1530 1560–1630	1410–1660	
Ahu Vinapu 1	K-523	Charcoal	1956	440 ± 100		**1420–1530** 1560–1640	1300–1670	Sample from phase II ramp
	M-709	Charcoal	1957	120 ± 200		1660–1950	1470–1950	Sample from later context
	M-711	Bone (human)	1958	730 ± 200		1040–1090 **1120–1430**	850–1650	Sample from crematorium
Ahu Vinapu 2	M-710	Charcoal	1957	1100 ± 20		770–1170	550–1300	Sample from bottom of earth-wall of plaza
	T-5175	Charcoal + ash	1984	570 ± 120		1280–1460	1250–1640	Sample from crematorium
Ahu NO 31-286	Ua-11704	Charcoal	1998	795 ± 50	−19.81	1220–1280	1160–1300	Sample from under the foundation stones

Note: Boldface numbers show higher level of statistical certainty.

TABLE 3. RADIOCARBON DATES OF STATUE SITES AND AGRICULTURAL SITES ON EASTER ISLAND

SITE	LAB. NO.	SAMPLE	YEAR	B.P.	^{13}C	CAL. A.D. ± 1 SD	CAL. A.D. ± 2 SD	COMMENTS
Statue quarry	K-521	Charcoal + earth	1956	750 ± 250?		1010–1450	700–1800	Problematic
	K-507	Charcoal	1956	480 ± 100		**1390–1530** 1570–1630	1290–1650	In debris
	K-508	Charcoal	1956	110 ± 100		1680–1740 **1800–1930**	1655–1950	In debris
	Ua-14189	Charcoal	1999	550 ± 70	−11.6	1310–1360 **1380–1450**	1280–1490	Sample in rubble mound 1.5 m depth
Tukuturi	T-5006	Wood	1983	180 ± 40	−26.1	**1720–1820** 1840–1880	**1660–1890** 1910–1950	Sample in association with statue
	T-6258	Wood	1986	230 ± 60	−26.1	1640–1700 **1720–1820**	1520–1570 **1620–1950**	Sample in association with statue
	Beta-13130	Charcoal	1985	540 ± 90		1300–1360 **1380–1470**	**1280–1530** 1570–1630	Sample from floor of *moai* debris
	Ua-618	Charcoal	1987	1040 ± 90	−2.5	890–920 **940–1160**	810–1230	Sample from floor of *moai* debris
Statue no. 478	Ua-1145	Charcoal	1989	180 ± 110	−25	**1660–1890** 1910–1950	1515–1600 **1620–1950**	Sample between stones of statue platform
Agricultural site	Beta-144306	Charcoal	2000	790 + 80	−25.7	1160–1300	**1040–1320** 1340–1400	
	Beta-144307	Charcoal	2000	840 + 40	0	1195–1265	1060–1080 **1120–1280**	
	Beta-144308	Charcoal	2000	740 + 40	−25	**1250–1300** 1360–1380	**1230–1320** 1350–1390	
	Beta-144309	Charcoal	2000	250 + 40	0	1640–1680 **1740–1800**	1620–1700 **1720–1820**	
	Beta-144310	Charcoal	2000	780 + 50	0	1225–1285	**1160–1300** 1360–1380	
	Beta-144311	Charcoal	2000	380 + 40	0	1470–1530 1560–1630	1450–1640	

Note: Boldface numbers show higher level of statistical certainty.

(A.D. 450–1250), and the fourth was derived from an early cultural deposit in Anakena (A.D. 650–1150). *Ahu* Tahai I and the rectangular house also produced later dates (Table 1). The sample from *ahu* Tahai I was found in the fill of the *ahu* and may therefore not date the construction of the *ahu* but may be due to another activity. The two remaining dated samples were likely derived from early settlement activities.

The dated samples presented above suggest that the island was settled c. A.D. 600, but this has so far not been supported by obsidian hydration dates or other in situ archaeological material. Furthermore, the ranges of these samples are large and may actually date to later in the range (e.g., A.D. 800–1000) rather than earlier. We must also consider that the early settlers on this island probably had greater access to wood that may have been dead for several hundred years (driftwood or dead palm trees) than did later inhabitants. This may have affected the dating of these samples. Evidence for occupation of Rapa Nui prior to A.D. 800 is scant. Several dated samples fall into the range of A.D. 800–1200. Both settlement activities and ceremonial activities are indicated within this time frame. This is also supported by obsidian hydration dates and excavated archaeological material. The bulk of dated samples from ceremonial structures, *ahu*, indicate that they date from the end of this range rather than the beginning. However, this proposition should be investigated further.

ORIGIN OF THE INITIAL SETTLERS OF RAPA NUI

Since Rapa Nui was visited by Europeans in 1722, there has been considerable speculation as to the origin of the Rapa Nui people. It is, however, quite clear that the contemporary indigenous population of Rapa Nui is related to other Polynesian populations (Métraux 1940). Thor Heyerdahl has suggested that a Polynesian population defeated and replaced an early population group from South America. The main argument for an early South American settlement of the island has been that a technology from an advanced civilization must have been the source of the outstanding stone work of the ceremonial structures on Rapa Nui, and that these features are similar to pre-Inca masonry features (for example, within the Tiahuanaco culture). Other evidence for a South American origin is the occurrence of South American plants such as the sweet potato, *kumara*, and bottle gourd in Polynesia (Green 1998:98–100; Wallin 1999:25–28). A probable South American connection has also been suggested by legends about the existence of two different population groups on the island, and the geographical position of the island (Heyerdahl 1952, 1961:21–90). Finally, it has been noted that there are similarities between the birdman cult (*tangata manu*) on Rapa Nui and birdman cults in South America (Heyerdahl 1998:178–184).

Most scientists dealing with Polynesian prehistory have not ruled out contact between the eastern Polynesian Islands and South America. The idea that Polynesians were the ones who visited South America, and not the other way around, prevails (Buck 1938; Green 1998; Irwin 1992). The physical anthropologist P. Chapman (1998:179) recently presented the following conclusion:

> If prehistoric gene flow occurred between Rapa Nui and South America, then either the corresponding gene flow was too small to detect or, . . . it was the result of Rapa Nui voyages to South America and not vice versa.

However, the idea that Rapa Nui was only settled once and subsequently the population evolved in total isolation, as suggested by Mulloy and Figureroa (1978), has recently been challenged (Green 1998, 2000; Martinsson-Wallin 1994). Based on excavations and comparisons of material culture of early settlements, as well as language similarities and possible migration routes, Green has suggested that the initial Rapa Nui population came from the Mangareva-Pitcairn-Henderson area (Green 1998; Weisler 1996:615–629, 1997:149–172). Excavations on Henderson Island by M. Weisler have demonstrated that there was an interaction sphere among the above-mentioned islands. A date from excavations on Henderson Island point to human occupation c. A.D. 800. Pearl shell, derived from Mangareva, appears on Henderson before A.D. 1000, even though the earliest habitation date thus far for Mangareva is c. A.D. 1200. Furthermore, volcanic glass that originated from Pitcairn Island has been found in cultural layers on Henderson dated to A.D. 900 (Weisler 1996:623, 1998:78–79).

One-piece fish hooks and harpoon heads have been found in early habitation layers on Mangareva as well as on Rapa Nui. However, on Mangareva they were made from pearl shell and on Rapa Nui from bone (Green 1998:107; Martinsson-Wallin and Wallin 1994:163, Fig. 38), the result of the geographic distribution of pearl shell. The early artifacts on Rapa Nui also show similarities to the early toolkit from the Marquesas Islands. However, a direct settling of Rapa Nui from the Marquesas is not considered likely, since winds and currents make it difficult to sail directly from the Marquesas to Rapa Nui (Green 1998:94; Irwin 1992:93). An indirect contact and influence from the Marquesas area via Tuamotu Islands and Mangareva is, however, possible. Basalt from Eiao Island in the Marquesan group has, for example, been found on Mangareva (Green 2000:84) (Fig. 2).

An alternative explanation for Marquesan influence has been put forward by Gill et al. (1997), who suggest that a Polynesian group from the Marquesas traveled to South America, intermarried and culturally exchanged with South Americans, and then returned to the Pacific, ending up on Rapa Nui (Gill et al. 1997; Gill and Owsley 1993). Anthropological and DNA studies of skeletal remains from Rapa Nui have so far not indicated any major input from a South American Indian population. Rapa Nui prehistoric skeletal remains appear to be rather similar to remains from the Tuamotu Islands (Chapman 1998). Skeletal samples from the islands closest to Rapa Nui, such as Pitcairn and Mangareva, are very small and comparisons have been difficult. Other materials recovered from early occupation deposits of Rapa Nui show similarities with finds from the Mangarevan-Tuamotu-Marquesas area (Green 1998). The find of the Polynesian rat, in a cultural layer dated to c. A.D. 800–1000, seems to indicate an early connection to Polynesia (Martinsson-Wallin and Wallin 2000; Skjølsvold 1994:113). Other migration routes through the South Pacific, originating in the Cook Islands via the Austral Islands and extending through Pitcairn to Rapa Nui, have also been discussed (Langdon and Tryon 1991; Van Tilburg 1994). According to Finney (1994:33) and Green (1998:95), while this route may have been possible, it is quite difficult to navigate and therefore not very likely.

In traditional history there are accounts of Polynesian voyages to Rapa Nui from Rapa Iti, Rarotonga, and Mangareva (Métraux 1940:94–97), but the context and time frame are somewhat unclear.

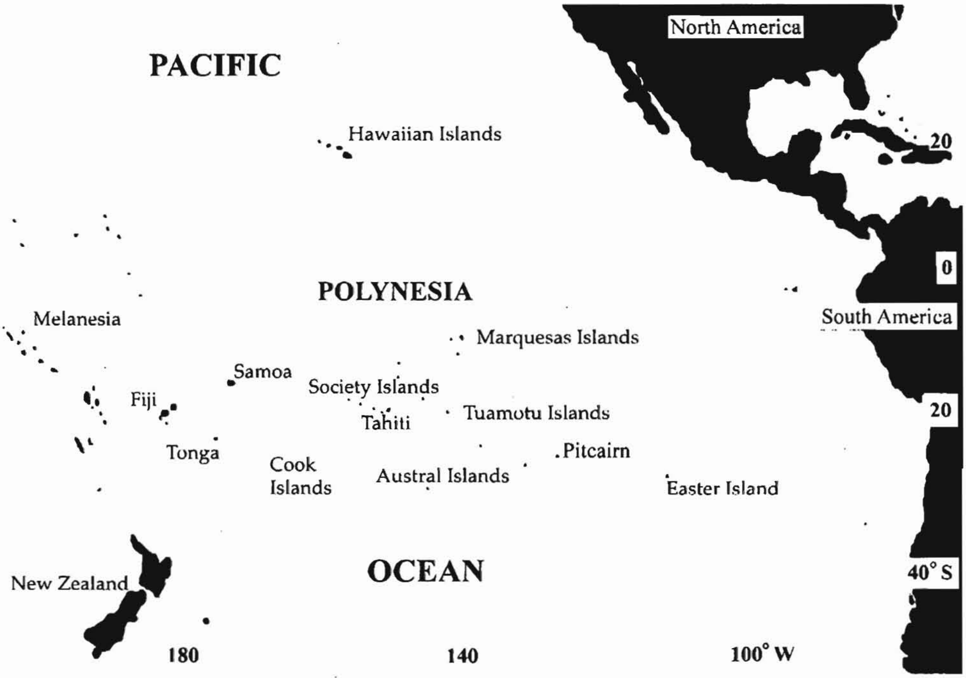

Fig. 2. Pacific Ocean with East Polynesia and South American coast.

> On Rapa there is a tradition reported by Stokes; Tamatiki, son and grandson of Tiki, the first man on Rapa, voyages to Easter Island and named it Rapa-taanga after his own land. He died in Easter Island ... In the second voyage, Temarango, also known as Rango, left Rapa with three canoes, each containing forty men and no women ... (Métraux 1940:94)

Rapa Nui is mentioned twice in Rarotongan traditions. In "History and traditions of Rarotonga" by Smith (1919–1921), Rapa Nui is the first island listed that was visited by Ui-te-rangi-ora when the Avaiki people were scattered. Smith also writes about the famous navigator Tangiia who visited Rapa Nui c. A.D. 1250 to find Taputapu-atea, the son of Iro, with whom he sailed back to Mo'orea. Mangarevans believe that the land called Mata-ki-te-rangi is the same as Rapa Nui, but Buck suggests that this land, in fact, refers to Pitcairn (1938:26). However, the Hotu Matua tradition appears to be found both on Rapa Nui and Mangareva.

To conclude the discussion of origins, current data suggest an initial colonization of Rapa Nui c. A.D. 800–1000 by a Polynesian population, possibly from the Mangareva-Pitcairn-Henderson area or the Tuamotu Islands. South American contact is likely, but the evidence indicates that this potential contact may have occurred c. A.D. 1100–1200 and did not result in any obvious genetic effects on the Polynesians.

THE EARLY SETTLEMENT IN ANAKENA

Several test trenches (27 trenches ranging from 1 to 10 sq m in size) were placed all around the restored *ahu* Nau Nau in 1986–1988 (Skjølsvold 1994). The majority of them were excavated down to bedrock. Prior to the outcome of the ^{14}C dated samples, it was suggested that the cultural remains found in a brown clay soil on top of the bedrock belonged to the same time period (c. A.D. 1100–1200). However, the dated samples from the bottom layer of different squares indicated a time range (1170 ± 140–710 ± 40 B.P.) of about 400 years. The earliest ceremonial structure found thus far in Anakena dates to 860 ± 130–710 ± 70 B.P. These results suggest that a settlement preceded an early ceremonial site. The earliest dated cultural deposit in Anakena (and on the island) thus far was found in trench C1, about 2.5 m below the present surface and partly situated under an early *ahu* structure. Due to its location, only 8 m^2 have been presently excavated at this site. The excavations are described elsewhere (Skjølsvold 1994), but presented below is a reanalysis of the material, including a presentation of the general osteological analysis and a new faunal analysis. Due to the extensive test excavations by the Kon-Tiki Museum during 1986–1988, and the test trench by Steadman in 1991, significantly more is known regarding the prehistory of this area (Skjølsvold 1987, 1988, 1994; Steadman 1994).

Trench C1

This trench was excavated on the inland side, just in front of the restored *ahu* Nau Nau. A pavement belonging to an earlier phase of the restored *ahu* was found approximately 1.2–1.5 m below the surface. It extends about 6 m inland from the front retaining wall. Further inland, a thin layer of greenish clay covered the plaza of this early structure (860 ± 130 B.P.). The excavation cut through this layer revealing the base construction of the plaza, which was constructed as a stone fill for leveling and drainage (Skjølsvold 1994:21–26). Below this layer, there is a layer of windblown sand. Beneath this, the earliest dated cultural stratum thus far found in Anakena was discovered. This deposit is 30–70 cm in thickness and situated just on top of the bedrock. It is dated by carbon and bone samples to 1170 ± 140 B.P., 1090 ± 100 B.P., 1015 ± 65 B.P. (rat bone), and 900 ± 120 B.P. (Skjølsvold 1994). Furthermore, the Padre Sebastian Englert Museum on Rapa Nui submitted two coral files found in the early deposit for dating by Warren Beck at NSF Arizona AMS Facilities. The coral file, A 161, found at a depth of 2.50 m, was dated to 965 ± 45 B.P., and a coral file, A 160, found at a depth of 2.65 m, gave a date of 1010 ± 60 B.P. (both dates are calibrated). These dates correlate well with the date of the rat bone (1015 ± 65 B.P.) found at a depth of 2.90 m.

Analysis of the Material Remains from the Early Layer of Trench C1

The material remains from the 8 sq m, 30–70-cm-thick layer consist of two coral files (A 160, A 161, Fig. 3), two obsidian scrapers (A 168, A 171), one obsidian chisel (A 169, Fig. 4), four obsidian cores (A 445, A 483), 27 used obsidian flakes, 22 obsidian flakes, 24 basalt flakes, and 39 obsidian chips (Fig. 5, Table 4). The same types of artifacts were generally found in the other trenches with a bottom layer dated c. A.D. 1200. This also includes the more extensively excavated settlement-activity area Nau Nau East. It is notable that nonpolished crude *toki* used for stone work on the ceremonial sites were not found in these early deposits (Skjølsvold 1994:94).

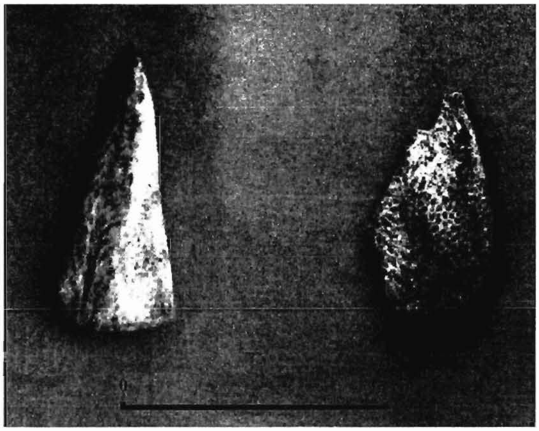

Fig. 3. Coral files, Anakena site, early layer of Trench C1: A 160 on left; A 161 on right.

No fishhooks were recovered from the early deposit in Trench C1, but the two coral files indirectly suggest that bone fishhooks may have been manufactured during this stage (Ayres 1979:74). A circular one-piece hook has been found at the settlement-activity area Nau Nau East, which is dated to c. A.D. 1100–1200. Comparative studies of the materials from other early Polynesian sites show that circular one-piece hooks are also found in early deposits at the Hanamiai site on the Marquesan Island Tahuata and on Mangareva (Green 1998:106; Rolett 1998:160). At the early Vaito'otia site on Huahine this type is also found, but it is made from pearl shell (Sinoto and McCoy 1975:161, pl. 3b–c). Coral files are also found in early deposits on the Marquesas Islands, but they have not been found at the early site at Huahine (Rolett 1998:216–218; Sinoto and McCoy 1975:167). Branch coral files have been found in prehistoric settlements on Mangareva (Green 1998:107)

One harpoon head was found in the cultural deposits at the settlement area *ahu* Nau Nau East dated c. A.D. 1100–1200 (Martinsson-Wallin and Wallin 1994:162, fig. 37). Comparative studies show that harpoon heads have also been found in prehistoric settlements on Mangareva (Green 1998:107) and in what could be an early settlement on the Marquesas Islands (Sinoto 1970:116). There are also indications that harpoons were used in the early settlement at the Vaito'otia site on Huahine (Emory 1979:203; Sinoto 1988:124; Sinoto and McCoy 1975:168; Wallin 1996). The obsidian chisels found at Anakena may indicate different types of woodworking.

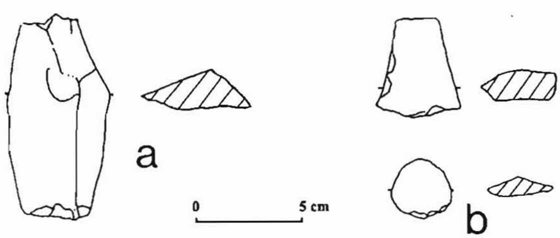

Fig. 4. Stone tools, Anakena site, early layer of Trench C1. a: obsidian chisel (A 169). b: obsidian scrapers (A 168, A 171).

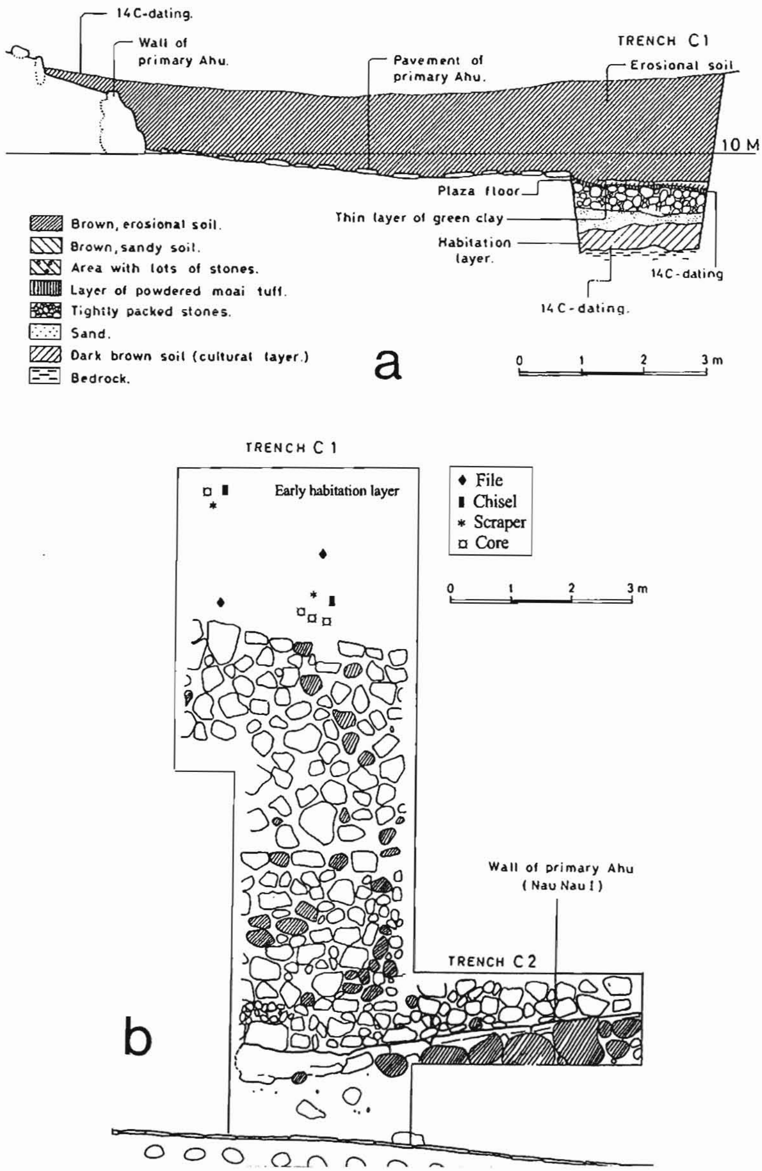

Fig. 5. Anakena Trench C1. a: section drawing of Trench C1. b: plan drawing of Trench C1 with indications of the material in the early habitation layer.

Osteological Analysis of Bone Material from the Early Layer of Trench C1

A general osteological analysis of the bone remains was carried out in 1987 (Table 5). This analysis indicated that the bones are from sea mammals (unidentified but probably dolphins), Polynesian rat, fish (unidentified), and birds (hen fowl, petrel, terns, and boobies). A few sea urchins and articulate shell were also found (Wallin and Martinsson-Wallin 1987, 1988) (Table 5, Fig. 6, 7).

TABLE 4. ARTIFACTS FROM ANAKENA, EARLY LAYER OF TRENCH C1

ARTIFACT TYPE	NUMBER	CATALOG NO.
Coral files	2	A160, A161
Obsidian scrapers	2	A168, A171
Obsidian chisel	1	A169
Obsidian cores	4	
Used obsidian flakes	27	
Obsidian flakes	22	
Obsidian chips	39	

In the early-dated bottom layer (900 B.P.) of a trench dug on the seaward side of *ahu* Nau Nau in 1991 by David Steadman bones from sea mammal (dolphin), fish (unidentified), and Polynesian rat were found. Various sea and land birds were also identified (petrels, terns, tropical bird, shearwaters, hen fowl, small rail, medium parrot, and barn owl). Remains of shell and sea urchins were few. Both excavations indicate that bones from hen fowl are few and that native birds are much more abundant in the early deposits (Steadman 1994:79–96). When comparing the bird bones from the early deposits with bird bones from later deposits at Anakena, it is also clear that the native birds become less abundant and some even become extinct over time (Martinsson-Wallin and Wallin 1994; Steadman 1994).

An osteological analysis of the fish and mammal bones from the early layer in Trench C1 has recently been carried out by faunal analyst Susan Crockford. The identification of fish bones is presented below. Her findings of the sea mammal remains indicate that they are probably spinner dolphin (*Stenella longirostris*)

TABLE 5. THE DISTRIBUTION OF BONE REMAINS FROM THE ANAKENA SITE, EARLY LAYER OF TRENCH C1

	230–240 CM		240–260 CM		270–280 CM		280–290 CM		290–300 CM	
TAXA	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Delphinidae (dolphin)			34	1	25	1			5	1
Mammal (not identified to species)	20	2					2	1		
Rattus (rat)	12	1	56	10	26	6			1	1
Áves (bird)	6	3	22	3	25	5	2	1	10	1
Pisces (fish)	20	3	120	5	41	4	6	1	18	3
Echinoidea (sea urchin)	1	1								
Plaxiphora (joint shell)	1	1	4	1	7	1				
Ossa (unidentified bones)	15		100		12					

Note: After Wallin and Martinsson-Wallin 1987.

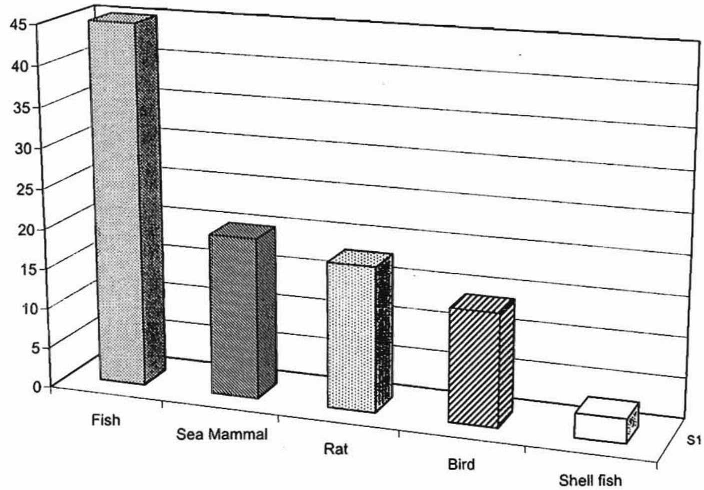

Fig. 6. Distribution of faunal remains, NISP, Anakena site, early layer of Trench C1.

and that the 12 identified bones in this early deposit represent a minimum of three animals, a fully mature adult (possibly male), a younger subadult, and a juvenile.

Preliminary Identification of Fish Remains from the Early Occupation at Anakena Cove

All material reported here was identified to the lowest possible taxonomic category, primarily using the comparative skeletal collections at the Bernice P. Bishop Museum (anthropology), Honolulu, augmented by material at the University of Victoria (anthropology), Victoria. An effort was made to identify material to at least genus if at all possible (cf. Ayres 1985). A large number of fish species known from Easter Island, however, are either endemic or have a very limited distribution in the southeastern Pacific and thus are not represented in any existing comparative skeletal collections. Therefore, some identifications are necessarily tentative. Therefore, this report must be considered preliminary until further analysis

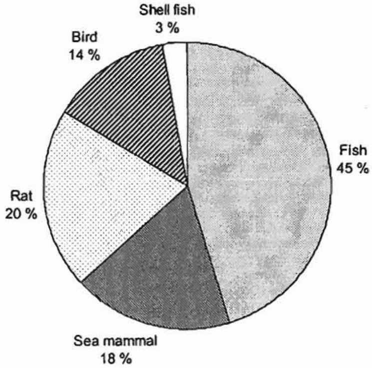

Fig. 7. Distribution of bone remains, MNI Anakena site, early layer of Trench C1.

allows more precise identifications to be made. An up-to-date list of fish taxa currently known from Easter Island is provided.

For the purpose of MNI (minimum number of individuals) calculation, the entire early occupation layer was considered a single depositional unit. A subjective assessment was made of the approximate living size of fish represented by each identified archaeological specimen, relative to similar taxa from reference material of known size. These size estimates are of course not particularly accurate but are useful in giving a general impression of the overall character of the prehistoric fish harvest. In some cases, future analysis may allow more precise estimates of size through the application of regression formulae derived from measurements of corresponding skeletal elements of reference specimens of known size (cf. Crockford 1997).

RESULTS

A total of 215 fish bones were recovered, of which 26 percent were identifiable to at least family level (Tables 6 and 7). The precise identity of a few of these specimens remain unknown, although they are potentially identifiable. Thus, 53 specimens were identified to at least family level, with an additional 3 specimens potentially identifiable, for a total of 56 identified or identifiable specimens (NISP). The remaining 159 pieces were unidentifiable fragments. Members of 12 families were identified, with at least another one (and possibly two or three) represented by the unknown material. Within this minimum of 13 families, some could be identified further: at least nine could be identified to at least genus (although sometimes only tentatively) and an additional five to species, for a total of 20 distinct taxa. A minimum of 30 individual fish (MNI) are represented in the deposit. Jacks or trevallies (Carangidae) are the most commonly occurring family represented (five taxa/seven MNI), with wrasses (Labridae), the next most common (four taxa/four MNI). Nibblers (Kyphosidae) and tunas (Scombridae) are each represented by two taxa (three MNI).

Table 6 lists all fish taxa currently known from Easter Island, minus a few very rare or minute species. This table also indicates reference material used to determine the identification of Anakena specimens. In many cases, only a single member of a family was available for reference and this was often a different genus than has been reported from Easter Island (in some cases, only a related family in the same order was available, such as flounders and soles). However, as family- and order-level characteristics are reflected in skeletal anatomy, these reference specimens could be used to narrow down the possible taxa represented by the archaeological material. Thus, it was possible to be sure that members of certain common families reported at Easter Island (such as moray eels) were definitely *not* represented in the prehistoric material. In an ecological and historical context, this information is perhaps as important as what *is* represented, given the severely impoverished state of the fish community at Easter Island compared to other, less isolated locales. Table 6 can be considered a comprehensive, up-to-date listing of all known Easter Island fishes and includes many taxa not reported by Ayres (1985).

A classification of individual fish into broadly defined and subjectively applied size classes (Table 8) reveals no very small fish (3–6 inches), about equal numbers

Table 6. Fish Known from Easter Island and Their Occurrence in the Archaeological Deposits from Anakena Cove as Compared with Known Skeletal Specimens from Two Collections

TAXON[a]	CONFIDENCE CODES[b]					
	22	21	20	10	TOTAL NISP[c]	TOTAL MNI[d]
Lamnidae (Mackerel sharks)			○			
Carcharodon carcharias						
Isurus oxyrinchus						
Alopiidae (Thresher sharks)						
Alopias vulpinus						
Rhincodontidae (Whale sharks)						
Rhincodon typus						
Carcharhinidae (Requiem sharks)			◇			
Galeocerdo curier						
Prionace glauca	◇					
Carcharhinus galapagensis						
Carcharhinus amblyrhynchos						
Sphyrnidae (Hammerhead sharks)						
Sphyrna sp.						
Squalidae (Dogfish sharks)						
Isistius brasiliensis	◇					
Squalus blainville		◇				
Engraulididae (Anchovies)						
Engraulis sp.		◆			2	1
Myliobatidae						
Aetobatis narinari						
Syndodontidae (Lizardfishes)			○			
Synodus capricornis						
Synodus lacertinus						
Synodus sp. nov.*						
Antennariidae (Frogfishes)						
*Antennarius coccineus**						
*Antennarius randalli**						
Congridae (Conger eels)						
Conger cinereus						
Ophichthidae (Snake eels)						
Ichthyapus vulturis						
Schismorhynchus labialis						
Moringuidae (Worm eels)						
Moringua ferruginea						
Muraenidae (Moray eels)			○			
Anarchias seychellensis						
Enchelycore ramosus						
Gymnothorax bathyphilus						
Gymnothorax eurostus	○					
Gymnothorax nasuta						
Gymnothorax panamensis						
Gymnothorax porphyreus						
Ophidiidae (Brotulas/Cuskeels)			◇			
Brotula multibarbata						
Otophidium exul						
Belonidae (Needlefishes)			◇			
Platybelone argalus platyura						

(Continues)

Table 6. *(Continued)*

TAXON[a]	CONFIDENCE CODES[b] 22	21	20	10	TOTAL NISP[c]	TOTAL MNI[d]
Hemiramphidae (Halfbeaks)						
Hyporhamphus acutus acutus						
Euleptorhamphus viridis						
Exocoetidae (Flying fishes)						
*Cheilopogon agoo rapanuiensis**						
Cypselurus pitcairnensis						
Exocoetus obtusirostris						
Fistulariidae (Cornetfishes)						
Fistularia commersonii						
Sygnathidae (Pipefishes and seahorses)						
*Cosmocampus howensis**		◇				
Aulostomidae (Trumpetfishes)						
Aulostomus chinensis						
Holocentridae (Squirrelfishes)						
Ostichthys archiepiscopus						
Plectrypops lima						
Pristilepis oligolepis						
cf. *Neoniphon sammara* (could be one of above sp.)			●		3	2
Adioryx lacteoguttatus		○				
*Myripristis tiki**		○				
Sargocentron punctatissimum	○					
Scorpaenidae (Scorpionfishes)			◇ ○	●	1	1
*Scorpaena orgila**						
*Scorpaena pascuensis**						
*Scorpaena englerti**						
*Rhinopias cea**						
Serranidae (Groupers)			●		2	1
*Acanthistius fuscus**						
Caprodon longimanus						
*Pseudogramma australis pascuensis**						
Trachypoma macracanthus						
*Plectranthias nasca**						
Kuhliidae (Flagtails)						
*Kuhlia nutabunda**		○				
Percichthyidae (Temperate basses)						
Polyprion oxygeneios						
Priacanthidae (Big eyes)						
Cookeolus japonicus	○					
Heteropriacanthus cruentatus	○					
Priacanthus sp. nov.*						
Cirrhitidae (Hawkfishes)			○			
*Cirrhitus wilhelmi**		○				
Cheilodactylidae (Morwongs)						
*Goniistius plessisi**		○				
Apogonidae (Cardinalfishes)			○			
Apogon talboti		○				
*Apogon chalcius**						
Apogon coccineus		○				

(Continues)

TABLE 6. *(Continued)*

TAXON[a]	CONFIDENCE CODES[b] 22	21	20	10	TOTAL NISP[c]	TOTAL MNI[d]
Labracoglossidae (Knifefishes)						
*Bathystethus orientale**						
Echeneididae (Remoras)						
Echeneis naucrates						
Remora remora		◇				
Carangidae (Jacks)			◇ ○			
Carangidae (sp. undetermined)			●		2	0
Alectis ciliaris (see text)*			●		5	3
Carangoides equula (see text)			●		1	1
Caranx lugubris		○				
Naucrates ductor	◇					
Decapterus scombrinus		●			1	1
Elagatis bipinnulata	○					
Pseudocaranx dentex						
Scomberoides lysan (see text)*		●			1	1
Seriola lalandi	○ ◇					
Seriola dumerili (see text)*		●			1	1
Coryphaenidae (Dorados)						
Coryphaena hippurus	◇ ●				1	1
Emmelichthyidae (Bonnetmouths)						
*Emmelichthys karnellai**			○			
*Erythrocles scintillans**						
Lutjanidae (Snappers)			○			
Etelis carbunculus	○					
*Parapristipomoides squamimaxillaris**						
Pristipomoides sp.						
Mullidae (Goatfishes)			○			
Mulloides vanicolensis						
Parupeneus orientalis						
Kyphosidae (Rudderfishes/Nibblers)						
*Girellops nebulosus**			●		2	1
Kyphosus bigibbus		●			6	2
Chaetodontidae (Butterflyfishes)			○			
Amphichaetodon melbae (R)						
*Chaetodon litus**		●			1	1
Chaetodon mertensii (R)						
Chaetodon pelewensis (R)						
Chaetodon smithi (R)						
Chaetodon unimaculatus (R)	○					
Forcipiger flavissimus	○					
Pomacanthidae (Angelfishes)			○			
Centropyge hotumatua						
Centropyge flavissimus						
Pentacerotidae (Boarfishes)						
Pentaceros decacanthus						
Pomacentridae (Damselfishes)			○			
*Chrysiptera rapanui**		○				
*Chromis randalli**		○				
Stegastes fasciolatus	○					

(Continues)

TABLE 6. *(Continued)*

TAXON[a]	CONFIDENCE CODES[b] 22	21	20	10	TOTAL NISP[c]	TOTAL MNI[d]
Sphyraenidae (Barracudas)			○			
Sphyraena helleri		●			1	1
Labridae (Wrasses)			●		2	2
Anampses caeruleopunctatus		○				
*A. femininus**						
Bodianus oxycephalus (see text)		●			1	1
Cheilio inermis	○					
*Coris debueni**		○				
*Novaculichthys woodi**						
Pseudolabrus fuentesi						
Pseudolabrus semifasciatus						
Thalassoma purpureum (see text)		●			1	1
Thalassoma lutescens						
Scaridae (Parrotfishes)			○			
Leptoscarus vaigiensis						
Blenniidae (Blennies)						
*Cirripectes patuki**						
*Entomacrodus chapmani**						
Gobiidae (Gobies)			◇			
Kelloggella oligolepis						
Eviota sp. nov.* (R)						
*Gnatholepis cauerensis** (R)						
Priolepsis sp. nov.* (R)						
Heteroleotris sp. nov.* (R)						
Trimma unisquamis (R)						
Acanthuridae (Surgeonfishes)			○			
Acanthurus leucopareius	○					
Naso unicornis	○					
Gempylidae (Snake mackerels)						
Ruvettus pretiosus	○					
Promethichthys prometheus						
Rexea sp. nov.*						
Scombridae (Mackerels/Tunas)			○			
Acanthocybium solanderi	○					
Katsuwonus pelamis	◇ ●				5	2
Thunnus alalunga	◇					
Thunnus albacares	◇ ●				4	1
Thunnus obesus	○					
Istiophoridae (Billfishes)						
Istiophorus platypterus						
Makaira sp.						
Xiphiidae (Swordfishes)						
Xiphias gladius	○					
Bothidae (Lefteye flounders)			◇			
Bothus mancus		○				
*Engyprosopon regani**						
Soleidae (Soles)				◇		
Aseraggodes bahamondei						
Centrolophidae (Medusafishes)			◇			
Schedophilus labyrinthicus						

(Continues)

TABLE 6. *(Continued)*

TAXON[a]	22	21	20	10	TOTAL NISP[c]	TOTAL MNI[d]
	CONFIDENCE CODES[b]					
Lamprididae						
Lampris guttatus		◇				
Balistidae (Triggerfishes)			○			
Xanthichthys mento						
Monacanthidae (Filefishes)						
*Cantherhines rapanui**		○				
Cantherhines dumerilii	○					
Thamnaconus paschalis						
Aluterus monoceros						
Aluterus scriptus						
Ostraciidae (Trunkfishes)			○			
*Lactoria diaphanus**						
Lactoria fornasini (R)						
Tetraodontidae (Puffers)			◇			
*Arothron meleagris**		○				
Sphoeroides pachygaster						
*Canthigaster cyanetron**						
Diodontidae (Porcupinefishes)						
Chilomycterus reticulatus						
Diodon holocanthus						
Diodon hystrix	○					
Molidae (Sunfishes)						
Mola ramsayi		◇				
Gerreidae (Mojarras)						
cf. *Gerres* sp. (unknown sp. #1)*			●		10	2
Unknowns (none of above families with ref. specimens)						
Unknown family/sp. #3					1	1
Unknown family/sp. #4					1	1
Unknown family/sp. #5					1	1

Notes: Comparative skeletal collections used for identification of Anakena material (December 1999) were in Bernice P. Bishop Museum (Anthropology), Honolulu, USA (○/●) and University of Victoria (Anthropology), Victoria, Canada (◇/◆)—see below for full explanation of symbols.

[a] Fish taxa known from Easter Island (a few rare or minute species not included) as of December 1999: From Randall (1976*a*, 1976*b*), Randall and Cea (1984, 1989), DiSalvo et al. (1988); taxonomic classifications updated according to Randall 1996 and Randall pers. comm. asterisk (*) *preceding* a name means taxon is not listed by the above authors and thus is a potential new record; asterisk *after* a name means the species is considered endemic to Easter Island by the above authors; R *after* a name means the species is considered rare.

[b] Confidence codes for identifications. 22: certain identification to species; 21: certain identification of the family and the genus, with a diagnosis of the species that it most closely resembles (equivalent to the designation "*Carangoides* cf. *equula*" or "*Caranx* sp."); 20: 100% confidence to family only (e.g., Carangidae), although the closest matching genus and species may be indicated (especially if the condition of the specimen creates uncertainty, i.e., broken); 10: a limited-confidence identification to family only (e.g., cf. Carangidae).

[c] A symbol in the "22" column means *that species* was available as a reference; in the "21" column it means *another species of the genus* was available as a reference; in the "20" column it means at least one or more *members* of the *family, but of different genera,* were available for reference; in the "10" column it means a *similar family in the same order* was available for reference. ◇: present in University of Victoria collection for comparison; ○: present in Bishop Museum collection for comparison; ◆: identified from the Anakena material to taxonomic level using specimens from the University of Victoria collection; ●: identified from the Anakena material to taxonomic level using specimens from the Bishop Museum collection.

[d] NISP: Number of identified specimens, all confidence levels combined; MNI: minimum number of individuals of taxon, all confidence levels combined.

TABLE 7. SUMMARY OF FISH FAMILIES, GENERA, AND SPECIES IDENTIFIED IN PRELIMINARY ANALYSIS OF THE EARLY COMPONENT AT ANAKENA COVE, TRENCH C (A.D. 800–1000)

	CONFIDENCE CODES[1]					
TAXON	22	21	20	10	TOTAL NISP[2]	TOTAL MNI[3]
Engraulidae (Anchovies)						
Engraulis sp.		●			2	1
Holocentridae (Squirrelfishes)						
cf. *Neoniphon sammara* (see text)			●		3	2
Scorpaenidae (Scorpionfishes)				●	1	1
Serranidae (Groupers)			●		2	1
Carangidae (Jacks)						
Carangidae (sp. undetermined)			●		2	0
Alectis ciliaris? (see text)*			●		5	3
Carangoides equula			●		1	1
Decapterus scombrinus		●			1	1
Scomberoides lysan (see text)*		●			1	1
Seriola dumerili (see text)*		●			1	1
Coryphaenidae (Dorados)						
Coryphaena hippurus	●				1	1
Kyphosidae (Rudderfishes/Nibblers)						
*Girellops nebulosus**			●		2	1
Kyphosus bigibbus		●			6	2
Chaetodontidae (Butterflyfishes)						
*Chaetodon litus**		●			1	1
Sphyraenidae (Barracudas)						
Sphyraena helleri		●			1	1
Labridae (Wrasses)			●		2	2
Bodianus oxycephalus		●			1	1
Thalassoma purpureum (see text)		●			1	1
Scombridae (Mackerels/Tunas)						
Katsuwonus pelamis	●				5	2
Thunnus albacares	●				4	1
Gerreidae (Mojarras)						
cf. *Gerres* sp. (unknown sp. #1) (see text)*				●	10	2
Unknown family/sp. #3 (see text)*					1	1
Unknown family/sp. #4 (see text)*					1	1
Unknown family/sp. #5 (see text)*					1	1
Totals					56	30
Unidentified fragments					159	
Total (NSP)					215	
Percent identified or identifiable					26%	

Note: See Table 6 for explanation of symbols.

of small, medium-sized, and large fish (eight individuals, 8–12 in.; eleven individuals, 16–20 in.; ten individuals, 24–36 in.), with only a very few extremely large fish (two individuals, 36–60 in.). The largest specimen, tentatively identified as *Seriola dumerili*, is a fourth vertebrae with a centrum length (GL) of 26 mm, likely representing a fish 48–60 in. in length.

Unknown Species #1 — Ten bone elements of Gerreidae (Mojarras), representing at least two individuals, most closely resembled a reference specimen classified

TABLE 8. MNI OF FISH BY SIZE CATEGORIES IN PRELIMINARY ANALYSIS, ALL CONFIDENCE LEVELS COMBINED (SEE TABLE 6)

	ESTIMATED SIZES[1]					
TAXON	VERY SMALL 3–6″	SMALL 8–12″	MEDIUM 16–20″	LARGE 24–36″	VERY LARGE 36–60″	FAMILY MNI TOTAL
Engraulidae (Anchovies)						1
Engraulis sp.		1				
Holocentridae (Squirrelfishes)						2
similar to *Neoniphon sammara*		2				
Scorpaenidae (Scorpionfishes)			1			1
Serranidae (Groupers)				1		1
Carangidae (Jacks)						7
could be *Alectis ciliaris*			2	1		
could be *Carangoides equula*				1		
cf. *Decapterus scombrinus*				1		
cf. *Scomberoides lysan*				1		
could be *Seriola dumerili*					1	
Coryphaenidae (Dorados)						1
Coryphaena hippurus				1		
Kyphosidae (Rudderfishes/Nibblers)						3
could be *Girellops nebulosus*			1			
Kyphosus bigibbus			1	1		
Chaetodontidae (Butterflyfishes)						1
Chaetodon sp. (could be *C. litus*)		1				
Sphyraenidae (Barracudas)						1
Sphyraena helleri				1		
Labridae (Wrasses)		1	1			4
Bodianus (could be *B. oxycephalus*)			1			
cf. *Thalassoma purpureum*			1			
Scombridae (Mackerels/Tunas)						3
Katsuwonus pelamis			1	1		
Thunnus albacares					1	
Gerreidae (Mojarras)						2
cf. *Gerres* sp. (unknown sp. #1)		2				
Unknown family/sp. #3 (see text)		1				1
Unknown family/sp. #4 (see text)			1			1
Unknown family/sp. #5 (see text)			1			1
MNI per size category	0	8	11	9	2	30

[1] Size categories are subjective estimations only, compared to similar taxa of known size.

only as *Gerres* sp., a genus known from Tonga. The fact that several elements matched this comparative specimen quite closely suggests both that the archaeological specimens all belong to the same species and that the species is either a member of the genus *Gerres* or one in that family. Seven vertebra; one maxilla; and two articular (two right) elements were identified.

Unknown Families, Unknown Species #3, #4, #5 — Three specimens, all potentially identifiable, could not be matched with any species in the reference collections available. In addition to the families mentioned in the above discussion, the unidentified specimens are clearly not in any of the families represented in the

Bishop Museum collection (see Table 6). Blennies, gobies, and halfbeaks are probably too small to be potential candidates, although none were available for comparison. This leaves very few families known to occur at Easter Island as candidates for the unknown specimens. It suggests that, as for unknown species #1 above, reference collections from other areas of the Pacific will need to be consulted in order to identify these remains correctly. Randall (1976*a*, 1976*b*) has previously commented that although the fish fauna of Easter Island contains a high percentage of endemic species, some species occur at Easter Island that otherwise are found only in the southwestern Pacific (Norfolk Island, the Kermadecs, and Australia). Two vertebra; and one quadrate elements were identified.

DISCUSSION

The fish fauna from the early component at Anakena is dominated by medium- to large-sized carnivorous taxa. Jacks or trevallies (Carangidae) are the most commonly occurring family represented, with wrasses (Labridae) the next most common, and both nibblers (Kyphosidae) and tunas (Scombridae) tying for third rank. Most of these common taxa (jacks, tunas, and wrasses) are medium-sized to extremely large carnivorous fish, although several of the less commonly occurring taxa also fall into this category (scorpionfish, grouper, mahi mahi). Squirrelfishes are also carnivorous in habit, but are nocturnal animals: they hide during the day and feed at night. The relatively common nibblers are medium- to large-sized herbivorous grazers that form large aggregations. Both types might be easy to catch with nets or traps, as well as with hook and line. The representation of species and size categories thus appears to reflect a harvesting strategy dominated by hook and line fishing aimed at medium to very large carnivorous taxa (both inshore and offshore), perhaps combined with an inshore use of nets or traps for smaller species (Ayres 1979).

Conspicuous by their absence are some families reported as relatively common in Easter Island waters today (DiSalvo et al. 1988; DiSalvo and Randall 1993; Randall and Cea 1984): the moray eels (Muraenidae); trumpetfish (Aulostomidae); angelfish (Pomacanthidae); damselfish (Pomacentridae); surgeonfish (Acanthuridae); triggerfish (Balistidae); filefish (Monacanthidae). Muraenidae (lumped together with Congridae and Ophidiidae) were reported as particularly common from three other Easter Island assemblages by Ayres (1985), with Balistidae also recovered. Other less common families (or ones more reclusive in habit) recently reported from Easter Island waters have been reported from other site assemblages but are absent from this deposit (Ayres 1985): sharks (six families, see Table 6); brotulas and cuskeels (Ophidiidae); snappers (Lutjanidae); parrotfish (Scaridae); trunkfish (Ostraciidae); porcupinefish (Diodontidae); big eyes (Priacanthidae). Families of especially diminutive species, such as needlefishes (Belonidae), halfbeaks (Hemiramphidae), pipefish (Sygnathidae), blennies (Blennidae), gobies (Gobiidae), and puffers (Tetraodontidae) are not represented in any of the archaeological assemblages, including this one, as might be expected (unless screen sizes used during excavation precluded the recovery of tiny fish remains). Ayres reports stingray (Dasyatidae) from previously analyzed deposits, although this family has not been formally reported from Easter Island.

Further work on the identification of certain specimens to species may provide an important historical component to current knowledge about the evolution of fish communities at Easter Island, as Flenley (1993) has provided for plant communities on the island. More precise estimation of size categories of fish utilized may also be of value.

As shown in the analysis, the majority of fish types found in the deposit live in habitats ranging from 500 m to over 1000 m offshore. This suggests the utilization of offshore fishing strategies, including seaworthy crafts, and fishing techniques such as trolling, long-line angling, and net fishing (Ayres 1985: 119). The occurrence of dolphin bones also supports an emphasis on offshore strategies. Only a few of the fish types identified in the deposit lived near shore. However, the composition of the sample may have been affected by the screen mesh size used, or the bones from small fish may not have been preserved in the early deposit. Another possible explanation is that the inshore fishing strategies were not favored in Anakena in early prehistoric times. It is indicated that fishing strategies such as inshore angling, spearing, and use of nets, as well as offshore fishing, were all used during the early settlement phase. The emphasis, however, appears to have been on offshore fishing strategies.

COMPARATIVE STUDIES OF ANALYZED BONE MATERIALS FROM PREHISTORIC SITES ON RAPA NUI AND EAST POLYNESIA

Previous osteological analysis of midden material has been carried out in four coastal cave-rockshelters and one "inland" cave on Rapa Nui (Ayres 1985; Rorrer 1998). Excavations of these sites were carried out in 1973 and 1987–1988 to obtain more information about the settlement sequence and prehistoric cultural dynamics of Rapa Nui. Site 12-1, Runga Va'e (Fig. 1), close to shallow inshore waters on the south coast, is dated c. A.D. 1469–1850. Site 34-2, Papa Tekena (Fig. 1), close to deep inshore waters on the rugged north coast, is dated c. A.D. 1321–1617. Site 37-7, Anakena beach, close to shallow inshore waters, is dated c. 1350–1550 (Ayres 1975: 53, 75, 66, 97, 1985: 113). Site 6-58 (Fig. 1), a cave situated by the south coast, is dated c. A.D. 1350–modern times. Site 6-356 (Fig. 1), a cave on the southern part of the island, is situated approximately 1 km from the coast and it is dated c. A.D. 1600–historic times (Rorrer 1998: 193–197). Obsidian hydration was primarily used in dating these sites. In 1973, Ayres test excavated 38 sites, mainly coastal and inland caves. Of these, nine were examined. However, osteological analyses of midden material were carried out on only three of the sites (see above). The excavations of the caves indicated that they had not been used for settlement during the earliest settlement phase on Rapa Nui. It was also indicated that the caves by the coast were used only temporarily, in relation to fishing activities. One of the aims of the 1987–1988 excavations was to examine if there were any notable differences between the find material from a coastal cave versus an inland cave. Two major differences were observed—no mammal bones were recovered from the inland site, and the coastal site appeared to be used more frequently (Rorrer 1998: 197).

Comparison of the composition of the fish bone material from the early-dated deposit in Anakena and the later deposits from the caves-rockshelters indicates

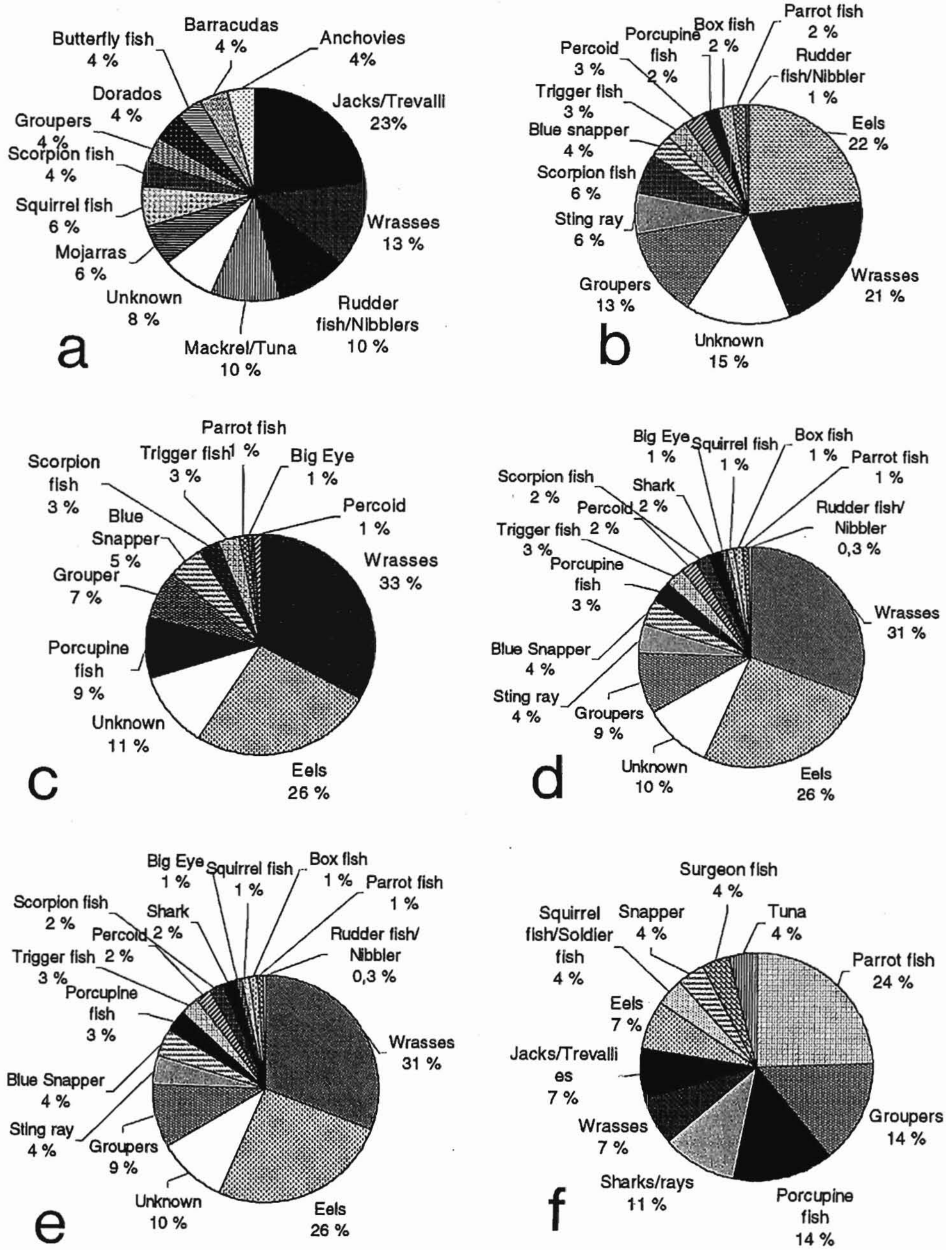

Fig. 8. Distribution of fish bones, MNI, Trench C1. a: early Anakena site. b: late Anakena site 35-7. c: Runga Va'e site 12-1. d: Papa Tekena site 34-2. e: Vaito'otia site, Huahine. f: Vitaria site, Rurutu.

that fishing strategies have changed over time (Fig. 8a–d). The later deposits show an increasing amount of inshore fish. To date no eel bones have been identified in the early deposit at Anakena, but they are found frequently in later deposits (Ayres 1985:123; Rorrer 1998:194). The types of fish most commonly found in the later deposits are wrasses, eels, and groupers. In the early deposit, jacks/

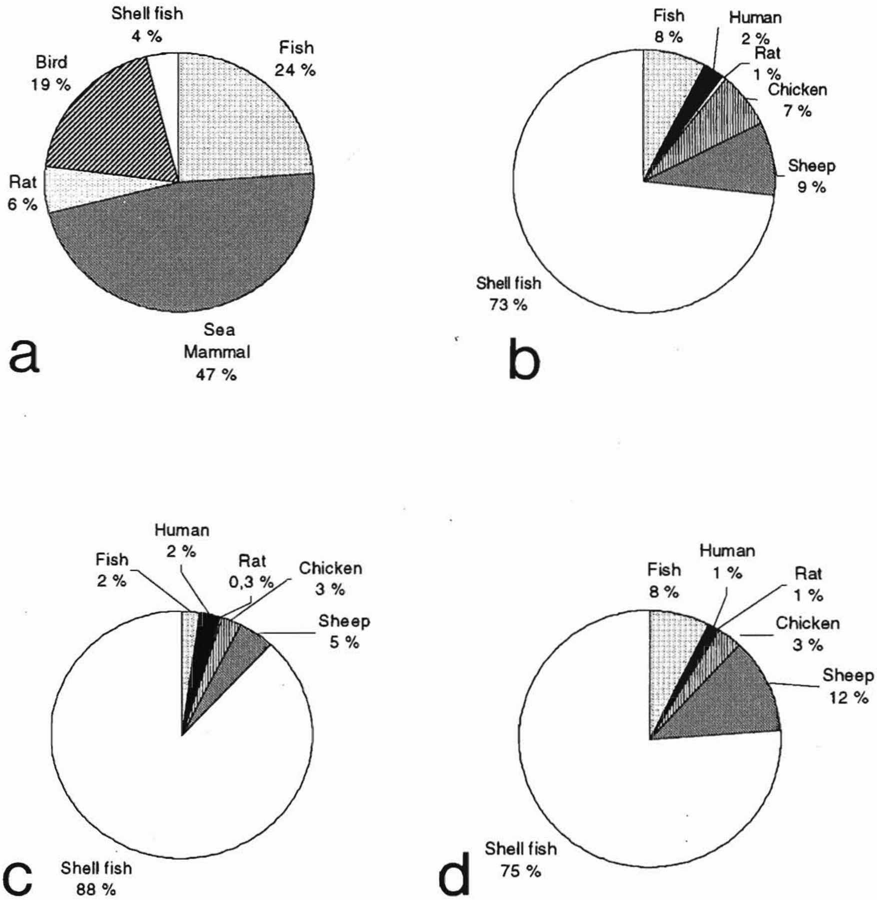

Fig. 9. Distribution of bone remains by weight (g), Trench C1. a: early Anakena site. b: late Anakena site 35-7. c: Runga Va'e site 12-1. d: Papa Tekena site 34-2.

trevallis are the most common fish types, followed by tunas/mackerels and wrasses. However, further osteological studies at other sites from various time periods are needed to complete this picture.

When looking at the general composition of the bone material from the early and the later sites on Rapa Nui (Fig. 9a–d), it appears that sea mammal bones are scarce or absent in later deposits (especially after c. A.D. 1500–1600). Furthermore, human bones are rare or absent in early deposits, but occur frequently in later deposits. These deposits also contain significantly more shellfish than earlier deposits. Bones of sheep occur after their nineteenth-century introduction, but rat bones occur in both early and later deposits. The bird bones in early deposits are mainly from native seabirds. In later deposits the domesticated hen fowl dominates (Ayres 1985; Martinsson-Wallin and Wallin 1994; Rorrer 1998).

Comparisons of analyses of fish bones from other early sites in central and east Polynesia, such as the Hanamiai site on Tauhata and Vaito'otia on Huahine (Fig.

8e) (Dye 1996; Leach et al. 1984; Rolett 1998), support an emphasis on offshore fishing during the early phase with an emphasis on inshore fishing later, also shown at the Vitaria site on Rurutu (Fig. 8f) (Leach and Intoh 1984). Furthermore, it appears that there are more variations in fishing strategies at an early stage than later. Concerning the Hanamiai site on the Marquesan Island Tahuata, Barry Rolett writes the following,

> Analysis of the fish remains suggests the early exploitation of a wide range of marine environments, including offshore deep-sea and pelagic as well as inshore waters. Exploitation of offshore deep-sea waters for large, bottom-feeding fishes was rare after Phase I. (1998: 142)

The early settlers on Rapa Nui may also be called the same as that suggested for the early settlers on Huahine, namely "Marine Hunters" (Leach et al. 1984: 196).

DISCUSSION AND CONCLUSION

When evaluating the radiocarbon and obsidian hydration dates associated with prehistoric sites on Rapa Nui, the initial settlement on this island may be set between c. A.D. 600 and 1000. At the present time, the earliest dates directly associated with a habitation layer on the island indicate that the initial date may even be set as late as c. A.D. 800–1000. Ceremonial sites with worked stones appear to be associated with activities occurring later than the initial settlement, and may be set to c. A.D. 1000 or even as late as c. A.D. 1100–1200.

Concerning the discussion of origin of the initial settlers to Rapa Nui, it is very likely that the Mangareva-Henderson-Pitcairn sphere could have been the homeland of the first people to arrive on this island. An indirect contact with the Marquesas and the Tuamotus has also been discussed, as well as a later contact with the South American continent. The material and time frame of an early settlement on this island show similarities with other early sites in eastern and central Polynesia. Osteological analyses of bone remains from early cultural deposits on Rapa Nui have shown that there was emphasis on the hunting of native birds, small sea mammals (dolphins), and offshore fishing. Hunting strategies, including the use and handling of seaworthy crafts, netting, trolling, and long-line angling were used by the early settlers. Limited evidence of inshore fishing strategies and domesticated fowl is also seen at the early sites. However, analyses of bone remains from later sites indicate that inshore strategies and the use of domesticated fowl were the most common subsistence strategies. This could indicate a shift in subsistence strategy from marine hunting to near-shore fishing-collecting of sea shells, chicken breeding, and farming.

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ABSTRACT

Extensive archaeological investigations on Rapa Nui were initiated by the Norwegian Expedition to the island in 1955–1956. An evaluation of the evidence for early settlement and discussion of the origin of the initial population are presented. The earliest settlement activity on the island was subsequently found at Anakena cove during the Kon-Tiki Museum expedition in 1987. A reanalysis of the material remains and a new osteological analysis of the fish remains from the early Anakena site are presented. This, together with analyses of cultural remains from other settlement sites on Rapa Nui and on other islands in Polynesia, forms the base for an intra- and interisland comparative analysis and discussion of the origin of the initial settlement on Rapa Nui. KEYWORDS: Rapa Nui, settlement, origin, comparative analysis, osteological analysis, fish bones.