AGE OF THE SITES IN THE SOUTH POINT AREA, KA'U, HAWAII

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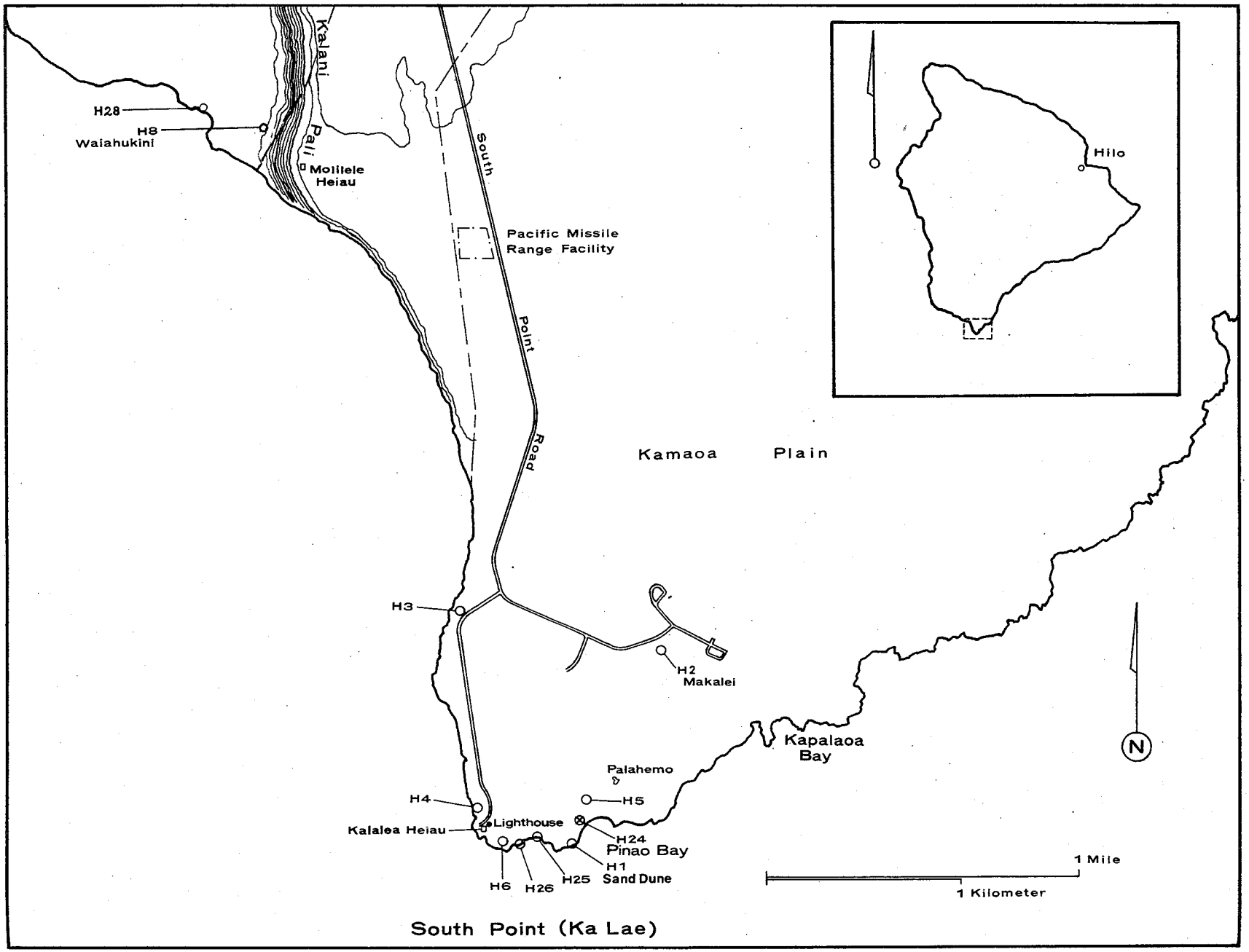

Figure 1. Map showing location of sites in the South Point area, Ka'u, Hawaii.

INTRODUCTION

The three habitation sites (Fig. 1) in the South Point (Ka Lae) area on the island of Hawaii, H1, H2, and H8, together, provide the longest cultural sequence observed to date in the Hawaiian Islands.

The sequence for the cultural assemblages from the earliest to the latest is fairly clear. In the attempt to arrive at absolute dating, seventy radiocarbon dates were obtained from these sites, fifty-nine of them through the cooperation of Dr. Roy M. Chatters, director of the Radioisotopes and Radiation Laboratory at Washington State University. The dates were financed in part by this laboratory and in part by grants from the National Science Foundation, the Wenner-Gren Foundation for Anthropological Research, and the Bernice P. Bishop Museum. The results are set forth in Tables 1-5.

RELATIVE CHRONOLOGY

In comparing the artifacts from these three excavated sites in the South Point area, it became clear that at site H8, Waiahukini shelter cave, the artifacts from the bottom layer (Layer II) match very closely similar kinds of artifacts from the Sand Dune site, H1. In Layer I-2, immediately above Layer II, there appear changes in the features of certain artifacts. The artifacts exhibiting these changes predominate in the uppermost layer of the site (Layer I-1) and in the cultural deposit at the Makalei shelter, H2. They are absent at Sand Dune site H1.

The changes referred to above are most readily observed in the features of the heads and bases of the fishhooks (Fig. 2*a* and *b*; for description, see Emory, Bonk and Sinoto 1968:34-43, 58-62) and in the kinds of ornaments present (Sinoto, ms.). At Sand Dune site, H1, and in the lowest layer (Layer II) at Waiahukini shelter, H8, the heads and bases of hooks are notched; whereas, in the upper levels of H8, as the surface is neared, more and more hooks are found with knobs, and in Makalei shelter, H2, almost all fishhooks are knobbed. From this evidence we assume that Sand Dune site was abandoned before the adoption of the knobbed fishhook.* Thus, Waiahukini shelter, H8, bridges the gap in the South Point area between the abandonment of the Sand Dune site and the occupation of Makalei shelter, H2.

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* Here it should be noted that, upon close examination, the several knobbed hooks, which were recorded for H1 (Emory, Bonk, and Sinoto 1968:26-27), were not typical examples.

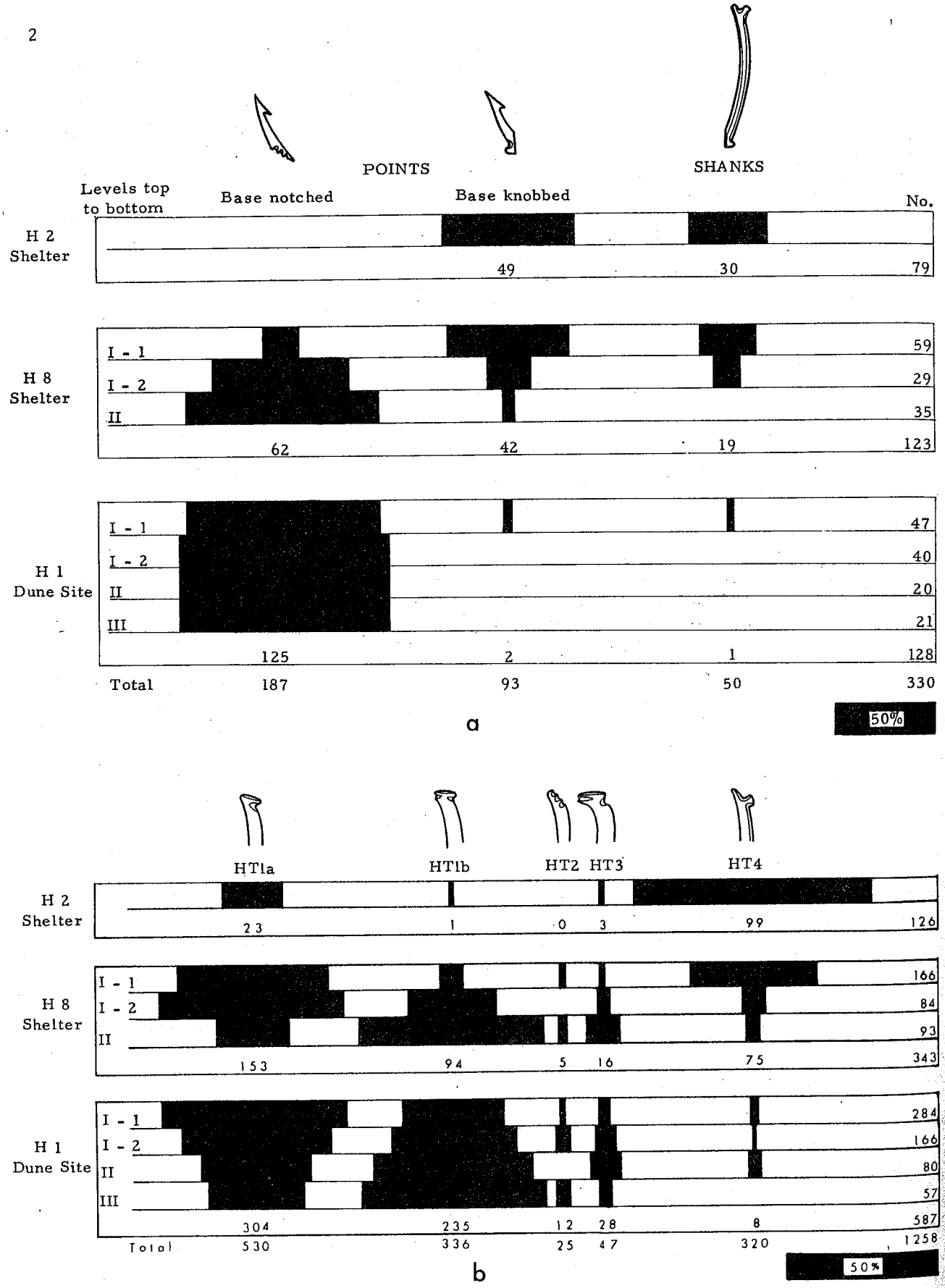

Figure 2. Stratigraphic distribution of Hawaiian fishhooks from sites H1, H2, and H8. *a*. Notched and knobbed, small, two-piece points and shanks; *b*. head types of one-piece hooks.

The full range of fishing gear present at the Sand Dune site, the quantity of fishhooks in various stages of manufacture, and the numerous tools for making them support the assumption that it was the location of an important fishermen's establishment. During its use there occurred no appreciable cultural change which was detectable in the artifacts. This would indicate that its occupation extended over one period, or a single cultural horizon. However, the numerous post molds and the great number of fishhooks (1,710) and files for making them (11,714) suggest an occupation of long duration. After the abandonment of this site as a fishermen's workshop, the sand dune which formed over it was used as a burial ground. All of the more than 90 burials (see Underwood, 1969, this vol.) recovered from the sand dune were located above the cultural deposit, or were clearly intrusive. No artifacts of European form or material were found in the main occupation layer or buried with the skeletons. We conclude, therefore, that both the occupation of the site and the use of the dune as a burial ground occurred before European contact with the inhabitants.

ABSOLUTE DATING

Both the Waiahukini (H8) and Makalei (H2) shelters were used for a short period after European contact. The evidence for this is to be found in the presence of only 3 metal fishhooks out of a total of 56 hooks in H2, and only 4 out of 39 in the uppermost Layer (Layer I-1) of H8 (Emory, Bonk and Sinoto 1968:24, Table 5). Therefore, we conclude that the occupation of these two sites ended not later than A.D. 1850, and probably soon after A.D. 1800.

As for the Sand Dune site (H1), it is certain from the forms of the artifacts, that it was abandoned as a living and working area in pre-historic times. How much time had elapsed before it was used as a burial ground, we have not been able to determine. Dating the skeletal material might give an answer. What is certain, as we have said, is that its use as a burial ground was mainly, if not entirely, before the coming of European influence.

While the artifact sequence is quite clear, the determination of absolute dating through radiocarbon dates of associated charcoal, shell, bone, fish scales, and sea-urchin spines has been beset with difficulties. Among the first dates obtained, all of which were from charcoal, some were inconsistent with others, or with our interpretation of sequences and estimated dates of the layers involved. Contamination of the samples of charcoal seemed certainly involved. To help us with this problem we invited Dr. Chatters to come to the area, review our methods of collecting and selecting samples, and observe the conditions at the sites. Realizing that this involved the whole question of the reliability and value of radiocarbon dates from similar sites, not only in Hawaii but elsewhere in Polynesia, Chatters accompanied us to the sites in January 1966. To further the investigation, Chatters obtained a grant from the Wenner-Gren Foundation, which enabled his geochronologist, Dr. Roald Fryxell to visit the South Point area in August 1967. Dr. Lars Engstrand, Director of the Radiocarbon Laboratory at Stockholm and temporarily with Washington State University at the time, accompanied Fryxell.

The fifty-nine radiocarbon dates obtained by Washington State University Laboratory were not only on samples of charcoal from sites H1 and H8, but also on *Cypraea* shells, pencil sea-urchin spines (*Heterocentrotus mammillatus*), fish scales, and fish bones. In addition, they obtained dates on samples of driftwood, on vegetation in the vicinity of volcanic activity, and on modern sea-urchin spines.

As a result of all this effort we can now evaluate much more meaningfully the radiocarbon dates in the South Point area, and hopefully our experience may have some significance for evaluating dates which may be obtained on similar materials at other sand dune dune and shelter sites where conditions are comparable.

Significant for us are the dates on three separate pieces of driftwood from South Point:

Sample	Date in Years A.D.	WSU Station Number
Douglas Fir	1480 ± 160	WSU 424
Western Red Cedar	750 ± 325	428
Local wood	+ 125 ± 27 (Future)	427

Logs have drifted ashore in the Hawaiian Islands for many years (Strong, 1962; Strong and Skolmen, 1963). From the driftwood radiocarbon dates above we learn that charcoal created by burning the inner part of a large fir or cedar drift log could be centuries older than any associated artifacts. Also, if wood contains bomb fallout carbon, it will date "modern" or "future."

Dr. Chatters, in discussing the matter of disagreement between stratigraphic sequences and carbon-14 dates with his best qualified geohydrologist was told that,

> ...stratigraphic analyses might be perfectly correct and the carbon-14 analyses equally correct, but the true dates must take cognizance of the lateral movement of surface and ground waters. These waters...can transport bicarbonate carbon-14 laterally which can and does exchange with carbon-14 in samples (particularly shell and bone) to produce carbon-14 analyses which do not represent the original carbon-14 content of the sample-source organism when alive. We frequently find discrepencies in samples which have been repeatedly wetted or are collected from sites which are continually saturated with water (Chatters, ltr.)

The purpose of selecting materials other than charcoal for dating was to test their suitability for determining true dates. It was found that fish scales, fish bones, and sea-urchin spines produced erratic dates, as will be seen by examining the readings of those samples taken from site H8, square E8 (Table 1). Dr. Engstrand explained in a report to Chatters,

> There is probably an exchange of the carbonate from the sea water which causes the scattered dates. Such samples of sea urchin material when processed for C^{14} analysis by treatment with acid or combusted, makes it impossible to avoid obtaining a "wrong" age date. Consequently, there will be an anomalous date. The ability of the sea urchin to selectively metabolize C^{12}, C^{13} or C^{14} is also possible source of anomalous ages in sea urchins. Weber at Pennsylvania states that "sea urchin material is unsuited to carbon-14 dating" (Engstrand, ms. p. 2).

Dr. Engstrand thought that with shells there would exist the same problem as with sea-urchin carbonate unless the shells were thick and only the inner layers were used for analysis. However, most of the *Cypraea* shell samples that were run from site H8 give dates remarkably similar to those from charcoal taken in the same levels and so hold promise of being a suitable substitute (Table 2).

Table 1. Radiocarbon dates from Waiahukini Shelter Cave, Site H8, Square E8. Determined by Washington State University

Depth in Inches	Layer	Dates in Years A.D.	WSU Station Number	Bishop Mus. Sample No.
		charcoal		
0-3	I-1	1615 ± 210	481	HRC 130
3-6	I-1 and I-2	1255 ± 160*	485	136
9-12	I-2	Modern**	480	129-III
12-15	II	1265 ± 300	479	128-II
15-18	II	985 ± 310	486	137
18-19.5	II	755 ± 210	487	138
19.5-21	II	850 ± 140	488	139
21-22.5	II	765 ± 320	489	140
22.5-24	II	same sample 1540 ± 200*	478	126-I
		same sample 1560 ± 90*	(GaK-1969)†	126
		Cypraea shell		
9-12	I-2	985 ± 220	549	HEX 85
12-15	II	1130 ± 180	548	79
15-18	II	905 ± 150	551	92
18-19.5	II	755 ± 160	544	95
19.5-21	II	915 ± 310	513	98
21-22.5	II	1255 ± 300	514	101
22.5-24	II	465 ± 160	558	82
		sea-urchin spines		
9-12	I-2	755 ± 160	545	HEX 86
12-15	II	425 ± 140*	542	80
15-18	II	830 ± 200	559	93
22.5-24	II	45 ± 170*	541	83
		fish scales		
3-6	I-1 and I-2	1120 ± 155*	543	HEX 91
9-12	I-2	Modern***	423	87
		fish bones		
18-19.5	II	830 ± 315	518	HEX 97
19.5-21	II	Modern<250*	520	100

* Anomalous dates

** Sample seems to contain bomb fallout carbon (Δ = + 119% ± 37%).

*** Sample seems to contain bomb fallout carbon (Δ = + 107% ± 27%).

† Gakushuin University laboratory station number.

Table 2. A Comparison of Radiocarbon Dates on Charcoal and *Cypraea* Shell from Waiahukini Shelter, Site H8, Square E8. Determined by Washington State University

Depth Inches	Layer	Dates in Years A.D.				
		Charcoal	WSU Station Number	*Cypraea* shell	WSU Station Number	Estimated calendar dates A.D.
0-3	I-1	1615 ± 210	481			1800
3-6	I-1 and I-2	1255 ± 160	485			1700
9-12	I-2	Modern*	480	985 ± 220	549	
12-15	II	1265 ± 300	479	1130 ± 180	548	1250
15-18	II	985 ± 310	486	905 ± 150	551	950
18-19.5	II	755 ± 210	487	755 ± 160	544	
19.5-21	II	850 ± 140	488	915 ± 310	513	
21-22.5	II	765 ± 320	489	1255 ± 300	514	
22.5-24	II	1540 ± 200**	478	465 ± 160	558	750
		1560 ± 90**	(GaK-1969)***			

* Sample seems to contain bomb fallout carbon (Δ = + 119% ± 37%).

** Anomalous dates

*** Gakushuin University laboratory station number.

DATES FROM MAKALEI SHELTER, SITE H2

Unfortunately we have only four dates from Makalei cave shelter, H2 (Table 3). As with the artifacts, these indicate a relatively late occupation extending into the historic period. It is most likely that this cave was used for sheltering large numbers of men passing through the area at the time Kamehameha's forces were contending with those of the chiefs of East Hawaii (Kamakau, 1961:53; Ellis, 1825:111-112; Kelly, 1969:23-24, this vol.).

Table 3. Radiocarbon Dates on Charcoal from Makalei Shelter, Site H2, Ka'u, Hawaii

Square	Depth in Inches	Dates in Years A.D.	Station No.	Bishop Mus. Sample No.
S9	33-38	recent	GrN-2061	HRC 16
S9	48	1750 ± 200*	M-478	17
N11	24	1580 ± 70	GaK-1347	63
N11	36	Modern<210	GaK-1348	65

The carbon sample (M-478) from 48 inches down in square S9, gave the very recent date of A.D. 1750 ± 200. The allowance of one standard deviation provides an earlier possible date of A.D. 1550, which would be acceptable and not inconsistant with the artifact content. The date of A.D. 1580 ± 70 on a sample (GaK-1347) which was taken at a depth of 24 inches in square N11, would also be acceptable. However, the sample (GaK-1348) from 12 inches deeper in the same square gave a future date which we interpret to reflect contamination. Also, a sample (GrN-2061) from a hearth in square S9 between 33 and 38 inches depth provided an age given simply as "recent." These anomalous dates could be the result of the lateral movement of water during floods, particularly at depths near the solid lava floor of the shelter. Taken together, the dates will only allow us to estimate that the intensive occupation at this shelter probably began somewhat before A.D. 1600, and on the basis of associated European artifacts in the uppermost level, ended before A.D. 1850.

DATES FROM WAIAHUKINI SHELTER, SITE H8

We thought we had obtained an estimated date for the pavement in H8 (Fig. 3), which marks the change in the cultural assemblage, by having the Michigan laboratory run a sample of charcoal from just under the pavement in square F5. This sample (M-863b) dated A.D. 1220 ± 200 years (Table 4; see also Emory, Bonk, and Sinoto 1968:viii). However, when we sent more charcoal from the same hearth to Groningen laboratory, they reported that it could not possibly be any earlier than A.D. 1600 ± 60 years (GrN-2901). We then sent the remaining charcoal from that hearth to Michigan, and they returned a date of A.D. 1350 ± 200 years (M-1245), a reading compatible with their first.

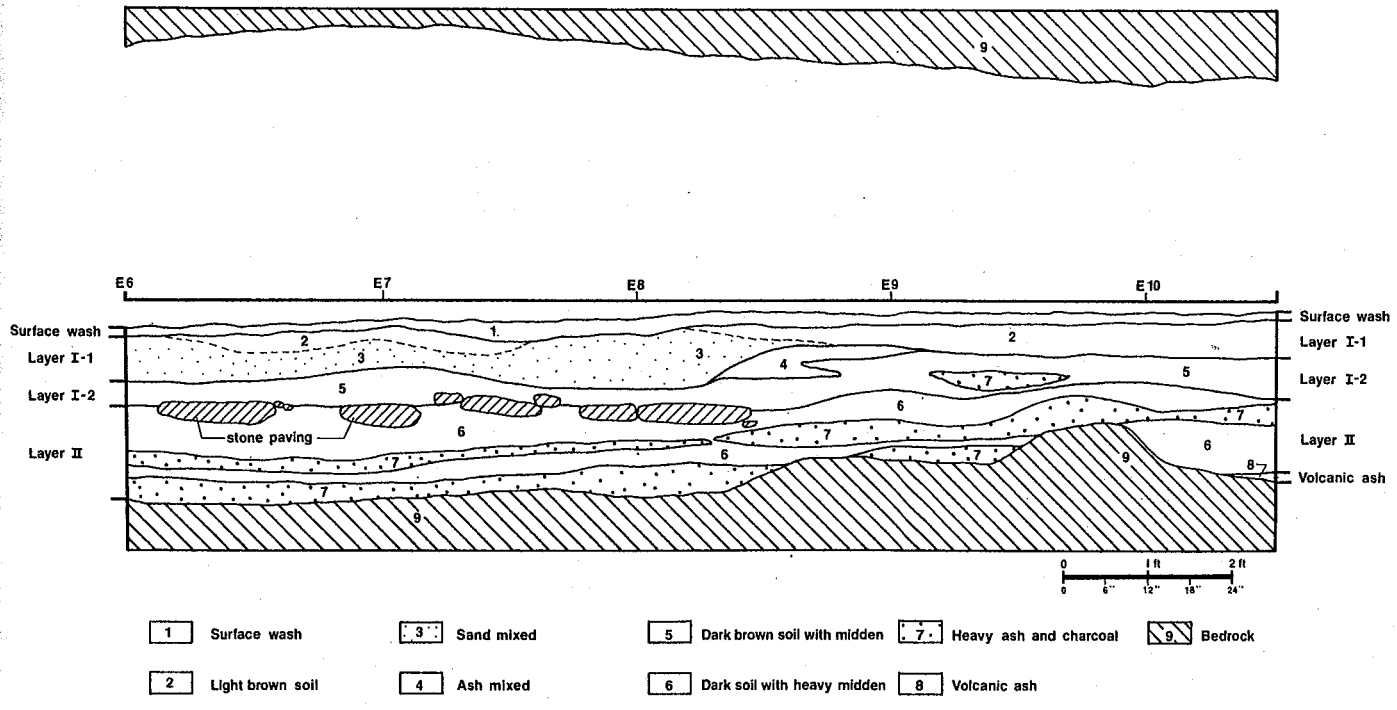

Figure 3. Waiahukini lava-tube shelter, H8, Ka'u, Hawaii: Cross-section diagram on the E line, looking west.

Table 4. Radiocarbon Dates on Charcoal and Sea-urchin Spines from Waiahukini Shelter, Site H8

Square No.	Depth in Inches	Layer	Dates in Years A.D.	Station No.*	Bishop Mus. Sample No.
			charcoal		
H8 - H8	5-6	I-1	Modern**	WSU-477	HRC 73
H8	12	I-2	Modern***	WSU-476	72
H7,H8	12	I-2	1723 ± 46	P-1118A	72
H7,H8	12	I-2	1877 ± 45†	P-1118	72
D10,E10	13-14	I-2	1750 ± 42	P-1119	45
F5	17-21	II	1220 ± 200	M-863b	19
F5	17-21	II	1350 ± 200	M-1245	19
F5	17-21	II	1600 ± 60†	GrN-2901	19
D10,D11	25-27	II	950 ± 200	M-666	18
E10	25-27	II	1130 ± 65	GrN-4652	70
G7	34	II	1600 ± 40†	GrN-2149	20
			sea-urchin spines		
H8 - G7	3-6	I-1	955 ± 315†	WSU-578	HEX 73
E10	9-12	I-2	385 ± 295†	WSU-568	69
E10	12-15	I-2 and II	1220 ± 230	WSU-571	70
G7	18-24	II	1015 ± 160	WSU-577	77
D10	21-24	II	B.C.30 ± 90†	WSU-396	56

* Station equivalents: GrN = Groningen Laboratory, Groningen, Netherlands
M = University of Michigan, Ann Arbor, Michigan
P = University of Pennsylvania, Philadelphia, Pennsylvania
WSU = Washington State University, Pullman, Washington.

** Sample seems to contain bomb fallout carbon (Δ = + 462 ± 50).

*** Sample seems to contain bomb fallout carbon (Δ = + 52 ± 26).

† Anomalous dates.

We also thought we had obtained an estimate of the age of the base of the deposit in the shelter by submitting charcoal from the border between squares D10 and D11 to the Michigan laboratory. They dated the sample as A.D. 950 ± 200 years (M-666). However, when we sent charcoal from the very bottom of square G7 to the Groningen laboratory, they reported its age as only A.D. 1600 ± 40 years (GrN-2149). Most probably this latter date and the charcoal taken from the bottom of square E8 (WSU 478, GaK-1969) were contaminated through lateral seepage of water on the floor of the lava-tube shelter. Other runs on samples of charcoal from other parts of the floor (see Tables 2 and 4) also give a number of ages that are too young to be credible, and lead us, therefore, to suspect contamination. During excavation we had noticed that after theavy rains, water seeped through the lava-tube ceiling and dripped heavily on parts of the floor. Fortunately, in the determination of radiocarbon age of ten successive samples of charcoal and seven on *Cypraea* shell in Square E8 (see Table 2), we observe a succession of ages not too much out of line with the relative depths of the deposit, considering the irregularity of the observed strata (see Fig.3). The only exceptions were (1) a future date on charcoal taken from the 9-12 inch level (Layer I-2), which was not reflected in the age given for shell from the same level, and (2) the age of the charcoal from the very bottom, which was too young (A.D. 1540 ± 200, WSU-478; see Tables 1 and 2) and was probably the result of contamination through lateral

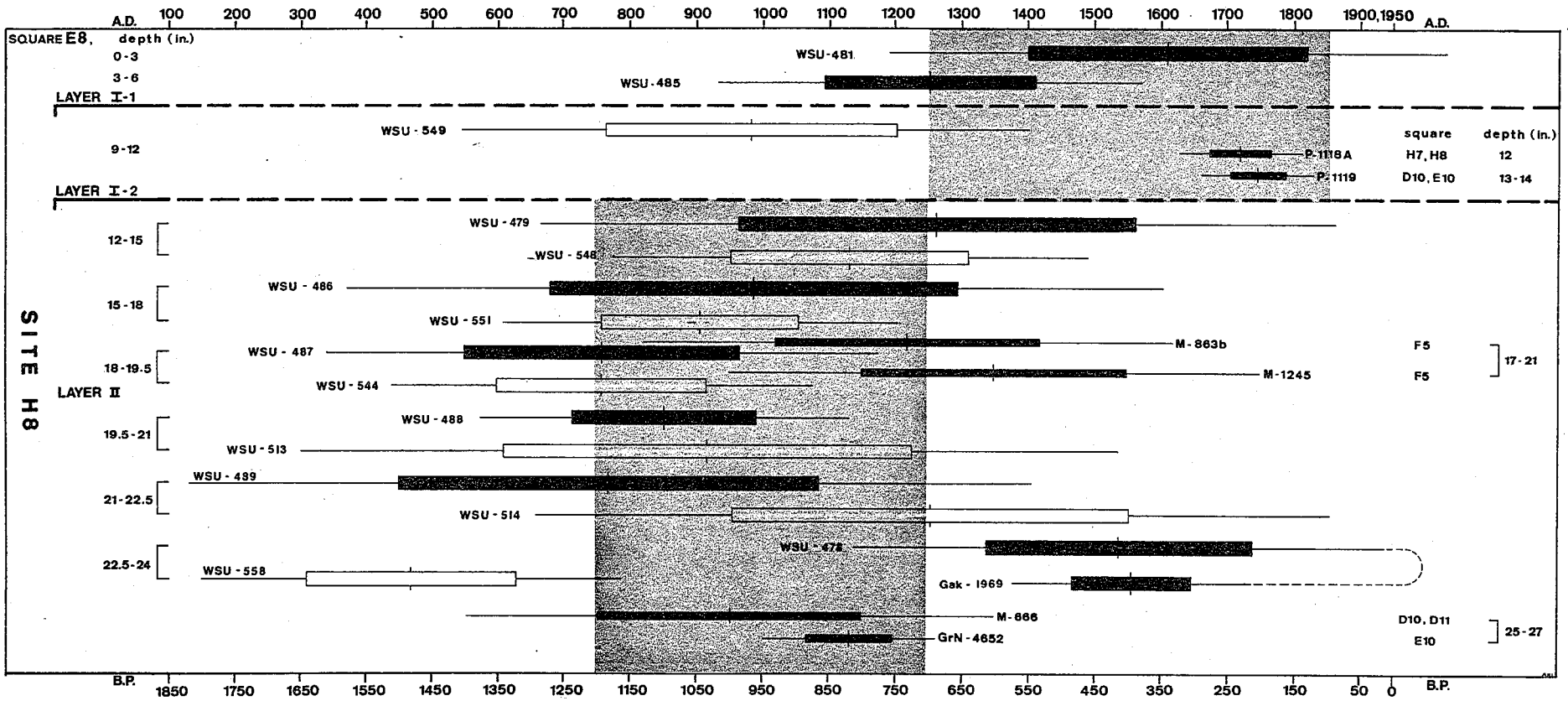

Figure 4. Radiocarbon dates for Waiahukini shelter, site H8. The heavy, dark bar represents the time span of the first standard diviation; the thin line, the second. The shaded area represents an estimation of the duration of occupation of the site.

seepage of water.* However, that this young age was not reflected in the shell date for the same depth would indicate that *Cypraea* shell may be more resistant to contamination than charcoal.

Figure 4 plots the radiocarbon age determination from square E8 in site H8. For each date the age range at one and two standard deviations is indicated, and only the anomalous date of sample WSU 480 is omitted. On the bases of the series from square E8 (see Table 1) it would seem we are justified in concluding that our original estimate of A.D. 950 (Emory, Bonk, and Sinoto, 1968:41, Fig. 23) for the beginning of the deposit was not early enough and that an estimate of A.D. 750 for the beginning of the deposit in H8 is not inconsistent with the first obtained radiocarbon date of A.D. 950 ± 200 (M-666). Our original estimate of A.D. 1230 for the pavement level (1968:41, Fig. 23) seems fairly well supported by the radiocarbon dates we now have from that level in square E8 (Table 1) and adjacent squares (Table 4). On the basis of these data we are fixing this critical level at about A.D. 1250, rejecting as anomalous only the date of A.D. 1600 ± 40 years (GrN 2901).

With the beginning of the occupational sequence in H8 estimated about A.D. 750, the level of the pavement at about A.D. 1250, and the end of occupation at not later than A.D. 1850, approximately half the depth of the cultural deposit would have been built up during a period of five hundred years and the other half during a period of similar duration. This seems a reasonable interpretation of these deposits.

DATES FROM SAND DUNE SITE, H1

The cultural deposit at Sand Dune site provided a sealed occupational assemblage which was of a demonstrably early period on the basis of archaelogical evidence alone. What we needed to determine was the approximate date of the beginning and end of this cultural deposit (Fig. 5).

The first date from site H1, was obtained by the Michigan laboratory from charcoal at the bottom (Layer III) of squares L5, K5, J5, and was reported to be A.D. 1750 ± 200 (M-479) (Table 5; Fig. 6). The second date, from the bottom of square L11, was "less than 250 years" (M-538) (Emory, Bonk, and Sinoto, 1968:viii). There seemed no question, even at that stage, that these dates were too recent. A third sample sent to Michigan (from the base of square J11) was treated with extra care to thoroughly remove any possible effect of humic acid from rootlets. It yielded a date of A.D. 1370 ± 150 (M-863a). While this was much more in accord with expectations, it still seemed too young.

At the other extreme, charcoal from a hearth under the heavy deposit was sent to the Groningen laboratory and yielded a date of A.D. 124 ± 60 (GrN-2225; Emory, Bonk, and Sinoto, 1968:viii). This date was later revised to A.D. 290 ± 60 (Vogel and Waterbolk, 1964:359). We must now regard this sample as possibly coming from a drifted log older than the hearth, or wood from a tree which had grown up near a volcanic fumarole,** or perhaps from a castaway's fire, and in any case not dating the cultural stratum above it.

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* Some of this sample was sent to Gakushuin University and it gave almost exactly the same result, i.e., A.D. 1560 ± 90 (GaK-1969).

** Dr. Roy M. Chatters reports that in his research on the island of Hawaii and in the New Hebrides he has discovered that plants growing in the immediate vicinity of volcanic fumaroles or steam vents may exhibit depressed radiocarbon levels as a result of the incorporation of the more ancient carbon of magmatic origin into the plant bodies during photosynthesis (Chatters, Crosby, and Engstrand, 1969). This might explain certain anomalously low dates on samples from archaeological sites at South Point on Hawaii.

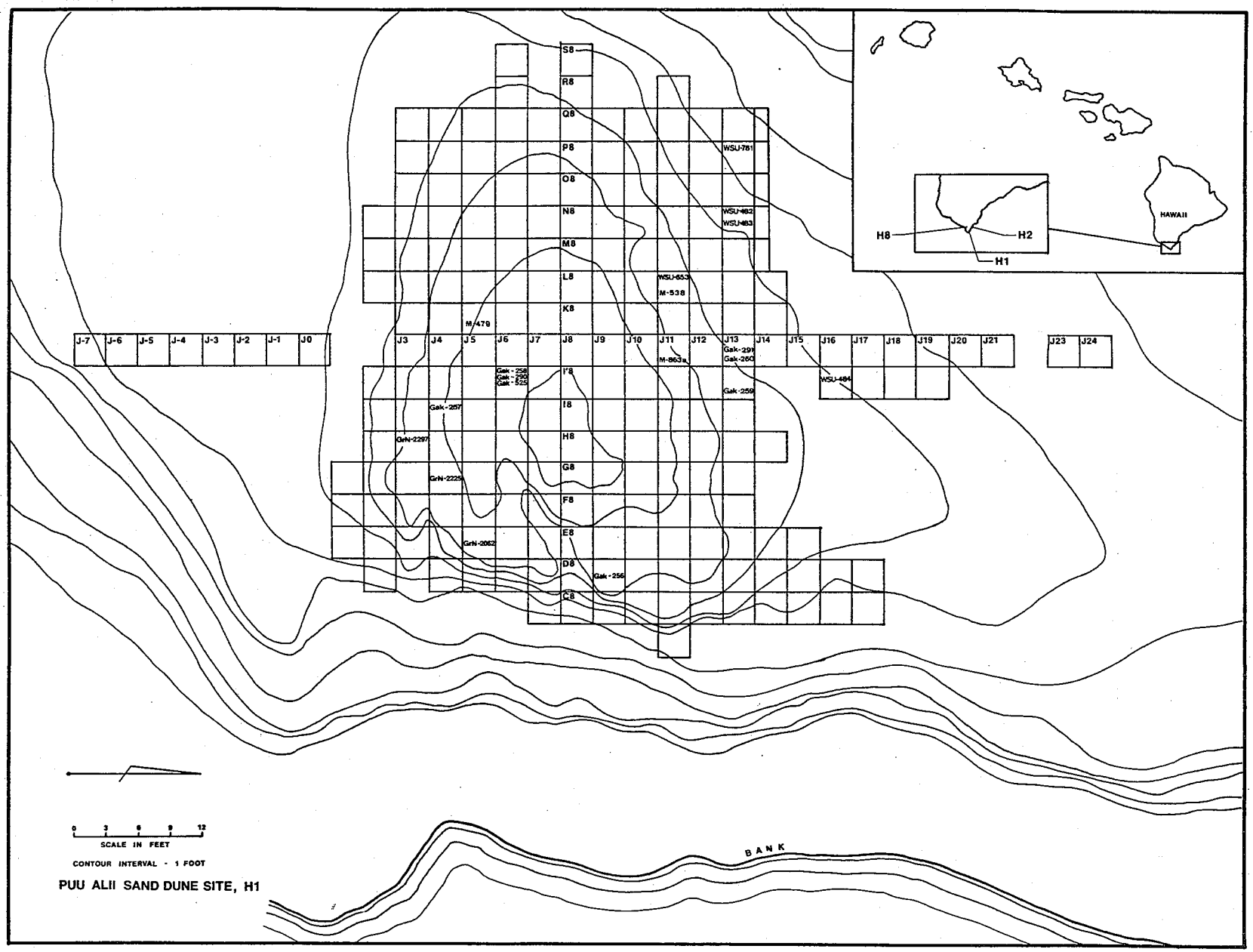

Figure 5. Sand Dune site H1, South Point (Ka Lae), Ka'u, Hawaii: site excavation grid showing positions from which charcoal and shell samples were collected and their dating-laboratory station numbers.

Table 5. Radiocarbon Dates on Charcoal, *Cypraea* Shell, and Sea-urchin Spines from Sand Dune Site H1

Square No.	Layer	Date in A. D.	Station No.*	Bishop Mus. Sample No.
		charcoal		
H1-D9	II	1375 ± 135	GaK-256	HRC-8
E5	II	1490 ± 40	GrN-2062	-9
I4	II	1270 ± 360	GaK-257	-12
I'6	II	B.C.300 ± 250	GaK-258	-13
	II	Modern<320	GaK-290	-14
	II	1480 ± 90	GaK-535	-15
I'16	II	925 ± 180	WSU-484	-134 IV
P13	II	1050 ± 230	WSU-883	-135
	II	600 ± 350	WSU-761	-135
N13	II (top)	1580 ± 340	WSU-482	-131
N13	II (bottom)	1455 ± 300	WSU-483	-132
G4	III	290 ± 60	GrN-2225	-10
H3	III	1460 ± 60	GrN-2297**	-11
I'13	III	1240 ± 170	GaK-259	-1
J11	III	1370 ± 150	M-863a	-2
J13	III	Modern<400	GaK-260	-3
	III	1470 ± 110	GaK-291	-4
L5,K5,J5	III	1750 ± 200	M-479	-5
L11	III	Modern<250	M-538***	-6
	III	1340 ± 80	GaK-153	-7
		Cypraea shell		
I'16	II (top)	490 ± 230	WSU-557	HEX-88
		sea-urchin spines		
	Level in Inches			
D8	0-5	710 ± 150	WSU-589	HEX-4
D8	0-6	720 ± 190	WSU-591	-5
J12	6-12	500 ± 160	WSU-602	-42
H3	6-12	1085 ± 190	WSU-607	-34
J12	6-12	1410 ± 160	WSU-612	-43
I'16	II (top)	1325 ± 170	WSU-547	-89

* Station equivalents: GaK = Gakushuin University, Mejiro, Tokyo, Japan
GrN = Groningen Laboratory, Groningen, Netherlands
M = University of Michigan, Ann Arbor, Michigan
WSU = Washington State University, Pullman, Washington.

** Incorrectly published as station number GrN-2237 (Vogel and Waterbolk, 1964:360).

*** Incorrectly published as <200 (See Emory, Bonk, and Sinoto, 1968:viii, footnote 2).

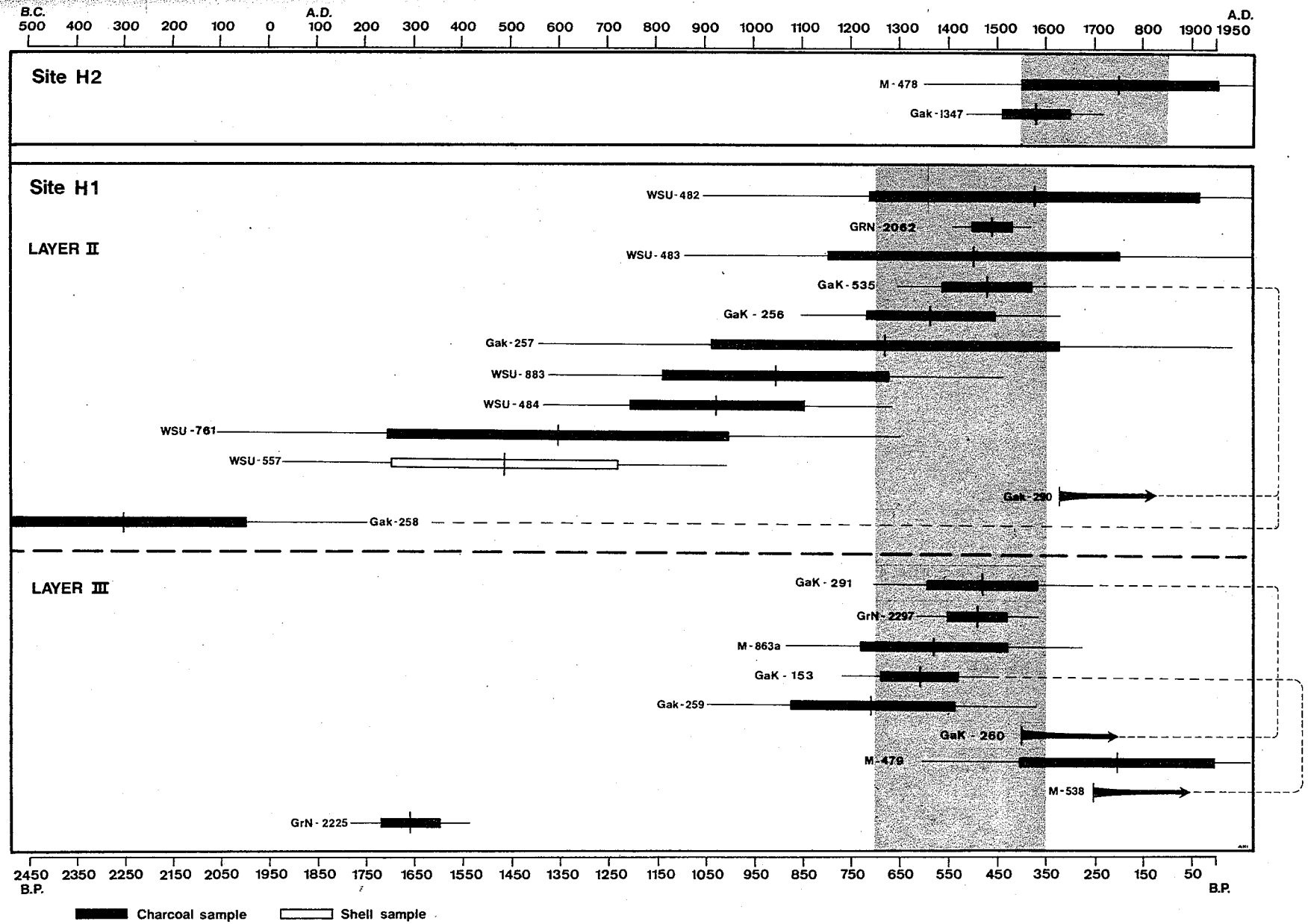

Figure 6. Radiocarbon dates for Sand Dune, site H1, and Makalei shelter, site H2. The heavy, dark bar represents the time span of the first standard diviation; the thin line, the second. The shaded area represents an estimation of the duration of occupation.

A Gakushuin laboratory date for charcoal from the pavement level located midway in the cultural deposit (Layer II) in square I'6, at first seemed to lend support to the very early Groningen date by giving a result which in calendar years would be B.C. 300 ± 250 (GaK-258). However, a second test on more of the same sample by the same laboratory gave a modern date of less than 320 years (GaK-290). Still, a third run on more of this same charcoal sample yielded what seemed a reasonable date of A.D. 1480 ± 90 (GaK-535)! Gakushuin laboratory dated the first charcoal sample submitted from the bottom of J13 (Layer III), modern <400 (Gak-260), but a second sample, seemingly uncontaminated, gave a date of A.D. 1470 ± 110 (GaK-291).

More of the same sample from square L11, which Michigan had dated as "less than 250 years old," was sent to Gakushuin and dated at A.D. 1340 ± 80 (GaK-153). These earlier dates still seemed not early enough to truly date the deposit, but nine additional dates obtained later also varied around them.* Only one of these dates is definitely from the top of the Layer II (WSU-482). We have no dates from the very thin cultural Layer I which occurs above Layer II.

From Fig. 6 it is apparent that there is only a limited use for age estimates that have a standard deviation of more than 250 years, when placed in the context of the other dates. They simply form part of a supporting statistical population, without lending any great precision to the matter of dating. For this reason we have concentrated on the other dates.

The majority of the charcoal dates which we feel are less affected by contamination indicate that the occupation of H1 began about A.D. 1250. The deposit of midden material is about a foot thick and covers a floor approximately forty feet square in which post-molds of houses and fences abound (see Fig. 5). As befits an extended period of continuous occupation, the quantity of files and fishhooks runs into the thousands. Were it granted that the occupation began about A.D. 1250, we would have to allow its continuation to at least A.D. 1350 or A.D. 1450. At the very latest it would have had to have been abandoned by A.D. 1600 to allow for the accumulation of sand which contained pre-European burials, and to allow sufficient time for the development and production of knobbed fishhooks at H8 after the abandonment of H1. However, an acceptance of A.D. 1250 to A.D. 1600 as the span of occupation of H1 would conflict with the results of stratigraphic analysis and with radiocarbon dating at H8, where is is very clear that the period preceeding the introduction of knobbed fishhooks, which are absent from H1, ended at H8 about A.D. 1250. Were we to cross date site H1 from site H8 on the basis of artifact forms, we would show the occupation of H1 as having ceased by A.D. 1250, or, allowing for some cultural lag and imprecision, by at least A.D. 1350. We believe therefore that many of the radiocarbon dates from H1 reflect age estimates that are definitely more recent than the actual age of the site. The best explanation would seem to be the contamination of the charcoal in an open sand dune which is subject to sea spray and waves at high tide and to storm surf during inclement weather.

It is possible that the exclusive use of notched hooks in the early layers at H8 continued a century or so after the laying down of the pavement, an event provisionally fixed at about A.D. 1250. The reason is that only a few knobbed hooks were found immediately above the pavement and they may have filtered down from above. Only one knobbed hook was found at the pavement level in square E8, whereas 29 notched hooks were at or below the pavement level. In such event an estimated date of A.D. 1350 for the end of H1 occupation might be closer to the true date than the estimate of A.D. 1250, which we originally obtained through cross dating from H8.

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* All the dates obtained from site H1 are given in Table 5 and Fig. 6.

DATES FROM OTHER PARTS OF SOUTH HAWAII

Edmund Ladd, archaelogist at the City of Refuge National Park, obtained a radiocarbon date of A.D. 1325 ± 80 (GX-0139) on charcoal at 20 to 22 cm. depth, from the bottom of a small fishermen's shelter (Ladd, 1969, site HV228). This site, located within the Hawaii Volcanoes National Park, contained fishhook forms of the historic period. At a shallower depth, 8-13 cm., he obtained a date of A.D. 1760 ± 100 (GX-0137). Site H65, a fishermen's lava tube shelter excavated in 1965 (Soehren, ms.) at Kahakahakea, Ka'u, produced a date of A.D. 1355 ± 80 (GaK-755, HRC 53), on charcoal from near the bottom of its cultural deposit at 45 cm. depth. The cultural deposit in H65 contained fishhooks similar to those from Sand Dune site as well as hooks of the historic period. A charcoal sample from a depth of 30 cm. at this same shelter gave a radiocarbon date of A.D. 420 ± 100 (GaK-1345, HRC 52). This last date is far too old to be credible as a date for this level. It may date the inner part of a large log which had drifted from the northwest coast of America, or a piece of local wood grown near a fumarole, or it may be one of those anomalous dates which we have occasionally encountered and cannot at the present time explain.

CONCLUSIONS

Individual radiocarbon dates at best span a period of 200 years. There are two chances out of three that the true date lies somewhere between these bounds; there are nineteen chances in twenty that the date lies somewhere within a span of 400 years (see Polach and Golson, 1966:16). Nevertheless, when a number of dates are taken together, as is the case with the South Point dates, the range is somewhat narrowed. Even so, it is possible to do little more than to demonstrate that the fishermen at Sand Dune site, H1, had abandoned that site before the fishermen in the vicinity began to adopt different fishhook features which are found in nearby sites. On the basis of radiocarbon dates it can then be suggested that this event took place sometime before A.D. 1600, at the very latest, and probably before A.D. 1350, for the reasons suggested above.

It is natural to expect that the Waiahukini shelter should have been occupied earlier than the Sand Dune site, as the shelter is adjacent to the very best canoe landing in the vicinity and offers immediate protection. The radiocarbon dates from this shelter, on the whole, provide acceptable age estimates which are earlier than those from Sand Dune site, and allow us to say that perhaps A.D. 750 saw the beginning of the use of Waiahukini shelter. They also suggest that A.D. 1250 or A.D. 1350 saw the beginning of the changes to the new fishhook forms.

It is not possible to determine accurately the duration of the fishermen's establishment at H1 from the radiocarbon dates alone. They do, however, when viewed along with the cultural evidence, and when compared with radiocarbon dates from site H8, allow for a minimum estimate of 200 years and a maximum of 400 years for its occupation.

It seems that the best we can do in the present state of our knowledge is to think of the fishermen at South Point as having set up their establishment not earlier than A.D. 1,000, and having continued its occupation to about A.D. 1350. These dates are not out of line with those we are obtaining from the Marquesas Islands (Sinoto, 1968a:31) and from cultural horizons (Sinoto, 1967; 1968b) containing artifacts similar to or prototypic of those found at H1.

Why the abandonment of the site? We might guess that perhaps a shift in the prevailing winds (Wentworth, 1949; Powers and Wentworth, 1941) exposed this point of land to wind-whipped sands, and caused the inhabitants to abandon their site. Or, perhaps the introducers of the new hook modifications, which appear in the neighborhood site of Waiahukini, were enemies and drove the Sand Dune site inhabitants away. But there was no evidence of burned posts at Sand Dune site to indicate that war raids at the site were responsible for the end of its occupation. Abandonment of the site, however, appears to have marked the end of a significant early period in Hawaiian history.

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