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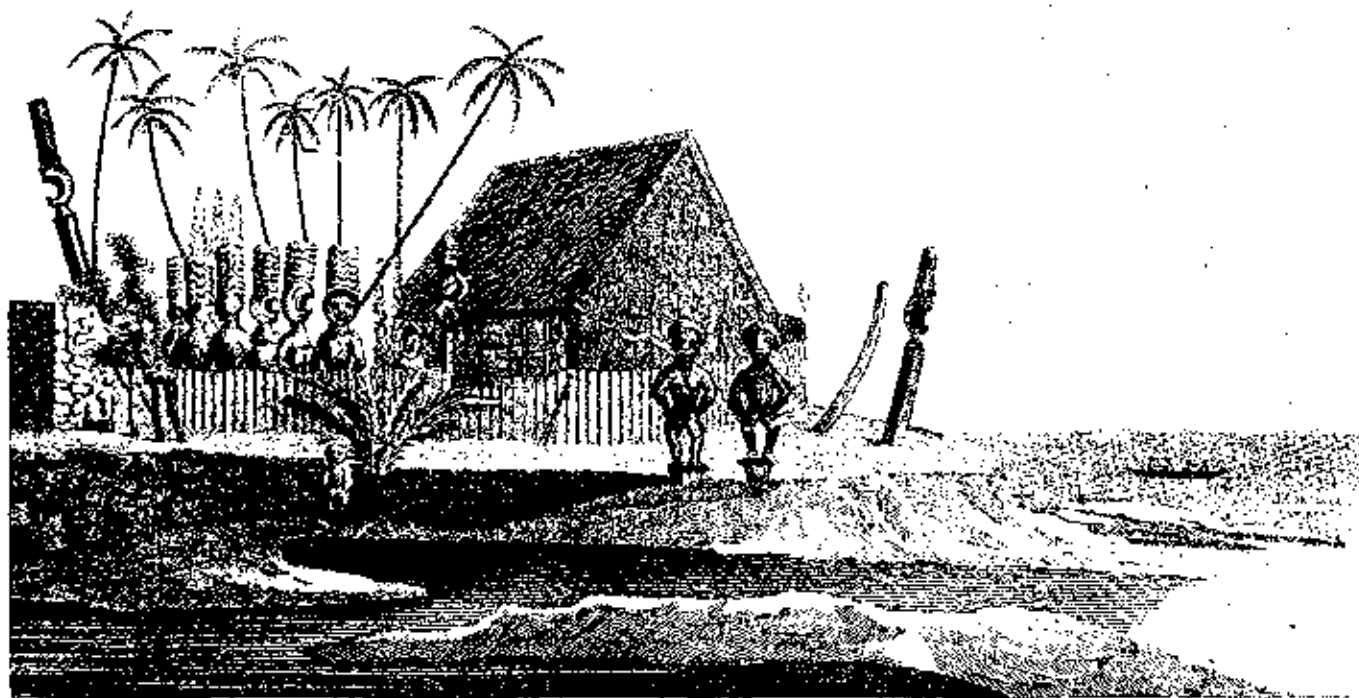


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The Natural and Cultural History of Hōnaunau, Kona, Hawai'i

Edwin H. Bryan, Jr.
Kenneth P. Emory



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DEPARTMENT OF ANTHROPOLOGY
BERNICE PAUAHI BISHOP MUSEUM
HONOLULU, HAWAII

ON MICROFILM

THE NATURAL AND CULTURAL HISTORY OF
HŌNAUNAU, KONA, HAWAI'I

Part I

The Natural History of Hōnaunau

Edwin H. Bryan, Jr.
Chester K. Wentworth
Amy Greenwell
Marie C. Neal
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Part II

The Cultural History of Hōnaunau

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Department of Anthropology
BERNICE PAUAI BISHOP MUSEUM
Honolulu, Hawai'i

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William Ellis in 1823. BPBM Neg. No. 3891.

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CONTENTS

	Page
INTRODUCTION TO THE 1986 VOLUME	
Yoshihiko H. Sinoto Chairman, Department of Anthropology, B. P. Bishop Museum . . .	viii
FOREWORD	
Alexander Spoehr Director, B. P. Bishop Museum*	x
Part I <u>THE NATURAL HISTORY OF HŌNAUNAU</u>	1
Report 1 ECOLOGY OF HŌNAUNAU Edwin H. Bryan, Jr. Curator of Collections, B. P. Bishop Museum*	3
Report 2 GEOLOGICAL NOTES ON HŌNAUNAU Chester K. Wentworth Geologist, Hawaiian Volcano Observatory, and B. P. Bishop Museum Collaborator*	17
Report 3 FLORA OF HŌNAUNAU Amy Greenwell B. P. Bishop Museum Collaborator* With contribution by Marie C. Neal Botanist, B. P. Bishop Museum*	23
Report 4 INSECTS OF HŌNAUNAU Amy Suehiro Entomologist, B. P. Bishop Museum*	31
Report 5 MAMMALS, BIRDS, AND REPTILES OF KONA Edwin H. Bryan, Jr. Curator of Collections, B. P. Bishop Museum*	63
Report 6 A SURVEY OF THE MARINE BIOTA OF THE HŌNAUNAU BAY REGION, HAWAI'I Alison Kay Assistant Professor of Zoology, University of Hawai'i, and B. P. Bishop Museum Uollaborator*	71
Part II <u>THE CULTURAL HISTORY OF HŌNAUNAU</u>	83
Report 7 INVESTIGATION OF ANCIENT HŌNAUNAU Kenneth P. Emory Anthropologist, B. P. Bishop Museum*	85
Report 8 HŌNAUNAU VILLAGE AND VICINITY UNDER HAWAIIAN CULTURE Kenneth P. Emory Anthropologist, B. P. Bishop Museum*	89
Report 9 HŌNAUNAU IN TRANSITION TO THE PRESENT Kenneth P. Emory Anthropologist, B. P. Bishop Museum*	111
Report 10 A RECONSTRUCTION OF THE HISTORY AND FUNCTION OF THE PU'UHONUA AND THE HALE O KEAWE AT HŌNAUNAU Dorothy B. Barrère Associate in Hawaiian Culture, B. P. Bishop Museum*	117
Report 11 THE CONCEPT OF ASYLUM Marion A. Kelly Bishop Museum Collaborator*	137

*1957 affiliation(s).

Report 12	ANNOTATED LIST OF <u>PU'UHONUA</u> IN THE HAWAIIAN ISLANDS Marion A. Kelly Bishop Museum Collaborator*	151
Report 13	ARCHAEOLOGICAL FEATURES OF THE <u>PU'UHONUA</u> AREA J. F. G. Stokes Former Curator of Collections, B. P. Bishop Museum, and B. P. Bishop Museum Collaborator*	183
Report 14	FEATURES PERTAINING TO THE EARLY HAWAIIAN LIFE IN THE <u>HONAUNAU BAY AREA</u> J. F. G. Stokes Former Curator of Collections, B. P. Bishop Museum, and B. P. Bishop Museum Collaborator*	211
Report 15	ARCHAEOLOGICAL FEATURES OF HINTERLAND AND <u>KEAMOALI'I OF HONAUNAU, AND OF KEOKEA AND KI'ILAE</u> Kenneth P. Emory Anthropologist, B. P. Bishop Museum*	225
GLOSSARY OF HAWAIIAN TERMS		251
APPENDIX. Copy of Chamberlain's Memorandum		255
BIBLIOGRAPHY		257

LIST OF TABLES

Table		Page
1.1	Vegetation Zones on the Kona Slope	14
3.1	Endemic and Indigenous Plants--Probable and Possible	24
3.2	Incomplete List of Endemic and Indigenous Plants Found--1957	25
3.3	List of Plants Suggested for Hōnaunau Area	26
4.1	Insects and Related Arthropods Reported to Occur Within the Hōnaunau Park Area	35
4.2	Species Reported or Collected from Kona or South Kona.	42
6.1	Check List of Invertebrates from Hōnaunau	79

*1957 affiliation(s).

LIST OF ILLUSTRATIONS

Figure		Page
1.1	The Project Area	4
1.2	Lava Flows that Formed the Kona Slopes	7
1.3	Soil Types in Hōnaunau <u>Ahupua'a</u> and Immediately Adjacent Areas	10
1.4	Vegetation Zones of West Central Hawai'i Island	15
6.1	Marine Habitats in the Hōnaunau Bay Region	72
7.1	Hōnaunau and Adjacent Areas	87
8.1	Hale o Keawe at Hōnaunau, by William Ellis, 1823	95
8.2	Sketch of Hale o Keawe, and Plan of Interior Arrangement, by Andrew Bloxam, 1825	95
8.3	Hale o Keawe, by Robert Dampier, 1825	96
8.4	Image from Left Side of Altar in Hale o Keawe	101
8.5	Image from Right Side of Altar in Hale o Keawe	101
8.6	Feather Image from Hale o Keawe, Pictured in <u>The Mirror</u>	102
8.7	Feather Image in American Museum of Natural History	102
8.8	Pieces from Hale o Keawe, Pictured in <u>The Mirror</u>	103
8.9	Bird-Headed Stick Image from Andrew Bloxam Collection	104
8.10	Image from Hale o Keawe Brought to England by Midshipman John Knowles	105
8.11	Two Stick Images from Hale o Keawe Brought to England by Midshipman John Knowles	106
8.12	Image in the Peabody Museum, Probably from Hale o Keawe	106
8.13	Caskets of Plaited Coconut-Fibre Braid	107
9.1	Sketch of Ruins at Hōnaunau (After Lyman 1846)	111
9.2	Sketch Map of Ruins at Hōnaunau, With Some Features Designated (After Hitchcock 1889)	113
13.1	Wall of <u>Pu'uhonua</u> at Hōnaunau	164
13.2	Wall of <u>Pu'uhonua</u> at Hōnaunau in 1919	164
13.3	Base Stone in a Continuation of the Great Wall	166
13.4	Exterior Face of West End of South Wall of <u>Pu'uhonua</u>	166
13.5	Interior Face of Great East Wall, Near the North End	167
13.6	Largest Stone in the Great <u>Pu'uhonua</u> Wall	168
13.7	Trench Along Exterior Face of Great East Wall, Near the North End	169
13.8	Schematic Cross Section of Great Wall of <u>Pu'uhonua</u>	170
13.9	Technique Used in Construction of the Great Wall at Hōnaunau	170
13.10	A Second Tier of <u>Pao</u>	172
13.11	Three Tiers of <u>Pao</u>	173
13.12	Plan of Ruins of Old <u>Heiau</u> Within the <u>Pu'uhonua</u>	175
13.13	Ruins of Old <u>Heiau</u> Platform Within the <u>Pu'uhonua</u>	178
13.14	Older <u>Heiau</u> Platform at Hōnaunau	178
13.15	Trench Revealing Outer Face Alignment of Base Stones of South Retaining Wall of Old <u>Heiau</u> Platform	180
13.16	'Ale'ale's <u>Heiau</u> Platform	182
13.17	Original Facing in the North Wall of 'Ale'ale'a <u>Heiau</u> Platform	182
13.18	Platform of Hale o Keawe	184

13.19	Stone Slab at Hale o Keawe	185
13.20	Trench Revealing South Face of Platform of Hale o Puni	
13.21	Ma'inui, Ka'apuni, and Lo'e	186
13.22	Petroglyph on 'Akahipapa Flat	188
13.23	Papamū on 'Akahipapa Flat	189
13.24	Wall Enclosing a Goat or Cattle Pen	191
13.25	Kooua Stone in Restored Position	192
13.26	Pōhaku o Ka'Ū	194
13.27	The Ka'ahumanu Stone, the Southeast Corner of 'Ale'ale'a Heiau Platform, and the Old Wall Connecting this Corner with the Great Wall	195
13.28	Interior of the Pu'uhonua in 1889	198
13.29	Interior of the Pu'uhonua in 1919	198
13.30	Pōhaku Nānā Lā	198
13.31	Pounding 'Auhuhu Shrubs	198
13.32	Narcotizing Fish in Kekuai'o Pool	199
13.33	Hammerstone Found Beside the Great Wall of the Pu'uhonua	200
13.34	Outline of a Typical Post or Image Hole	201
13.35	Post or Image Holes in the Lava at Hōnaunau	201
13.36	Warning Figure of Wood Overlaid with Tapa	202
13.37	Line of Cup Marks	203
13.38	South Wall of the Pu'uhonua	205
13.39	Southeast Corner of the Pu'uhonua Wall	206
13.40	Plan of South Wall of the Pu'uhonua at Hōnaunau	207
13.41	Burial Vault of Post-European Period	208
13.42	Ancient Burial	208
13.43	Cross Section of Low Mound	210
13.44	Profile of a Low Mound	210
14.1	Hōnaunau Bay Area (After Stokes 1919)	212
14.2	Salt Pans at Kahapa'akai	214
14.3	Canoe Mooring and Landing Place at Laeiki	216
14.4	Mortars at Laekole	217
14.5	Ruins of Short Hōlua Slide Back of Hōnaunau	220
14.6	View of Hōnaunau in 1889	222
14.7	Possible Idol Holes at Kaulalewalewa	223
15.1	Papamū on the Shore at Paeiki	227
15.2	Natural Rock Column at Heiau Oma'o	229
15.3	Plan of Dwelling Site of King Keawe, Paumoa, Kōōkea	231
15.4	Indentation on 'Īlio Point	232
15.5	Ancient House Platform at Paumoa	233
15.6	Mould of a Prone Tree Trunk	233
15.7	Natural Arch Called Ka-Wai-o-Pele	234
15.8	Hōlua Sled in B. P. Bishop Museum Collection	236
15.9	Long Hōlua Slide at Kōōkea	237
15.10	Alahaka Cliffs, Showing Lava Flow Festooning	238
15.11	Lava Flow Over Alahaka Cliffs	239
15.12	Ramp of Kamehameha Highway, and Entrance to Waiu-o- Hina Lava Tube	242
15.13	Plan of Alahaka Heiau	242
15.14	East Face of Alahaka Heiau	243
15.15	Break in the Floor of Alahaka Heiau, Showing Hollow Construction	244
15.16	Plan of Upper Part of 'Īlio Cave	248

LIST OF MAPS

Map					
1	Hōnaunau, Vicinity of <u>Pu'uhonua</u>	.	.	.	Map folder
2	Kēōkea, North Section	.	.	.	Map folder
3	Hōnaunau, <u>Mauka</u> Section	.	.	.	Map folder
4	Hōnaunau-Kēōkea, <u>Mauka</u> Section	.	.	.	Map folder
5	Kēōkea, Central Section	.	.	.	Map folder
6	Kēōkea, South Section	.	.	.	Map folder
7	Ki'ilae, South Kona, Hawai'i	.	.	.	Map folder

INTRODUCTION TO THE 1986 VOLUME

In 1956 the National Park Service contracted with the Bernice Pauahi Bishop Museum to conduct a study of the natural and cultural history of Hōnaunau, Kona, Hawai'i. The study produced a manuscript in 1957 (Bryan and Emory et al. 1957) that is considered a pioneering, multi-disciplinary work. This manuscript has formed the basis for subsequent archaeological investigations at Pu'uhonua o Hōnaunau National Historical Park.* Because of the significance of the 1957 manuscript, the National Park Service contracted in 1985 with the Department of Anthropology, Bernice Pauahi Bishop Museum, to publish the present volume.

The goal in producing the present volume was to combine the two parts (the natural history and the cultural history) of the original, unpublished manuscript and an accompanying collection of plates into one volume, employing the current Departmental Report Series format. Changes in the original content were kept to a minimum, even though the 1957 manuscript is outdated in places (e.g., titles and affiliations of the contributors to the 1957 volumes are listed in the table of contents as given in 1957; scientific names for many of the insects and some of the plants and animals are obsolete). However, diacritics were added to Hawaiian words that could be checked against the Hawaiian Dictionary (Pukui and Elbert 1971) and Place Names of Hawaii (Pukui, Elbert, and Mookini 1974); abbreviations and symbols were employed wherever appropriate; figure and table references were added to the text wherever appropriate; figures and tables were incorporated into the text as soon as possible after being cited; figure captions were altered to accommodate their incorporation into the text; several lists throughout the manuscript were made into tables; and citations and references were changed to reflect the current Departmental Report Series style (discrepancies or omissions in reference information that could not be clarified or ascertained were left as given in the 1957 manuscript).

Moreover, a few additions and changes were made to the content of the original text, which do not alter the integrity of the original manuscript. Notes added sometime in the early 1960s to the cultural history manuscript (Part II) by Dorothy Barrère (DB) and Marion Kelly (MK) were inserted in footnote form, and new references contained in these notes were added to the bibliography. Statements clarifying the original text were also added in footnote form by the editor; these footnotes are not followed by initials. A location map was added in Report 1 (Fig. 1.1); maps and line drawings in the 1957 manuscript, except for Maps 1 through 7, were redrawn for the present volume; the boundaries for Pu'uhonua o Hōnaunau National Historical Park were added to Figures 1.2, 1.3, and 1.4; a photograph of a hōlua slide at Pu'uhinahina in South Kona, included in the collection of plates in 1957,

*Formerly City of Refuge National Historical Park.

was deleted from the present volume because there was no reference to it in the text; and a glossary of Hawaiian terms was added.

Acknowledgments for the 1986 volume are as follows: the National Park Service for the opportunity to publish this volume; Gary Somers, National Park Service-Pacific Area Office, for assistance in locating numerous maps that are contained in this volume; and Barbara Dunn, Hawaiian Historical Society, for assistance in locating source material for clarifying some of the information contained in the appendix of this volume. Individuals from the B. P. Bishop Museum acknowledged for their assistance include: Elaine Rogers-Jourdane for accounting and administrative assistance; Christine Takata, Betty Kam, and Clarice Mauricio for photo reproduction assistance; Elizabeth Tatar and Patience Bacon for both proofreading and Hawaiian language assistance; and Marc Smith for cover design and graphics in this volume. Maureen Liu-Brower is especially acknowledged for her careful editing, and for taking on and seeing through the many tasks of production and overall project management.

Yoshihiko H. Sinoto, Chairman
Department of Anthropology
Bernice Pauahi Bishop Museum
August 1986

FOREWORD

Alexander Spoehr

In November, 1956, the U. S. National Park Service and the Bernice P. Bishop Museum entered into a contract whereby the Museum was to make a study of the natural and cultural history of the City of Refuge at Hōnaunau, Hawai'i. The results of the consequent field and library research have been incorporated in the following series of reports by Museum staff and collaborators. These reports have been assembled in two volumes. This first volume deals with the natural history of the Hōnaunau area, in which the City of Refuge is located. The second volume will be devoted to the cultural history of the City of Refuge, with particular emphasis on the archaeology of this famous site. It is the Museum's hope that the two volumes will prove of substantial assistance to the U. S. National Park Service in its plans for developing the City of Refuge as a unique National Historical Park.

The Museum is grateful to the National Park Service for the opportunity to undertake the City of Refuge research project. The project has been entirely within the scope of the Museum's purpose and activities as an institution devoted to scientific research and its interpretation. At the same time, through this project the Museum has been able to make a direct contribution to the welfare of the Territory of Hawai'i. The general public is little aware that the proper establishment of a site such as the City of Refuge requires a thorough research study before the site can be restored and opened for public use. The purpose of this report is to make available to the National Park Service the results of such a research study.

Grateful acknowledgement is made for the thoughtful cooperation of the members of the Museum staff and the Museum collaborators whose individual reports comprise this volume. I also wish to express my personal appreciation to Mrs. James W. Anderson, Secretary to the Director, for the competent handling of numerous administrative details, and to Mrs. George Bacon, who typed the manuscript. And my thanks are extended to the Trustees of the Museum for their keen interest in the project and in bringing it to completion.

Lastly, the Museum acknowledges with gratitude the cooperation given by the National Park Service. Superintendent John B. Wosky and Dr. George C. Ruhle of Hawai'i National Park were of great assistance throughout the field research. Both Superintendent Wosky and Dr. Ruhle participated in the field work at the City of Refuge, and their advice and aid have been most valuable.

PART I

THE NATURAL HISTORY OF HŌNAUNAU

ECOLOGY OF HŌNAUNAU

Edwin H. Bryan, Jr.

LOCATION

Hōnaunau is a land division (ahupua'a) located near the middle of the Kona Slope of the island of Hawai'i (Fig. 1.1). Like other such land divisions, which date back to prehistoric Hawai'i, it is a narrow, wedge-shaped segment, stretching up from the sea coast onto the forested slope of Mauna Loa.

Such a method of dividing the land among the chiefs and their people gave each district a maximum supply of natural resources: a stretch of sea and reef, with their marine products, together with access to the sea for transportation; a coastal flat on which homes could be built, and where coconut palms and other useful lowland plants could be grown; valley floors (where present, there were none in Kona), for growing taro, bananas, sugar cane, and other crops requiring an abundance of water; forehills and kula (upland) slopes, for the cultivation of sweet potatoes, upland taro, and similar plants of economic value; and forested upper slopes or ridges, from which could be had timber for making canoes, houses, utensils, weapons, images, and other artifacts.

Kona is one of a half-dozen major districts of the island of Hawai'i. The others, in clockwise rotation, were Kohala, Hāmākuā, Hilo, Puna, and Ka'ū. For modern political purposes, three of these, Kona, Kohala, and Hilo, have each been divided in two (North and South). Each district occupies a facet of Hawai'i, the largest island of the Hawaiian chain. Each facet extends from the sea coast up the mountain slope. Kona occupies the westernmost face of the island, extending up onto Mauna Loa and the volcano on its northwestern shoulder, Hualālai.

The island of Hawai'i is located at the southeastern end of the Hawaiian chain, the youngest and loftiest of the group.

KONA'S "TOTAL ENVIRONMENT"

Life in a region can be understood best by examining the interrelations of all the environmental factors of the region, such as elevation, slope, rocks, soil, and climate. The interaction of all these factors produces what is called the "total environment" for the plant and animal life of the region.

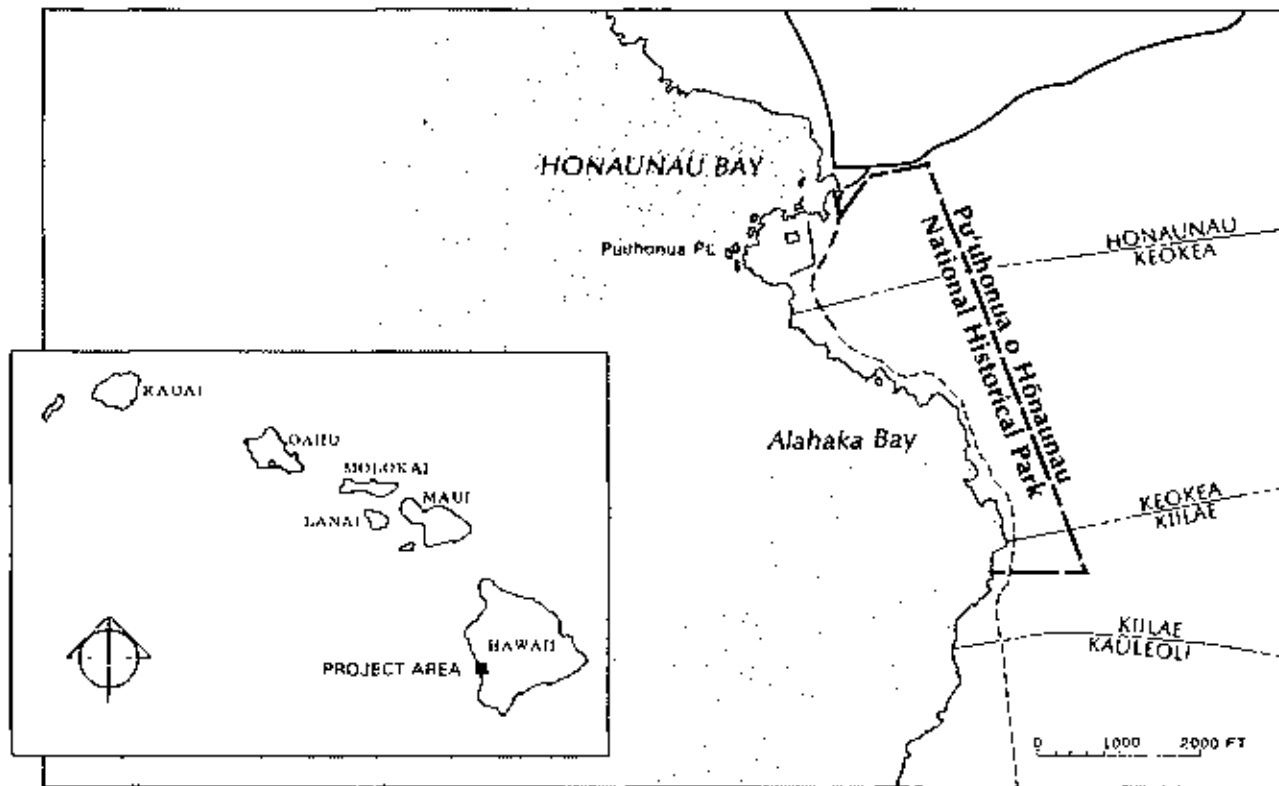


Fig. 1.1. THE PROJECT AREA.

Topography

The entire Kona coast, of which Hōnaunau is a small segment, is a great mountain slope, most of it descending from the summit of Mauna Loa (19,680 ft) to sea level. In a line through Hōnaunau, the distance is about 18 nautical miles. Although this slope is not entirely uniform, a simple calculation will show that this line, on the average, has an angle with the horizontal of 12.5%, or 7.2°.

This geomorphic province has been called the Kona Slopes by Wentworth (1936; Territorial Planning Board 1939:plate 6). The province is bounded on the north by the Kona Hualālai Slopes, and on the south and east by the Mauna Loa Southwest Rift Zone, which runs in a southerly direction to South Point, or Ka Lae. A line from Hualālai Saddle to Moku'āweoweo Caldera, on the summit of Mauna Loa, forms the northeast boundary between the Kona Slopes and the northwest Mauna Loa Slopes.

The Kona Slopes continue beneath the sea to the 2,000 fathom line (12,000 ft below sea level) in about 14 nautical miles, a gradient of 14.1% or about 8°. Below this they tend to flatten out in a westerly direction.

A glance at a topographical map of the Kona Slopes will show the entire absence of valleys, even of gulches of any size. The ground is so porous and the rainfall so comparatively light that there are not even permanent streams here, such as one finds on the much wetter east and northeast slopes of the island of Hawai'i. Furthermore, this portion of the island is geologically "young," so that no great amount of erosion has had time to take place. It is, at present, being built up as fast as, or even faster than, it is being worn away.

HOW WAS THIS SLOPE PRODUCED?

Geologists tell us that the Hawaiian Islands are the summits of a great range of volcanic mountains, which stretches a distance of nearly 2,000 mi from northwest of Kure and Midway Islands to southeast of the island of Hawai'i. They suggest that these mountains were poured out during the late Pliocene era, continuing during the Pleistocene or glacial period, flow upon flow of basaltic lava and deposits of other volcanic products, from a long crack or rift in the floor of the North Pacific.

The general sequence of activity is believed to have been from northwest to southeast. It is interesting to note, in passing, that Hawaiian legend agrees with this belief, in brief that Pele, goddess of the volcano, visited each island in turn until now her home is in the calderas of Moku-'āweoweo and Kilauea. The reasons given by geologists for the sequence are based on the relative ages of the various sections of the chain.

Peaks at the northwestern end of the chain have been truncated, cut off below the present sea level, apparently by wave action at a period when the sea stood at a lower level than at present, relative to the land. This would have been during one of the glacial periods of the Pleistocene, when a large amount of water from the oceans was deposited as ice on the continents. As the glaciers melted, the level of the sea rose again with reference to the land; and as the temperature became warmer, corals, coralline algae, and other marine organisms grew abundantly on the surface of the great platforms resulting from the cut-off mountain peaks, and their skeletons formed reefs, particularly around the edges of the platforms. The northwestern islands of the Hawaiian chain consist of three atolls (Kure, Midway, and Pearl and Hermes Reef), two low sand islets surrounded by reefs (Lisianski and Laysan), and various reefs and shoals.

The islands in the middle portion of the Hawaiian chain can be assumed to be a little younger, for here we find rocky pinnacles, little remnants of

the once much larger mountain peaks, protruding above the reefs and shoals. Gardner Pinnacles, La Perouse Pinnacle in French Frigate Shoal, and Necker and Nihoa Islands are the remaining portions of former, much larger and higher islands in this middle third.

The large islands of the chain are all at the southeastern end. Kaua'i is larger than Ni'ihau, O'ahu than Kaua'i. During the glacial era, Moloka'i, Lāna'i, Maui, and Kaho'olawe were all united into one great, growing island, separated into four when sea level rose and the land settled. Hawai'i, at the southeastern end, is the youngest and largest of the chain. On this island, the Kohala Mountains are the oldest; Mauna Kea is next in age, its mature summit having been glaciated (see Wentworth and Powers 1941); Hualālai ceased to pour forth lava in 1801; only Mauna Loa and Kilauea remain volcanically active. Periodically, Madame Pele puts in an appearance at the calderas (great craters) of these two peaks, or pours out her lava in flows down their flanks, from rifts, into Puna, Ka'ū, Kona, or the saddle between Mauna Loa, Mauna Kea, and Hualālai.

Thus, the Kona slopes can be seen to have been formed by volcanic activity (Fig. 1.2). Most of the flows originated from vents along the Southwest Rift Zone of Mauna Loa. Some of the flows, especially those in North Kona, came from Hualālai, but those in the vicinity of Hōnaunau came from well up the slope of Mauna Loa at a time before recorded history. By human standards they are comparatively old, just how old it is difficult to say. To the geologist, they are recent. To the south are flows which can be dated. The dates seem to become more and more recent as one comes northward from Ka'ū. In Ka'ū there were flows in 1868 and 1877; near the Kona-Ka'ū boundary is the 1907 flow; then coming northward, flows in 1916, 1919, 1926, and 1950. Higher on the slope are also flows dating from 1851 and 1949.

These flows weather very slowly. Parts of those which are nearly a century old appear almost as fresh as those which were poured out during the past decade. Very little study has been made of the revegetation of Kona lava flows. A preliminary contribution was made by Charles N. Forbes (1912), but he died before he was able to complete his studies. He suggested that a few lower cryptogams are established first on pāhoehoe lava, followed by ferns (Forbes 1914). On 'a'ā, lower cryptogams became established at an early date and eventually covered the flow to a considerable extent. It takes a relatively longer period of time for ferns to become established on 'a'ā than the same species on pāhoehoe, other conditions being the same. Also, plants found on a newer flow are of the same kinds as those found on older flows in the immediate vicinity. A fertile soil apparently is formed in the cracks of pāhoehoe sooner than among 'a'ā particles. Metrosideros polymorpha, the 'ōhi'a lehua, is one of the first flowering plants to become established on pāhoehoe. Its roots spread over this smooth lava, often from one crack to

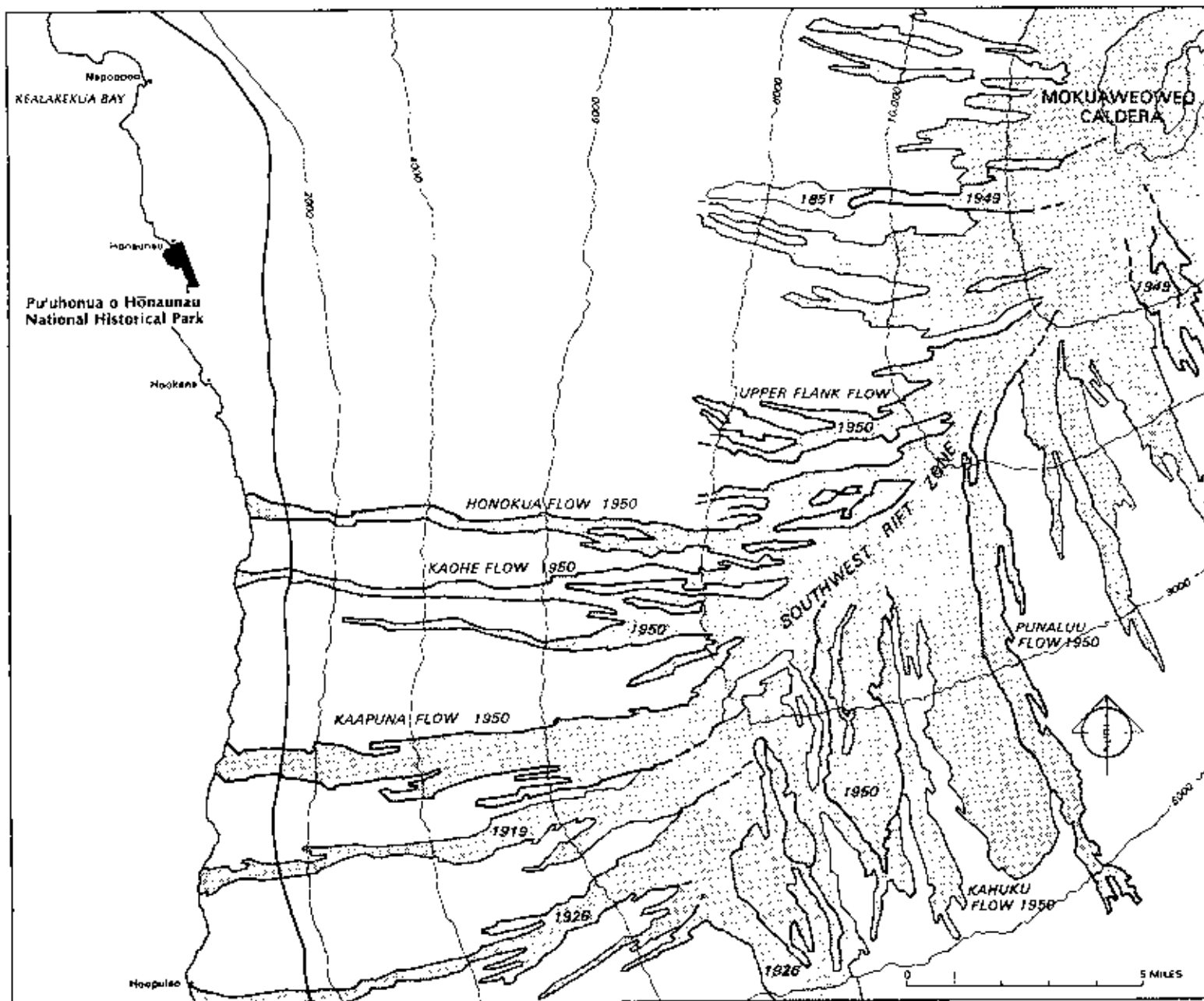


Fig. 1.2. LAVA FLOWS THAT FORMED THE KONA SLOPES (After Bryan 1957).

another, forming pockets to catch the soil formed of dead leaves and other debris. Mr. Forbes noted considerable variation depending upon the varied environmental factors.

Soils

A simple classification of general soil types found throughout the Hawaiian Islands is given in a report on "Soils of Hawaii," by the late Zera C. Foster in the Territorial Planning Board's (1939) first progress report. He groups the soil types into 18 soil associations, 5 of which are found at different elevations on the Kona Slopes, as follows.

His type XIV is found on the lower slopes from shore to about 1,000 ft elevation. He calls this the Kawaihae-Kailua-Kalae Association, and describes it as follows:

These soils occupy areas of moderate to steep slopes on lee sides of Hawaii and Maui--between sea level and elevations as high as 2000 feet. Rainfall is low and temperatures high, making for semi-arid conditions. Shallow soils with much rock outcrop are characteristic of the area as a whole. Where present, the soil consists of a brown or dark-brown loamy layer over a yellowish silty subsoil....

Land use is limited to pasture and the carrying capacity is low, especially in the lower sections. The quality or feeding value of such pasturage as occurs is high, being well supplied with calcium and other bases [Territorial Planning Board 1939].

His type XI is found between about 1,000 and 2,200 ft, and is called the Honokohau-Kealakekua Association.

Situated on the lee slopes where the climate is usually dry, this area receives from 30 to 80 inches of rain, due to diversion of air currents by the large mountain mass of Mauna Loa. An almost daily cloud bank is characteristic. The land is characterized by interspersed lava flows and ash pockets. Depth of material varies from a very thin mantle to pockets several feet thick. The soils are friable and have good moisture-holding capacity. They are slightly acid and generally low in potash.

It is in this area that most of the coffee is produced. While high yields of good coffee can be produced with correct husbandry, steep slopes and shallow soils necessitate hand cultivation and increased transportation costs... [Territorial Planning Board 1939].

Type XIII is found between 2,200 and 4,500 ft elevation, and is called Honokohau-Kona Association. In an area with more rainfall (80 in. and up),

leaching of bases and silica is greater. These areas are used mainly for forests and pasture.

Between 4,500 and 8,900 ft is found type XV, Puu Lehua-Pauehi-Kapapala Association, comparatively flat land at high elevation on Hawai'i. This has thin soil over pāhoehoe lava, interspersed with la'ā flows. The climate is cool, moist, with fog. "The soils consist of a mat of organic matter over lava, with pockets of deeper soil. Clumps of koa trees with puakiawa, and a ground cover of grasses form the vegetation" (Territorial Planning Board 1939). The soils are generally too shallow to permit cultivation.

Above this last, the upper slopes of Mauna Loa are covered by lava flows, type XVIII. These are too recent for weathering to have developed any soil. These lands are either bare of vegetation or support scattered small 'ōhi'a trees, clump grasses, mosses, and lichens. At present these areas have no economic value.

The results of the U. S. Department of Agriculture Soil Conservation Service's Soil Survey of the Territory of Hawaii (1955) presents a much more detailed analysis of the soils of the Kona Slope. Taking just the Hōnaunau ahupua'a and immediately adjacent areas, the following types of soils are found (Fig. 1.3).

The bulk of the Kona Slope, at least in the vicinity of Hōnaunau, has soil classified as the type of Lithosol called Rockland. Up nearly to the belt road is type Rm, "Rockland, pahoehoe lava with Kawaihae, Waikaloa or Naalehu soil material" (Soil Conservation Service 1955). This soil consists of a very thin covering of volcanic ash on young, relatively smooth and unbroken pāhoehoe. In most places the soil layer is about 4 to 6 in. thick, seldom more than 10 in. thick.

Above this zone (from about 1,500 to 3,000 ft elevation) is type Rn, "Rockland, pahoehoe with Kealakekua, Olaa, or Opia soil material" (Soil Conservation Service 1955). Much of the area is smooth pāhoehoe outcrop, the rest is covered by very dark brown or, in places, black silty loam or silty clay loam, high in organic matter and generally saturated with water, due to the somewhat heavier rainfall in this zone.

Above this (3,300 to 4,400 ft elevation) the pāhoehoe is overlain by still another type, Ro, "Puu Oo, Maile or Olinda soil," latosolic brown forest soils, from 4 to 6 in. thick, resting directly on pāhoehoe bedrock, with outcrops in more than half the area. The soil is a dark brown to black fine sandy loam.

The upper slopes (above 4,400 ft) are covered with H2a, shallow Hanipoe sandy loam, with outcrops of bedrock and with low water-holding capacity in an area of light precipitation. This area has scattered koa and māmane trees with bracken and alapai ferns and grasses.

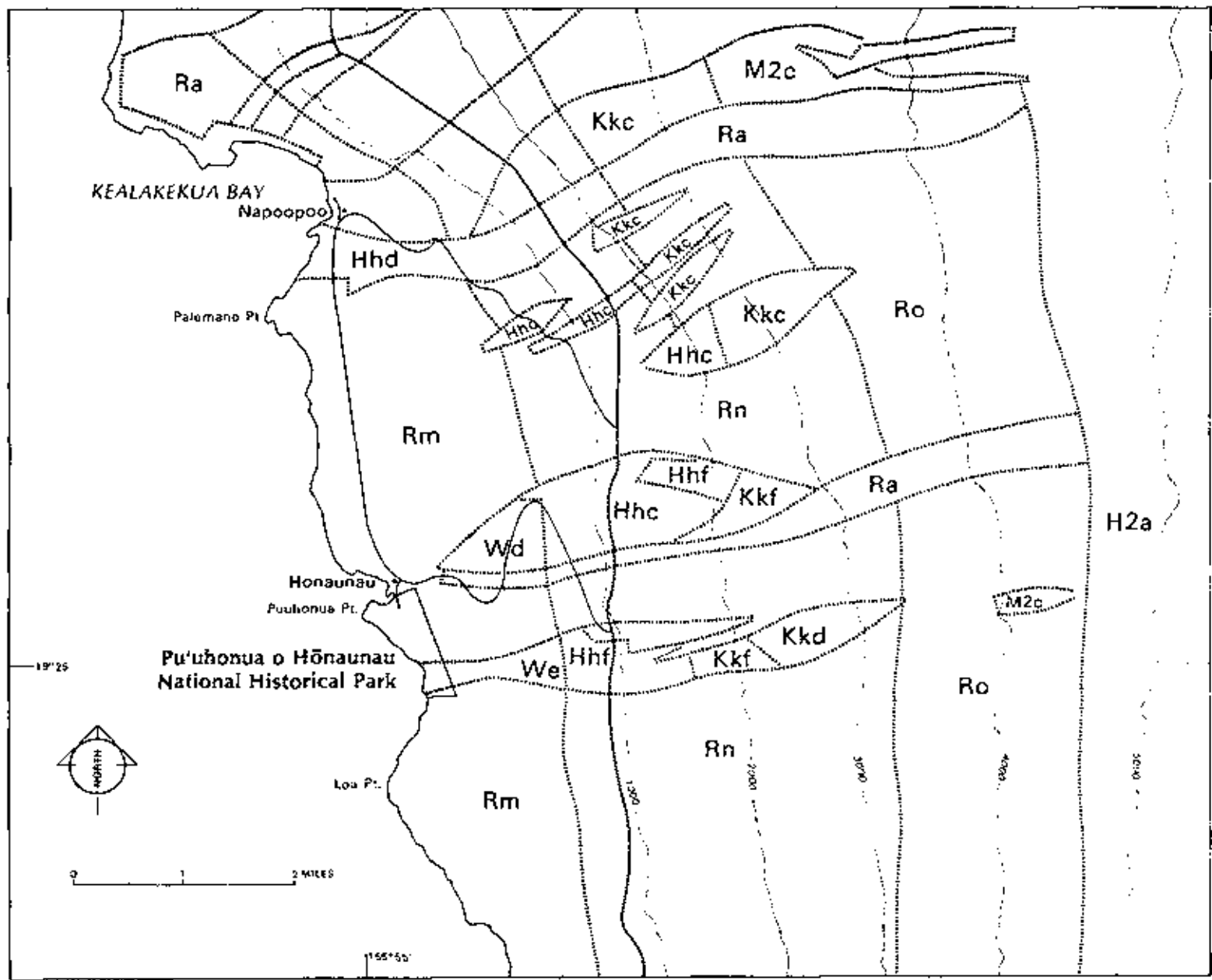


Fig. 1.3. SOIL TYPES IN HŌNAUNAU AHUPUA'A AND IMMEDIATELY ADJACENT AREAS (After Bryan 1957).

Crossing the lower portions of the slope are narrow flows of young, barren la'ā lava, Ra, with practically no soil. One such flow traverses the land of Hōnaunau, narrowing as it approaches the sea, and ending about half a mile above the head of Hōnaunau Bay, south of the road.

There are also lens-shaped areas crossing these zones up to about 3,500 ft. The nature of the soils in these lenses changes with the rainfall, consisting of the Wai'aha series of reddish-brown soils below, with light rainfall; the Honua'ula series of Humic Latosols in the middle portion, with medium rainfall; and the Kealakekua series of Hydrol Humic Latosols at their upper ends, in the area of maximum rainfall. To the north and south of the Hōnaunau area, at still higher elevations (3,300 to 4,400 ft), are areas of Manaha'a loam.

The Wai'aha series consists of shallow soils derived from volcanic ash in an area of low to moderate rainfall. Wd is this sandy clay loam, in a very shallow phase, over la'ā lava. We is the same over pāhoehoe lava, 4 to 10 in. deep, with stony surface and bedrock outcrops. The road which descends to Hōnaunau traverses a wedge of this soil for nearly a mile, ending at the same point as the la'ā flow, Ra, half a mile up the slope from Hanauma Bay.

The Honua'ula series occupies an area with increased rainfall, which makes these soils, consisting of shallow clay loam, richer than the Wai'aha soils, although they are also shallow and rocky. Hhc is the sloping phase; Hhe lies over la'ā lava; and Hhf is over pāhoehoe lava. These soils, coupled with the type of rainfall, make this the coffee growing belt of Kona.

In the zone of still higher rainfall, at the upper end of these lens-shaped areas, the soil type changes to the "Kealakekua series of hydrol humic latosols" (Soil Conservation Service 1955). In this area is found the heaviest rainfall on the Kona Slopes. Kkf is the Kealakekua silty clay loam, very shallow phase over pāhoehoe; Kkd is the same over la'ā lava complex.

In the Manaha'a series of latosolic brown forest soils there is again a decrease in the rainfall. The soils are derived from a thin layer of volcanic ash mixed with weathered particles derived from the underlying young lavas. Most of the soils are very shallow, seldom more than 18 in. thick. The sloping phase is labeled M2c in the Kealakekua-Kahauloa area; M2e is Manaha'a loam, very shallow phase-pāhoehoe lava complex, in the Ku'ulae area.

The soils of the Kona Slopes have been derived from basaltic volcanic products. They owe their differences chiefly to rainfall, temperature, drainage, vegetation, and age. Where temperature is sufficiently high and rainfall sufficiently heavy, soil is produced by a process called laterization. The resulting Latosols are derived chiefly by the removal of bases and combined silica through weathering. The amount of humus in the soil depends

upon the nature of the vegetation which grows on the soil, again related to climatic conditions.

Climate

The island of Hawai'i lies within the tropics, but its climate is not really tropical, due to the expanses of ocean, with which it is surrounded, and the cool trade winds, which blow from the east-northeast about 80% of the time. At lower elevations the mean temperature varies from about 68°F in January and February to 73.5°F in September. Above this the temperature drops with increased elevation, about 3° per 1,000 ft. Frost is rare below 4,000 ft, but freezing temperatures occur every night on the summits of Mauna Kea and Mauna Loa.

The heaviest rainfall occurs on the northeastern slopes of the island, where the great mountain masses of Mauna Kea and Mauna Loa intercept the trade winds. The maximum rainfall exceeds 240 in. a year at about 3,000 ft elevation on the slope of Mauna Kea behind Hilo. Above that it decreases to less than 40 in. in the saddle between Mauna Kea, Mauna Loa, and Hualālai. The Kona Slopes are almost entirely cut off from the trade winds, these being replaced by onshore-offshore winds. Here the maximum rainfall exceeds 100 in. at about 2,500 ft elevation, above Keauhou.

In Kona the morning usually dawns clear.

Between 8:00 and 10:00 a.m. cool breezes start to blow from the sea to replace the rising warm air over the land. Clouds form at about 2,000 feet and rain begins to fall. The top of the cloud layer rises during the day and usually reaches about 7,000 feet during late afternoon, but the rain falls chiefly below 5,000 feet. During the night the wind stops, the clouds dissipate, and the cool night air flows down the mountain toward the sea. This system of air circulation gives rise to light southwesterly winds nearly every day of the year [Stearns and Macdonald 1946].

The rainfall near the coast is low, but remains rather uniform throughout the year, highest in June, lowest in December. At higher elevations, such as Hōlualoa (1,450 ft), rainfall is heavier, increasing from February to June, maintaining a rather even maximum through September, and then decreasing rapidly through November, with December and January a little higher. A maximum rainfall is found at about 2,500 ft, about 120 in. a year.

Vegetation Zones

As a result of the various environmental factors, particularly rainfall, soil, elevation, and slope, we find definite zones of plant life growing on the Kona Slopes.

The vegetation zones of the main Hawaiian islands have been classified into 5 zones by J. C. Ripperton and E. Y. Hosaka (1942), and some of these further subdivided according to elevation, making 10 in all.

All but 2 of these 10 zones can be found between the shoreline at Hōnaunau and the summit of Mauna Loa. A condensed tabulation summary of these is here given (Table 1.1), together with a copy of the vegetation map of west central Hawai'i (Fig. 1.4), showing their boundaries.

Miss Amy Greenwell and Miss Marie C. Neal present a report on the flora of the Hōnaunau area, and a list of species which have been suggested for planting in the park area, in order to approximate plant conditions which may have existed there prior to the great invasion of exotic vegetation.

Table 1.1
VEGETATION ZONES ON THE KONA SLOPE*

Zone-Phase	Elevation at Hōnaunau	Rain-fall (in.)	Natural cover type	Representative species of plants
A	Absent from the Kona Slope	<20	Xerophytic scrub, coastal fringe	
B	Sea to 500	20-40	Xerophytic scrub with some trees	'Opiuma, algaroba, coconut, lantana, koa haole, weeds
C-1, low	500-1,000	40-60	Mixed open forest and shrubs	Indigofera, lantana, koa haole, Waltheria, guava
C-2, high	Absent from region			
D-1, low	1,000-1,600	60-80	Shrub and closed forest	'Ōhi'a lehua, koa, pandanus, kukui, guava, Boston fern
D-2, med.	1,600-3,400	>80	Closed forest	Cibotium and Sadleria ferns, kukui, 'Ōhi'a lehua, koa
D-3, high	3,400-4,800	80-50	Open forest	Koa, Dryopteris ferns
E-1, low	4,800-7,000	<50	Open forest and scrub	Koa, naio, māmane, puakiawe
E-2, med.	7,000-10,000	<40	Upland open scrub	Māmane, naio, puakiawe
E-3, high	>10,000	<40	No seed-bearing plants; largely base lava	Mosses and lichens; occasional grass, herbs, ferns

*Adapted from Ripperton and Hosaka (1942).

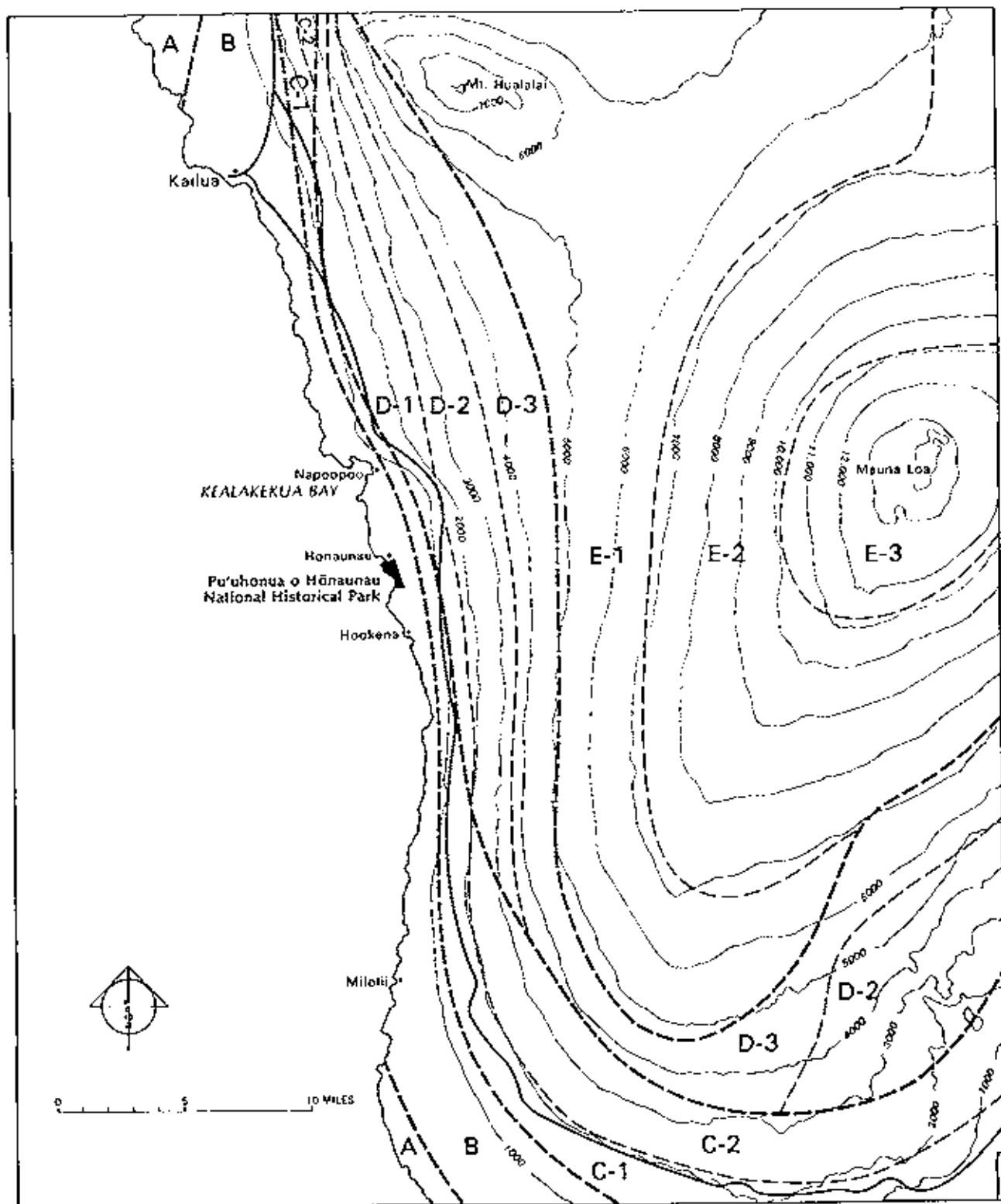


Fig. 1.4. VEGETATION ZONES OF WEST CENTRAL HAWAI'I ISLAND (After Bryan 1957).

Report 2

GEOLOGICAL NOTES ON HŌNAUNAU

Chester K. Wentworth

The Hōnaunau (City of Refuge) monument lies on the west shore of the great volcano Mauna Loa, where the 13,680 ft slope passes beneath the sea. It is almost due west of the summit of Mauna Loa, a little south of Kealahakua Bay where Captain Cook was killed, and a little north of the old village of Ho'okena where Robert Louis Stevenson did some of his writing. The west slope of Mauna Loa is a long one, taking some 21 mi to make the descent of nearly 14,000 ft from the summit to sea level. For many miles, both north and south, the west slope of Mauna Loa is a great incline of both pāhoehoe and ʻaʻā lava flows, joining at the north with the similar slope of the volcano Hualālai, which makes a slight bulge in the coast north of Kailua. Otherwise, for nearly 50 mi of north-south coast, the combined slopes of Hualālai and Mauna Loa pass into the ocean as the major portion of the west shore of the island of Hawai'i. At the northern end of the area enclosed in the monument is a lobate point some 1,000 ft by 1,000 ft, just south of Hōnaunau Bay, which is composed of a somewhat hummocky pāhoehoe lava flow. It has a very slight seaward slope, and its edge is marked by many small inlets, and its surface by patches of sand and rubble, which is in part man-placed. As far as could be seen, the lava flows which form the slope in the immediate vicinity of the City of Refuge are pāhoehoe flows, except that in places the festoon lava which came down over the Palikaholo fault cliff turned to ʻaʻā at the foot of the cliff and extended a short distance shoreward. It is not immediately evident that the festoon lava reached the coast at this point.

The general slope of the west slope of Mauna Loa is about 10%, or around 500 ft to the mile. Between the elevations of 1,000 and 2,000 ft, the slope is somewhat steepened to reach nearly twice that value, and this zone is thought to be the buried southward extension of the Kealahakua Fault turned southward. On the contrary, the immediate lava flows at the shore in this sector have a much more gentle slope of not over 200 ft to the mile, which combined with the normal irregular surface of a large pāhoehoe flow make a very intricate and interesting shoreline and surface.

At some time in the geologic past, probably some thousands of years ago, the sub-sea level part of Mauna Loa and part of the narrow shoreline slipped down in relation to the upper part of the mountain and left the cliff known as Palikaholo. This is a nearly straight cliff which reaches in places a height of 200 ft, and forms the cliffed head of Ki'ilae Bay and Kauhakō Bay at Ho'okena, and parallel to the shore appears in a number of discontinuous

alcoves with cliffs at the landward side for a distance of about 15 mi. Whether this fault is related to the buried probable southern part of the Kealakekua Fault is not exactly known. The Palikaholo fault, in the intervening stretches of its occurrence, appears to have been buried by the festoon lava flows, and, in the various parts where it can be seen, is also in part covered by the lava which plunged over the cliff, formed curtains and stalactites, and hence got its name.

The festooning lava, which had been known for a long time for its curious forms, was strongly shaken by the earthquake of 1951, and parts of it shaken down so that we can say that this earthquake was one of the more severe which had occurred in this region since the placement of the lava. This earthquake, which was responsible for much damage in Kona, was due to a slip on the Kealakekua Fault. The northernmost stretch of the Palikaholo which can be seen is in this monument area, in the middle of Kāōkea, a stretch of cliff a short distance inland from the head of Alahaka Bay. This cliff will be discussed further in another section.

It is interesting to notice the slow development of a cliff on the south shore of Hōnaunau Bay as one approaches the open ocean to the westward. At the head of the bay there is no cliff at all, the shore being marked by a slight sand beach. On the south side of the bay, the shore is formed by rounded and gently sloping lava flows which at first scarcely show any modification by wave action. In the bay are irregular islands which vary their size with the tide, and boats entering to the head of the bay must watch ahead for rocks both above and below water.

Near the head of the bay the lava flows show molds of prostrate coconut trunks and those also of one or two vertical ones, showing that coconut trees grew when the last lava flow was placed, just as now. Coconut tree molds are also found at other places on the surfaces of the lava. It is interesting to observe also that, in places, the coconut molds were formed in the early stages of lava flow, were sufficiently solid to be preserved, but have been disrupted in the formation of tumuli so that two portions of the same mold are found discordant on the two sides of a rift across the top of a tumulus. It appears evident that tumuli are formed in the later stages of cooling of a gently sloping lava flow of which the crust has already cooled, but certain parts of that crust are subjected to the pressure of liquid lava beneath. This still liquid lava pushes up the crust, which often locks in that position, and the liquid lava often forces up and dribbles out and down the slopes of the tumulus.

Resuming our trip toward the ocean, we see an increase in the number of places where the waves have formed a low cliff at the shore, by plucking of the crust of the pāhoehoe, by the joints, and also by abrasion, where cobbles have been caught in the crevices and agitated by the action of waves. There

are pools, also, one or several yards in extent, that are nothing but low places in the surface of the lava flows. Such pools, if rather effectively cut off from the ocean, and if there is no great spray wash, will maintain their own mean level, usually slightly higher than the ocean, and with less fluctuation. However, usually the spray or waves break over, and the water surface is often several feet higher than mean sea level.

Many small inlets are developed at the sea coast, and as water gets deeper a shore cliff is developed, often with a goodly portion under water. Much depends on where the upper and lower limits of a given lava unit are in relation to sea level. Often an inlet controlled by joints may be 10 ft deep with an incoming wave, and only 3 or 4 when the wave goes out. Sometimes such inlets are roofed over, and lusty spouting horns are produced. Sea urchin borings and the incrustation of various types of algae give very vivid testimony to the prevailing and average level of wave and spray action, though this may be well above mean sea level if the inlet has the right shape and exposure.

The process of plucking by ocean water probably includes those methods of removal and lifting which depend primarily on pressure differences, either developing higher pressures inside by virtue of the drive of the waves, or the reverse, a partial vacuum by which rock fragments are moved. Despite its common use for ice work, it seems to be a good term. Many of the first plucked patches are very small, just a few inches square, but they are enlarged to a few feet or many feet across. Soon after they are formed they, as well as joints or any sort of fissure, including the cracks in tumuli, become traps for any loose detritus and abrasion begins. The fragments begin to become rounded, and the depression in the rock becomes smoothed and takes, in part, the shape of the loose blocks. Occasionally the block dislodged by plucking in a great storm may be so oversized and so placed that it is not soon moved, and may become a local landmark, remaining for many years.

In places, the Polynesians have made post holes, or sockets, which are somewhat geometrical in their arrangement. There are also, at many points on the solid upper surface, what can be called grinding holes, which quite clearly have been used and enlarged in the course of grinding seeds and the parts of sea shells. But it is also evident that many of the more irregular or larger of these holes are of natural origin, and in some cases they are still supplied with pebbles and cobbles, and are in active process of being enlarged. Abrasion goes on both under sea level, in pocket beaches where larger or smaller aggregations of boulders are trapped in fissures or inlets in rock, and in isolated pits and fissures of various sizes in or somewhat removed from normal work on the waves. In places, a block or boulder of larger than usual size will be trapped in such a crevice and remain long enough to bring about enlargement of the fissure to somewhat fit the boulder.

Cracks and the structure of the rock interact with the blocks or debris to influence the final form of the depression, as well as the form of the boulder.

One of the products of abrasion is the chink-faceted boulder or pebble. This is a rock fragment which has been retained in the interstices between larger fragments or against the rock in such a way that it was free to move repeatedly with a slight motion, thereby cutting one or more scars on its points of contact. Such pebbles or cobbles have been found with as many as 20 such facets, sometimes spots on an otherwise rather symmetrical pebble, and in other instances a quite grotesque form, and often 2 or 3 together, which have to be extricated one at a time like the pieces of a puzzle.

One of the products of both abrasion and deposition on the open coast is the patch of bench which appears to stand at a level usually about 1 to 3 ft above sea level. There is some question about the validity of this bench as being cut by abrasion on the basalt flows. It is not as sharply or definitely cut as it would be on tuff or limestone, yet, in places, patches of rock surface occur along the coast at about 2 to 3 ft above mean sea level, which give the definite impression that they are incised against the coast, have a landward nip cut into the higher rock inland, and are not wholly the fortuitous selection of surface which will support the yellow-brown seaweed that grows on them. At a slightly higher level there is a growth of light green seaweed, which may be a different species favored by that elevation, or it may be younger growth of the same species. There is a tendency for a bench to level itself, even when it has been potholed below the upper surf level by the growth of seaweed and other algae, which stabilizes the sand and pebbles and forms a very slightly sloping surface which occurs in patches a few tens or occasionally a few hundred feet long and commonly 25 to 50 ft wide. There is no doubt that these beaches are favored by the stripping of the upper units of a lava flow, where are situated at a suitable level,* but it is believed that there is abrasional attack as well as the organic attack of seaweed at that level.

To the southward of the projecting lobe of lava flows, which forms the principal projecting part of the coast south of Hōnaunau Bay, the coast is marked by low cliffs and intervening boulder beaches for a few hundred yards. Here it is perhaps several hundred yards inland to the talus which marks the foot of this section of Palikaholo. Between the coast and the talus is the surface of rugged pāhoehoe flows, and the trail leads past heiau platforms and other marks of ancient Hawaiian activity. In the face of the cliff at the top of the talus are several caves which show signs of walling and other usage

*As written in the 1957 manuscript.

before the coming of the last festooning lava flows, which will be more fully described in the sequel.

Toward the south, Palikaholo comes out to the coast, and at this point where it merges with the coast it forms a higher cliff from thence south to beyond the limits of this area. Just before it reaches the coast, there has been built a sort of causeway which appears wide enough to have been used for carts to gain the top of the combined cliff of Kaholo and the sea cliff. Whether this has been modified by Caucasians should be discussed in the main part of this booklet.

Along this cliff there are many places, both at the top of the boulder beaches and at other places, where it is evident that there has been a recent fall of blocks, and even of the festooning driblet. No doubt much of this was shaken down in the strong earthquake of August 21, 1951. At the point where the causeway stands in front of the cliff of Kaholo, there are surfaces along the vertical face that look much as if they had recently been molten. One is tempted to interpret that the festooning lavas had come over the face, but it is more probable that the surface showing such evidence of liquidity is the landward side of a lava tube which has been broken into by the Palikaholo, and even by the earthquake of 1951 been freshly disturbed.

Among the features of fascinating interest is the almost infinite variety in the flow of water, and the relation of different pools along parts of the coast. At one point is a rather high surface of rock with lower rock back of it. On the top of the higher surface is a slight depression and pool to which water is furnished by a particular kind of wave.

The high pool can be known as pool A. Behind it is pool D. On either side are pools B and C. Water commonly reaches pool D through pool B and thence through a narrow channel connecting the two. When pool D is high enough there may be flow into pool C on the other side.

Less frequently a high, direct wave sends water to fill pool A, which in turn spills into pool D, which rises and may reverse the current through the channel to pool B. At times the conflict between current and counter current through the D-B channel is continuous because the availability of water to pool D is retarded by passage through pool A. Pool C is somewhat more remote than any, and rises less frequently. No doubt there are many variations in the flows through channels B-D, D-C, and over the A-D spillway due to angle of approach of the waves, their height, and the stage of tide.

In places, most commonly close to the rock bound ends of boulder beaches, chink-faceted boulders may be seen. These are boulders on certain sides of which are closely delineated rubspots, a fraction the size of the boulder, due to recurrent, restrained abrasion where the boulder has long been caught in a crevice or between larger boulders so that it could only move

recurrently in a certain way. Most of the boulders, not so constrained, are flung about in a random way, and assume smooth, rounded forms.

Some of the fragments, being near the limit of wave capacity, at the upper or storm margin, are much less rounded, and often show large bubble holes, somewhat enlarged by etching, or they may be marked by more numerous sea urchin borings. In some few instances the two are not readily distinguished.

Often, incipient erosion is shown by small areas where the surface layer of somewhat glassy selvage, with its 2 or 3 in. jointing, has been stripped off, exposing the next layer with coarser jointing, or even no visible jointing. Everywhere the erosion is subtle, etching out the flow-placed structure, but where the waves are strong and boulders are larger, doing so with an appropriate boldness of line and form.

A coarse grit forming some beaches close to the head of Hōnaunau Bay contains an amazing variety of inentifiable.* The following is just a start: basalt, rock glass, sections of sea urchin spines, pieces of coral, olivine grains, bits of mollusca shells, olivines in basalt, small cone shells, worm-bored shells, and so forth. Further search under a low-powered glass would reveal other classes of objects as well as freakish curios. Sand or grit is defined by the geologist as grains that are comparatively durable, that have been sorted for size and weight, and that are somewhat rounded by abrasion. But the original material can be nearly anything. Pebbles can be pieces of rock or mineral, or fragments of shell, horn, bone, nuts, wood, pieces of glass, metal, or any other artificial object, just so its present shape is somewhat modified by the ceaseless play of waves on a beach. The material on a given beach depends on the material available and durable in a given locality. Hawai'i's beaches have most commonly coral and shell fragments; basalt fragments come in where the organic debris is less available and waves are strong. There is no quartz, so common on most mainland beaches.

Natural bridges or sea arches are seen at certain places and stages of tide. Isolated rocks or small islets are offshore in certain places, some can be seen to have moved about by waves, others are still attached to the bedrock and rise above erosion platforms, forming true stacks as the geologists call them.

*As written in the 1957 manuscript.

Report 3
FLORA OF HŌNAUNAU
Amy Greenwell*

The present flora of the future National Historical Park at Hōnaunau is a far cry from its pre-Captain Cook representatives. Today among the higher plants there is scarcely an endemic or indigenous one to be found among the tangle of exotics comprised mostly of kiawe (*Prosopis* sp.), klu (*Acacia farnesiana*), 'opiuma (*Pithecellobium dulce*), Lantana camara, pānini (*Opuntia* sp.), ākoa (*Leucaena glauca*), 'uhaloa (*Malthesia americana*), *Passiflora foetida*, and monkeypod (*Samanea saman*). All but the last species have hampered survey operations in the area. To clear the land will be slow and expensive. However, on the brighter side, the only area to be kept free from overall poisoning, cutting, and burning is a very small section of Paumoa where an excellent stand of seedling to very old kou (*Cordia subcordata*) is situated.

Common natives easily replaced are: lilima (*Sida fallax*), hili'e or hili'e (*Plumbago zeylanica*), hinahina (according to Theodore Kelsey). All others hereafter listed are either very local, or a single or two isolated plants, or small herbaceous plants not showing up at the time of the survey (rains began in late April 1957). An isolated stand of puakala (*Argemone glauca*) was washed away by the high surf of late February 1957.

Introductions of the last century can be found at housesites. The most outstanding of these is the tamarind (*Tamarindus indicus*), kī (*Cordyline terminalis*), and hala (*Pandanus* sp.) (natives); and a clove-scented basil (*Ocimum* sp.) and chili pepper (*Capsicum frutescens* var.), rarely found, but bearing mute witness to old homes nearby.

Modern housesites have mostly remains of specimen plants, but have also aided in making up the following "probable" list (Table 3.1). Fifty years ago the area above the beach road was covered with pili grass (*Heteropogon contortus*), which has since given way to introduced forage grasses and the above-mentioned thicket. These sites are few in number, but the variety found in them is great.

The plants on the "probable" list (Table 3.1) grow or can grow at similar elevations at nearby villages or lava fields. Several of the cultivated plants, usually grown at higher elevations, could have been grown around houses for medicinal or religious purposes. Among these would be banana, sugarcane, 'awa, kukui, pia, and yam. Breadfruit and taro have been omitted. A famous grove of the former grew at a slightly higher elevation and

*With Table 3.3 contributed by Marie C. Neal.

about 2 mi north of Hōnaunau, and this was the main source of kukui nuts also. Taro needs much fresh water, even though growing in soil, and was grown at a much higher elevation. Among the native plants, all but Jacquemontia and Cuscuta, which are littoral, would grow on the flat land up to the upper boundary line. Certain littoral plants such as Scaevola frutescens, Portulaca sp., and other less common ones found elsewhere on the West Hawai'i coast are absent in this section, and hence not listed.

The lava molds at the Faunoa shoreline appear to be loulu (Eupritchardia) and kou (Cordia).

The following lists (Tables 3.1-3.3) are as complete as dry weather, difficult terrain to cover, and the writer's limited knowledge of the lower plant groups can make them. Specialists in algae, mosses, and hepatics will find many species in the ocean and the numerous caves. In the rainy season, there will probably be numerous fungi and an increase in the already large lichen population. On the whole, the higher plant life at Hōnaunau today is very monotonous, thorny, and introduced.

Table 3.1
 ENDEMIC AND INDIGENOUS PLANTS--PROBABLE AND POSSIBLE

Scientific Name	Native Name
Native	
<i>Erythrina sandwicensis</i> Degener	Wiliwili
<i>Canthium odoratum</i> (Forst.)	Alahe'e
<i>Reynoldsia</i> sp.	'Ohe
<i>Myoporum sandwicense</i> (DC.) Gray	Naio, 'A'ake (10-10,000 ft)
<i>Dodonaea</i> sp.	'A'ali'i
<i>Santalum</i> sp.	'Ilihi
<i>Bidens</i> sp.	Ko'oko'olau
<i>Lipochaeta</i> sp.	Nehe
<i>Euphorbia</i> sp.	Koko
<i>Tephrosia purpurea</i> (L.) Pers.	'Auhuhu
<i>Ipomoea</i> sp.	Koeli
<i>Ipomoea acetosaeifolia</i> , Roem & Sch.	Hunakai
<i>Jacquemontia sandwicensis</i> Gray	Pa'ū-o-Hi'iaka
<i>Cuscuta sandwichiana</i> Choisy	Kauna'oa
Cultivated	
<i>Lagenaria siceraria</i> (Molina) Standley	Ipu nui
<i>Hibiscus tiliaceus</i> L.	Hau
<i>Broussonetia papyrifera</i> (L.) Vent.	Hauke
<i>Musa paradisiaca</i> L.	Mai'a
<i>Piper methysticum</i> Forst.	'Awa
<i>Curcuma domestica</i> Valet.	'Olona
<i>Dioscorea alata</i> L.	Uhi
<i>Tacca leontopetaloides</i> (L.) O. Ktze.	Pia
<i>Saccharum officinarum</i> L.	Kō
<i>Aleurites moluccana</i> (L.) Willd.	Kukui

Table 3.2
INCOMPLETE LIST OF ENDEMIC AND INDIGENOUS PLANTS FOUND--1957

Scientific Name	Native Name
Ferns	
<i>Psilotum nudum</i> (L.) Griseb.	<u>Hulumoa, Moa</u>
<i>Polypodium phymatodes</i> L.	<u>Laua'e</u>
<i>Pteris</i> sp.	
Monocotyledons	
<i>Pandanus odoratissimus</i> L. f.	<u>Pūhala, Hala</u>
<i>Heteropogon contortus</i> (L.) Beauv.	<u>Pili</u>
	<u>Hinahina</u>
	<u>'Ahu'awa</u>
<i>Pritchardia</i> sp.	<u>Loulu</u>
<i>Cocos nucifera</i> L.	<u>Niu hiwa</u> (green)
	<u>Niu lelo</u> (deep yellow)
<i>Cordyline terminalis</i> (L.) Kunth	<u>KI</u>
Dicotyledons	
<i>Peperomia</i> sp.	<u>'Ala'alawainui</u>
<i>Argemone glauca</i> Nutt.	<u>Puakala</u>
<i>Capparis sandwichiana</i> DC	<u>Pilo, Puapilo</u>
<i>Sida fallax</i> Walp.	<u>'Ilima</u>
<i>Thespesia populnea</i> (L.) Sol.	<u>Milo</u>
<i>Plumbago zeylanica</i> L.	<u>'Ilie'e</u>
<i>Ipomoea batatas</i> (L.) Poir	<u>'Uala</u>
<i>Ipomoea pes-caprae</i> (L.) Sweet	<u>Pōhūehue</u>
<i>Ipomoea</i> sp.	<u>Pilikai*</u>
<i>Gordia subcordata</i> Lam.	<u>Kou</u>
<i>Morinda citrifolia</i> L.	<u>Noni</u>
<i>Plectranthus australis</i> , R. Br.	<u>'Ala'alawainui</u>

*Pilikai--no flowers. Hunakai grows along the coast north of Hōnaunau; pilikai found in woods and damp places nearby.

Table 3.3
LIST OF PLANTS SUGGESTED FOR HŌNAUNAU AREA*

Scientific Name	Native Name	Family	Remarks
<i>Parmelia</i>	Unahe	Lichen	On rocks (N)
<i>Psilotum nudum</i>	Moa	Psilotum	(G)
<i>Asplenium nidus</i>	'Ēkaha	Fern	Possible in tree crotches (Pc)
<i>Dryopteris decora</i>	Manawahua?	Fern	On lava, Kona and Ka'ū (Hbd, MN)
<i>Polypodium phymatodes</i>	Laua'e	Fern	On lava, Kona and Ka'ū (Hbd, PNG**)
<i>Sadleria cyatheoides</i>	'Ama'u	Fern	Possible; alt. 100+ ft (MN)
<i>Sphenomeris chusana</i>	Pala'ā	Fern	Possible; grows in low, dry places (PN)
<i>Pandanus odoratissimus</i>	Hala	Pandanus	(G)
<i>Cenchrus hillebrandianus</i>	'Ume'alu, mau'u, kukū	Grass	Undesirable burgrass
<i>Heteropogon contortus</i>	Pili	Grass	(PG)
<i>Oplismenus hirtellus</i>	Honohono kukui	Grass	Most tropics (PN)
<i>Saccharum officinarum</i>	Kō	Grass	(P**)
<i>Cladium angustifolium</i>	'Uki	Sedge	Perhaps too low and dry (MN)
<i>Cladium meyenii</i>	'Abaniu	Sedge	Perhaps too low and dry (MN)
<i>Cyperus brevifolius</i>	Kili'o'opu	Sedge	All tropics (PN)
<i>Cyperus javanicus</i>	'Ehu'awa	Sedge	At Kalapana, needs some water (PN)
<i>Cyperus laevigatus</i>	Makaloa	Sedge	Needs marshy places
<i>Cocos nucifera</i>	Niu	Palm	(G**)
<i>Pritchardia affinis</i> var. <i>rhopalocarpa</i>	Loulu	Palm	Nāpō'opo'o, acc. J. F. Rock (PN)
<i>Alocasia macrorrhiza</i>	'Ape	Taro	(PC**)
<i>Colocasia esculenta</i>	Kalo	Taro	(Pv**)
<i>Cordyline terminalis</i>	KI	Lily	(PG**)
<i>Tacca leontopetaloides</i>	Pia	Tacca	(P**)
<i>Dioscorea alata</i>	Uhi	Yam	(P**)
<i>Dioscorea bulbifera</i>	Hoi	Yam	(PN)
<i>Dioscorea pentaphylla</i>	Pi'a	Yam	In woods only? (P**)
<i>Musa sapientum</i>	Mai'a	Banana	(Pc**)
<i>Curcuma domestica</i>	'Olona	Ginger	(Pc**)
? <i>Zingiber zerumbet</i>	'Awapuhi	Ginger	(Pc**)
<i>Peperomia leptostachya</i>	'Ala'alawainui	Pepper	On 'a'ā, Nāpō'opo'o (PN)

Table 3.3 (cont'd)

Scientific Name	Native Name	Family	Remarks
<i>Piper methysticum</i>	'Awa	Pepper	Too dry? (Pc**)
<i>Artocarpus incisus</i>	'Ulu	Fig	(P**)
<i>Broussonetia papyrifera</i>	Wauke	Fig	Grows at Kealakekua (PcM**g)
<i>Neraudia ovata</i>	Ma'aloa	Nettle	On hot, dry lava, also rain forests; alt. too high (MN)
<i>Santalum ellipticum</i> (littoral var.)	'Iliahi	Sandalwood	At Kailua, Nāpō'opo'o (Ng**)
<i>Chenopodium oahuense</i>	Āheheha	Spinach	Alt. 10-8,250 ft, Nāpō'opo'o (NP)
? <i>Nototrichium sandwicense</i>	Kulu'i	Amaranth	Alt. 45-2,500 ft
<i>Boerhavia diffusa</i>	Alena	Four o'clock (-)	
<i>Phytolacca brachystachys</i>	Pōpoko-kumai	Pokeweed	Alt. 50-6,000 ft
<i>Sesuvium portulacastrum</i>	'Ākulikuli	Carpet-weed	(-)
<i>Portulaca hawaiiensis</i>	'Ākulikuli	Purslane	Many by beach, South Pt. (PN)
<i>Portulaca lutea</i>	'Ākulikuli	Purslane	(PN)
<i>Portulaca oleracea</i>	'Ākulikuli kula	Purslane	(-)
<i>Argemone alba</i> var. <i>glauca</i>	Puskala	Poppy	(G)
<i>Capparis sandwichiana</i>	Puapilo, Maipilo	Caper	Common Hōnaunau vicinity (G**)
<i>Pittosporum bosmeri</i> var. <i>longifolium</i>	Hō'ewa	Pittosporum	Kapu'a, Kona; alt. 200 high? (MN)
<i>Osteomeles anthyllidifolia</i>	'Ūlei	Rose	e.g., [sic] near shore, Puna (PN)
<i>Caesalpinia bonduc</i>	Kākalaioa	Bean	The rarer sp., no stipules, seed yel.-gray; possible loc. (PN)
<i>Caesalpinia crista</i>	Kākalaioa	Bean	Possible loc.?; stipule seed gray; Ki'ilae
<i>Canavalia galeata</i>	'Āwikiwiki	Bean	Grows at Kealakekua (MN; N. Carlson)
<i>Cassia gaudichaudii</i>	Kolomona	Bean	Formerly grew near sea (N)
<i>Erythrina sandwicensis</i>	Wiliwili	Bean	(Pg**)
<i>Mucuna gigantea</i>	Kā'e'e'e	Bean	Woods and shore?, Puna, Ka'ū (PN)
? <i>Sesbania tomentosa</i>	'Ōhai	Bean	Possible
<i>Tephrosia purpurea</i>	'Aubuhu, 'aubola	Bean	All H. I. near coast (PN)
<i>Vigna marina</i>	Nanea	Bean	Near beach; nat. and many tropics (PN)

Table 3.3 (cont'd)

Scientific Name	Native Name	Family	Remarks
<i>Tribulus cistoides</i>	Nohu	Tribulus	In N. Pacific (PNHbd)
<i>Aleurites moluccana</i>	Kukui	Spurge	May be native (KHbd**)
<i>Antidesma pulvinatum</i>	Hame, ha'a	Spurge	Kapu'a, Kona; but alt. too high (MN)
<i>Euphorbia degeneri</i>	'Akoko	Spurge	Near shore (PN)
<i>Dodonaea viscosa</i>	'A'ali'i	Soapberry	Recorded at alts. 700+ ft (PNG**)
<i>Colubrina asiatica</i>	'Anapanapa	Buckthorn	Near shore (PN)
<i>Colubrina oppositifolia</i>	Kauila	Buckthorn	Alt. too high (MN)
? <i>Gossypium tomentosum</i>	Ma'o	Hibiscus	None in herb. from Hawai'i, but from four other islands; probably not on Hawai'i (N)
<i>Hibiscus tiliaceus</i>	Hau	Hibiscus	(Pg**)
<i>Sida fallax</i> (wild forms)	'Ilima	Hibiscus	(PG)
<i>Thespesia populnea</i>	Milo	Hibiscus	(P**)
<i>Calophyllum inophyllum</i>	Kamani	Mangosteen	(P**)
<i>Wikstroemia uva-ursi</i>	'Akia ?	Akia	Puna, near the coast (PNHbd)
<i>Eugenia malaccensis</i>	'Obi'a 'ai	Myrtle	Near shore not possible, too dry; Hōnaunau alt. too low (MN**)
<i>Metrosideros collina</i> <i>polymorpha</i>	'Obi'a lehua	Myrtle	Formerly on Ka'ū cliffs near sea (MN)
<i>Reynoldsia sandwicensis</i>	'Ohe	Panax	Grows on lava Ke'ei (PG)
<i>Plumbago zeylanica</i>	'Ili'a'e	Leadwort	(PG)
<i>Diospyros ferrea</i> var. <i>pubescens</i>	Lama	Ebony	Kona, Ka'ū, Hilo (M)
<i>Cuscuta sandwichiana</i>	Kauna'oa, Kauna'oa Kahakāi, Kauna'oa lei	Morning- glory	(Pg**)
<i>Ipomoea batatas</i>	'Uala	Morning- glory	
<i>Ipomoea cairica</i>	Kowali 'ai	Morning- glory	Herbm. spm. from near Hōnaunau (PN)
<i>Ipomoea congesta</i>	Kowali 'awa	Morning- glory	Herbm. spm. from near Hōnaunau (PN)
<i>Ipomoea pes-caprae</i>	Pōhuehue	Morning- glory	(PG**)
<i>Ipomoea tuboides</i>	Kowali	Morning- glory	South Pt. (PN)
<i>Jacquemontia</i> <i>sandwicensis</i>	Pa'ū-o- Hi'iaka	Morning- glory	Vine on rocks (PN)

Table 3.3 (cont'd)

Scientific Name	Native Name	Family	Remarks
<i>Stictocardia campanulata</i>	Pilikai	Morning-glory	Herbm. spm. from near Hōnaunau (PN)
<i>Cordia subcordata</i>	Kou	Heliotrope	(G**)
<i>Heliotropium anomalum</i> var. <i>argenteum</i>	Hinahina	Heliotrope	Grows Kailua and North on beach (-)
<i>Heliotropium curassavicum</i>	Nena, Kipūkai	Heliotrope	(-)
<i>Vitex trifolia</i> var. <i>simplicifolia</i>	Pohinahina	Verbena	(PN)
<i>Lycium sandwicense</i>	'Ae'ae, 'Ohalo_kai	Tomato	Probably at Hōnaunau (PN)
<i>Solanum nodiflorum</i>	Pōpōlo	Tomato	Native acc. to Hbd (KN)
<i>Myoporum sandwicense</i>	Naio	Naio	Grows Littoral at Miloli'i, S. Kona from near beach to 9,500 ft (PNg**)
<i>Plantago princeps</i> var. <i>laxifolia</i>	Laukahi	Plantain	Near shore on Hawai'i (PNHbd)
<i>Canthium odoratum</i>	Alehe'e	Coffee	(Pg)
<i>Morinda citrifolia</i>	Noni	Coffee	(PG)
<i>Legenaria siceraria</i>	Ipu	Gourd	(Pg**)
<i>Bidens skottsbergii</i> var. <i>conglutinata</i>	Ko'oko'olau	Daisy	Low alt., Pāhoeh, Puna, perhaps Hōnaunau; various sp. low, lava country in N. and S. Kona (PN)
<i>Gnaphalium sandwicense</i>	'Epa'ena	Daisy	Alts. 15-10,000 ft (PN)
<i>Lipochaeta integrifolia</i>	Nehe	Daisy	South Pt., common; another sp. in Kona

*Compiled by Marie C. Neal.

NOTES: All native except those indicated by **.
 **, Introduced by natives prehistorically, according to Hillebrand and others.
 G, Native plants found in 1957 by Amy Greenwell.
 g, Native plants possibly present (Amy Greenwell).
 -, Native plants found on sand dunes, Kailua, Hawai'i, June 1957, by L. W. Bryan.
 K, Mrs. Pukui: Will grow midway, between beach and mauka.
 M, Mrs. Pukui: Will grow mauka.
 P, Mrs. Pukui: Will grow near beach.
 Pv, Mrs. Pukui: Some varieties will grow.
 Pc, Mrs. Pukui: Will grow with care.
 N, Plants checked as to possibility, in literature and by actual herbarium specimens, by Marie C. Neal.
 Hbd, Hillebrand's (1888) Flora of the Hawaiian Islands.

Limu (algae) and other low forms of plant life--lichens (see *Parmelia*), hepatics, mosses, fungi--may be the same as in prehistoric times. Ordinarily, these forms of plant life are not adapted to planting or transplanting.

Report 4

INSECTS OF HŌNAUNAU

Amy Suehiro

Except for an occasional kou tree (*Cordia subcordata*), a couple of *Pritchardia* palms, and coconut trees, little remains of the native vegetation that once must have covered the Hōnaunau park area. The destruction of the forest was speeded by the introduction of domesticated animals which destroyed the undergrowth, and the subsequent invasion of introduced grasses and other plants which prevented the regrowth of the native plants. With the disappearance of the native plants went along many of the endemic insects that were associated with them. A few of these insects might have been able to adapt themselves to changing environments and new host plants if it had not been for the introduction of various predaceous and parasitic insects. One species in particular, the abundant and widespread ant, *Pheidole megecephala*, has caused the destruction of countless species of endemic insects. Early entomologists observed that as *Pheidole* invaded an area, the native insects, especially the beetles, disappeared before it.

At the present time, the insect fauna of the Hōnaunau park area consists, in the main, of common lowland species, either immigrants which have come in accidentally since the arrival of man in various ways such as on imported plants or with cargo, or purposely-introduced species brought in for work in biological control. A smaller percentage consists of the native species--either those that are considered endemic and found nowhere else but in the Hawaiian Islands, or those which are indigenous, species found in Hawai'i and some other part of the world as well, but which got here under their own power before the advent of man.

A SUMMARY OF INSECT FAUNA

Although Kona, as a whole, has been collected in quite extensively, insect records are relatively few for the Hōnaunau park area. Of a total of 809 species recorded for the entire district, only 150 species have been collected in the park area, and of these, 72 are considered native to the islands.

Chilopoda. Only one centipede has been recorded from Hōnaunau--the familiar, large brown species which is often found under stones or in dark, damp places.

Other Arthropods. No millipedes, pseudoscorpions, mites, or scorpions have been reported from the area. Though 28 species of spiders are found in Kona, none have been recorded so far from Hōnaunau.

Orthoptera. Five species of cockroaches are found in the park area. *Periplaneta americana* and *P. australasiae* are two large household pests, extremely common all over the islands. *Neostylopyga rhombifolia*, first recorded from Hawai'i in 1862, is a large flightless species; another, *Allacta similis*, is an immigrant from Australia, though it was earlier considered endemic to Hawai'i. The fifth species, a prettily-marked small insect, is a garden roach, and seldom found in the house. One grasshopper and two cricket species collected at Kealakekua are endemic. As they are flightless and arboreal, usually attached to a specific host plant, it is unusual to find them collected so far from their usual habitat, and in such decidedly unfavorable surroundings.

Isoptera. The very destructive drywood termite, *Cryptotermes brevis*, and the lowland tree termite, *Kalotermes immigrans*, are found in Kealakekua. Both have been known in the islands for over three-quarters of a century.

Dermoptera. Four species of earwigs are reported from Hōnaunau and Kealakekua. All are immigrants, and because of their carnivorous habits are usually considered as beneficial.

Embiidina. The little silk-spinning embiid has also been reported from the park, and it is common in the drier lowlands. It is small, dark, and seldom seen, and of no economic importance.

Hemiptera-Heteroptera. Surprisingly enough, all of the 10 species of leafhoppers collected in the park area are endemic. Though no elevations are given on the specimens examined, they were collected on native plants such as *Straussia*, *Myoporum*, and *Maba*, and must have been found in the lower forests back of Hōnaunau. The two species of aphids are immigrants, although one was collected on young *kōa* leaves.

Five of the seven species of true bugs are endemic. They include members of the *Nysius-Neseis* group which, though largely endemic, show remarkable tolerance to the presence of the ubiquitous *Pheidole* ant, and are able to build up large populations in lowland areas. They also show a marked facility for adapting themselves to changing food plants, many of them living and breeding on introduced weeds as well as their original native hosts. *Halobates sericeus*, the endemic water strider, has been collected at sea far from land. Though little is known of its life history or habits, it is thought that the entire life cycle is spent on the water, eggs being laid on drifting pieces of seaweed or other floating objects. They are seldom seen except after a strong Kona storm when they are driven on shore in numbers.

Zelus renardii, the large assassin bug, is common in the lowlands where it is a voracious feeder on other insects.

Neuroptera. Both species of green lace-wing flies found at Kealakekua are endemic. Though usually found at higher altitudes, they occasionally are found in the lowlands, feeding on a variety of small insects.

Odonata. One species of dragonfly, the cosmopolitan green darner, was caught at Hōnaunau, but the other common lowland species are strong fliers and undoubtedly present. Only one species of the many native little damselflies of the genus *Megalagrion* has been collected at Hōnaunau; this species is common and often found from sea level to the native forest, breeding in streams and forest pools.

Coleoptera. Except for an endemic species of wood borer, *Xyletobius timberlakei*, and a ladybeetle of doubtful endemicity, all 23 species of beetles from the park area are immigrants, the native species having vanished with their host plants. The *Pheidole* ant, too, may have been a contributing factor in their disappearance, bearing out the statement that the native beetles vanish as *Pheidole* takes over, leaving the field to the immigrant species which seem to be unaffected by it. The beetles collected in the park area are, for the most part, pests which do much damage to food crops such as sweet potatoes, eggplants, beans, and potatoes. Others bore in dead wood, while the scarab, *Aphodius lividus*, feeds and breeds in manure.

Lepidoptera. Of the butterflies, only the immigrant bean butterfly, *Lampides boeticus*, has been collected at Hōnaunau, but undoubtedly, some of the seven other species taken in Kona can be found there. They are mostly (all) strong fliers, and common on plants found throughout the region. Twenty species of moths are recorded; of these, 11 are native. Most of them were collected about the 1,200-ft level, presumably past the elevation where *Pheidole* and other predators are most effective. Of the immigrant species, *Hymenia recurvalis* is the common best webworm of the mainland; a comparatively late arrival is the giant black witch moth, *Erebus odora*, which was first observed in the early 1930s, and feeds on monkeypod foliage.

Diptera. The flies found in the park are immigrants for the most part. The crane flies, however, have four native species out of five represented in the Hōnaunau collection; one, *Limonia parkinsi*, is an indigenous species also found in Samoa and Tahiti. Both species of day mosquito are represented; they are widely distributed in the tropics and subtropics. *Aedes aegypti* is the yellow fever mosquito, and both are carriers of dengue fever. The night mosquito, *Culex*, has not yet been collected from Kona, though undoubtedly present, as it is the commonest species in the lowlands.

Hymenoptera. Native bees are represented by species from the general *Odynerus*, *Nesoproctis*, and *Xenobroch*. Unlike most native insects, these

genera are frequently found in the lowlands--Nesoproasopis, in particular, may be found in hot, dry, coastal regions, often forming burrows in the ground or in dry twigs and hollow branches, and visiting immigrant plants for pollen. Species of Odynerus are also found in varying situations. They are all caterpillar hunters, attacking various introduced species. They show an unusual adaptation to locally changing conditions, not only shifting from native to introduced plants for pollen and honey, but also from caterpillars of native species to those of various foreign varieties. On the coast and lowlands, large colonies often occur, for some reason undisturbed by Pheidole ants.

Echthromorpha fuscator, a very common and conspicuous caterpillar wasp, was one of the very first insects to be collected and described from the Hawaiian Islands. Though no record was kept of the collector, it may have been obtained by David Nelson, the botanist with Captain Cook's Third Expedition who collected on Hawai'i. It was studied and described by Fabricius in 1793.

The greater number of Hymenoptera found in the park are immigrants, many of them purposely introduced for biological control work. Brachymeria obscurata was introduced from Japan in 1895 as a general parasite of lepidopterous larvae. Both species of Amblyteles were introduced from California to prey on armyworms and cutworms. The little cockroach wasp, Evania sericea, was described from O'ahu in 1883, but is also known in Australia. It is common around houses, searching for egg cases of cockroaches to parasitize. Only two of the five species of ants recorded from Kona have been found in the park area: one, the abundant Pheidole ant, the other a blackish ant which is known locally as the "crazy ant" because of its rapid, erratic, and seemingly meaningless movements. Widely distributed in the islands, it comes from the Indo-malayan and neotropical regions.

The most abundant bee in the Hōnaunau area, as well as in all the islands, is the familiar honey bee, Apis mellifera. The first bees were introduced from California in 1857, and soon spread throughout the islands.

The following checklist (Table 4.1) of insects and related arthropods includes all species which have been reported to occur within the limits of the Hōnaunau park area, which, for the purposes of this report, includes localities along the Kona coast from Kealakekua Bay to Ki'ilae Bay, and mauka, to the lower boundaries of the Hōnaunau park area at an elevation of about 2,500 ft. Records are taken from data on specimens in the collections of Bishop Museum and of the Experiment Station of the Hawaiian Sugar Planters' Association, as well as from the Museum catalogs which list references to all insects described or reported from the Hawaiian Islands. An asterisk before the species name indicates that it is native to the Hawaiian Islands.

Table 4.1
 INSECTS AND RELATED ARTHROPODS REPORTED TO OCCUR
 WITHIN THE HÖNAUNAU PARK AREA

Taxon	Remarks
CHILOPODA (Centipedes)	
Hemicopidae	
<u>Scolopendra subspinipes</u> Leach	Kona: City of Refuge; under stones
HEXAPODA (Insects)	
ORTHOPTERA	
Blattidae (Cockroaches)	
<u>Allacta similis</u> (Saussure)	Kona: Kealakekua; immigrant from Australia
<u>Euthyrrhapha pacifica</u> (Coquebert)	Kona: Hönaunau; first recorded in 1882
<u>Naostylopyga rhombifolia</u> (Stol)	Kona: Hönaunau; Indo-malayan, now tropicopolitan
<u>Periplaneta americana</u> (Linnaeus)	Kona: widely distributed and abundant
<u>Periplaneta australasiae</u> (Fabricius)	Kona: widely distributed and abundant
Tettigoniidae (Long-horned grasshoppers)	
<u>Banza nitida</u> (Brunner)	Kona: Kealakekua
Gryllidae (Crickets)	
* <u>Paratrigonidium gracile</u> Perkins	Kona: Kealakekua; beneath bark of trees
* <u>Paratrigonidium varians</u> Perkins	Kona: Kealakekua
<u>Metioche vittaticollis</u> Stal	Kona: Hönaunau; in grass and low vegetation
DERMAPTERA (Earwigs)	
<u>Anisolabis sternonoma</u> Borelli	Kona: Hönaunau
<u>Chelisoches morio</u> Fabricius	Kona: Hönaunau
<u>Euborellia annulipes</u> (Lucas)	Kona: Hönaunau
<u>Labia pilicornis</u> (Motschulsky)	Kona: Kealakekua
ISOPTERA (Termites)	
Kalotermitidae	
<u>Cryptotermes brevis</u> (Walker) (drywood termite)	Kona: Kealakekua; there before 1889
<u>Kalotermes immigrans</u> Snyder (lowland tree termite)	Kona: Kealakekua; known in islands since 1889
EMBIIDINA	
<u>Oligotoma saundersii</u> (Westwood)	Kona: Miloli'i (near Hönaunau)
HOMOPTERA	
Cicadellidae (Leafhoppers)	
* <u>Balclutha volcanicola</u> Kirkaldy	Kona: Hönaunau; Kealakekua; usually on <u>Eragrostis</u>
* <u>Nesophrosyne eburneola</u> Osborn	Kona: Kealakekua; on <u>Straussia</u>
* <u>Nesophrosyne insularis</u> Kirkaldy	Kona: Kealakekua; on <u>Clermontia oerulea</u>
Cixiidae	
* <u>Oliarus heveheva</u> Kirkaldy	Kona: Ho'okona

Table 4.1 (cont'd)

Taxon	Remarks
Delphacidae (Leafhoppers)	
* <u>Aloha myoporica</u> Kirkaldy	Kona: Kealahakua; ex <u>Myoporum sandwicense</u>
* <u>Kelisia paludum</u> Kirkaldy	Kona: Hōnaunau
* <u>Leialoha lehuae hawaiiensis</u> Muir	Kona: Kealahakua; ex <u>Acacia koa</u>
* <u>Nesosydne rubescens pele</u> Kirkaldy	Kona: Kealahakua; ex <u>Acacia koa</u>
* <u>Nesosydne umbratica</u> Kirkaldy	Kona: Kealahakua; ex <u>Clermontia coerulea</u>
* <u>Nesothoë maculata</u> (Muir)	Kona: Ho'okena; ex <u>Maba sandwicensis</u>
Aphididae (Plant lice)	
* <u>Amphorophora sonchi</u> (Oestlund)	Kona: region around Hōlualoa; on <u>Sonchus oleraceus</u> leaves
* <u>Toxoptera aurantii</u> (Boyer de Fons.) (Black citrus aphid)	Kona: Keakea; at forest edge; on young 'Ōhi'a leaves; widespread, long known in islands
HETEROPTERA (True bugs)	
Lygaeidae (Plant bugs)	
* <u>Nesais nitidus pipturi</u> Usinger	Kona: Kealahakua; in forest
* <u>Nysius terrestris</u> Usinger	Kona: Hōnaunau; usually on pigweed; many other hosts
* <u>Oechalia virgula</u> Van Duzee	Kona: Kealahakua; on <u>Pipturus albidus</u>
Reduviidae	
* <u>Zelus renardii</u> (Kolenati) (Assassin bug)	Kona: Hōnaunau; a common, widespread predaceous insect
Nabidae (Damsel bugs)	
* <u>Nabis cepsiformis</u> Germar	Kona: Nāpū'opo'o; on various truck and garden crops; common and widespread
Miridae (Leaf bugs)	
* <u>Sulamita lunulata</u> Kirkaldy	Kona: Kealahakua; on <u>Freyinetia arborea</u>
Gerridae (Water striders)	
* <u>Halobates sericeus</u> Eschscholtz	Kona: waters off Hōnaunau
NEUROPTERA (Lacewing flies)	
Chrysopidae (Green lacewings)	
* <u>Anomalochrysa maclachlani</u> Blackburn	Kona: Kealahakua; on <u>Myoporum sandwicense</u>
* <u>Anomalochrysa pinceps</u> Perkins	Kona: Kealahakua; beating fern leaves
ODONATA	
ANISOPTERA (Dragonflies)	
Aeshnidae	
* <u>Anax junius</u> (Drury) (Common green darner)	Kona: Hōnaunau; a widespread, strong flier; probably in islands for several hundred years as a natural immigrant

Table 4.1 (cont'd)

Taxon	Remarks
ZYGOPTERA (Damsel flies)	
Coenagrionidae	
* <u>Megalagrion nigrohamatum</u> <u>nigrolineatum</u> (Perkins)	Kona: Hōnaunau
COLEOPTERA (Beetles)	
Oedemeridae	
<u>Sessinia livida</u> Fabricius	Kona: Hōnaunau; breeding in old wood
Elateridae (Click beetles)	
<u>Melanoxanthus melanocephalus</u> Thunberg	Kona: Kealakekua
Nitidulidae (Souring beetles)	
<u>Carpophilus maculatus</u> Murray	Kona: Nāpō'opo'o
Anobiidae	
* <u>Xyletobius timberlakei</u> Perkins	Kona: Kealakekua; on <u>Clermontia</u> and <u>Byronia</u>
Bostrichidae (Powderpost beetles)	
<u>Xylopsocus castanoptera</u> (Fairmaire)	Kona: Kealakekua
Coccinellidae (Lady beetles)	
<u>Curinus corymbosus</u> Mulsant	Kona: Kealakekua
<u>Hyperaspis jocosus</u> (Mulsant)	Kona: Hōnaunau
* <u>Scymnus ocellatus</u> Sharp	Kona: Hōnaunau
<u>Scymnus uncinatus</u> Sicard	Kona: general region around Hōlualoa; probably predatory on <u>Pseudococcus</u>
Cerambycidae (Long-horned beetles)	
<u>Ceresium simplex</u> (Gyllenhal)	Kona: Hōnaunau; in dead branches
<u>Cyllene grinicornis</u> Chevrolat	Kona: Kealakekua; widespread algaroba beetle
<u>Leptocheirus obsoletus</u> Thoms.	Kona: Kealakekua
<u>Prosgplus bankii</u> (Fabricius)	Kona: Nāpō'opo'o; Kealakekua
Chrysomelidae (Leaf beetles)	
<u>Lema trilineata californica</u> Schaeffer (Striped potato beetle)	Kona: Hōnaunau; on eggplant, potato, and other solanums
<u>Octotoma spabripennis</u> Guerin (Lantana leaf miner)	Kona: Ho'okena; released May 1954
Bruchidae (Pea and bean weevils)	
<u>Bruchus proscopis</u> Le Conte	Kona: Hōnaunau
<u>Bruchus pruininus</u> Horn	Kona: Nāpō'opo'o; widely distributed in islands; infesting legume seeds
<u>Bruchus sallei</u> Sharp	Kona: Kawaihae to Nāpō'opo'o; in green and ripe algaroba pods
<u>Caryoborus agnata</u> Fabricius	Kona: Nāpō'opo'o; originally from India; first observed in islands about 1906
Curculionidae (Weevils)	
<u>Cylas formicarius elegantulus</u> (Summers) (Sweet-potato weevil)	Kona: Nāpō'opo'o; serious pest of sweet potatoes and other Convolvulaceae
<u>Dryophthorus</u> species	Kona: Hōnaunau

Table 4.1 (cont'd)

Taxon	Remarks
Scolytidae (Bark beetles)	
<u>Hypothenemus exuditus</u> Westwood	Kona: Nāpō'opo'o
<u>Poecilips persicae</u> (Hopkins)	Kona: Keōpū; ex avocado
<u>Kyleborus confusus</u> Eichhorn	Kona: Ka'awaloa
Scarabaeidae (Dung beetles)	
<u>Aphodius lividus</u> Olivier	Kona: Hōnaunau; Kealakekua; breeding in manure
LEPIDOPTERA	
RHOPALOCERA (Butterflies)	
Lycaenidae (Blues)	
<u>Lampides boetica</u> (Linnaeus) (Bean butterfly)	Kona: Hōnaunau
HETEROCERA (Moths)	
Tortricidae	
* <u>Cryptophlebia illepida fulva</u> Walsingham	Kona: Ka'awaloa; 1,500 ft
<u>Crocidosema plebeiana</u> Zeller	Kona: Ka'awaloa; 1,500 ft
* <u>Tortrix chlorocalla</u> Walsingham	Kona: Ka'awaloa; 1,500 ft
Carposinidae	
* <u>Heterocrossa dispar</u> Walsingham	Kona: Ka'awaloa; 1,500-2,000 ft
* <u>Heterocrossa solutella</u> Walsingham	Kona: Ka'awaloa; 2,000-3,000 ft
Cosmopterygidae	
* <u>Batrachedra microstigma</u> Walsingham	Kona: Ka'awaloa; above 2,000 ft
Gelechiidae	
<u>Stoberhinus testaceus</u> Butler	Kona: Ka'awaloa
Hyponomeutidae	
* <u>Hyposmocoma domicolens</u> (Butler)	Kona: Ka'awaloa; 1,500 ft
* <u>Hyposmocoma longitudinalis</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
* <u>Hyposmocoma vermiculata</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
* <u>Prays fulvocanellus</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
Pyraustidae	
<u>Hymenia recurvalis</u> (Fabricius) (Beet webworm)	Kona: Hōnaunau; in beets and spinach
* <u>Phlyctaenia argoscelis</u> (Meyrick)	Kona: Hōnaunau
* <u>Scoparia siderina</u> Meyrick	Kona: Hōnaunau
Tineidae	
* <u>Ereunetis mioscula</u> Walsingham	Kona: Ka'awaloa; to 2,000 ft
* <u>Opogona aurisquamosa</u> (Butler)	Kona: Ka'awaloa; to 2,000 ft
<u>Setomorpha rutella</u> Zeller	Kona: Ka'awaloa; 1,500 ft
<u>Tinea fuscipunctella</u> Haworth	Kona: Ka'awaloa; 1,500 ft
Geometridae	
* <u>Eucymatoge monticolans</u> (Butler)	Kona: Hōnaunau
Noctuidae	
<u>Erebus odora</u> (Linnaeus) (Black witch)	Kona: Hōnaunau; larvae in <u>Cassia nodosa</u>

Table 4.1 (cont'd)

Taxon	Remarks
DIPTERA (Flies)	
Tipulidae (Crane flies)	
* <u>Erioptera (Trimicra) lateralis</u> (Grimshaw)	Kona: Hōnaunau
<u>Erioptera (Trimicra) pilipes</u> Fabricius	Kona: Hōnaunau; Ka'awaloa; 1,500 ft
* <u>Limonia (Dicranomyia) hawaiiensis</u> (Grimshaw)	Kona: Hōnaunau; Kealahakua
* <u>Limonia (Dicranomyia) kauaiensis</u> (Grimshaw)	Kona: Kealahakua
* <u>Limonia (Limonia) perkinsi</u> (Grimshaw)	Kona: Kealahakua
Culicidae (Mosquitoes)	
<u>Aedes aegypti</u> (Linnaeus)	Kona: Kealahakua
<u>Aedes albopictus</u> Skuse	Kona: Ki'ilae Bay
Ceratopogonidae	
* <u>Dasyhelea calvescens</u> Macfie	Kona: Ki'ilae Bay; Hōnaunau; on rocks
Sciariidae	
* <u>Sciara molokaiensis</u> (Grimshaw)	Kona: Hōnaunau
Dorilaeidae	
* <u>Dorilas obscuratus</u> Hardy	Kona: Kealahakua; on <u>Clermontia</u>
Syrphidae (Hover flies)	
<u>Tubifera arypum</u> (Fabricius)	Kona: Nāpō'opo'o
<u>Volucella (Ornidia) obesa</u> (Fabricius)	Kona: Ki'ilae Bay
Lauaxaniidae	
<u>Hogoneura unguiculata</u> (Kertész)	Kona: Hōnaunau
Canacidae	
<u>Canaceoides nudata</u> (Cresson)	Kona: Ki'ilae Bay
Sphaeroceridae	
* <u>Limosina (Opacifrons) aequalis</u> (Grimshaw)	Kona: Pauahi (8 mi E. of Captain Cook)
Otitidae	
<u>Euxesta annonae</u> (Fabricius)	Kona: Hōnaunau
Piophilidae	
<u>Piophila casei</u> Linnaeus (Cheese skipper)	Kona: Kēōkea; widespread pest of stored cheeses
Dolichopodidae	
<u>Sciapus pachygyna</u> Macquart	Kona: Nāpō'opo'o
Ephydriidae	
<u>Lytogaster graxida</u> (Loew)	Kona: Pauahi (8 mi E. of Captain Cook)
Chloropidae	
<u>Cadrema pallida</u> (Loew)	Kona: Hōnaunau
Calliphoridae (Blowflies)	
<u>Chrysomya rufifacies</u> (Macquart) (Sheep maggot fly)	Kona: Hōnaunau; first reported from islands in 1918
<u>Chrysomya vomitoria</u> (Linnaeus)	Kona: Kēōkea

Table 4.1 (cont'd)

Taxon	Remarks
HYMENOPTERA (Bees, wasps, ants)	
Braconidae	
* <u>Chelonus blackburni</u> Cameron	Kona: Hōnaunau; in coffee field; parasitic on moth larvae, particularly the potato stem borer
* <u>Apanteles trifasciatus</u> Muesbeck	Kona: Nāpō'opo'o
* <u>Heterospilus prosopidis</u> Bridwell	Kona: Hōnaunau
Ichneumonidae	
<u>Amblyteles koebeli</u> (Swezey)	Kona: Kēōkea
<u>Amblyteles purpuripennis</u> (Cresson)	Kona: Kēōkea
<u>Echthromorpha fuscator</u> (Fabricius)	Kona: Ki'ilae Bay
<u>Zuletopygus flavo-orbitalis</u> (Cameron)	Kona: Nāpō'opo'o; bred ex <u>Plutella</u> larvae
Eulophidae	
* <u>Burksia viridimaculata</u> Fullaway	Kona: Hōnaunau
Encyrtidae	
* <u>Adelencyrtus odonaspidis</u> Fullaway	Kona: Hōnaunau
* <u>Anagyrus swezeyi</u> Timberlake	Kona: Hōnaunau
* <u>Calolelaps coerules</u> Timberlake	Kona: Kealakekua; on naio
* <u>Coelopencyrtus swezeyi</u> Timberlake	Kona: Kealakekua; bred from <u>Odynerus nigripennis</u>
<u>Encyrtus barbatus</u> Timberlake	Kona: Nāpō'opo'o
<u>Encyrtus infelix</u> (Embleton)	Kona: Nāpō'opo'o
Eurytomidae	
* <u>Eurytoma tephritidis</u> Fullaway	Kona: Kealakekua
Chalcidae	
<u>Brachymeria obscurata</u> (Walker)	Kona: Ki'ilae Bay; in coffee fields
<u>Brachymeria polynesiensis</u> (Cameron)	Kona: Hōnaunau
* <u>Dirhinus giffardii</u> Silvestri	Kona: Hōnaunau
<u>Stomatoceras partorum</u> Girault	Kona: Hōnaunau
Figitidae	
<u>Eucocila impatiens</u> Say	Kona: Hōnaunau; parasite of sarcophagids
Evaniidae (Ensign flies)	
<u>Evania appendigaster</u> (Linnaeus) (Cockroach parasite)	Kona: Ki'ilae Bay; Hōnaunau
Bethyloidae	
* <u>Sclerodermus muiri</u> Bridwell	Kona: above Kealakekua; in <u>Straussia</u> , a wood
Formicidae (Ants)	
<u>Paratrechina longicornis</u> Latreille (Crazy ant)	Kona: Kēōkea; tropicopolitan, especially in Indo-malaya and the Neotropics
<u>Pheidole megacephala</u> (Fabricius) (Common black ant)	Kona: Hōnaunau, and common in lowlands of all islands; first observed about 1880; extremely prolific nuisance and pest

Table 4.1 (cont'd)

Taxon	Remarks
Vespidae (Wasps)	
* <u>Odynerus cooki</u> Perkins	Kona: Kealahakua; close to monument
* <u>Odynerus heterochromus</u> Perkins	Kona: Kōōkea
* <u>Odynerus mesospilus</u> Perkins	Kona: Hōnaunau
* <u>Odynerus molokaiensis</u> Perkins	Kona: Hōnaunau; Nāpō'opo'o
* <u>Odynerus obscura-punctatus</u> (Perkins)	Kona: Hōnaunau
* <u>Odynerus nigripennis</u> (Holmgren)	Kona: Hōnaunau; Nāpō'opo'o
* <u>Odynerus sociabilis</u> Perkins	Kona: Kōōkea
<u>Nesodynerus rudolphi</u> (Dalla Torre)	Kona: Hōnaunau
<u>Polistes hebraeus</u> Fabricius	Kona: Hōnaunau
Sphecidae	
* <u>Xenocrabro hawaiiensis</u> Perkins	Kona: Hōnaunau; on Ilex
<u>Xenocrabro polynesiensis</u> (Cameron)	Kona: Kōōkea
Colletidae	
* <u>Nesoprosopis anthracina</u> (Perkins)	Kona: Kealahakua Bay region
* <u>Nesoprosopis obscurata</u> Perkins	Kona: Kealahakua, rare; Kōōkea
* <u>Nesoprosopis rubrogaudatus</u> Blackburn and Cameron	Kona: Kōōkea
* <u>Nesoprosopis coniceps</u> Perkins	Kona: Kōōkea
* <u>Nesoprosopis simplex</u> Perkins	Kona: generally distributed around lowlands, up to Kōōkea <u>mauka</u>
Apidae	
<u>Apis mellifera</u> Linnaeus (Honeybee)	Kona: Hōnaunau region and widespread throughout islands; first introduced into islands from California in 1857

*Species is native to the Hawaiian Islands.

The following list (Table 4.2) includes species which have been reported or collected from "Kona" or "South Kona" without further data. As many of them are widely-distributed, lowland forms, it is quite probable that some of them were collected in the Hōnaunau park area.

Table 4.2
SPECIES REPORTED OR COLLECTED FROM KONA OR SOUTH KONA

Taxon	Remarks
CHILOPODA (Centipedes)	
Hemicoptidae	
<u>Lamycetes fulvicornis hawaiiensis</u> Silvestri	Kona: usually in mountains
<u>Pleotarsobius heterotarsus</u> (Silvestri)	Kona
<u>Scolopendra subspinipes</u> Leach (common large centipede)	Kona: City of Refuge; under stones
DIPLOPODA (Millipedes)	
Julidae	
<u>Aporodesmus wallacei</u> Silvestri	Kona: 2,000 ft
<u>Julus luscus</u> Meinert	Kona
<u>Trigoniulus lumbricinus</u> (Gerst)	Kona
PSEUDOSCORPIONS	
Cheliferidae	
<u>Eumecopernes hawaiiensis</u> (Simon)	Kona
ARACHNIDA	
ACARINA (Mites)	
<u>Phyllocoptes oleivorus</u> Ashmead	Kona: on <u>Citrus</u>
<u>Hoplodermas dasyus</u> Duges (Moss mites)	Kona
<u>Neoliodes theleproctus</u> Herm	Kona
<u>Oribata oriformis</u> Pearce	Kona
SCORPIONIDA (Scorpions)	
<u>Chelifer hawaiiensis</u> Simon	Kona
ARANEIDA (Spiders)	
Clubionidae	
<u>Heteropoda regia</u> (Fabricius)	Kona: the large, brown, house spider; native to the Orient but now widespread
Theridiidae	
<u>Argyrodes argyrodes</u> Walckenaer	Kona: in mountains
<u>Argyrodes hawaiiensis</u> Simon	Kona
Sicariidae	
<u>Theridion grillator</u> Simon	Kona
<u>Theridion melipum</u> Simon	Kona
<u>Theridion praetextum</u> Simon	Kona
<u>Theridion rufipes</u> Simon	Kona
<u>Teutana grossa</u> Koch	Kona
Attidae	
<u>Ascyltus penicillatus</u> Koch	Kona: on vanilla
<u>Hasarius adansonii</u> (Audouin)	Kona
<u>Sandalodes cruciatus</u> Simon	Kona

Table 4.2 (cont'd)

Taxon	Remarks
<u>Sandalodes navatus</u> Simon	Kona
<u>Sandalodes pubens</u> Simon	Kona
Thomisidae	
<u>Misumena anguliventris</u> Simon	Kona
<u>Misumena nesiotus</u> Simon	Kona
<u>Adrastidia stigmatica</u> Simon	Kona
<u>Diaga insulana</u> Keyserling, and varieties	Kona
<u>Pagiopalpus atomarius</u> Simon	Kona
<u>Synaema dimidiatipes</u> Simon	Kona
<u>Synaema impotens</u> Simon	Kona
<u>Synaema baevigerum</u> Simon	Kona
Lycosidae	
<u>Lycosa hawaiiensis</u> Simon	Kona
<u>Syroloma major</u> Simon	Kona
Argiopidae	
<u>Microneta insulana</u> Simon	Kona
<u>Cnephalocotes simpliciceps</u> Simon	Kona
<u>Tetragnatha restricta</u> Simon	Kona
<u>Tetragnatha sobrina</u> Simon	Kona
<u>Tetragnatha uncinifera</u> Simon	Kona
HEXAPODA (Insects)	
COLLEMBOLA (Springtails)	
Entomobryidae	
<u>Entomobrya insularis</u> Carpenter	Kona: 2,000 ft
<u>Lepidocyrtus heterophthalmus</u> Carpenter	Kona: 2,000 ft
<u>Salina maculata</u> Folsom	Kona: on coffee leaves
ORTHOPTERA	
Blattidae (Cockroaches)	
<u>Allacta similis</u> (Saussure)	Kona: Kealakekua
<u>Eoblatte populata</u> (Stal)	Kona
<u>Euthyrhapha pacifica</u> (Coquebert)	Kona: Hōlualoa
<u>Neostylopyga rhombifolia</u> (Stoll)	Kona: Hōmaunau
<u>Periplaneta americana</u> (L.)	Kona: abundant and widely distributed
<u>Periplaneta australasiae</u> (F.)	Kona: abundant and widely distributed
<u>Pycnoscelus surinamensis</u> (L.)	Kona: Kailua
Tettigoniidae (Long-horned grasshoppers)	
<u>Ranga nitida</u> (Brunner)	Kona: Kealakekua
<u>Conocephalus saltator</u> (Saussure)	Kona: in coffee fields
<u>Elimaea punctifera</u> (Walker)	Kona: on coffee
<u>Xiphidopsis litā</u> Hebard	Kona
Gryllidae (Crickets)	
<u>Gryllus oceanicus</u> Le Guillou	Kona
<u>Paratrigonidium gracile</u> Perkins	Kona: Kealakekua; beneath bark of tree
<u>Paratrigonidium grande</u> Perkins	South Kona
<u>Paratrigonidium pacificum</u> Scudder	South Kona

Table 4.2 (cont'd)

Taxon	Remarks
<u>Paratrigonidium varians</u> Perkins	Kona: Kealakekua
<u>Metioche vittaticollis</u> Stal	Kona: Hōnaunau; in grass and low vegetation; first seen in 1951
Acrididae (Short-horned grasshoppers)	
<u>Atractomorpha ambigua</u> Bolivar	Kona: Hōlualoa, first seen in 1945
EMBIIDINA	
<u>Oligotoma saundersi</u> (Westwood)	Kona: Miloli'i; near Hōnaunau
CORRODENTIA (Psocids)	
<u>Elipsocus criniger</u> Perkins	Kona: on <u>Suttonia</u> and <u>Sophora</u>
<u>Elipsocus erythrosticka</u> Perkins	Kona
<u>Elipsocus micranurus</u> Perkins	Kona: 4,000 ft; on <u>Metrosideros</u> and <u>Gouldia</u>
<u>Elipsocus psylloides</u> Perkins	Kona
<u>Palistrepus inconstans</u> (Perkins)	Kona
<u>Psocus kōnae</u> Perkins	Kona
<u>Psocus innotatus</u> Perkins	Kona
THYSANOPTERA (Thrips)	
<u>Hoplothrips barbatus</u> (Bagnall)	Kona: beneath decaying log in mountains
<u>Hoplothrips laticornis</u> (Bagnall)	Kona: 3,000 ft
<u>Hoplothrips gowdeyi</u> (Franklin)	Kona: the black flower thrip has a long host plant list; first recorded in the territory in 1892
HOMOPTERA	
Cicadellidae (Leafhoppers)	
<u>Acopsis minerva</u> (Ball)	Kona: Kailua
<u>Balclutha hospes</u> Kirkaldy	Kona: in coarse grass
<u>Balclutha plutonis</u> Kirkaldy	Kona
<u>Balclutha volcanicola</u> (Kirkaldy)	Kona: Hōnaunau; Kealakekua
<u>Nesophrosyne craterigena</u> Kirkaldy	Kona
<u>Nesophrosyne eburneola</u> Osborn	South Kona: 1,400 ft
<u>Nesophrosyne giffardi</u> var. <u>interrupta</u> Osborn	Kona: on <u>Myoporum</u> in the mountains
<u>Nesophrosyne insularis</u> Kirkaldy	South Kona
<u>Nesophrosyne mabae</u> Osborn	South Kona Road: on <u>Maha sandwicensis</u>
<u>Nesophrosyne montium</u> Kirkaldy	North Kona
<u>Nesophrosyne oceanides</u> Kirkaldy	South Kona Road: 1,600 ft; on <u>Straussia hawaiiensis</u>
<u>Nesophrosyne sylvigena</u> Osborn	South Kona: on <u>Wikstroemia</u>
<u>Nesophrosyne silvicola</u> Kirkaldy	Kona
<u>Nesophrosyne pluvialis</u> Kirkaldy	Kona
Membracidae (Tree hoppers)	
<u>Stictocephala festina</u> (Say)	Kona: 'Ala'ā; Hōlualoa; the alfalfa hopper
<u>Vanduzee segmentata</u> (Fowler)	Kona: on <u>Cassia</u> sp.
Cixiidae	
<u>Iolanis perkinsi</u> Kirkaldy	South Kona
<u>Oliarus filicicola</u> Kirkaldy	Kona
<u>Oliarus hevaheva</u> Kirkaldy	South Kona: Ho'okena

Table 4.2 (cont'd)

Taxon	Remarks
<u>Oliarus koanae</u> Kirkaldy	Kona: ex <u>Maba sandwicensis</u> ; tree fern
<u>Oliarus niger</u> Giffard	South Kona: 1,500-2,000 ft
<u>Oliarus pele</u> Kirkaldy	Kona: in mountains
<u>Oliarus tarai</u> Kirkaldy and varieties	South Kona
Delphacidae	
<u>Aloha myoporica</u> Kirkaldy	Kona: on <u>Pelea volcanica</u> ; South Kona: on <u>Myoporum</u> ; Hu'ehu'e: on <u>Myoporum</u> ;
<u>Aloha swezeyi</u> Muir	Kona: on <u>Annona cherimolia</u> , weeds, <u>Bidens</u>
<u>Kelisia paludum</u> Kirkaldy	Kona: Hōnaunau
<u>Leialoha hawaiiensis</u> Kirkaldy	South Kona: on 'ōhi'a
<u>Leialoha ohiae</u> (Kirkaldy)	Kona: on <u>Metrosideros</u>
<u>Negosydne blackburni</u> Muir	South Kona
<u>Negosydne ipomoeicola</u> (Kirkaldy)	Kona: on <u>Lythrum maritimum</u>
<u>Nesothoë frigidula</u> (Kirkaldy)	Kona
<u>Nesothoë maculata</u> (Muir)	Kona: Ho'akena, on <u>Maba sandwicensis</u> ; Government Road, Kahuku to Kona: on <u>Metrosideros</u>
<u>Peregrinus maidis</u> Ashmead	Kona: Hōnaunau; on corn; the widespread corn leafhopper; probably reached the islands about 1880
Flatidae (Torpedo bug)	
<u>Siphanta acuta</u> (Walker)	Kona: Hōlualoa; on wide range of host plants; often injurious to coffee; here about 1898
Psyllidae (Jumping plant lice)	
<u>Trioza ohiaicola</u> Crawford	South Kona: forming galls on 'ōhi'a lehua
Aphididae (Plant lice)	
<u>Aphis gossypii</u> Glover (Cotton aphid)	Kona: in cotton fields
<u>Apherophora sonchi</u> (Oestlund)	Kona: Hōlualoa; on <u>Sonchus oleraceus</u> leaves
<u>Brevicoryne brassicae</u> (L.) (Cabbage aphid)	Kona: on cabbages
<u>Myeromyzus formosanus</u> (Takahashi) (Onion aphid)	Kona: on onions; first seen prior to 1939
<u>Toxoptera aurantii</u> (Boyer de Fons.) (Black citrus aphid)	Kona: Kēōkea mauka; at forest edge; on young 'ōhi'a leaves; widespread; long known in the Hawaiian Islands
Coccidae (Scales, mealybugs)	
<u>Coccus viridis</u> (Green) (Green scale)	Kona: producing coffee blight; wide range of host plants; here since 1905
<u>Odonaspis ruthee</u> Kotinsky	Kona: on māniēnie grass (<u>Cynodon dactylon</u>)
<u>Orthezia insignis</u> Brown	Kona: on lantana
<u>Howardia biclavata</u> (Comstock)	Kona
<u>Pseudococcus brevipes</u> (Cockerell) (Pineapple mealybug)	Kona: damaging coffee; wide range of host plants

Table 4.2 (cont'd)

Taxon	Remarks
<u>Pseudococcus vastator</u> (Maskell)	Kona: bad on terminal buds of orange; probably introduced from Japan; here in islands before 1891
<u>Pseudococcus nipae</u> (Maskell)	Kona: on guava leaves; in islands since 1902
<u>Pulvinaria psidii</u> Maskell	Kona: especially bad on coffee plants
HETEROPTERA (True bugs)	
Cydnidae	
<u>Geotomus pygmaeus</u> (Dallas) (Negro bug)	Kona: originally from India; in the islands a long time
Scutelleridae (Shield-back bugs)	
<u>Colectichus blackburniae</u> White (Koa bug)	Kona: usually on koa; a beautiful red and green bug; our largest native species
Pentatomidae (Stink bugs)	
<u>Oechalia acuta</u> Usinger	South Kona
<u>Oechalia grisea</u> (Burmeister)	Kona: widespread
Coreidae	
<u>Liorhyssus hualinus</u> (Fabricius) (Grass bug)	Kona: on <u>sonchus</u> and other weeds; probably an early immigrant; first recorded in 1910
Lygaeidae (Plant bugs)	
<u>Metarraga nuda</u> White	Kona: under dead bark and in cavities of dead branches of <u>Pipturus</u> , <u>Metrosideros</u> , <u>Cibotium</u>
<u>Neseis fasciatus fasciatus</u> Usinger	Kona: in mountains; on <u>Straussia</u> , <u>Myrsine</u>
<u>Neseis nitidus comitans</u> (Perkins)	Kona: near Kona-Ka'u line; on <u>Pipturus albidus</u>
<u>Neseis nitidus pipturi</u> Usinger	Kona: Kealahakua; 3,500 ft; South Kona: on <u>Pipturus</u>
<u>Neseis saundersianus</u> (Kirkaldy)	Kona: on <u>Urera</u> , <u>Sapindus</u>
<u>Neseis mauiensis</u> Blackburn	Kona
<u>Nysius communis</u> Usinger	Kona: Hu'ehu'e; 1,800 ft
<u>Nysius terrestris</u> Usinger	Kona: Honaunau; usually on pigweed; many other host plants
<u>Nysius nemorivagus</u> White	Kona: on Chinese cabbage and <u>Solanum nodiflorum</u> roots
<u>Nesomartis psammophila</u> Kirkaldy	Kona: on <u>Sophora</u> , <u>Eragrostis</u> , <u>Sida</u>
<u>Oceanides bryani</u> Usinger	South Kona: on <u>Euphorbia</u> , <u>Straussia</u>
<u>Oceanides rubicola</u> (Kirkaldy)	Kona: on <u>Mycoporum sandwicense</u>
<u>Orthaea nigriceps</u> (Dallas)	Kona: occasionally on truck crops
Reduviidae (Assassin bugs)	
<u>Epicoris rubromaculatus</u> Blackburn (Thread bug)	Kona
<u>Epicoris whitei</u> (Blackburn)	Kona

Table 4.2 (cont'd)

Taxon	Remarks
<u>Zelus renardii</u> (Kolenati) (Leafhopper assassin bug)	Kona: Hōnaunau; a common, widespread, predaceous insect
Nabidae (Damsel bugs)	
<u>Nabis blackburni</u> (White)	Kona: the commonest and most widespread of our native nabids
<u>Nabis capsiformis</u> Germar	Kona: Nāpō'opo'o; on various truck and garden crops; common and widespread
<u>Nabis giffardi</u> Van Duzee	South Kona Road
<u>Nabis kahavalu</u> (Kirkaldy)	Kona
<u>Nabis luscipus</u> (White)	Kona: in grass and low herbage
<u>Nabis tarai</u> White	Kona: on <u>Styphelia</u> ; widespread in islands
Anthocoridae (Flower bugs)	
<u>Lesiochilus denigrata</u> White	Kona: in dead tree-fern stem
Miridae (Leaf bugs)	
<u>Cyrtopeltis modesta</u> Distant	Kona: ex tomato
<u>Hyalopeplus pellucidus</u> (Stal)	Kona
<u>Kalania hawaiiensis</u> (Kirkaldy)	Kona: 3,000 ft
<u>Kamehameha lunalilo</u> Kirkaldy	Kona
<u>Koanoa hawaiiensis</u> Kirkaldy	Kona
<u>Nesiomiris hawaiiensis</u> Kirkaldy	Kona: on <u>Byrsonia</u> , <u>Cheirodendron</u> , <u>Reynoldsia</u>
<u>Orthotylus daphne</u> Kirkaldy	Kona
<u>Psallus sharpianus</u> Kirkaldy	Kona: on <u>Euphorbia</u>
<u>Pseudoclerada morai</u> Kirkaldy	Kona
<u>Sulemita lunalilo</u> Kirkaldy	Kona: Kealahakua; on <u>Freycinetia arborea</u>
<u>Oronomiris hawaiiensis</u> Kirkaldy	Kona: usually in grasses
Saldidae (Shore bugs)	
<u>Saldula pahuensis</u> (Blackburn)	Kona: among wet leaves on ground
Gerridae (Water striders)	
<u>Halobates sericeus</u> Eschscholtz	Kona: waters off Hōnaunau shore
Notonectidae (Back swimmers)	
<u>Buenoa pallipes</u> (F.)	Kona: abundant in lowlands; predaceous
ODONATA	
ANISOPTERA (Dragonflies)	
Aeshnidae	
<u>Anax junius</u> (Drury) (common green darner)	Kona: Hōnaunau; a widespread, strong flier; probably in islands for several hundred years as a natural immigrant
<u>Anax strenuus</u> Nagen (giant Hawaiian dragonfly)	Kona: mostly in mountains, but occasionally seen in lowlands; our largest native insect; it was first captured by the Danish "Galathea" Expedition
ZYGOPTERA (Damsel flies)	
Coenagrionidae	
<u>Megalagrion calliphya</u> (McLachlan)	Kona: in mountains; about 3,000 ft

Table 4.2 (cont'd)

Taxon	Remarks
<u>Megalagrion calliphya microdemas</u> (Perkins)	Kona: in mountains
<u>Megalagrion nigrohamatum nigrolineatum</u> (Perkins)	Kona: Honaunau
<u>Megalagrion xanthomelas</u> (Selys-Longch.)	Kona: 3,000 ft
NEUROPTERA (Lacewing flies)	
Myrmeleonidae (Antlions)	
<u>Formicaleo wilsoni</u> (McLachlan)	Kona
Chrysopidae (Green lacewings)	
<u>Anomalochrysa debilis</u> Perkins	Kona
<u>Anomalochrysa deceptor</u> Perkins	Kona: in mountains; 4,000 ft
<u>Anomalochrysa frater</u> Perkins	South Kona
<u>Anomalochrysa peles</u> Perkins	Kona
<u>Anomalochrysa princeps</u> Perkins	Kona: 1,800-3,000 ft
<u>Anomalochrysa proteus</u> Perkins	Kona: 3,000-4,000 ft
<u>Anomalochrysa raphidioides</u> Perkins	Kona: in mountains; 4,000 ft
<u>Anomalochrysa reticulata</u> Perkins	Kona
<u>Chrysopa microphyta</u> McLachlan	Kona: in coffee fields; common all over in gardens
Hemerobiidae (Brown lacewings)	
<u>Nesomicromus latipennis</u> Perkins	Kona
<u>Nesomicromus minimus</u> Perkins	Kona: in mountains; 4,000 ft
<u>Nesomicromus vagus</u> Perkins	South Kona
COLEOPTERA (Beetles)	
Carabidae (Ground beetles)	
<u>Colpocaccus hawaiiensis</u> Sharp	Kona
<u>Mecyclothorax gracilis</u> (Sharp)	Kona: in mountains; 4,000 ft
<u>Mecyclothorax variipes</u> (Sharp)	Kona: 3,000 ft
<u>Mecyclothorax proximus</u> Britton	Kona: in mountains; 4,000 ft
<u>Mecyclothorax vulcanicus</u> (Blackburn)	Kona: in mountains; 4,000 ft
<u>Metromenus extimus</u> Sharp	Kona
Hydrophilidae (Water beetles)	
<u>Dactylosternum abdominale</u> (F.)	Kona
Staphylinidae (Rove beetles)	
<u>Atheta coriaria</u> Kr.	Kona: 2,500 ft
<u>Liophaena gracilipes</u> Sharp	Kona
<u>Oligota glabra</u> Sharp	Kona
<u>Oligota mutanda</u> Sharp	Kona
<u>Philonthus discoideus</u> Grav.	Kona: predatory on papaya parasites
<u>Thorachophorus blackburni</u> (Sharp)	Kona
<u>Thyreoscephalus albertisi</u> (Fauvel)	Kona: liberated April 1950
Cleridae	
<u>Necrobia ruficollis</u> F.	South Kona
<u>Necrobia rufipes</u> DeGeer (Copra bug)	Kona
Oedemeridae	
<u>Sessinia livida</u> F.	Kona: Honaunau; breeding in old wood
Cucujidae	
<u>Parandrita kona</u> Sharp	Kona

Table 4.2 (cont'd)

Taxon	Remarks
Elateridae (Click beetles)	
<u>Eopenthes cognatus</u> Sharp	Kona
<u>Eopenthes kona</u> Blackburn	Kona
<u>Melanoxanthus melanocephalus</u> Thumb.	Kona: Kealahakua
<u>Simodactylus cinnamomeus</u> Boisduval	Kona
Melasidae	
<u>Ceratotaxia tristis</u> Sharp	Kona
<u>Dromaeolus arduus</u> Sharp	Kona
<u>Dromaeolus compressus</u> Sharp	Kona
<u>Dromaeolus coneus</u> Sharp	Kona
<u>Dromaeolus grandicornis</u> Sharp	Kona
<u>Dromaeolus konensis</u> Sharp	Kona
<u>Dromaeolus perkinsi</u> Sharp	Kona
<u>Dromaeolus solitarius</u> Sharp	Kona
Dermestidae (Carpet beetles)	
<u>Labrocerus gravidus</u> Sharp	Kona
<u>Labrocerus simplex</u> Sharp	Kona
<u>Labrocerus vestitus</u> Sharp	Kona
Histeridae	
<u>Acritus fadilis hawaiiensis</u> Scott	Kona
<u>Acritus minor</u> Scott	Kona
<u>Saprinus lugens</u> Erichson	Kona: in mountains; 4,000 ft
Colydiidae	
<u>Antilissus aper</u> Sharp	Kona: 3,000 ft
Monotomidae	
<u>Hesperobaenus capito</u> Perkins	Kona
Ciidae	
<u>Cis bimaculata</u> Sharp	Kona
<u>Cis cognatissimus</u> Perkins	Kona: 3,000 ft
<u>Cis gravipennis</u> Perkins	Kona: in mountains; 4,000 ft
<u>Cis nudipennis</u> Perkins	Kona
<u>Cis roridus</u> Sharp	Kona: in mountains; to 5,000 ft
<u>Cis setarius</u> Sharp	Kona: in mountains; 4,000-5,000 ft
<u>Cis signatus</u> Sharp	Kona: on 'Ohia's; 2,500-4,000 ft
<u>Cis subaeneus</u> Perkins	Kona: in mountains; 4,000 ft
Nitidulidae (Souring beetles)	
<u>Carpophilus humeralis</u> (F.) (Yellow-shouldered souring beetle)	Kona: Kailua; widely distributed; common and often extremely abundant
<u>Carpophilus dimidiatus</u> (F.)	Kona: Hōlualoa
<u>Carpophilus maculatus</u> Murray	Kona: Nāpō'opo'o
<u>Haptoncus tetragonus</u> Murray	Kona
<u>Nesopeplus bidens</u> Sharp	Kona
<u>Nesopeplus inauratus</u> Sharp	Kona: in high mountains; around 5,000 ft
<u>Nesopeplus nigricans</u> Sharp	Kona
<u>Nesopetinus apertus</u> (Sharp)	Kona
<u>Nesopetinus celatus</u> (Sharp)	Kona: high mountains
<u>Nesopetinus metallescens</u> (Sharp)	Kona: from 2,000 ft
<u>Nesopetinus quadraticollis</u> (Blackburn)	Kona: mountains; 4,000 ft
<u>Nesopetinus rudis</u> (Sharp)	Kona

Table 4.2 (cont'd)

Taxon	Remarks
<i>Nesopetinus scottianus</i> Sharp	Kona
<i>Nesopetinus varius</i> (Sharp)	Kona
<i>Eupetinus hawaiiensis</i> Sharp	Kona
<i>Orthostoceus guttatus</i> (Sharp)	Kona
<i>Orthostoceus sordidus</i> (Sharp)	Kona
Mycetophagidae	
<i>Litargus balteatus</i> LeConte	Kona
<i>Litargus vestitus</i> Sharp	Kona: Hōlualoa
<i>Propalticus oculatus</i> Sharp	Kona
Anobiidae	
<i>Holcobius affinis</i> Perkins	Kona
<i>Holcobius hawaiiensis</i> Perkins	Kona: in tree-fern stem
<i>Mirosternus amaurodes</i> Perkins	Kona
<i>Mirosternus simplex</i> Perkins	Kona
<i>Mirosternus tristis</i> Perkins	Kona
<i>Xyletobius hawaiiensis</i> Perkins	Kona
<i>Xyletobius oculatus</i> Sharp	Kona
<i>Xyletobius timberlakei</i> Perkins	Kona: Kealahakua; on <i>Clermontia</i> and <i>Byronia</i>
Bostrichidae (Powderpost beetles)	
<i>Xylopsocus castanoptera</i> (Fairmaire)	Kona: Kealahakua
Lathridiidae	
<i>Lathridius nodifer</i> Westwood	Kona
Coccinellidae (Lady beetles)	
<i>Coelophora inaequalis</i> (Fabr.)	Kona: in coffee fields
<i>Cryptolaemus montrouzieri</i> Mulsant	South Kona
<i>Curinus coeruleus</i> Mulsant	Kona: Hōlualoa; Kealahakua
<i>Hyperaspis jocosus</i> (Mulsant)	South Kona: Hōnaunau
<i>Lindorus ventralis</i> (Erichson)	Kona: in coffee fields
<i>Olla abdominalis</i> (Say)	Kona
<i>Orcus chalybeus</i> (Boisduval)	Kona
<i>Platymus lividigaster</i> Mulsant	Kona
<i>Ptiliodes insignis</i> Scott	Kona
<i>Rodolia cardinalis</i> (Mulsant)	Kona: Hōlualoa
<i>Scymnus ocellatus</i> Sharp	Kona: Hōnaunau
<i>Scymnus uncinatus</i> Sic.	Kona: Hōlualoa; probably on <i>Pseudococcus</i> sp.
<i>Scymnus vividus</i> Sharp	Kona
Orthoperidae (Corylophidae)	
<i>Orthoperus aequalis</i> Sharp	Kona
<i>Serocoderes pubipennis</i> Sharp	Kona
Ptilidae	
<i>Ptiliodes insignis</i> Scott	Kona: in mountains; 4,000 ft
Malacodermidae	
<i>Carpheuroides pectinatus</i> (Sharp)	Kona: in forest
Tenebrionidae (Darkling beetles)	
<i>Alphitobius laevigatus</i> (F.)	Kona: Kailua
<i>Blapstinus dilatatus</i> LeC.	Kona
<i>Gonocephalus seriatum</i> Boisduval	Kona: generally distributed in soil; under stones and trash
<i>Lobometopon diremptus</i> Karsch	Kona: Kailua, but generally distributed

Table 4.2 (cont'd)

Taxon	Remarks
<u>Tribolium ferrugineum</u> F. (Flour beetle)	Kona: destructive to stored products; widely distributed, cosmopolitan
Cistelidae	
<u>Cistela kонаe</u> Perkins	Kona
Cerambycidae (Long-horned beetles)	
<u>Aegosoma reflexum</u> Karsch	Kona: usually in forest, but occasionally damaging coffee plants and sugarcane; largest beetle found in the Hawaiian Islands
<u>Ceresium simplex</u> (Gyll.)	Kona: Hōnaunau; in dead branches
<u>Cylene crinicornis</u> Chevrolat (Algaroba beetle)	Kona: Kealakekua
<u>Lagocheirus obsoletus</u> Thoms.	Kona: Kealakekua
<u>Parandra puncticeps</u> Sharp	Kona
<u>Plagithmysus bilineatus</u> Sharp	Kona: on lehua
<u>Plagithmysus blackburni</u> Sharp	Kona
<u>Plagithmysus davisii</u> Swezey	Kona: in mountains
<u>Plagithmysus elegans</u> Sharp	Kona
<u>Plagithmysus frater</u> Perkins	Kona: 3,000 ft; on Pelea
<u>Plagithmysus immundus</u> Sharp	Kona
<u>Plagithmysus simplicicollis</u> Sharp	Kona
<u>Plagithmysus vicinus</u> Sharp	Kona: 3,000 ft
<u>Prosopius bankii</u> (F.)	Kona: Nāpō'opo'o; Kealakekua
<u>Sybra alternans</u> Weid.	Kona: Kailua
Chrysomelidae (Leaf beetles)	
<u>Epitrix parvula</u> F. (Tobacco flea beetle)	Kona: Hōlualoa; on solanaceous plants
<u>Lema trilineata californica</u> Schaeffer	Kona: Hōnaunau; on eggplant, potato, and other solanums
<u>Octotoma scabripennis</u> Guer. (Lantana leaf miner)	Kona: Ho'okena; released May 1954
Bruchidae (Bean weevils)	
<u>Bruchus prosopis</u> LeC.	Kona: Hōnaunau; Kailua
<u>Bruchus pruininus</u> Horn	Kona: Nāpō'opo'o; widely distributed in islands; infesting legume seeds
<u>Bruchus sallei</u> Sharp	Kona: Kailua, Kawaihae to Nāpō'opo'o; in green and ripe kiawe pods
<u>Caryoborus gonagra</u> F.	Kona: Nāpō'opo'o; originally from India; first observed in island about 1908
<u>Megacerus alternatus</u> Bridwell	Kona: Keauhou, on <u>Ipomoea pes-caprae</u> ; Kailua
Curculionidae (Weevils)	
<u>Acalles tuberculatus</u> Perkins	Kona: in mountains
<u>Anthonomus eugenii</u> Cano (Pepper weevil)	Kona: Hōlualoa; on peppers and other solanums
<u>Cylas formicarius elegantulus</u> (Summers) (Sweet potato weevil)	Kona: Nāpō'opo'o; Kailua; serious pest of sweet potatoes and other plants of the morning-glory family
<u>Diocalandra taitensis</u> (Guerin)	Kona: Honu'apo; Kailua

Table 4.2 (cont'd)

Taxon	Remarks
<u>Dryophthorus declivis</u> Sharp	Kona
<u>Dryophthorus distinguendus</u> Perkins	Kona
<u>Dryophthorus gravidus</u> Sharp	Kona
<u>Dryophthorus homoeorhynchus</u> Perkins	Kona
<u>Dryophthorus modestus</u> Sharp	Kona
<u>Dryophthorus species</u>	Kona: Hōnaunau
<u>Oodemas konanum</u> Perkins	Kona
<u>Oodemas maulense</u> Blackburn	Kona
<u>Oodemas multifforme</u> Perkins	South Kona: ex <u>Cheirodendron</u>
<u>Oodemas solidum</u> Perkins	Kona
<u>Oodemas viridipenne</u> Perkins	Kona: in mountains; 3,000-4,000 ft
<u>Pantomorus godmani</u> Crotch (Fuller rose beetle)	Kona: on citrus; widely distributed; native of Mexico usually feeding on rose, and a variety of plants
<u>Phloeophagosoma tenuis</u> (Gemm.)	Kona
<u>Rhyncogonus giffardi</u> Sharp	Kona
Scolytidae (Bark beetles)	
<u>Hypothenemus eruditus</u> Westwood	Kona: Nāpō'opo'o
<u>Poecilips persicae</u> (Hopkins)	Kona: Keōpū; ex avocado
<u>Xyleborus hawaiiensis</u> Perkins	South Kona: ex <u>Cheirodendron</u>
<u>Xyleborus immaturus</u> Blackburn	Kona
<u>Xyleborus confusus</u> Eichhorn	Kona: Ka'awaloa
<u>Xyleborus lanaiensis</u> Perkins	South Kona
<u>Xyleborus tantalus</u> Schedl	South Kona: ex <u>Byronia</u>
<u>Xyleborus truncatus</u> Perkins	Kona: on most of the Hawaiian Islands attacking wide variety of host plants
Anthribidae	
<u>Araecerus constans</u> Perkins	Kona: on coast
<u>Araecerus fasciculatus</u> (DeGeer)	Kona
<u>Araecerus varians</u> Jordan	South Kona: on <u>Clermontia</u>
Proterhinidae	
<u>Proterhinus affinis</u> Perkins	Kona
<u>Proterhinus ater</u> Perkins	Kona
<u>Proterhinus deceptor</u> Perkins	Kona
<u>Proterhinus deceptor konanus</u> Perkins	Kona: 3,000 ft
<u>Proterhinus desquamatus</u> Perkins	Kona: 2,000 ft
<u>Proterhinus hawaiiensis</u> Perkins	Kona
<u>Proterhinus hypotretus</u> Perkins	Kona: 3,000 ft
<u>Proterhinus similis</u> Blackburn	Kona: in mountains; 4,000 ft
<u>Proterhinus tarsalis</u> Blackburn and varieties	Kona
<u>Proterhinus vulcanus</u> Perkins	Kona: in mountains; 2,000 ft
Scarabaeidae (Dung beetles)	
<u>Adoretus sinicus</u> Burmeister (Chinese rose beetle)	Kona: common everywhere; here in islands before 1896
<u>Aphodius lividus</u> Oliv.	Kona: Hōnaunau; Kealakekua; breeding in manure

Table 4.2 (cont'd)

Taxon	Remarks
LEPIDOPTERA	
HETEROCERA (Butterflies)	
Nymphalidae	
<u>Danaida archippus</u> F. (Monarch)	Kona: common everywhere
<u>Vanessa atalanta</u> (L.) (Red admiral)	Kona: abundant in the 1890s; feeding on <u>Pipturus albidus</u>
<u>Vanessa cardui</u> L. (Painted lady)	Kona: common in uplands; feeding on <u>Pipturus</u> , occasionally on <u>Piper</u>
<u>Vanessa virginiensis</u> Dryry (Painted beauty)	Kona: common on weeds
Lycaenidae (Blues)	
<u>Lampydes boetica</u> (Linnaeus) (Bean butterfly)	Kona: common on growing beans
<u>Lycaena blackburni</u> (Tuely) (Native green)	Kona: uplands; on <u>Pipturus</u> , <u>Dodonaea</u>
<u>Callicista thius</u> (Hübner)	Kona: around lantana blossoms
Pieridae	
<u>Pontia rapae</u> (Linnaeus) (Cabbage butterfly)	Kona: abundant in cabbage and allies
HETEROCERA (Moths)	
Gelechiidae	
<u>Thyrocopa fraudulentella</u> Walsingham	Kona
<u>Gnorimoschema operculella</u> (Zeller)	Kona: Kawaihae; in potato, tomato, etc.; especially injurious to tobacco
<u>Stoeberhinus testaceus</u> Butler	Kona: Ka'awaloa
<u>Pectinophora gossypiella</u> (Saunders) (Pink bollworm of cotton)	Kona: in coffee field; in islands many years
Cosmopterygidae	
<u>Pyroderces rileyi</u> Walsingham	Kona: in coffee fields
<u>Batrachedra rileyi</u> Walsingham	Kona: Ka'awaloa
Hyponomeutidae	
<u>Prays fulvocanellus</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
<u>Hyposmocoma domicellus</u> (Butler)	Kona: Ka'awaloa; 1,500 ft
<u>Hyposmocoma longitudinalis</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
<u>Hyposmocoma lupella candidella</u> Walsingham	Kona
<u>Hyposmocoma vermiculata</u> Walsingham	Kona: Ka'awaloa; about 2,000 ft
<u>Neelysia cleodorella</u> Walsingham	Kona
Tineidae	
<u>Opogona aurisquamosa</u> (Butler)	Kona: Ka'awaloa
<u>Opogona purpuricella</u> Swezey	Kona
<u>Tinea fuscipunctella</u> Haworth	Kona: Ka'awaloa; 1,500 ft
<u>Setomorpha rutella</u> Zeller	Kona: Ka'awaloa; 1,500 ft
<u>Ereunetis simulans</u> (Butler)	Kona: in coffee fields
<u>Ereunetis minuscula</u> Walsingham	Kona: Ka'awaloa; 1,500 ft
<u>Philodoria basalis</u> Walsingham	South Kona: on 'Ohia
Carposinidae	
<u>Heterocrossa dispar</u> Walsingham	Kona: Ka'awaloa; 1,500-2,000 ft
<u>Heterocrossa solutella</u> Walsingham	Kona: Ka'awaloa; 2,000 ft

Table 4.2 (cont'd)

Taxon	Remarks
Tortricidae	
<i>Agenoneura montana</i> Walsingham	Kona
<i>Cryptophlebia fulva</i> Walsingham	Kona: Ka'awaloa; 1,500 ft
<i>Amorbia emigratella</i> Busck	Kona: on macadamia nut and various other leaves
<i>Tortrix chlorocalla</i> Walsingham	Kona: Ka'awaloa; 1,500 ft
<i>Crociosema plebeiana</i> Zeller	Kona: Ka'awaloa; 1,500 ft
Galleriidae	
<i>Meliphora grisella</i> Fabricius	Kona: feeding on combs in beehives
Phycitidae	
<i>Homoeosoma humeralis</i> (Butler)	Kona: 1,500-4,000 ft
<i>Cryptobalbes aliena</i> Swezey	Kona
<i>Hypenodes altivolens</i> (Butler)	Kona: 1,500-4,000 ft
<i>Hypocala velans</i> Walker	Kona
<i>Nesamiptis obsoleta</i> (Butler)	Kona: 1,500-4,000 ft
<i>Phytometra chalcites</i> (Esp.)	Kona: 1,400-3,000 ft
Oecophoridae	
<i>Ethmia colonella</i> Walsingham (Kou moth)	Kona: coast between Kailua and Keauhou; defoliating kou
Pterophoridae	
<i>Platyptilia pusillidactyla</i> (Walker)	Kona: around lantana flowers; introduced from Mexico in 1902
Pyraustidae	
<i>Scoparia siderina</i> Meyrick	Kona: Honaunau
<i>Scoparia loxocentra</i> Meyrick	Kona: around 2,000 ft
<i>Scoparia ombrodes</i> (Meyrick)	Kona: 1,500-4,000 ft
<i>Scoparia rhombias</i> Meyrick	Kona
<i>Lineodes ochrea</i> Walsingham	Kona
<i>Lineodes subextincta</i> Walsingham	Kona
<i>Hyperectis dioctias</i> Meyrick	Kona
Geometridae	
<i>Eucymatoge monticolans</i> (Butler)	Kona: Honaunau
<i>Eucymatoge staurophragma</i> Meyrick	Kona: above 2,000 ft
Selidosemidae	
<i>Scotorythra pachyspyla</i> Meyrick	South Kona
<i>Scotorythra brachytarsa</i> Meyrick	South Kona
Agonoxenidae	
<i>Agonoxena argaula</i> Meyrick	Kona: between Kailua and Keauhou; on coconut leaves
Geometridae	
<i>Anacamptodes fragilaria</i> (Grossb.)	Kona: lowlands; Kawaihae; on <u>kiawe</u>
Sphingidae (sphinx moths)	
<i>Herse cingulata</i> (Fabricius)	Kona: on <u>Ipomoea</u>
<i>Celerio lineata</i> (Fabricius)	Kona
Plutellidae	
<i>Plutella maculipennis</i> Curt.	Kona: on cabbage; 1,500-4,000 ft
Noctuidae	
<i>Erebus odora</i> (Linnaeus) (Black witch)	Kona: Honaunau; larvae in <u>Cassia nodosa</u>

Table 4.2 (cont'd)

Taxon	Remarks
<u>Heliothis armigera</u> (Hubner) (Corn earworm)	Kona: on tomato and other crops
<u>Feltia dislocata</u> (Walker)	Kona: 1,500-4,000 ft
<u>Agrotis ypsilon</u> Rott. (Cutworm)	Kona: well-known garden cutworm; widespread and troublesome
<u>Polydesma umbricola</u> Boisduval (Monkeypod moth)	Kona: on monkeypod
<u>Laphygma exempta</u> (Walker) (Nutgrass armyworm)	Kona: widespread
<u>Caradrina examinis</u> Meyrick	Kona: 1,500 ft; probably on <u>Panicum</u> stems
Plusiadae	
<u>Adrapsa manifestalis</u> (Walker)	South Kona
<u>Hypenodes altivolens</u> (Butler)	Kona
<u>Nesamiptis obsoleta</u> (Butler)	Kona
<u>Plusia biloba</u> Steph.	Kona
DIPTERA (Flies)	
Tipulidae (Craneflies)	
<u>Erioptera (Trimicra) lateralis</u> (Grimshaw)	Kona: Hōnaunau
<u>Erioptera (Trimicra) pilipes</u> Fabricius	Kona: Hōnaunau; Ka'awaloa; 1,500 ft
<u>Limonia (Dicranomyia) hawaiiensis</u> (Grimsh.)	Kona: Hōnaunau; Kealahakua
<u>Limonia (Limonia) perkinsi</u> (Grimshaw)	Kona: Kealahakua
<u>Styringomyia didyma</u> Grimshaw	Kona: Kapu'a
Psychodidae	
<u>Psychoda alternata</u> Say	Kona: about 2,000 ft
Culicidae (Mosquitoes)	
<u>Aedes aegypti</u> (Linnaeus)	Kona: Kealahakua
<u>Aedes albopictus</u> Skuse	Kona: Ki'ilae Bay
Heleidae (Ceratopogonidae)	
<u>Dasyhelea calvescens</u> Macfie	Kona: Ki'ilae Bay; Hōnaunau; on rocks
<u>Ceratopogon</u> sp.	Kona
Sciariidae	
<u>Sciara molokaiensis</u> (Grimshaw)	Kona: Hōnaunau
Fungivoridae	
<u>Platyura hawaiiensis</u> Grimshaw	South Kona
Stratiomyidae	
<u>Neocxaireta spinigera</u> (Wiedemann)	Kona: on papaya
Dolichopodidae	
<u>Chrysosoma fraternum</u> Van Duzee	Kona
<u>Cymatopus acrosticalis</u> Parent	Kona: Kailua; on rocks
<u>Dolichopus exsul</u> Aldrich	South Kona
<u>Medeterus [cilifemorata?]</u>	South Kona
<u>Sciapus pachygya</u> Macquart	Kona: Nāpō'opo'o
Phoridae	
<u>Aphiochaeta xanthina</u> (Megaselia <u>scalaris</u> Loew)	Kona: around 2,000 ft

Table 4.2 (cont'd)

Taxon	Remarks
Dorilaeidae	
<u>Dorilas (Dorilas) nigrotarsitus</u> Grimsh.	Kona: uplands
<u>Dorilas obscuratus</u> Hardy	Kona: Kealahakua; on <u>Clermontia</u>
Syrphidae	
<u>Allograpta obliqua</u> (Say)	Kona: common
<u>Volucella pusilla</u> Macquart	Kona: Kailua
<u>Volucella (Ornidia) obesa</u> (Fabricius)	Kona: Ki'ilae Bay
<u>Tubifera arvorum</u> (Fabricius)	Kona: Nāpō'opo'o
<u>Ischiodon scutellaris</u> (Fabricius)	Kona: lowlands
Lauxaniidae (Sapromyzidae)	
<u>Homoneura unguiculata</u> (Kertész)	Kona: Hōnaunau
Canacidae	
<u>Canaceoides nudata</u> (Cresson)	Kona: Ki'ilae Bay
Sphaeroceridae	
<u>Limosina (Opacifrons) aequalis</u> Grimshaw	Kona: Pauahi (8 mi E. of Captain Cook)
<u>Limosina punctipennis</u> Wiedemann	Kona
Ephydriidae	
<u>Lytogaster graxida</u> (Loew)	Kona [?]: Pauahi (8 mi E. of Captain Cook)
Piophilidae	
<u>Piophila casei</u> Linnaeus (Cheese skipper)	Kona: Kēōkea; widespread pest of stored cheeses
Dolichopodidae	
<u>Cymatopus acrosticalis</u> Parent	Kona: Kailua; on rocks
Otitidae	
<u>Euxesta annonae</u> (Fabricius)	Kona: Hōnaunau
Tephritidae	
<u>Ceratitis capitata</u> (Wiedemann) (Mediterranean fruit fly)	Kona: on citrus and other fruits
<u>Chaetodacus cucurbitae</u> (Coquillett) (Melon fly)	Kona: in cucumber, tomato, and other cucurbits
<u>Dacus (Strumeta) dorsalis</u> Hendel (Oriental fruit fly)	Kona: on wide list of host plants; generally found from Hilo to Kona
<u>Procecidochares utilis</u> Stone	Kona
Drosophilidae (Pomace or vinegar flies)	
<u>Drosophila xanthostoma</u> Grimshaw	Kona
<u>Drosophila inaequalis</u> Grimshaw	Kona
<u>Drosophila perkinsi</u> Grimshaw	South Kona
<u>Drosophila plumosa</u> Grimshaw	Kona: about 2,000 ft
<u>Drosophila sordidapex</u> Grimshaw	South Kona
Asteidae	
<u>Asteia apicalis</u> Grimshaw	South Kona
<u>Asteia hawaiiensis</u> Grimshaw	Kona
Milichiidae	
<u>Milichiella lacteipennis</u> Loew	Kona: uplands

Table 4.2 (cont'd)

Taxon	Remarks
Chloropidae	
<u>Rhodesiella scutellata</u> (Meigen)	Kona
<u>Prohippaelates pallidus</u> Loew	Kona: Hōnaunau
Agromyzidae	
<u>Agromyza pusilla</u> Meigen (Serpentine leaf miner)	Kona: in cabbage leaves and many other plants
<u>Liriomyza minutiseta</u> Frick	Kona: in pole beans
<u>Ophthalmomyia lacteipennis</u> (Loew)	Kona
Larvaevoridae	
<u>Archytas cirphis</u> Curran	Kona
<u>Chaetogaedia monticola</u> (Bigot)	South Kona
Sarcophagidae (Flesh flies)	
<u>Revinia lherminieri</u> (Robineau-Desvoidy)	South Kona
<u>Sarcophaga albiceps</u> Meigen	Kona
Calliphoridae	
<u>Chrysomya rufifacies</u> Macquart	Kona: Hōnaunau
<u>Chrysomya megacephala</u> (Fabricius)	Kona: on sap from wound on papaya
<u>Calliphora vomitoria</u> (Linnaeus)	Kona: Kēōkea
<u>Eucalliphora lilaea</u> (Walker)	Kona: Kēōkea
<u>Prostethochaeta luciliodes</u> Grimshaw	South Kona
<u>Phaenicia sericata</u> Meigen	Kona
<u>Prostethochaeta fasciata</u> Grimshaw	South Kona
Muscidae (including Anthomyidae)	
<u>Stomoxys calcitrans</u> (Linnaeus) (Stablefly)	Kona: widespread pest of livestock; here since about 1892
<u>Musca domestica</u> Linnaeus (Common housefly)	Kona: of world-wide distribution; intimately associated with man for ages
<u>Lispocephala dexicoidea</u> (Grimshaw)	Kona: about 2,000 ft
<u>Lispocephala xenina</u> Malloch	South Kona
<u>Siphona irritans</u> (Linnaeus) (Hornfly)	South Kona: widely distributed; serious enemy of cattle and other animals; established in Hawai'i about 1896
<u>Fannia canicularis</u> Linnaeus	South Kona
<u>Limnophora arcuata</u> Stein	South Kona
Hippoboscoidea	
<u>Olfersia acarta</u> Speiser	Kona: off short-eared owl
<u>Ornithoica pusilla</u> (Schiner)	Kona: off <u>Himatione steinegeri</u> and <u>Vestiaria coccinea</u>
HYMENOPTERA (Bees, wasps, ants)	
Braconidae	
<u>Aphaereta muscae</u> Ashmead	South Kona
<u>Aspilota konae</u> Ashmead	South Kona
<u>Chelonus blackburni</u> Cameron	South Kona: Hōnaunau; in coffee fields; parasite of lepidopterous larvae
<u>Heterospilus prosopidis</u> Bridwell	Kona: Hōnaunau
<u>Ecphylopsis nigra</u> Ashmead	Kona
<u>Opius humilis</u> Silvestri	Kona: Mediterranean fruit fly parasite

Table 4.2 (cont'd)

Taxon	Remarks
<i>Hormiopterus vagrans</i> Bridwell	South Kona
<i>Ischiogonus palliatus</i> (Cameron)	South Kona: on <i>Pittosporum hosmeri</i>
Ichneumonidae	
<i>Amblyteles koebelei</i> (Swezey)	Kona: Kōōkea
<i>Amblyteles purpuripennis</i> (Cresson)	Kona: Kōōkea
<i>Atrometrus delicatus</i> Ashmead	Kona: 2,000 ft
<i>Atrometrus flavifrons</i> Ashmead	Kona: 2,000 ft
<i>Coccygominus punicipes</i> (Cresson)	Kona
<i>Echromorpha fuscator</i> (Fabricius)	Kona: Ki'ilae Bay
<i>Echromorpha maculipennis</i> Holmgren	Kona
<i>Ephialtes hawaiiensis</i> Cameron	Kona: in coffee fields; moth parasite
<i>Enicospilus ashmeadi</i> Perkins	South Kona
<i>Enicospilus capnodes</i> Perkins	Kona
<i>Enicospilus castaneus</i> Ashmead	Kona
<i>Enicospilus nigrolineatus</i> Ashmead	Kona
<i>Enicospilus orbitalis</i> Ashmead	Kona
<i>Hemiteles tenellus</i> (Say)	Kona
<i>Horogenes blackburni</i> (Cameron)	South Kona
<i>Pristomerus hawaiiensis</i> Perkins	South Kona
<i>Zaleptopygus flavo-orbitalis</i> (Cameron)	South Kona: Nāpō'opo'o; bred ex <i>Plutella</i> larvae
Trichogrammatidae	
<i>Uscana semifumipennis</i> Girault	Kona: ex <i>Bruchid</i> eggs
Aphelinidae	
<i>Aneristus ceroplastae</i> Howard	Kona: parasite of scales
<i>Coccophagus lecanii</i> Fitch	Kona: parasite of <i>Coccus viridis</i>
<i>Coccophagus orientalis</i> Howard	Kona: parasite of <i>Coccus viridis</i>
<i>Frospatella transvena</i> Timberlake	Kona: reared from Hibiscus whitefly
Encyrtidae	
<i>Adelencyrtus odonaspidis</i> Fullaway	Kona: Hōnaunau
<i>Anagyrus nigricornis</i> Timberlake	South Kona: on <i>Ōhii</i>
<i>Anagyrus swezeyi</i> Timberlake	Kona: Hōnaunau
<i>Calolelaps coeruleus</i> Timberlake	Kona: Kealakekua; on <i>nain</i>
<i>Coelopencyrtus swezeyi</i> Timberlake	Kona: Kealakekua; ex <i>Odynerus nigripennis</i>
<i>Encyrtus barbatus</i> Timberlake	Kona: Nāpō'opo'o
<i>Encyrtus infelix</i> (Embleton)	Kona: Nāpō'opo'o
<i>Omphale metallicus</i> Ashmead	Kona: lowlands around Kailua
<i>Quaylea whittieri</i> (Girault)	Kona
<i>Sympiesis konae</i> Ashmead	Kona
Eupelmidae	
<i>Anastatus kogbelei</i> Ashmead	Kona
<i>Eupelmus chrysopinus</i> Perkins	Kona
<i>Eupelmus flavipes</i> Cameron	Kona
<i>Eupelmus konae</i> Ashmead	Kona
<i>Eupelmus vulgaris</i> Ashmead	Kona
<i>Solindenia picticornis</i> Cameron	Kona
Eulophidae	
<i>Burksia viridimaculata</i> Fullaway	Kona: Hōnaunau
<i>Tetrastichus hagenowii</i> (Ratzeburg)	Kona
<i>Tetrastichus</i> species	Kona: from puparium of <i>Tephritis</i> species

Table 4.2 (cont'd)

Taxon	Remarks
<u>Eulophus citripes</u> Ashmead	Kona
<u>Hemiptarsenus hawaiiensis</u> Ashmead	Kona
Pteromalidae	
<u>Mesoleleaps cyaneiventris</u> Ashmead	South Kona
Miscogasteridae	
<u>Toxeuma hawaiiensis</u> Ashmead	Kona
Eurytomidae	
<u>Eurytoma tephritidis</u> Fullaway	South Kona: Hōlualoa; Kealahou
Chalcidae	
<u>Brachymeria polynesiensis</u> (Cameron)	Kona: Hōnaunau
<u>Brachymeria obscurata</u> Walker	Kona: in coffee fields; Ki'ilae Bay
<u>Dirhinus giffardii</u> Silvestri	Kona: Hōnaunau
<u>Stomatoceras pertorvum</u> Girault	Kona: Hōnaunau; Keauhou
Proctotrypidae	
<u>Proctotrypes hawaiiensis</u> Ashmead	Kona
Figitidae	
<u>Eucolla impatiens</u> Say	Kona: Hōnaunau
<u>Hexaplasta konensis</u> Ashmead	Kona
<u>Hypodirachis hawaiiensis</u> Ashmead	Kona
Evanidae (Ensign fly)	
<u>Evania appendigaster</u> Linnaeus (Cockroach parasite)	Kona
<u>Evania sericea</u> Cameron	Kona: Hōnaunau; Ki'ilae Bay
Bethylidae	
<u>Sierola aucta</u> Fullaway	Kona
<u>Sierola dichroma</u> Perkins	Kona
<u>Sierola konana</u> Fullaway	Kona: uplands
<u>Sierola leuconaura</u> Cameron	Kona
<u>Sierola molokaiensis</u> Ashmead	Kona
<u>Sierola monticola</u> Cameron	Kona
<u>Sierola spicata hawaiiensis</u> Fullaway	Kona
<u>Sierola testaceipes</u> Cameron	Kona
<u>Sclerodermus muiri</u> Bridwell	Kona: above Kealahou; in Straussia wood
<u>Sclerodermus perkinsi</u> (Ashmead)	Kona
<u>Sclerodermus sophorae</u> Perkins	Kona: in Sophora
Formicidae	
<u>Anoplolepis longipes</u> (Jerdon) (Argentine ant)	Kona: airport and lowlands
<u>Monomorium latinode</u> Mayr	Kona: around Kailua region
<u>Paratrachina longicornis</u> Latreille	Kona: Kōōkea
<u>Pheidole megacephala</u> (Fabricius)	Kona, and all islands: from coast to 3,000 ft
<u>Technomyrmex albipes</u> Smith	South Kona
Vespididae	
<u>Rumenes campaniformis</u> (Fabricius)	Kona: airport and lowlands
<u>Nesodynerus chelifer</u> Perkins	Kona
<u>Nesodynerus rudolphi</u> (Dalla Torre)	Kona: Hōnaunau
<u>Odynerus exastes</u> Perkins (Native bees)	Kona district

Table 4.2 (cont'd)

Taxon	Remarks
<u>Odynerus chelifera</u> Perkins	Kona
<u>Odynerus cooki</u> Perkins	Kona: Kealahou; close to monument
<u>Odynerus crypterythrus</u> Perkins	Kona
<u>Odynerus cyanopteryx</u> Perkins	Kona
<u>Odynerus cyphotes</u> Perkins	South Kona
<u>Odynerus dromedarius</u> Blackburn	South Kona
<u>Odynerus erythrognathus</u> Perkins	Kona
<u>Odynerus konanus</u> Perkins	Kona: 800-2,000 ft
<u>Odynerus eutretus</u> Perkins	Kona
<u>Odynerus frater</u> Dalla Torre	Kona: about 1,500 ft
<u>Odynerus heterochromus</u> Perkins	Kona: Kōōkea
<u>Odynerus holomelas</u> Perkins	South Kona
<u>Odynerus melanognathus</u> Perkins	Kona: around 1,500 ft
<u>Odynerus pterocheloides</u> Perkins	Kona
<u>Odynerus mesospilus</u> Perkins	Kona: Hōnaunau
<u>Odynerus molokaiensis</u> Perkins	Kona: Nāpō'opo'o; Hōnaunau
<u>Odynerus nigripennis</u> (Holmgren)	Kona: Hōnaunau; Nāpō'opo'o
<u>Odynerus obscure-punctatus</u> Perkins	Kona: Nāpō'opo'o; Hōnaunau
<u>Odynerus peles</u> Perkins	South Kona
<u>Odynerus rubropustulatus</u> Perkins	Kona: in mountains
<u>Odynerus scoriaceus</u> Perkins	Kona: on coast and in mountains
<u>Odynerus sociabilis</u> Perkins	Kona: Kōōkea
<u>Odynerus vulcanus</u> Blackburn	South Kona
<u>Pachodynerus simplicicornis</u> Saussure	Kona
<u>Polistes hebraeus</u> Fabricius (Paper wasps)	Kona: Hōnaunau
<u>Polistes macaensis</u> Fabricius	Kona: common caterpillar hunter; builds paper nests
<u>Polistes aurifer</u> (Saussure)	Kona: common
<u>Pseudopterocheilus pterocheloides</u> Perkins	Kona
Sphecidae	
<u>Hylocrabro tumidoventris</u> <u>leucognathus</u> Perkins	Kona
<u>Deinomimesa hawaiiensis</u> Perkins	Kona
<u>Melanocrabro curtipes</u> Perkins	Kona: uplands
<u>Nesocrabro rubrocaudatus</u> Blackburn and Cameron	Kona
<u>Nesomimesa hawaiiensis</u> Perkins	Kona: ex <u>Cheirodendron</u>
<u>Pison hospes</u> Smith (Spider wasp)	Kona
<u>Xenocrabro fulviorus</u> Perkins	Kona: uplands
<u>Xenocrabro hawaiiensis</u> Perkins	Kona: Hōnaunau
<u>Xenocrabro atripennis</u> Perkins	Kona: common generally from lowlands to 5,000 ft
<u>Xenocrabro polynesiensis</u> (Cameron)	Kona: Kōōkea
<u>Xenocrabro unicolor</u> Smith	Kona
Colletidae (Hylaeidae)	
<u>Nesoprosopis anthracina</u> (Perkins)	Kona: Kealahou Bay region
<u>Nesoprosopis assimulans</u> Perkins	Kona: coast
<u>Nesoprosopis attripennis</u> Perkins	South Kona
<u>Nesoprosopis coniceps</u> Perkins	Kona: Kōōkea
<u>Nesoprosopis difficilis</u> Perkins	Kona
<u>Nesoprosopis dimidiata</u> Perkins	Kona
<u>Nesoprosopis kona</u> Perkins	Kona
<u>Nesoprosopis obscurata</u> Perkins	Kona: Kealahou; rare
<u>Nesoprosopis ombrias</u> Perkins	Kona: south coast up to 2,000 ft

Table 4.2 (cont'd)

Taxon	Remarks
<u>Nesoprosopis paradoxa</u> Perkins	Kona
<u>Nesoprosopis pubescens</u> Perkins	Kona
<u>Nesoprosopis setosifrons</u> Perkins	Kona
<u>Nesoprosopis simplex</u> Perkins	Kona: generally distributed around lowlands; up to Kōōkea <u>mauka</u>
<u>Nesoprosopis sphecoideoides</u> Perkins	Kona: in mountains
Megachilidae (Leaf-cutting bees)	
<u>Megachile diligens</u> Perkins	Kona
Apidae	
<u>Apis mellifica</u> Linnaeus (Honey bee)	Kona: and common throughout the islands; first hive bees introduced in 1857 from California

Report 5

MAMMALS, BIRDS, AND REPTILES OF KONA

Edwin H. Bryan, Jr.

MAMMALS

The only mammals which occur naturally in Kona, except those which have escaped from domestication, are the bat, the house mouse, four species of rats, and the mongoose.

The Hawaiian Hoary bat, Lasiurus semotus (True and Allen), seems to have been reported first from Kona, by the artist and naturalist of the U. S. Exploring Expedition, Titian Peale. He says:

At Kaa-la-kea-kua [Kealakekua] on the island of Hawaii, memorable as the place where the renowned circumnavigator Cook perished, a species of bat, which we believe new to naturalists, was quite common; it measures about twelve inches across the wings; it is of ferruginous gray color; the interfemoral membrane is large and includes the tail, which is about the length of the body.*

This membrane, which forms the "wings" of the bat, is covered with fur-like hair. The species is related to species of common bats in North and South America, and one in the Galapagos Islands. This species was described by True and Allen in 1890 as Atalapha semota, but later was placed in the genus Lasiurus. It has been found to occur on several of the larger Hawaiian islands, as far northwest as Kaua'i, but at present is most common in the Hualālai region of North Kona. It has been seen flying along the Kona and Ka'ū coasts, at elevations between sea level and 4,000 ft, in both dry and wet regions, chiefly in the late afternoon and near sundown. It is no longer "quite common," as reported in the 1840s; to see one today is quite an event.

The little cosmopolitan house mouse, Mus musculus Linnaeus, appears to have reached the Hawaiian islands before the coming of foreigners, for Captain Cook's third voyage reported it as common and well established in Kona in 1778. The first missionaries also noted its presence, as did the naturalists of the U. S. Exploring Expedition. It measures about 3 in. long, with a tail 3-1/2 to 4 in. in length.

One of the four varieties of rats was also of aboriginal introduction. This is called Rattus hawaiiensis Stone, and its close relationship to members

*No reference citation in original manuscript.

of the *Rattus concolor* group, of Indonesia and various Pacific islands, suggests that it accompanied the Polynesians on their voyages across the Pacific, possibly as stowaways in their voyaging canoes. The Hawaiians made a sport of shooting rats and mice, using the bow and arrow, the only way in which they made use of this type of weapon.

The other three species of rats were accidental immigrants of a later date. Two are closely related varieties of a species rather similar in size and appearance to the Hawaiian rat. One is the white-bellied or Alexandrine rat, *Rattus rattus alexandrinus* Geoffroy, which builds nests in trees, and is also known as the roof rat, entering attics from roofs. It is known to damage fruits, such as mangos and avocados, eating small holes which cause the fruits to spoil. The other is the black rat, *Rattus rattus rattus* Linnaeus, which prefers to live in burrows in the ground or double walls of buildings, causing great annoyance by scampering about at night. It does even more damage by eating food materials and soap, and leaving unsightly litter. Both these rats carry fleas, which in turn carry diseases, such as bubonic plague. These two species, particularly the black rat, because of its domestic habits, are likely to bring these fleas into contact with people, who may become infected with the disease.

The largest of the four species of rats is the brown, Norway, or wharf rat, *Rattus norvegicus* Berkenhout. Its body averages 8 or 9 in. in length, with an additional 6 in. of tail, and it usually weighs about 3/4 lb; large specimens may weigh as much as 2 lb. This species was present in Hawai'i before 1840, probably coming ashore from early trading ships. It nests on or near the ground, making runways and burrows with complicated galleries. It causes much destruction, chiefly in warehouses, but also in fields and to birds, as well as carrying fleas with disease.

The mongoose, *Herpestes griseus* (Geoffroy), is a carnivore of the civet family (Viverridae), native to India. It was introduced from Jamaica in 1883, and later from New Orleans in 1885, in the hope that it would destroy rats. Unfortunately, it has not had much effect in reducing the rat population, but it does eat insects and ground-nesting birds and their eggs.

CHECK LIST OF THE LAND BIRDS OF KONA

Those currently seen in the Hōnaunau area are marked with a star (*).

ANATIDAE (Ducks and geese)

Anas wyvilliana wyvilliana Schlater, the Hawaiian duck, koloa maui.
[While this species has been found in Kona, it probably was never abundant in South Kona because of the absence of large bodies of fresh water. The same applies to migratory ducks.]

Branta (Nesochen) sandvicensis (Vigors), nēnē or Hawaiian goose. Found on the upper slopes and visiting small ponds in North Kona just before mating.

ACCIPITRIDAE (Hawks)

Buteo solitarius Peale, ʻio, the Hawaiian hawk. Once abundant, it still is to be found on the slopes of Kona.

PHASIANIDAE (Quail, partridges, pheasants)

Phasianus torquatus Gmelin, the Ring-necked pheasant, is found throughout the Kona area (according to Schwartz and Schwartz 1949).

RALLIDAE (Rails, gallinules, coots)

[The Sandwich rail, moho, *Pennula sandwichensis millsii* Dole, is now extinct. The Hawaiian gallinule, ʻālae ʻula, *Gallinula chloropus sandvicensis* Streets, and the Hawaiian coot, ʻālae keʻokeʻo, *Fulica americana alai* Peale, probably were never abundant in Kona, due to the absence of marshes and ponds.]

CHARADRIIDAE (Plover)

(*)*Pluvialis dominica fulva* Gmelin, the Pacific Golden Plover, kōlea, is a winter migrant which frequents the Kona coast in some numbers.

SCOLOPACIDAE (Sandpipers, snipe)

Numenius tahitiensis (Gmelin), the Bristle-thighed curlew, kioea, a winter migrant which has visited this area in small numbers, is now rarely seen.

Heteroscelus incanus (Gmelin), the Wandering tattler, ʻŪlili, a regular winter migrant, is not as abundant in the Hōnaunau area as the plover and the turnstone.

(*)*Arenaria interpres interpres* (Linnaeus), the Ruddy turnstone, ʻakekeke, is a regular winter migrant, occurring in small flocks.

[Other migratory species, particularly snipe and the sanderling or hūnakai, *Crocethia alba* Pallas, occur as occasional migrants on sandy shores of Hawaiian islands, particularly those to the northwest, but probably are rare along the Kona coast.]

RECURVIROSTRIDAE (Stilts)

[Although the Hawaiian stilt, kukuluāeʻo or āeʻo, *Himantopus himantopus knudseni* Stejneger, is thought to have occurred on all the main islands of the Hawaiian group, there is no doubt that it was much more abundant on Kauaʻi and Oʻahu than on Hawaiʻi; there are few suitable places for it to live along the Kona coast.]

PERISTRIDAE (Doves and pigeons)

(*)*Streptopelia chinensis* (Scopoli), the Turtle dove, laceneck, or Chinese dove, in later days called ʻehakō by the Hawaiians, was an early introduction which is now present in Kona. "Medium density up to about 1000 feet; low density above this to 2000 feet or more" (Schwartz and Schwartz 1949).

(*)*Geopelia striata striata* (Linnaeus), Barred dove, introduced from Singapore at various times since 1922, is fairly abundant in Kona. "Low density up to about 1000 feet" (Schwartz and Schwartz 1949).

STRIGIDAE (Owls)

Asio flammeus sandvicensis (Bloxam), pueo, the Hawaiian short-eared owl, seen flying at dusk over grassy forehills.

ALAUDIDAE (Larks)

Alauda arvensis Linnaeus, the Skylark, variously introduced since 1865, occurs on the upper slopes.

CORVIDAE (Crows)

Corvus tropicus Gmelin, 'alalā, the Hawaiian crow, still to be found in small numbers on the upper forested slopes.

TIMELLIDAE (Babbling thrushes)

Leiothrix lutea (Scopoli), "Pekin nightingale," "Japanese hill robin," introduced since 1918, has become widespread and locally abundant, even being blown onto the high, barren slopes.

TURDIDAE (Thrushes)

Phaeornis obscura obscura (Gmelin), 'ōma'ō or kāma'ō, a native Hawaiian thrush, is endemic to the island of Hawai'i. Its present status in Kona is unknown.

MUSCICAPIDAE (Old World flycatchers)

Chasiempis sandwichensis sandwichensis (Gmelin), the 'elepaio, is endemic on the island of Hawai'i, and occurs in the lower rain forest.

STURNIDAE (Starlings)

(*Acridotheres tristis (Linnaeus), the mina or mynah, called by the Hawaiians in later days pihale'kele, was introduced from India in 1865, and has become widely distributed throughout lower regions of the Hawaiian islands.

DREPANIIDAE (Hawaiian honeycreepers)

[The entire family found only in the Hawaiian islands; now confined to higher elevations, and many species becoming rare and some extinct.]

Loxops virens virens (Gmelin), the Hawai'i 'amakihi, endemic, island of Hawai'i.

Loxops maculata mana (Wilson) [formerly in Himatione and Paroreomyza], the Olive-green creeper, endemic to the island of Hawai'i.

Loxops coccinea coccinea (Gmelin), the 'ākepa or 'ākepeu'ie, endemic, island of Hawai'i.

Hemignathus obscurus obscurus (Gmelin), the Hawai'i 'akiāloa, endemic to island of Hawai'i.

Hemignathus wilsoni (Rothschild) [formerly in Heterorrhynchus], the 'akiapōlā'au, endemic to the island of Hawai'i.

Psittirostra psittacea (Gmelin), the 'ō'ū.

Psittirostra bairdii (Oustalet) [formerly in Loxioides], the palila, endemic, Hawai'i Island.

Psittirostra palmeri (Rothschild) [formerly in Rhodacanthis], hōpue, the Orange koa finch, endemic to the Kona district of Hawai'i.

Psittirostra flaviceps (Rothschild) [formerly in Rhodacanthis], the Lesser- or Yellow-headed koa finch, endemic to the Kona region of Hawai'i.

Psittirostra kona (Wilson) [formerly in Chloridops], Grosbeak finch, endemic to Kona.

Himatione sanguinea sanguinea (Gmelin), the 'apapane.

Ciridops anna (Dole), 'ula-'ai-hāwane, endemic to island of Hawai'i.

Vestiaria coccinea (Forster), the 'i'iwi.

Drepanis pacifica (Gmelin), the mamo, endemic to the Hilo forests of the island of Hawai'i, possibly did not occur at all in Kona, long extinct.

MELIPHAGIDAE (Honey suckers)

Moho nobilis (Merrem) [also put in the genus *Acrulocercus*], the 'ō'ō, endemic to the island of Hawai'i, and no specimens positively seen for more than forty years.

Chaetoptila angustipluma (Peale), the kiōka, endemic, doubtless extinct, Hawai'i Island.

PLOCEIDAE (Weaver finches)

Munia nisoria (Temminck), the Rice bird, called by later-day Hawaiians 'ai-laiki, introduced about 1865, escaped and established on all the main Hawaiian islands, not abundant in Kona.

Passer domesticus (Linnaeus), the English sparrow, introduced before 1870, called by later-day Hawaiians manu li'i-li'i, established on all the main Hawaiian islands, but not abundant in Kona.

FRINGILLIDAE (Finches, sparrows, buntings)

(*) *Richmondia cardinalis* (Linnaeus), the Red cardinal, Kentucky cardinal, introduced since 1929, established in Kona.

(*) *Carpodacus mexicanus frontalis* (Say), the House finch, linnet, papaya bird, 'ai-mikaōa, introduced before 1870, not common in Kona.

[Records of species of birds seen in Kona, particularly in the Hōnaunau area, would be much appreciated at Bishop Museum.]

REPTILES OF KONA

The reptiles found commonly on land in the Hawaiian Islands, including those known in Kona, are all species found widely distributed in the Pacific. They include three species of geckos (Geckonidae) and three species of skinks (Scincidae). In certain parts of Hawai'i a few other geckos and skinks have been reported, also a small, slender burrowing snake, *Typhlops braminus* (Daudin), but none of these is reported from the Hōnaunau area of Kona.

Geckos and skinks are easy to tell apart, both in appearance and in habits. Geckos have their body covered with small granules or minute scales, the top of the head is without symmetrical shields, the digits (fingers of the feet) are dilated, and the pupil of the eye is vertical. Skinks have the body covered with larger, cycloid scales, the top of the head bears large symmetrical shields, the digits are not dilated, and the pupil is round. Geckos are active chiefly at night, being seen usually in houses or on screens, catching insects which are attracted to lights. Skinks are active in the daytime, commonly seen sunning themselves or darting in search of insects in the open or from under rocks and trash. They are most active in the late afternoon. They seldom invade houses, preferring loose piles of leaves, rock piles, and other places out of doors.

GECKOS

The Sad or Mourning gecko, *Lepidodactylus lugubris* (Dumeril and Bibron) is the commonest gecko in Hawai'i. Their coloration is variable, ranging from brown, pale gray, tan or pinkish on the back, with dark spots or blotches, and with white or pinkish lower surface, to very dark specimens, with or without dark streak through the eye and along the side of the head. It lays pear-shaped eggs with hard, thick, white shells, 9.0 by 6.5 mm, capable of falling and bouncing without breaking. These are found sticking to a vertical surface or cemented together in clusters in cracks, against boards, or under loose bark or stones.

The Fox gecko, *Hemidactylus garnoti* Dumeril and Bibron, grows to a length of more than 4 in., with a long, fox-like snout. Its general color is dark grayish-drab, varying with the changing size of a large number of black, white, and brown spots, the white spots on the back forming rows. The under surface is pale, with a lemon-yellow tinge on the belly, and salmon on the tail. It occurs commonly in houses, under stones and planks, and even in trees. It seems always to be on the alert, and moves swiftly. The eggs are nearly spherical, 9 or 10 mm in diameter, firm, but rather brittle, laid in crevices in tree trunks and other such hiding places.

The Stump-toed gecko, *Paropus mutilatus* (Wiegmann), gets its specific name from the thin and tender nature of its skin. One can scarcely catch a specimen which is not mutilated in some way. Struggles of this gecko against one's fingers are likely to tear rents in the skin, and the tail is broken off easily. The tail is broad and flat, with a distinct constriction at the base. This species may reach a length of 3-1/2 in. It has a uniform drab color, with brownish markings on the head, and a white stripe between the eyes. The under surface is whitish, with a yellowish tinge on the hind legs and belly. Both surfaces are covered with minute black specks.

SKINKS

The Moth skink, *Leiolopisma noctua* (Lesson), is the smallest of the three skinks, measuring about 2-1/2 in. in length. Its color is described as glassy clay above, paler beneath, white with dull brownish marbling on the tail. A pale band covers the two central rows of scales down the back; the sides of the head and a band on each side are dark brown, irregularly dotted with pale spots, which may continue on the legs.

In the woods we find the Azure-tailed skink, *Emoia cyanura* (Lesson), largest of the Hawaiian skinks, measuring almost 5 in. long. It is recognized by its sharply defined, light mid-dorsal line, which extends from the tip of the snout to the tail. The ground color of most adults is dark brown, even black; some may have a yellowish or white stripe on each side of the central

line. The middle six rows of scales on the back may be bronzed tawny olive. The under surface is lighter than the back, and may have a greenish tinge. Colors are more intense in young skinks, becoming duller with age.

The Snake-eyed skink, Ablepharus boutonii poecilopleurus Wiegmann, is a very agile species, up to 4 in. long. It lives generally at lower elevations, where the climate is drier, preferring sunshine to shaded woods. The color is variable, ranging from entirely dark, through brown, olive, slaty, even blue-green, uniform or with two to four lighter stripes on the back, but never an odd number (a stripe in the exact center). It seldom stays sufficiently still for you to see that it does not close its eyes, the eyelids not functioning. It lays oval pink eggs, measuring 2/3 by 1/3 in., deposited in damp earth.

For additional data about mammals and reptiles in Hawai'i see Tinker (1941).

A SURVEY OF THE MARINE BIOTA OF THE HŌNAUNAU BAY REGION, HAWAI'I

Alison Kay

The object of this survey is to present a generalized picture of the marine biota of the Hōnaunau Bay region of the island of Hawai'i. The survey was undertaken during two periods, one of five days in January, and one of three days in August, 1957. Because of the limited time available for collecting in the area, the following discussion comprises neither a comprehensive list of species which occur in the region nor an intensive ecological survey.

GEOGRAPHY AND OTHER FACTORS

The Hōnaunau Bay region comprises approximately 3 mi of coastline extending from the north end of Hōnaunau Bay to the east shore of adjacent Alahaka Bay, which lies to the south of Hōnaunau. Although the entire area presents a more or less constant topography, consisting of a fringing coastline of basalt, the distribution of the marine biota is not uniform. The region has been divided into four habitats for purposes of the present discussion (Fig. 6.1). These habitats are influenced by factors such as the degree of wave action, tidal exposure, and type of substrate.

Tidepools form a habitat with a rich and varied biota which is easily accessible to the visitor. The coastline of the Hōnaunau Bay area presents considerable scope for the occurrence of tidepools, the most conspicuous region of their occurrence being on the lava flow which projects seaward directly in front of the Sanctuary. The edges of this flow form the south shore of Hōnaunau Bay and the north shore of Alahaka Bay. The flow extends approximately 500 ft from the shore seaward, and is about 400 ft in diameter at its greatest dimension. The surface of the lava is studded with small pits, crevices, shallow basins, etc. In addition there are several arms of the bays which indent the flow. The flow is exposed at 0.0 tides, at which time the majority of the pools are not in communication with the sea but subject to complete isolation. At tides higher than 0.0, the flow is variously covered by waves, and the tidepools are consequently replenished with sea water.

Although the tidepools on the lava flow are the most conspicuous in the Hōnaunau Bay area, other tidepools occur along the coastline wherever the shore is wide enough to support a pool of water, and where it is close enough to sea level to be replenished by a high tide.

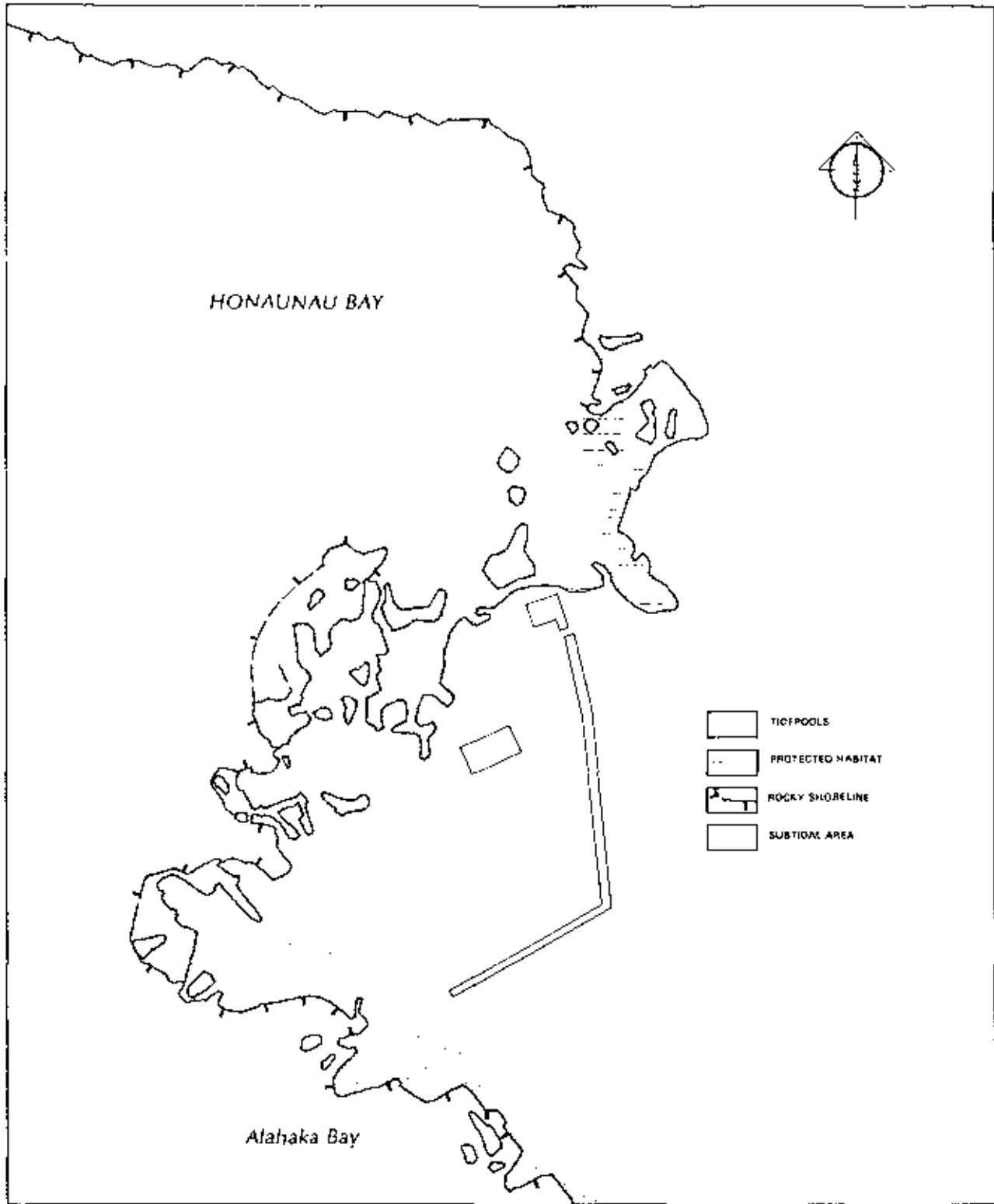


Fig. 8.1. MARINE HABITATS IN THE HŌNAUNAU BAY REGION (After Kay 1957).

The second habitat which will be discussed is that which may be termed a protected habitat, where there is little surf action. This factor characterizes the shallow inlet, Ke-one-'ele, at the southeast corner of Hōnaunau Bay, adjacent to the Sanctuary and the Sanctuary lava flow. The inlet is partially constricted off from the bay by a basalt spit which forms a shallow bar across the entrance. The bar is interrupted by a narrow channel which permits small boats access to the bay. The substrate here is sand, but Ke-one-'ele is bordered by the rocky shoreline and the walls of the Sanctuary.

An exposed habitat is the third type of habitat which will be discussed. This habitat comprises the major portion of the shoreline, occurring along the seaward face of the coast, and consists of an irregular fringe forming benches and bluffs varying in height between 2 and 50 ft above sea level. In places the face of the shoreline is sheer; in other parts there is a gentle slope toward the sea, the slope frequently levelling off into benches which are washed continuously by waves. The seaward face of the coastline is subject to constant surf and tidal action.

The shallow waters of the bays form the fourth habitat, which may be considered as a subtidal habitat. Depth of the water varies from a few inches to 6 ft within 100 ft of shore, depending on the height of the tide and the degree of surf action. The waters of both Hōnaunau Bay and Alahaka Bay are extremely clear, and from the high areas of the shoreline it is possible to observe brightly-colored fish swimming about submerged benches and boulders. Divers may be hampered by a freshwater lens which forms in areas where there are bubbling freshwater springs in the southeast corner of Hōnaunau Bay. The lens impairs visibility.

The prevailing wind direction is northeast. During the early morning there is little wind, and the waters of the bays and tidepools are calm and clear. At noon, with a rise in wind, ruffle appears, and visibility both in tidepools and in the bay is lessened.

The effects of wave action along the coastline and on the Sanctuary lava flow were considerably more noticeable in January than in August. The author observed both a high tide (1.7) with vigorous surf and a low tide (-0.1) with a calm sea in January. During the period of the January high tide, all but a few pools at the shoreward edge of the lava flow became inaccessible as the entire lava flow was covered at intervals by waves of considerable force. During the January low tide, the entire lava flow was exposed; it was not possible, however to collect in pools at the seaward edge of the flow because of the force of the surf, although these pools were visible between waves. In contrast to the conditions existing in January, in August the entire Sanctuary lava flow and coastline were accessible even during a 1.8 tide. Pools at the seaward edge of the Sanctuary flow, and patches of seaweed growing on partially-submerged benches along the coastline,

which during January had been hidden by surf, could easily be examined in August.

TIDEPOLS

Tidepools vary greatly in size, ranging from small depressions or crevices to wide stretches of water. They differ in character according to their distance from shore and the consequent degree of exposure which they experience.

Those pools which are nearest shore and which are replenished with water only at very high tides are barren. Animal life is limited to specimens of the periwinkle *Nerita picea* and *Littorina pintado*. Occasional bivalve mollusks such as *Isognomon costellatum* may be discovered by turning over rocks on the bottoms of the pools. The large black grapsid crab, *Grapsus grapsus*, frequently scrambles about on the lava between the pools.

Seaward, the tidepools become richer both in fauna and algae. The walls of most of the pools are lined with the crisp green alga *Boodlea composita*, which forms a dense mat in which are harbored numerous minute mollusks, annelids, and crustaceans. Occasional patches of another alga, the orange-brown *Hydroclathrus clathratus*, cling to the walls of the pools also. The bright-orange sponge *Spirastrella keaukaha* forms a thick growth in some of the pools, and is also found on the undersurfaces of the loose rocks in the bottom of the pools. Also lining the walls of the pools and projecting between the small rocks on the bottom is the gray sea urchin *Echinometra mathaei mathaei*. Patches of brightly-colored sea anemones occur on the walls of the tidepools from the midsection of the lava flow to the seaward edge. The bandanna prawn, *Stenopus hispidus*, frequents the edges of the deeper portions of the larger pools, seldom venturing forth into the open water, but visible by its antennae which protrude from beneath the pool ledges.

The substrate of the majority of pools is smooth basalt on which lie numerous small rocks, and among which may be some sand. The sea cucumbers *Holothuria atra*, *Actinopyga mauritiapa*, and *Stichopus* sp. lie on the bottom of the pools, their tentacles spread out in front in a semicircular crown. *Holothuria atra*, a black species which is frequently coated with sand, is most numerous; 25 specimens have been counted in a pool 4 ft in diameter. Rosettes of moulded sand, which are often noticeable on the bottoms of the tidepools, are the egg cases of the gastropod mollusk *Natica macrochiensis*. The only mollusk which occurs frequently in the pools is the small triton, *Cymatium ohlorostoma*.

If the rubble of the substrate is examined, other forms of animal life become visible. Numerous small crabs such as *Fachygrapsus* and *Carpilodes* scurry about when the rubble is disturbed. Clinging to the undersurfaces of

rocks are the bivalve mollusks Anomya and Isognomon costellatum, and the gastropod Peristernia chlorostoma. The snake-like sea cucumber, Ophiodesoma spectabilis, also may be found under rocks in tidepools.

There are several species of fish in tidepools in addition to the invertebrates. Gobies and pool-hopping blennies are conspicuous both in pools near the shore and those which are at the seaward edge of the flow. In addition, small specimens of the silver and black-striped manini, Acanthurus triostegus, the black-and-white demoselle, Dascyllus albisella, and the yellow chaetodon, Chaetodon fremblii, are numerous. A small flounder, Bothus sp., was noted on one occasion.

As the seaward edge of the lava flow is approached, the tidepools become noticeably richer in algal growth, and animal life is no longer conspicuous. The algae form a thick, heavy covering over the substrate; the species comprising the algal turf include the small, fan-like, brown, Padina, the pink and white Jania, and the coarse brown Turbinaria. String-like white tentacles of a terebellid worm frequently move slowly over the algae; the worm itself lives in a moulded tube deep in the algal substrate. Brightly-colored opisthobranch mollusks such as Micromela guamensis and Hydatina amplustre may be noted wandering over the algal substrate.

The north shore of the lava flow is deeply indented by an arm of Hōnaunau Bay, Keawewai, which extends approximately 100 ft across the flow, varying in diameter from 50 to 100 ft. Keawewai is in constant communication with the sea, and is thus subject to the rising and lowering of the tides. It varies in depth from 3 ft at its seaward entrance to less than 6 in. at the distal end. The substrate is formed of loose rubble consisting of small algal-covered rocks and pieces of dead coral. The rubble is interrupted in places by patches of sand studded with the green and white algae.

The walls of Keawewai are lined by several species of sea urchin, particularly the gray Echinometra mathaei mathaei noted in other tidepools, and the similar but black E. mathaei oblonga. In addition, the bright-orange sponge Spirastrella keaukaha and occasional heads of the pink coral Pocillopora damicornis line the walls. The bottom of the indentation is covered by numerous specimens of the large, short-spined sea urchin, Tripneustes, the spines of which frequently bear small bits of debris such as pieces of algae and small mollusks. The purple test of this sea urchin is often found amid the rubble of the shoreline. The sea cucumbers Holothuria atra, Actinopyga mauritiana, and Stichopus sp. also lie about on the substrate. At the seaward edge, small specimens of the red, flat-spined sea urchin Heterocentrotus mamillatus, and the long-spined wana, Centrocchinus paucispinus, occur between the rocks and coral on the bottom.

The sand patches of Keawewai form a feeding ground for several species of carnivorous mollusks. Several species of the genus Conus occur partially buried in the sand during the day; Conus hebraeus, C. abbreviatus, C. lividus, and C. naps are particularly numerous. Other mollusks in this area include Cymatium chlorostoma, Mitra litterata, and the small strombid Strombus maculatus.

The undersurfaces of the rubble substrate also present an interesting picture as regards animal life. Moving the stones and pieces of coral results in the disturbance of the rapidly moving brittle stars, Ophiocoma spp., which quickly disappear beneath the adjacent rocks and coral. Clinging to the undersurfaces of the rocks are at least three different species of starfish: the large, smooth-armed Linkia multiflora, the wide-armed Asteropa carinifera, and a very small (inch or less in diameter) red species. Two small sea urchins also cling to the undersurfaces of the rocks, the blunt-spined Eucidarus metularia and the white Lytechinus verruculatus.

THE INLET, KE-ONE-'ELE

The inlet, Ke-one-'ele, with its sandy substrate, has little to offer in the way of either animal life or algae. However, the walls of the Sanctuary which border the inlet on the shoreward edge, the coastline on the two sides, and the basalt spit which denotes the seaward margin are characterized by algae and animal life which are dark and sparse in comparison with the bright colors and rich variety of the tidepools.

Small beds of the mussel Brachidontes cerebristriatus cling to the basalt substrate of the northern edge. The southern edge and the walls of the Sanctuary are covered [with a] dense, deep mat of red algae. Harbored in the mat are numerous small annelid worms and mollusks. Larger mollusks such as Morula tuberculata, Drupa ricina, Thais harpa, Littorina pintado, and Nerita picea cling to the walls and exposed substrate. All of these species are dark gray or black, scarcely noticeable against the basalt and dark algal mat.

Seaward, the basalt flats which are exposed at low tides form a feeding ground for several species of the gastropod Conus, which during the day are partially buried in the sand and algae on the basalt. The white gastropod Morula ochrostoma also occurs here, as do small limpets such as Siphonaria and Phenacolepas. A minute, purple barnacle clings to the exposed portions of the spit.

THE ROCKY SHORELINE

The rocky shoreline is subject to almost constant wave action even at low tides, but it may be partially exposed by receding waves. The face of much of the shoreline has a pink hue, owing to the cover of the coralline alga

Porolithon. Occasional tufts of the brown Sphaecelaria are also present. Animal life on the sheer face of the shoreline is limited to a few more-or-less sessile invertebrates such as the sea urchins Podophora atrata and Echinometra mathaei mathaei, the latter frequently occurring in deep pits in the substrate; mollusks such as the 'opihi Helcioniscus eximius and Drupa morum; and the large barnacle Cthalamus bembali.

On the boulders which lie below the sheer walls of the shoreline, and on the sea-level portions of the shoreline which form low-lying benches, there is a rich growth of brown algae, principally Sargassum and Turbinaria. Occasional patches of the bright-green Ulva show through the browns. In several areas of the coastline there are thick patches of the crisp, golden Chnoospora pacifica.

SHALLOW WATERS OF THE BAY

The bottom of the bay is covered by loose rock and dead coral rubble; at low tide the depth of the shallow regions within 100 ft of shore is less than 3 ft. The rocks are strewn with echinoderms; particularly noticeable are the bright-red, flat-spined Heterocentrotus mamillatus, which may be 6 in. in diameter, and the black, long-spined Centrechinus paucispinus. The debris-carrying Tripterygion also occurs here. The holothurians, Holothuria atra and Actinopyga mauritiana are also numerous. In the deeper water (5-7 ft), large heads of coral are present: the white Pocillopora meandrina var. nobilis, and large yellow and purple heads of Porites spp. Numerous small fish were noted around the coral heads, particularly large specimens of the manini Acanthurus triostegus, the boxer Ostracion cubicus, and a red-striped labrid.

ADDITIONAL FAUNAL NOTES

In addition to the living animals which have been recorded for this survey, evidence of the occurrence of various other species was obtained from fishermen in the area, and noted in the debris on the beaches well above the tidal mark.

Fishermen noted the occurrence of species such as the 'U'U (Myripristia murdjan), 'Aweoweo (Priacanthus cruentatus), moi (Polydactylus sexfilis), maomao (Abudefduf abdominalis), 'Ohua (Cantherines sandwichensis), akule (Selar crymenophthalmus), uku (Aprion virescens), kawale'a (Sphyrna helleri), and hīnēlea (Thalassonia umbrostigma).

Various mollusk species were noted in the rubble at high tide level along the shore. Specimens of Cypraea granulata, C. mauritiana, C. helvola, C. poraria, Conus striatus, C. pulicarius, Distorsio anus, and Casmaria kalosmodix were noted. Examination of the rubble along the shoreline will

probably lead to the recording of other species which have not been noted in the tidepools or along the shoreline.

A detailed faunal list is appended (Table 6.1). This is not to be considered comprehensive, but merely indicates the species which were collected or noted during the survey.

SUMMARY

The marine biota of the Hōnaunau Bay region has been discussed from the aspects of four habitats which are distinctive in their distribution of animal and plant life. The tidepools of the lava flow projecting directly seaward from the Sanctuary are most accessible to the visitor; short walks along the shoreline permit observation of the exposed rock habitat and the subtidal habitat.

The biota of the tidepools is rich, varied, and colorful. The tidepools differ in character, depending on their distance from the shore, those nearest the seaward edge of the flow support a dense population of the algae and animal life. The dominant animal group in the tidepools is the echinoderms, four classes of which are represented in considerable numbers. Sea urchins (Echinoidea) and sea cucumbers (Holothuria) are particularly noticeable, lining the walls and substrate of the pools. Mollusks are limited to a few species which occur principally on the undersides of rocks.

The seaward edge of the coastline, which has been considered as an exposed rock habitat, is also colorful, but relatively few animals occur here. The color is imparted by the pink coralline alga *Porolithon* which encrusts the rocky substrate, and the rich golden-brown *Sargassum* which covers the boulders and benches. Animal life is limited to a few more-or-less sessile invertebrates. The waters of the bays, the subtidal habitat, are clear and permit observation of brightly-colored fish which hover near submerged benches and boulders. Divers in the bays may also observe large heads of coral and numerous large sea urchins.

By way of contrast to the three habitats above, the algae and animal life of the protected habitat, the inlet at the southeast corner of Hōnaunau Bay, is dark and limited to very few species.

Table 6.1
CHECK LIST OF INVERTEBRATES FROM HŌNAUNAU

Species	Tidepool	Inlet	Coast	Subtidal
COELENTERATES				
<u>Pocillopora damicornis</u>	x			
<u>Pocillopora meandrina</u> var. <u>nobilis</u>				x
<u>Porites</u> sp.	x			
<u>Dendrophyllia manni</u>	x			
<u>Cyphastrea ocellata</u>	x			
PORIFERA				
<u>Spirastrella kaeukaha</u>	x			
Black Sponge	x			
ANNELIDS				
Terebellid	x			
<u>Eurythoe</u> sp.	x			
MOLLUSCA				
Gastropods				
<u>Bursa bufonia</u>	x			
<u>Cerithium nesioticum</u>	x			
<u>Conus abbreviatus</u>	x			
<u>Conus distans</u>	x			
<u>Conus hebraeus</u>	x	x		x
<u>Conus imperialis</u>	x			
<u>Conus lividus</u>	x			x
<u>Conus nanus</u>	x	x		
<u>Conus rattus</u>	x			
<u>Conus vermiculatus</u>	x			x
<u>Cymatium chlorostoma</u>	x			
<u>Cymatium gemmatum</u>	x			
<u>Cymatium pileare</u>	x			
<u>Cypraea caputserpentis</u>	x			
<u>Cypraea isabella</u>	x			
<u>Cypraea moneta</u>	x			
<u>Cypraea reticulata</u>	x			
<u>Drupa morum</u>			x	
<u>Drupa ricina</u>			x	
<u>Helcioniscus exaratus</u>			x	
<u>Littorina pintado</u>	x	x		
<u>Melanella cumingi</u> <u>midpacifica</u>	x			
<u>Mitra litterata</u>	x			
<u>Morula ochrostoma</u>		x		
<u>Morula tuberculata</u>		x		
<u>Natica macrochiensis</u>	x			
<u>Nexita pioea</u>	x	x		
<u>Peristernia chlorostoma</u>	x			
<u>Phenacolepas</u> sp.		x		
<u>Rhizoehilus madreporum</u>	x			
<u>Siphonaria</u> sp.		x		
<u>Strombus maculatus</u>	x			
<u>Thais harpa</u>	x	x		
<u>Turris</u> sp.	x			
<u>Vexilla taeniata</u>	x			

Table 6.1 (cont'd)

Species	Tidepool	Inlet	Coast	Subtidal
Opisthobranchs				
<u>Heminoea grossata</u>	x			
<u>Hexabranchus</u> sp.	x			
<u>Hydractinia amplustre</u>	x			
<u>Microgelo guamensis</u>	x			
Lamellibranchs				
<u>Anomya nobilis</u>	x			
<u>Brachidontes cerebristriatus</u>	x			
<u>Ctena bella</u>	x			
<u>Isognomon costellatum</u>	x			
<u>Isognomon incisum</u>	x			
<u>Periglypta edmonsoni</u>	x			
<u>Spondylus hawaiiensis</u>	x			x
ECHINODERMATA				
Asteroids				
<u>Asterope carinifera</u>	x			
<u>Linkia multiflora</u>	x			
Unidentified small red sp.	x			
ECHINODERMATA				
Echinoidea				
<u>Centrochinus paucispinus</u>	x			x
<u>Echinometra mathaei mathaei</u>	x		x	x
<u>Echinometra mathaei oblonga</u>	x			x
<u>Eucladaris metularia</u>	x			
<u>Heterocentrotus mamillatus</u>	x			x
<u>Lytechinus verruculatus</u>	x			
<u>Podophora atrata</u>			x	
<u>Trippneustes gratilis</u>	x			x
Holothuria				
<u>Actinopyga mauritiana</u>	x			x
<u>Chiridota rigida</u>	x			
<u>Holothuria atra</u>	x			x
<u>Ophiodesoma spectabilis</u>	x			
<u>Stichopus</u> sp.	x			
Ophiuroidea				
<u>Ophiocoma erinaceus</u>	x			x
<u>Ophiocoma pica</u>	x			x
ARTHEPODA				
Crustacea				
<u>Carpiloides bella</u>	x			
<u>Grapsus grapsus</u>		x		
<u>Leander debilis</u>	x			
<u>Leptodius sanguinensis</u>	x			
<u>Leptodius</u> sp.	x			
<u>Pachygrapsus minutus</u>	x			
<u>Platypodia cydouxii</u>	x			
<u>Pseudosquilla ciliata</u>	x			
<u>Stenopus hispidus</u>	x			

Table 6.1 (cont'd)

Species	Tidepool	Inlet	Coast	Subtidal
<u>Cirripedia</u>				
<u>Cthalamus hembeli</u>			x	
Unidentified purple sp.		x		
<u>BRYOZOA</u>				
<u>Loxosoma</u> sp.	x		x	
<u>FISHES</u>				
<u>Abudefduf abdominalis</u>	x			x
<u>Acanthurus triostegus</u>	x			x
<u>Aprion virescens</u>				x
<u>Bothus</u> sp.	x			
<u>Cantherines sandwichensis</u>				x
<u>Chaetodon fremblii</u>	x			x
<u>Dascyllus albisella</u>	x			
<u>Myripristis murjan</u>				x
<u>Naso unicornis</u>				x
<u>Ostracion cubicus</u>	x			x
<u>Polydactylis sexfilis</u>				x
<u>Prisacanthus cruentatus</u>				x
<u>Selar crumenophthalmus</u>				x
<u>Sphyaena helleri</u>				x
<u>Thalassonia umbrostigma</u>				x
<u>ALGAE</u>				
<u>Asparagopsis</u>	x		x	
<u>Boodlea composita</u>	x			
<u>Cbnoospora pacifica</u>			x	
<u>Cladophora</u>	x	x		
<u>Dictyosphaeria</u>	x			
<u>Gracilaria</u>	x	x		
<u>Hydroclathrus clathratus</u>	x			
<u>Jania</u>	x			
<u>Laurencia</u>		x	x	
<u>Padina</u>	x		x	
<u>Porolithon</u>			x	
<u>Sargassum</u>			x	
<u>Sphacellaria</u>	x		x	
<u>Turbinaria</u>	x		x	
<u>Ulva</u>			x	
<u>Valonia</u>	x			

PART II

THE CULTURAL HISTORY OF HŌNAUNAU

INVESTIGATION OF ANCIENT HŌNAUNAU

Kenneth P. Emory

The Polynesians who came to the Hawaiian Islands more than a thousand years ago were quick to appraise the sunny, sheltered Kona coast of Hawai'i, rising gently to fertile, cloud-covered slopes, as an environment suited to their needs. It was ideal for the taro, breadfruit, bananas, sweet potatoes, and sugar cane they brought with them. Its clear, calm waters offered excellent reef and offshore fishing. This coast became the most densely populated area in the islands, and the coveted land of the chiefs.

The small but deeply-indented Hōnaunau Bay, with a sandy cove where canoes could be easily beached, was a favorite residence for the king. The constant presence of high chiefs, descended from the gods, hallowed the ground.

In time, one of the ruling chiefs declared the wide tongue of black lava which formed the west border of Hōnaunau Bay a sanctuary, under the protection of the great gods; and he decreed that it would be under his own deified spirit when he departed this life. Here the people of his sons, or their sons, should they war against each other for the kingship and its supreme powers, could flee and find a safe haven when they were threatened. This protection was also extended to those who were the objects of blood revenge and who broke the onerous tapus which bore the death penalty, providing they gained the portals of the sanctuary before the executioners caught up with them.

To reinforce the sacred protection, a massive stone wall was built around the neck of the land. This great wall has stood as the most impressive monument of ancient Hawai'i. Adjacent to it is the platform on which once stood the temple house where the deified bones of King Keawe and other high chiefs were arranged in woven caskets. This house with its host of wooden images was seen and depicted by early European visitors. Haole and Hawaiian scholars have written about Hōnaunau and the dramatic events which took place there before Hawai'i was reunited under Kamehameha, and about the struggle which followed the overthrow of the ancient tapus.

That this remarkable center of Hawaiian life and the great beauty of its aboriginal setting should not be lost and forgotten has been the concern of many islanders. Far-seeing individuals have realized that the happiest solution would be for the United States Government to create a National Historical Park for the preservation and restoration, as far as practicable,

of the scene as it was when the kings of Hawai'i dwelt here. Thanks to their efforts, this National Historical Park will become an accomplished fact, through an act of Congress approved by the President on July 26, 1955*. It will be a monument to the achievements of the Hawaiians and their ancestors.

Bishop Museum, in response to an invitation from the United States National Park Service, has prepared the report herewith submitted, on the area selected for the park (Fig. 7.1). Its preparation has furnished an opportunity to pull together such archaeological and historical material on Hōnaunau as has been accumulated by the Museum over the years, and to examine the ruins more at length.

The backbone of the current report is the research of J. F. G. Stokes, who in 1919 was detailed by Bishop Museum to investigate the ruins at Hōnaunau. His notes, maps, and photographs were at our disposal. Mr. Stokes, though long in retirement, came forth voluntarily to discuss his material. He has allowed the major part of his original manuscript to be incorporated into this report.

Stokes found that, by 1919, reliable local information concerning Hōnaunau before the overthrow of the ancient tapu system a century earlier, in 1819, was scant, and added not very much to what had been written by the earlier European visitors and the Hawaiian scholars who lived close to those times.

Henry P. Kekahuna and Theodore Kelsey, in 1952, after perusing the material in Bishop Museum and interviewing old-timers at Hōnaunau, compiled a descriptive map of the place of refuge (see bibliography**), in which some further interpretations of the ruins were attempted. They also, in a series of articles in the Hilo Tribune Herald (March 24-29, 1954), described features of Hōnaunau and the adjacent shores. In 1956, Kekahuna compiled an interpretative map of the ruins at Ki'ilae. His maps and writings stirred up considerable interest, and are in no small measure responsible for furthering the movement which has resulted in the creation of a National Historical Park in this region.

At my invitation, Kekahuna and Kelsey joined us for several days while we were mapping the area, and made available their maps, which shortened our work of spotting and following out ruins. For this generous help we are most grateful.

In the fall of 1956 and during the spring and early summer of 1957, I recruited from Bishop Museum and the University of Hawai'i and from among

*Pu'uhonua o Hōnaunau National Historical Park was established by Act of Congress on July 1, 1961.

**Kekahuna (1952).

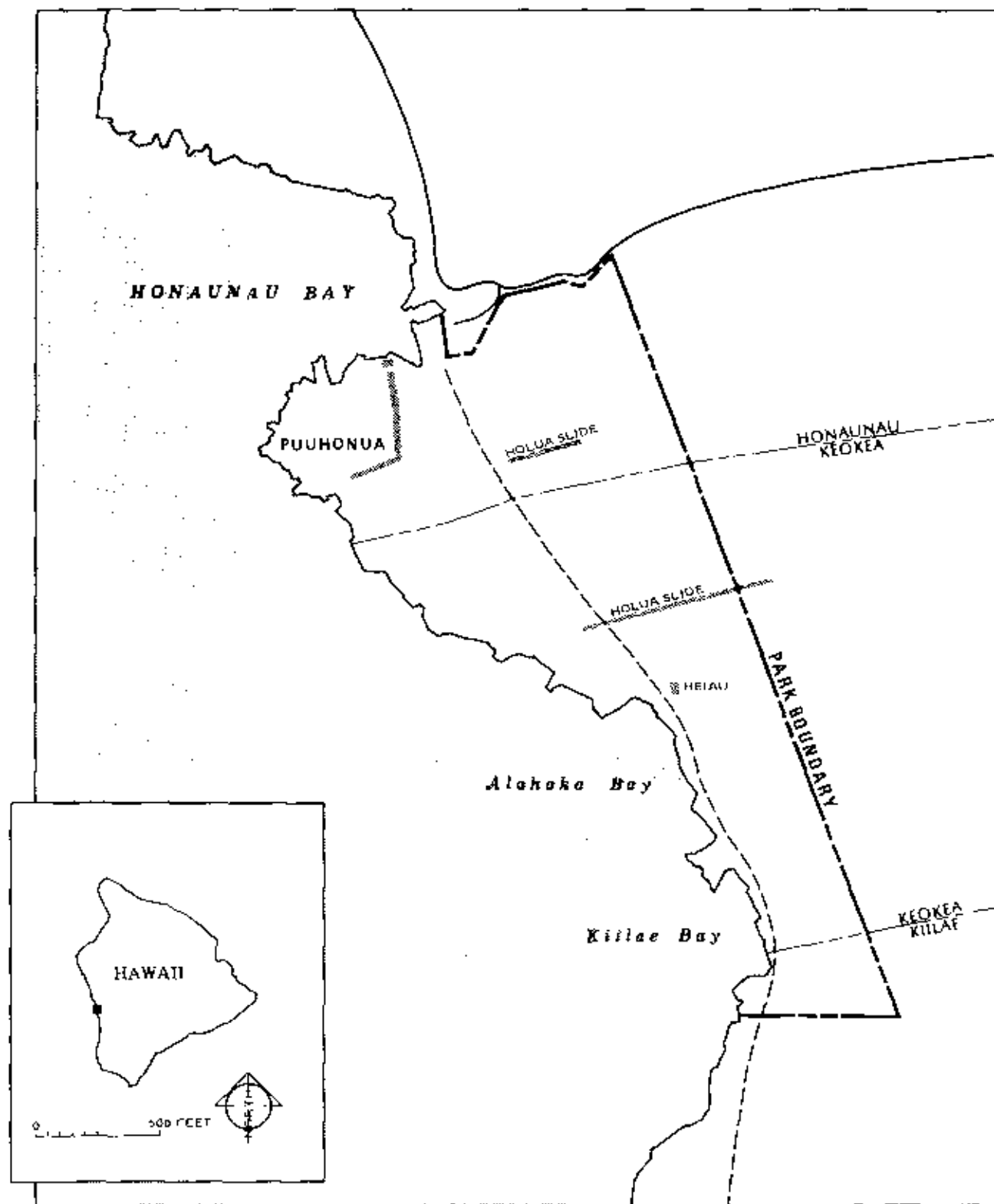


FIG. 7.1. HŌNAUNAU AND ADJACENT AREAS, SHOWING THE PROPOSED BOUNDS OF THE NATIONAL HISTORICAL PARK; THE PU'UHONUA, OR CITY OF REFUGE; A HŌLUA SLIDE WITHIN THE DISTRICT OF HŌNAUNAU; AND A HŌLUA SLIDE AND HEIAU PLATFORM WITHIN THE DISTRICT OF KĒOKEA (After Emory 1957).

residents of the island of Hawai'i, groups to assist with our explorations and the surveying and mapping of the area proposed for the National Park. Now, this land which was once the scene of open fields of waving pili grass, shady clumps of pandanus and kou trees, and groves of coconut trees along its shores, has been invaded and covered over with vicious thorny vegetation which claws at the skin and clothing. We owe much to the dogged persistence of the field parties who carried out the work despite the difficult terrain: to William J. Bonk and his Hilo Branch University of Hawai'i students; to Haley Cox, Jack Ward, Robert Bowen, from the University of Hawai'i in Honolulu; and, especially, to Yoshihiko H. Sinoto, of the University of Hawai'i and the Bishop Museum, our chief surveyor, who, like Bonk, is my field assistant in archaeology. From Bishop Museum came Dorothy and Ivan Rainwater and Mary Cameron Sanford; from the island of Hawai'i, Ruth and Frank Tabrah, Fred Seymore and some of his friends, and George C. Ruhle, naturalist with the Hawai'i National Park Service, and our contact with the Park Service. Miss Amy Greenwell, of Captain Cook, met all parties, attended their many needs, and joined us in the field day after day. The Commandant of the Fourteenth Naval District, headquarters at Pearl Harbor, detailed a Hawaiian Sea Frontier plane to fly over the area and obtain a set of air photographs, which were most useful, especially in mapping the coast line.

As an archaeological investigation of the whole park area, aside from the actual sanctuary, the work to date can be considered only a reconnaissance survey. Once park headquarters are established and the land cleared, it will be possible to carry out intensive investigations here and on adjacent coasts, which will add considerably to our knowledge of the ancient situation. Even at the place of refuge itself, excavation under the great wall and the platforms should yield charcoal for carbon dating, a most important step toward unraveling the past.

At Bishop Museum, Marion Kelly assembled and sorted the Hōnaunau material and investigated all available data on the theory of asylum in Hawai'i and other places. Dorothy Barrère, with the help of Mary Kawena Pukui, went through all the material in the Hawaiian language relating to the sanctuary at Hōnaunau, and searched genealogies to determine the relationships of the deified chiefs whose bones were deposited in the temple house attached to the sacred enclosure. Barrère also studied the written accounts of the early foreign visitors. From her researches comes the section of this report which treats of the history and function of the sanctuary. Sinoto did the final drafting of the maps, and Patience Bacon typed the final manuscript.

HŌNAUNAU VILLAGE AND VICINITY UNDER HAWAIIAN CULTURE

Kenneth P. Emory

IN GENERAL

When Captain Cook's ships were anchored below the cliffs at Kealakekua Bay in 1778-1779, had the officers ventured to the next bay south, Hōnaunau Bay, only 4 mi away, they would have happened upon a feature of ancient Hawaiian life which would surely have excited their wonder, as the remnants of it do for visitors today, and they would have left a record of it which would have been invaluable. This is the great stone-walled enclosure which had been established as a sanctuary for those fleeing from an avenging spear, and a place of safe refuge for the women, children, and old people, in time of war. It is a massive wall, rising to the height of 10 ft and running for over 1,000 ft, to block access to a flat peninsula which borders the south side of Hōnaunau Bay.

The enclosure has been familiarly known as the City of Refuge since Rev. William Ellis so termed it in his "Tour of Hawaii" describing his journey in 1823. To the Hawaiians it has always been known as the Pu'uhonua at Hōnaunau. A pu'uhonua is a sacred refuge established by a ruling chief. It operated in conjunction with a heiau, or temple, whose deities extended their protecting influence, and whose priests watched over it. At Hōnaunau this heiau was a neatly thatched house with a high roof, surrounded by an array of grimacing images standing on a pavement at the north end of the great wall of the enclosure. This heiau was called Hale o Keawe or Ka-iki-'Āle'ale'a, that is, the House of Keawe or The Little 'Āle'ale'a. 'Āle'ale'a is the name of a larger, and earlier heiau, whose high stone platform dominates the interior of the pu'uhonua. Keawe is the name of a Hawaiian chief who ruled over the whole island, and whose deified bones rested in the house which bore his name.

For the visitors of Ellis' time until the images were removed and the house itself destroyed in 1829, the Hale o Keawe was more intriguing than the great walled enclosure, as it was only here that one could survey the last relics of the ancient religion, and witness the last observances of the tabus which had supported the kings of Hawai'i in barbaric splendor and awesome power during the centuries just prior.

In approaching the Hale o Keawe, visitors passed through an attractive village at the head of the bay, which was a residence of chiefs. Before reaching the heiau and the pu'uhonua it was necessary to skirt a deeply indented, sandy cove where only the canoes of the king were allowed to land.

It was by the side of this cove that Archibald Menzies, botanist with Captain Vancouver, spent the night of February 28, 1793, upon his return from a long excursion into the uplands. He was, so far as we know, the first foreigner* to reach Hōnaunau and leave some record of it. His account, which follows, of approaching the village and of his stay, although tantalizingly incomplete, gives us a vivid glimpse of Hōnaunau as it presented itself before Western culture had made appreciable inroads.

After taking some refreshment on the morning of the 28th, we set out on our return home by the same path we had ascended till we came nearly out of the wood, and then we struck off by a path that went a little more to the southward of our former route, through plantations in the highest state of cultivation. Every field bore the marks of indefatigable labour, perseverance and industry, which were now amply repaying by productive crops. But as we came down towards the sea side, we walked over the most barren, rocky country that can possibly be conceived, composed of nothing but rugged cavernous lava, full of chinks and fissures that made it both dangerous and difficult to travel over.

We arrived in the afternoon at a village by the seaside called Honaunau, about two leagues to the southward of Kealakekua Bay. As we approached it, the natives came out in great crowds to meet us. The young women expressing their joy in singing and dancing, from every little eminence, to entertain us, while the men received us with a clamorous welcome and an officiousness to serve us that would have been troublesome and teasing had they not been kept in good order by John Smith and the natives who accompanied us, who exercised their authority by clearing an avenue before us wherever we went. They took us to a large house which was tabooed for the king, with a number of smaller houses contiguous to it for sleeping in and for his attendants when he comes to the village. We were told that he has a set of houses kept for him in the same way in every village he is likely to stop at round the island, which when he once occupies or eats in, cannot afterwards be used by any other.

Here clean mats were spread for us to stretch ourselves out after the fatigue of our long journey in the heat of the day, while a number of the natives placed themselves round us to lomi and pinch our limbs, an operation which we found on these occasions very lulling and pleasing when gently performed. Cocoa nuts, plantains and every kind of refreshment which the country afforded were got ready and supplied to us in abundance, and in justice to the friendly and hospitable disposition of the natives, we must observe that during this excursion our wants were anticipated and provided for with the utmost alertness the moment they were known. They took care of

*See Cook's voyage for "first." (DB)

everything we had, and behaved towards us with a scrupulous honesty that we could not help admiring. Every man of our followers had his post of trust allotted to him when we set out on our journey, and in no instance did any of them betray the confidence reposed in them, but performed their duty with fidelity and care.

In the evening a double canoe arrived from Kealakekua with several empty casks in her which the chief of the village had undertaken to fill with good water for the Discovery, and at dawn of next morning we heard a orier go through the village summoning all the natives to set out for the mountains to fetch water to fulfill his contract, and in a large marae close to us we now and then heard the hollow sounding drums of the priests who were up in the dead hour of the night performing their religious rites [Menzies 1920:86-87].

The next foreign visitor to leave a record of Hōnaunau was William Ellis. He came to the village on July 23, 1823, 30 years after Menzies, and 4 years after the overthrow of the tabu system and the general destruction of the heiaus.

Hale o Keawe had survived because it was also a royal mausoleum. To Menzies it was just another heiau, in Ellis' time it was the only one still standing. Menzies was a botanist, whereas Ellis, besides being a missionary, was an ethnographer bent on learning all he could about Hawaiian culture, and he could converse in the Hawaiian language. This explains why the significance of the heiau and pu'uhonua completely escaped Menzies. Most fortunately for us Ellis immediately sensed the central importance of Hōnaunau and realized the remarkableness of the pu'uhonua institution. Despite suffering violent pains, the after effects of drinking brackish water, he made a heroic effort to learn and record all he could during the two nights and the day he spent there. Undoubtedly, Ellis' investigation resulted in drawing to the spot the officers of the Blonde, two years later, and the addition of many more important details, for these men were not only allowed entry into Hale o Keawe, but permitted to take anything they wanted except the bones of the chiefs. Without the records of Ellis and the officers of the Blonde, and the preservation of a number of images taken from the Hale o Keawe, the paucity of information concerning this center of Hawaiian life would be deplorable.

Ellis learned that Hōnaunau was regarded as a place of considerable importance "having been the frequent residence of the kings of Hawaii for several generations" (Ellis 1917:124). He counted 147 houses in the village, which was so crowded that he and his companions, Thurston and Goodrich, could find no better accommodation than a canoe-building shed, where they were pestered by recently-introduced vermin, and were exposed to the intrusion of pigs and dogs. They were not the guests of the king, as was Menzies, or they would have been given the best accommodation possible. But Ellis says that

"notwithstanding we were uncomfortable during our short stay at Honaunau, and the people less kind than we usually found them, it appears to us a most eligible place for a missionary station" (Ellis 1917:129-130). What Ellis adds to the above reveals the cultural position of Hōnaunau village in 1823:

The coast, for twenty miles to the northward, includes not less perhaps than forty villages, either on the shore or a short distance inland, and contains probably a population of 20,000 souls, among whom a missionary might labour with facility.

Though there is at present no chief of distinction residing here, as at Kairua, or Kearake'kua, yet the very circumstance of establishing a station here might lead one to remove hither; and the conduct of the people, we have no doubt, would alter materially as they became better acquainted with the missionaries, and their object in settling permanently among them. It is near Kearake'kua bay, the frequent resort of shipping, where supplies might be left; and the natives also told us, that fresh water in considerable quantities might be procured at a short distance. We had not an opportunity to examine the place where they said it was found; but should this prove a fact, Honaunau would possess an accommodation seldom met with on this side of the island (Ellis 1917:124).

During Ellis' visit, Thurston and Goodrich examined the inland part of the district.

After proceeding about two miles... They passed through considerable groves of bread-fruit trees, saw many cocoa-nuts, and a number of prickly pear growing very large and loaded with fruit. They also found many people residing at the distance of from two to four miles from the beach, in the midst of their plantations, who seemed to enjoy an abundance of provisions seldom possessed by those on the sea shore (Ellis 1917:122).

The state to which Hōnaunau was falling as a result of the abandonment of it as a residence of kings, and the abolition of the old religion is revealed by James Macrae's journal, recounting his visit to Hale o Keawe two years later.

July 16 [1825]. Went to see the morai (Hale o Keawe), on the other side of the island. On our way met the old priest in his canoe coming on board. He alone is entrusted to enter the morai, and we accordingly took him back with us. We found the morai was on the east point of a small bay surrounded by huts standing under a thinly scattered grove of coconut trees, but with no signs of cultivation about. As we were about to enter the morai the old priest, who had on a straw hat and a cotton shirt, took both of them off, and only left his maro on. On entering we only found an empty filthy hut with quantities of human bones in heaps under mats at each end of the hut, many of the bones not yet dry and disgusting to the

sight. In the middle were several effigies of the deceased chiefs, tied to a bundle of tapa cloth containing the bones of each person the effigies represented. Most of the effigies were made of wood, but the one representing the late Tamahamaha* was substituted by a mask of European manufacture and was more finely dressed than the others. The party with Lord Byron that had visited here the day before, had taken away any memorials of the morai that could be taken, so we asked the old priest to be allowed to take some of the ancient weather beaten carved figures outside.

On board we found the old priest awaiting us for some presents in return for the old images he had allowed us to take from outside the morai. We gave him several articles of clothing with which he was more pleased than if we had given him money [Macrae 1922:71-79].

The seat of power of the chiefs who possessed and ruled the land had shifted from Hōnaunau to Kailua in North Kona, Hawai'i, and to Honolulu, on O'ahu, as ships, traders, and missionaries converged upon these ports. The resultant changes were to rob Hōnaunau of the exalted position it had enjoyed from the time of the establishment of its Hale o Keawe down to the death of Kalani'ōpu'u, in 1782. Kalani'ōpu'u's body lay at Hōnaunau while the events were shaping which would raise his nephew Kamehameha to the kingship of all Hawai'i, in place of his son Kiwala-'ō. Ke-'o-lei-o-kū, a son of Kamehameha's youth, was the last chief to have his bones deposited in the Hale o Keawe. That was in 1818. The following year, Kamehameha's son and heir, Liholiho, abolished the tabus of the gods, and Hale o Keawe became impotent as an institution which could maintain the pu'uhonua.

A hundred years later, in 1919, a few descendants of Hōnaunau people who still clung to its shores, could remember their grandparents saying that until the overthrow of the tabus, commoners had to pass along the shore in the morning, and around the bank of the village in the afternoon, lest their shadows fall upon the sacred ground of the chiefs, a profanity punishable by death.

Adjoining Hōnaunau on the south is Kōōkea, which, to judge from its ancient residential sites along the shore, including that of King Keawe, its two heiaus, its fine hōlua slide, and its burial cliffs, must have played a supporting part to the life of Hōnaunau. In Ki'ilae, the next land south of Kōōkea, chiefly residences sprung up around a celebrated well called Wai-ku'i-o-Kekela. Here lived Kekela, granddaughter of Kamehameha's younger brother, Keli'imaika'i, and mother of Queen Emma. Extending from the shore

*This must be an error of understanding, as Kamehameha was not buried here. (KPE footnote in 1957 ms.)

**This was likely Ke-'o-lei-o-kū, not taken, apparently. (DB)

inland 1/4 mi at Ki'ilae, is the lava-tube refuge caves which were so useful in giving protection to those who had ready access to them and who were familiar with their intricacies.

THE HALE O KEAWE (HOUSE OF KEAWE)

John I'i, who often saw the Hale o Keawe when it was still functioning in the old culture, wrote of it as "standing majestically on the south side of Akehipapa flat...by the entrance of a wooden inclosure, with door facing upland, towards the farming lands of South Kona."* He added that the house was well built, that its post and rafters were of kauiia wood, and that it was thatched with the crossed stems of dry ti leaves.** Ellis who saw it in 1823, four years after the overthrow of the ancient religion, describes the house as a

...compact building, twenty-four feet by sixteen, constructed with the most durable timber and thatched with ti leaves, standing on a bed of lava that runs for a considerable distance into the sea. It is surrounded by a strong fence of palings, leaving an area in front, and at each end about twenty-four feet wide. The pavement is of smooth fragments of lava, laid down with considerable skill [Ellis 1917:124].

He has left us a sketch of the house and the surrounding fence and images, shown in Figure 8.1. Bloxam, on the voyage of the Blonde, in 1825, called the house "a large native thatched hut, thirty by fifteen feet, with a very high roof and one low door" (Bloxam, A., 1925:74). He says it was "placed in a square paved with large stones and surrounded with thick wooden stakes and palings," and that it had "a small wooden door about two feet high arched over at the top, the only light the interior received was from this." He too has given us a sketch of the house (Fig. 8.2). James MacCras, botanist with the same expedition as Bloxam, describes the fence as composed of "sticks to the height of 6 feet, kept together by two rows of bars." Byron (1826:189) calls the fence "a palisade formed of the trunks of palm-trees." Robert Dampier, the artist of the voyage of the Blonde, gives a picture of Hale o Keawe (Fig. 8.3) which it would seem he made from memory, or from a very hurried sketch, so un-Hawaiian are the images he shows standing about the house. Lyman after his visit December 2, 1846, recorded of the pu'uhonua and the platform of Hale o Keawe:

*I'i (1959:136). (DB)

**I'i (1959:136). (DB)



The Depository of the Kings of Hawaii, adjoining the Place of Burial of Hōnaunau.

Fig. 8.1. HALE O KEAWE AT HŌNAUNAU, AS DEPICTED BY WILLIAM ELLIS IN 1823. BPBM Neg. No. 3891.

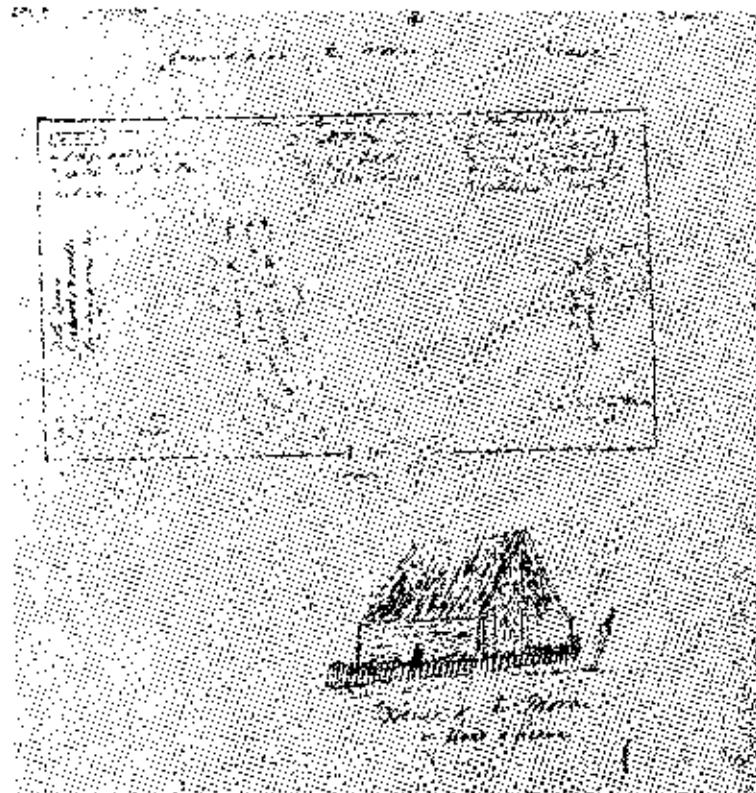


Fig. 8.2. SKETCH OF HALE O KEAWE, AND PLAN OF INTERIOR ARRANGEMENT, BY ANDREW BLOXAM IN 1825. BPBM Neg. No. 98519.

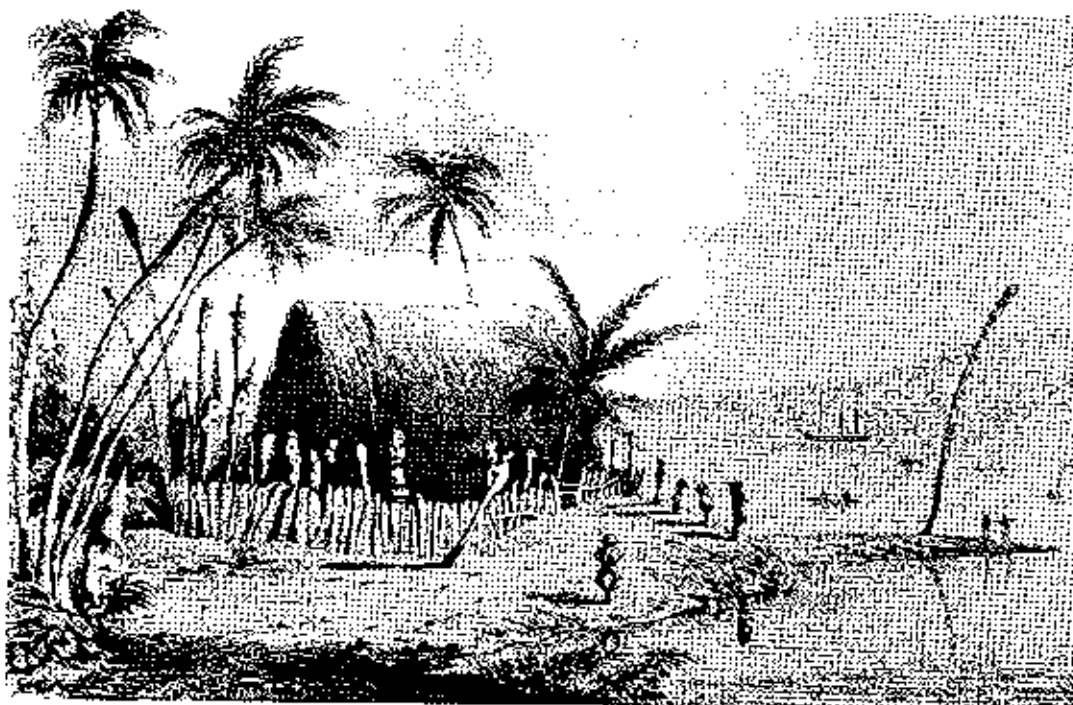


Fig. 8.3. HALE O KEAWE, AS DEPICTED BY ROBERT DAMPIER, ARTIST WITH H.M.S. BLONDE, IN 1825. BPBM Neg. No. 29183.

The walls are yet quite entire and the stone foundation of the House of Keawe with most of the wooden palisade which encompassed it on the west and north sides. The whole platform on which the house stood we found to be 50 feet by 50 - the house, 24 feet wide, occupying the west side [Lyman Ms.].

Lyman's description makes it clear that the wooden palisade continued around the north and west sides of the house. Whether or not from the east side the palisade continued around the south end, is not clear. In Ellis' sketch (Fig. 8.1) it seems to go to the north end of the great pu'uhonua wall. But Ellis says the house was "surrounded by a strong fence of palings." Andrew Bloxam also says it was "surrounded with thick wooden stakes and palings." His uncle, Reverend R. Bloxam, has it "encircled by a strong wooden palisade." Dampier's sketch of 1825 (Fig. 8.3) shows a definite curve around the south side. All in all, therefore, it seems safe to conclude that the wooden fence went completely around Hale o Keawe. This would leave possible access to the enclosure of the pu'uhonua on both the north and south side of the fenced-in area."

*Besides the "several wide entrances" mentioned by Ellis. (DB)

Concerning the disposition of images on the fence enclosing Hale o Keawe and both outside and inside the fence, this is what Ellis has to comment, and his remarks should be considered together with his sketch (Fig. 8.1).

Several rudely carved male and female images of wood were placed on the outside of the enclosure; some on low pedestals under the shade of an adjacent tree, others on high posts on the jutting rocks that hung over the edge of the water.

A number stood on the fence at unequal distances all around; but the principal assemblage of these frightful representatives of their former deities was at the south-east end of the enclosed space, where, forming a semicircle, twelve of them stood in grim array, as if perpetual guardians of "the mighty dead" reposing in the house adjoining.

A pile of stones was neatly laid up in the form of a crescent, about three feet wide, and two feet higher than the pavement, and in this pile the images were fixed. They stood on small pedestals, three or four feet high, though some were placed on pillars, eight or ten feet in height, and curiously carved.

The principal idol stood in the centre, the others on either hand; the most powerful being placed nearest to him; he was not so large as some of the others, but distinguished by the variety and superior carvings of his body, and especially of his head.

Once they had evidently been clothed, but now they appeared in the most indigent nakedness. A few tattered shrods round the neck of one that stood on the left hand side of the door, rotted by rain and bleached by the sun, were all that remained of numerous and gaudy garments, with which their votaries had formerly arrayed them.

A large pile of broken calabashes and cocoa-nut shells lay in the centre, and a considerable heap of dried and partly-rotten wreathes of flowers, branches of shrubs and bushes, and fragments of tapa, (the accumulated offerings of former days,) formed an unsightly mound immediately before each of the images [Ellis 1917:124].

Two years later, at the time visitors from H. M. S. Blonde entered the premises, it would seem from Bloxam's account that the images within the enclosure had been removed, and possibly those on the fence. Bloxam simply says that, "Outside this fence are ranged without order or regularity about twenty wooden idols rudely carved and of various uncouth forms, most of which are now fast rotting and decaying" (Bloxam, A., 1925:74). However, his uncle, Rev. R. Bloxam, speaking of the courtyard, says, "Here in all directions were rude-looking carved images of all shapes and dimensions whose hideous forms and countenances exhibited a most grotesque spectacle... Immediately before the morai [i.e., the house] without the fence stood an immense horrid looking deity" (Bloxam, R., 1924:79). The official account contains these comments,

The court within the palisade is filled with rude images of all shapes and dimensions whose grotesque forms and horrible countenances present a most extraordinary spectacle. Most of these idols are placed in the same attitude; one, however, was distinguished by a greater degree of carving: it had a child in its arms. There were also a number of poles with carved heads in various parts of the court, and, immediately in front of the morai, and outside the palisades, there was a kind of sentinel deity of a very grotesque shape [Byron 1826:199].

The engraving made from Dampier's sketch (Fig. 8.3) is not much help in establishing the position and shape of the images, and differs radically from Ellis' sketch (Fig. 8.1) in respect to them. Notable in both of them, however, is what looks like the trunk of a coconut tree, standing outside the house on the seaward side. In the Dampier illustration (Fig. 8.3) it is clearly on the flat 'Akahipapa, where no coconut tree could grow, and so must have been fixed in position if there. Andrew Bloxam mentions one very important detail omitted by all the others, namely, the presence "in the interior of the palisade on one side... a kind of stage, about fourteen feet high, of strong poles on which the offerings had been placed. At the bottom lay a considerable number of coconuts" (Bloxam, A., 1925:74).

In entering the Hale o Keawe, we are most fortunate in having Bloxam's sketch of the interior arrangements (Fig. 8.2), his written description, and that of several others on the same expedition, and the glimpse which Ellis had when he pushed aside one of the boards across the doorway. We can go back to the time when the house was functioning for John I'i's statement,

The compact bundles of bones (puku'i iwi) that were deified (ho'oakua ia) were in a row there in the house, beginning with Keawe's, near the right side of the door [viewed from the inside] and continuing to a place opposite the door. At the right corner of the house were the unwrapped bones of those who had died in war, heaped up like wood. In that pile of bones were those of Nahiolea, father of Kekuanoa [I'i Ms. "].

Ellis saw "many large images, some of wood very much carved, others of red feathers with distended mouths, large rows of shark's teeth and pearl-shell eyes" (Ellis 1917:128). He adds,

We also saw several bundles, apparently of human bones, cleaned, carefully tied up with cinet made of coconut fibres, and placed in different parts of the house, together with some rich shawls and other valuable articles, probably worn by those to whom the bones belonged... [ibid.].

Andrew Bloxam's description is as follows:

Before us were placed two large and curious carved wooden idols, four or five feet high,

*Also I'i (1959:139). (DB)

between which was the altar where the fires were made for consuming the flesh of the victims. On our left were ranged ten or twelve large bundles of tapa each surmounted by a feather or wooden idol, and one with a Chinese mask, these contained the bones of a long succession of kings and chiefs whose names were mentioned there. The floor was strewn with litter, dirt, pieces of tapa, and offerings of every description. In one corner were placed a quantity of human leg and arm bones covered over with tapa. In two other corners were wooden stages, on which were placed quantities of bowls, calabashes, etc., containing shells, fishhooks, and a variety of other articles; leaning against the wall were several spears, fifteen or sixteen feet in length, a small model of a canoe, two native drums and an English drum in good preservation. This, one of the chiefs took with him. In the sides of the building were stuck several small idols with calabash generally attached to them, one of these we opened and found the skeleton of a small fish, it was there probably the offering of a fisherman [Bloxam, A. 1925:75].

To this description of Andrew Bloxam we must add the details on his plan (Fig. 8.2). Rev. Rowland Bloxam's account is valuable in that it enables us to trace to their present resting place a number of images removed at the time of this visit.

On one side were arranged several feathered deities protruding their misshapen heads through numberless folds of decayed tapa. Under these folds were deposited the bones of the mighty kings and potent warriors who had formerly hailed these idols as their penates....after the party had viewed this holy place for some time, our rapacious inclinations began to manifest themselves and after his lordship had taken what he thought proper, the rest began to take an ample sanctuary regardless of the punishment attending such shameless sacrilege. Two immense though beautifully carved gods that stood on each side of the stone altar were immediately plucked up and sent down to the boats. I succeeded in appropriating to myself two wooden gods, a feathered deity that covered the bones of Keawe, grandfather of Terreahoo (Kaleiopuu), a beautiful spear and a few other articles within my reach. All the other visitants were equally piously inclined. Having thus gratified our curiosity we returned to the ship laden with the spoils of this heathen temple [Bloxam, R., 1924:79-80].

Byron's account of the voyage of the Blonde gives details which are confirmatory, and add several items of importance.

On entering the morai we saw on one hand a line of deities made of wicker-work, clothed in fine tapa, now nearly destroyed by time, and adorned with feather helmets and masks, made more hideous by rows of shark's teeth, and tufts of human hair; each differing a little from the other, but all

preserving a strong family likeness. Under these the bones of the ancient kings of the islands are said to be deposited; and near them the favorite weapons of deceased chiefs and heroes, their ornaments, and whatever else might have been pleasing to them when alive [Byron 1826:199].

The "two beautifully carved gods that stood on each side of the stone altar" in Hale o Keawe, and which, says Reverend R. R. Bloxam (1924:80) were "plucked up and sent down to the boats" by men of the Blonde expedition, may be seen today, one in the Bishop Museum which came to it in 1924 through the Bloxam family, and the other in the private collection of A. W. F. Fuller who lives in London* (Figs. 8.4 and 8.5). The Bloxam image (Fig. 8.5), not counting the pedestal, is 4 ft, 5 in. high, the Fuller image (Fig. 8.4) is slightly shorter. For a detailed comparison of these two, which Buck thought were made by the same craftsman, see his description in *Arts and Crafts of Hawaii* (Buck 1957:494). M. H. Bloxam, younger brother of Reverend Bloxam, in a speech given on his 80th birthday, in 1885, speaks of one of the two images as having been in his possession since 1826. This is surely the one he figured in *The Mirror* in 1826 (Bloxam, M., 1826b:210), which is the one now in the Bishop Museum. So we can conclude that this was collected by either Reverend Bloxam or his nephew Andrew Bloxam. However, upon the death of Rev. Bloxam's younger brother, it evidently went out of the hands of the Bloxam family temporarily, as a note added to the diary of Andrew Bloxam by his son, A. R. Bloxam, says "in possession of Sir H. Berney about 1896 and of A. R. Bloxam in 1914."

The "feather deity that covered the bones of Keawe" which Rev. R. R. Bloxam said he "appropriated" seems to be illustrated by M. H. Bloxam in an engraving in *The Mirror* of October 7, 1826 (Bloxam, M., 1826a:88; Fig. 8.6). Explaining the engraving, M. H. Bloxam simply says that this image is "one of the feather idols taken out of the morai...which was entered by Lord Byron and his officers." It is more than likely that this image is the one taken by his brother, as he would have had ready access to it. The article continues with this description, "The idol is composed of wicker work covered with red, black, and yellow feathers...the neck is surrounded by a string of European beads, probably left by Captain Cook."

As with the wooden image, if this had been in M. H. Bloxam's hands also, it could have gone out of the hands of the family upon his death. A feather image recently acquired by the American Museum of Natural History (Fig. 8.7) has such a remarkable resemblance to the one figured by M. H. Bloxam, that I believe we can conclude it is the same, except that now the image has suffered the loss of its pearl-shell eyes, most if not all of its feathers, and the bead necklace.

*The Fuller Collection is now at the Field Museum in Chicago.



Fig. 8.4. IMAGE FROM LEFT SIDE
OF ALTAR IN HALE O KEAWE.
Reproduced courtesy of Field
Museum of Natural History. Field
Museum Catalog No. 222689.



Fig. 8.5. IMAGE FROM RIGHT SIDE
OF ALTAR IN HALE O KEAWE.
BPBM Neg. No. 11795.

Rev. Bloxam seems to have plucked also one of the small idols his nephew Andrew Bloxam mentioned as stuck in the sides of the building, for in Rev. Bloxam's collection illustrated in *The Mirror* by his brother M. H. Bloxam (1826b:217; Fig. 8.8) is a small stick image with a bird-like head surmounted by a cox-comb. This image was acquired by Andrew Bloxam's son, A. R. Bloxam, and in 1949 was returned to Hawai'i by Andrew Bloxam's grandson for housing in the Bishop Museum (Fig. 8.9).

A. R. Bloxam evidently desired to obtain the curious helmeted head also figured in Rev. Bloxam's collection, as no. 6, for he had added in ink this note to the bottom of the illustration, "I do not know at all what became of



Fig. 8.6. FEATHER IMAGE FROM HALE O KEAWE, PICTURED IN THE MIRROR, LONDON, 1826. BPBM Neg. No. H321.



Fig. 8.7. FEATHER IMAGE IN AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK CITY. Found in storage, no data, probably the same as that figured in The Mirror. Neg. No. 320730 (photo by Rota), courtesy Dept. Library Services, American Museum of Natural History.

nos. 1, 5, and 8, they may possibly be in the Rugby School Museum to which Mr. Mathew H. Bloxam gave a very large collection of antiques and curios." M. H. Bloxam had evidently acquired the collection upon the death of his brother. In the text for the illustration, the head is described as "covered with stripes of red, blue, and yellow cloth. The eyes are made of mother-of-pearl and in the mouth are two rows of teeth." We can safely assume this image brought back from the Blonde expedition came from Hale o Keawe also.

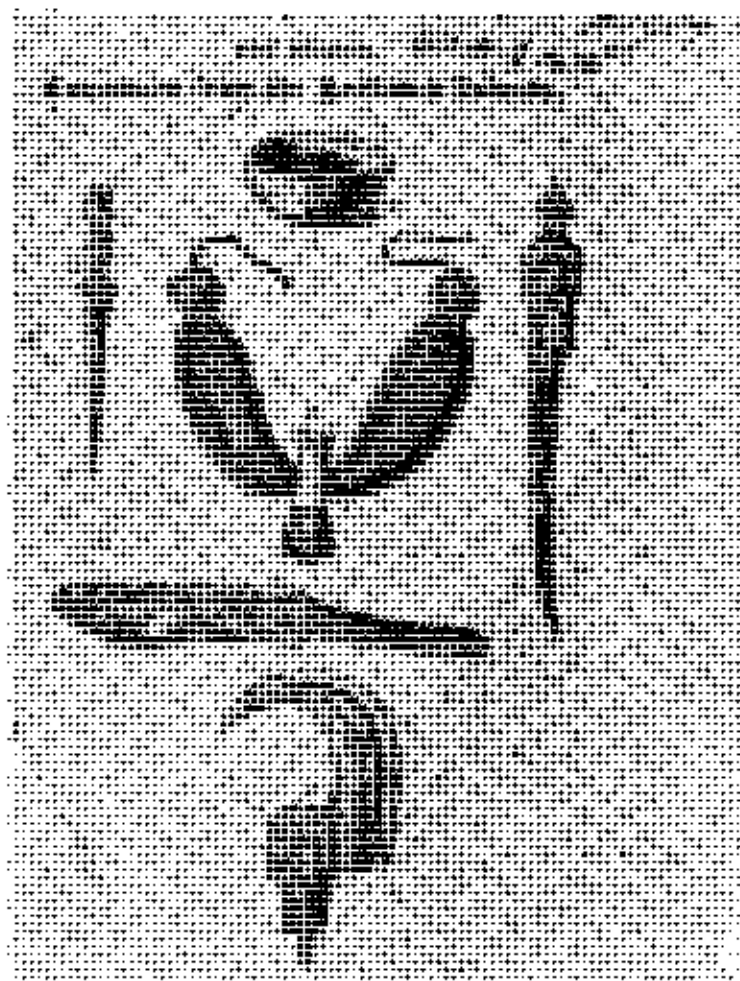


Fig. 8.8. PIECES TAKEN FROM HALE O KEAWE BY A MEMBER OF THE BLONDE EXPEDITION OF 1825, PICTURED IN THE MIRROR OF OCTOBER 7, 1826. Numbers 2 and 4 are now in B. P. Bishop Museum. BPBM Neg. No. H322.

Midshipman John Knowles of the Blonde brought to England three images, one naturalistic in form, with human hair pegged into the head, 16 in. high (Fig. 8.10), and two stick images, 23.5 in. and 13.6 in. high (Fig. 8.11). H. G. Beaseley acquired them in the 1930s for his Cranmore Museum. After his death his collection was distributed among several museums in England. The naturalistic image is now in the British Museum, the whereabouts of the other two we do not know yet.*

*The longer of the two images is now at the Honolulu Academy of Arts; the shorter is now at the Metropolitan Museum of Art in New York. (DB)



Fig. 8.9. BIRD-HEADED STICK IMAGE FROM ANDREW BLOXAM COLLECTION.
Taken from Hale o Keawe in 1825, and now in B. P. Bishop Museum.
BPBM Neg. No. 28955-a.

Undoubtedly some others of all the images taken from the Hale o Keawe survive in public and private collections. Research should result in discovering some of them. An image 7 ft, 2 in. high, counting in its elongated headdress, was picked up in England from a gardenhouse where it had stood for many years, at Old Garden Cliff, near Gravesend, England, and sold in 1920 to the Peabody Museum at Salem, Massachusetts (Fig. 8.12). It is possibly one that stood outside of Hale o Keawe.

From Ellis' remark that the bones in the bundles were carefully tied up with coconut-fibre braid, and Byron saying these bundles contained "deities made of wicker-work" under which were the bones of the chiefs, it is very likely that the bones of these deified chiefs in the bundles were encased in

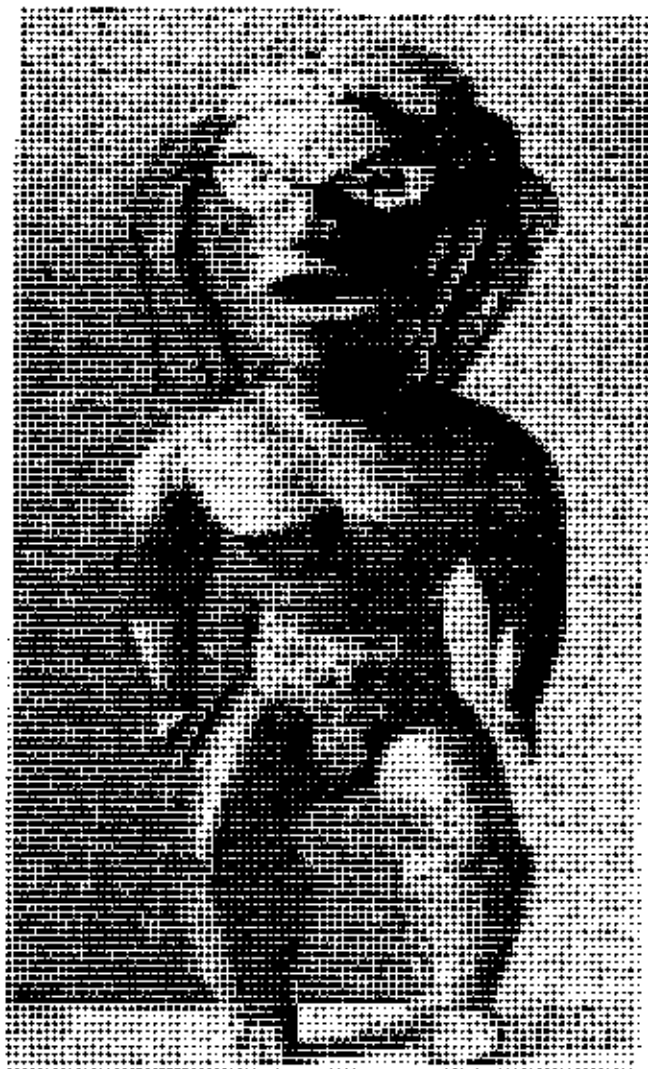


Fig. 8.10. IMAGE FROM HALE O KEAWE BROUGHT TO ENGLAND BY MIDSHIPMAN JOHN KNOWLES, AND NOW IN THE BRITISH MUSEUM. Reproduced courtesy of the Trustees of the British Museum. British Museum Registration No. 1944 Oc.2.716.

woven, sennit caskets moulded over the skull and having pearl-shell eyes, as in the two from the Hale o Liloa, Waipi'o Valley, Hawai'i (Fig. 8.13). This was a method of treating the bones of a deified chief known as ku i ke ka'ai (placed in a sennit container). Neither Ellis nor the officers of the Blonde saw the tapa bundles unwrapped, but mention is made of the wrappings being in poor repair, so parts of the woven sennit casing may have been exposed. On the genealogies and belonging to two generations earlier than the Keawe thought to be the founder of Hale o Keawe, there is a Keawe-ku-i-ke-ka'ai (i.e., Keawe-bound-in-sennit) whom Kamakau (1670a) gives as the original founder in one of his versions.

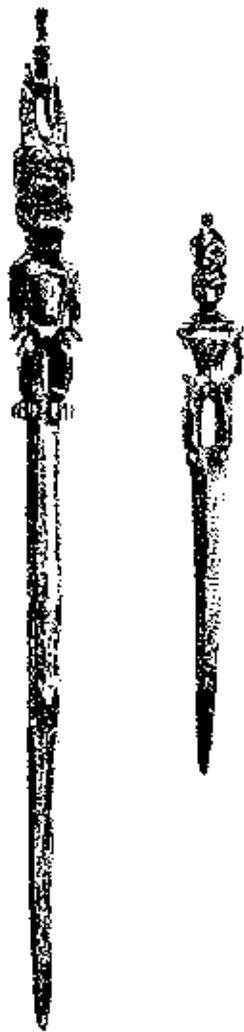


Fig. 8.11. TWO STICK IMAGES FROM HALE O KEAWE BROUGHT TO ENGLAND BY MIDSHIPMAN JOHN KNOWLES. Left: reproduced courtesy of Honolulu Academy of Arts, Catalog No. 3075.1. Right: reproduced courtesy of The Metropolitan Museum of Art, The Michael C. Rockefeller Memorial Collection, Bequest of Nelson A. Rockefeller, 1979 (1979.206.1625).



Fig. 8.12. IMAGE IN THE PEABODY MUSEUM, SALEM, MASSACHUSETTS. Bought from an English dealer, and probably from Hale o Keawe. Reproduced courtesy of Peabody Museum of Salem.

During the life of a high chief, consecrated sennit-braid, 'aha, called 'aha kapu, were made for ritualistic purposes. These were given names and at the death of a chief these 'aha were incorporated in his ka'ai, which was then placed in a house called a hale poki. Such a house was Hale o Keawe, this being one of its functions (Kamakau 1869; Malo 1951:106).

*"...king..." (DB)

**...used to keep his bones or, in the case of a "king" were... (DB)

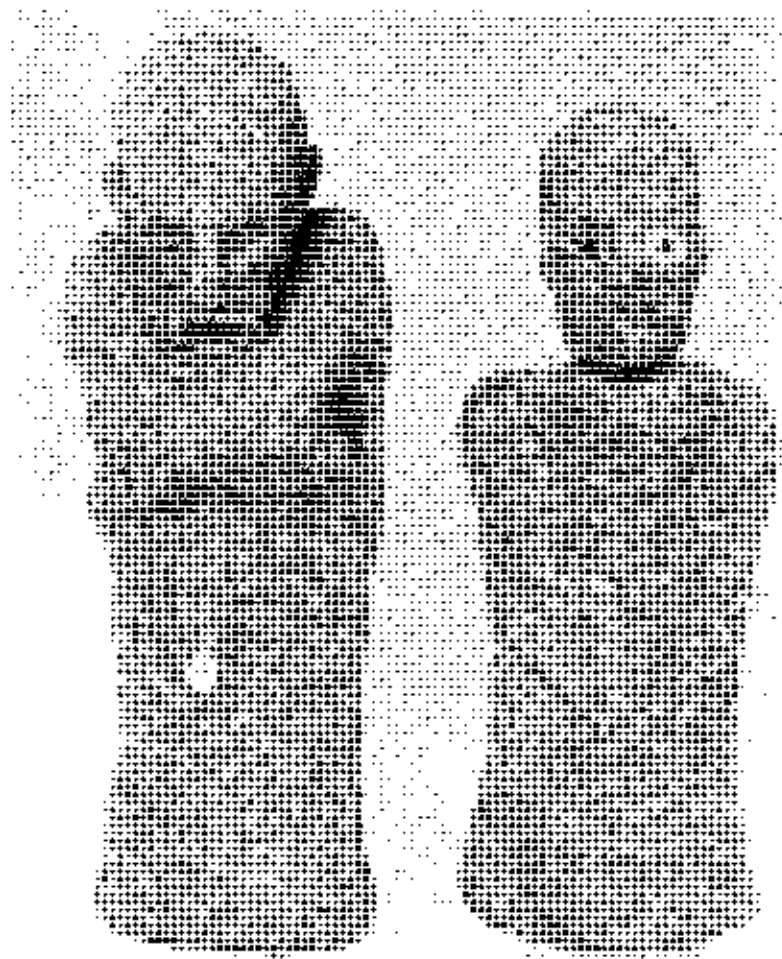


Fig. 8.13. CASKETS OF PLAITED COCONUT-FIBRE BRAID CONTAINING THE SKULL AND BONES OF DEIFIED CHIEFS. From Hale o Liloa, Waipi'o Valley, Hawai'i, and preserved at B. P. Bishop Museum. BFBM Neg. No. 29038.

THE PU'UHONUA

Ellis' description of how the pu'uhonua functioned, derived from those who had seen it in the days when it was being used, can be regarded as reliable, as far as it goes. It is our basic document to which we have been able to add little, and so should be quoted in full:

Adjoining the Hare o Keave to the southward, we found a Pahu tabu (sacred enclosure) of considerable extent, and were informed by our guide that it was one of the pu'uhonuas of Hawaii, of which we had so often heard the chiefs speak. There are only two on the island; the one which we were then examining, and another at Waipio, on the

north-east part of the island, in the district of Kohala.*

These Puhonuas were the Hawaiian cities of refuge, and afforded an inviolable sanctuary to the guilty fugitive, who, when flying from the avenging spear, was so favoured as to enter their precincts.

This had several wide entrances, some on the side next the sea, the others facing the mountains. Hither the manslayer, the man who had broken a tabu, or failed in the observance of its rigid requirements, the thief, and even the murderer, fled from his incensed pursuers, and was secure.

To whomsoever he belonged, and from whatever part he came, he was equally certain of admittance, though liable to be pursued even to the gates of the enclosure.

Happily for him, those gates were perpetually open; and as soon as the fugitive had entered, he repaired to the presence of the idol, and made a short ejaculatory address, expressive of his obligations to him in reaching the place with security.

Whenever war was proclaimed, and during the period of actual hostilities, a white flag was unfurled on the top of a tall spear, at each end of the enclosure, and, until the conclusion of peace, waved the symbol of hope to those who, vanquished in fight, might flee thither for protection. It was fixed a short distance from the walls on the outside, and to the spot on which this banner was unfurled, the victorious warrior might chase his routed foes; but here, he must himself fall back; beyond it he must not advance one step, on pain of forfeiting his life.

The priests, and their adherents, would immediately put to death any one who should have the temerity to follow or molest those who were once within the pale of the pahu tabu; and, as they expressed it, under the shade or protection of the spirit of Keawe, the tutelar deity of the place.

In one part of the enclosure, houses were formerly erected for the priests, and others for the refugees, who, after a certain period, or at the cessation of war, were dismissed by the priests, and returned unmolested to their dwellings and families; no one venturing to injure those, who, when they fled to the gods, had been by them protected.

We could not learn the length of time it was necessary for them to remain in the puhonua; but it did not appear to be more than two or three days. After that, they either attached themselves to the service of the priests, or returned to their homes.

*Rather Hāmākua. (DB)

The pūhōnua at Hōnaunau is capacious, capable of containing a vast multitude of people. In time of war, the females, children, and old people of the neighbouring districts, were generally left within it, while the men went to battle. Here they awaited in safety the issue of the conflict, and were secure against surprise and destruction, in the event of a defeat [Ellis 1917:126-128].

HŌNAUNAU IN TRANSITION TO THE PRESENT

Kenneth P. Emory

After the destruction of Hale o Keawe in 1829, accounts of the ruins at Hōnaunau were left by various visitors who usually dwelt on the past functions of the sanctuary, mainly basing their remarks on Ellis' account. Their descriptions of the features of the ruins have been taken into consideration in the archaeological section of this report.

The earliest of these visitors was Chester S. Lyman, a missionary stationed at Hilo.* He visited Hōnaunau in 1846, and left a sketch plan of the ruins (Fig. 9.1), and the first recorded note on the tradition of the Ka'ahumanu Stone (Lyman Ms.:December 2, 1846). Next came the Rev. Henry T. Cheever, in 1849 (Cheever 1851:18-24), who repeats Ellis at length, including his tale of Kalanimoku having fled to the pu'uhonua after the battle of Moku'ōhai. Then came Samuel S. Hill in the 1850s (Hill 1856:178-185), whose description of the ruins is so at variance with those of other observers as to

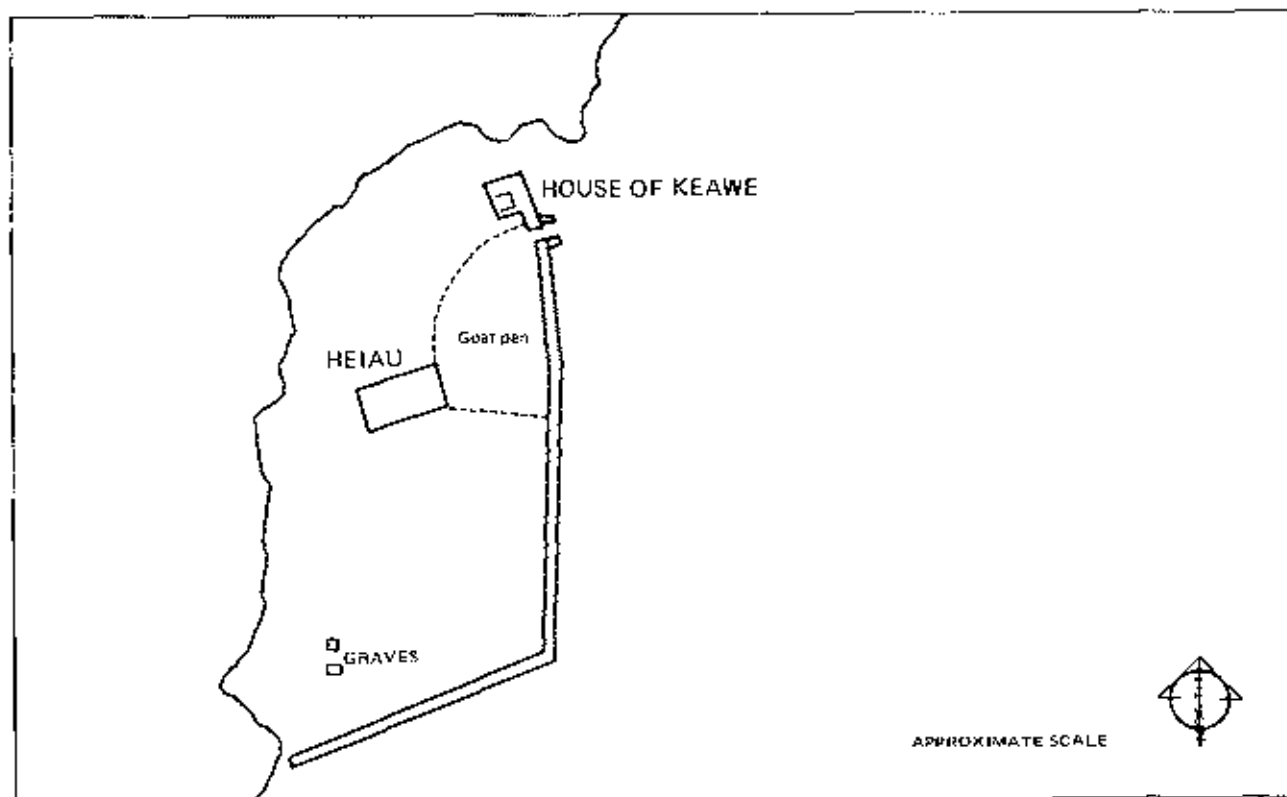


Fig. 9.1. SKETCH OF RUINS AT HŌNAUNAU (After Chester S. Lyman 1846).

*Lyman was a visiting scientist from Yale University. (DB)

be discounted. However, his remark that the village contained only 40 houses and not more than 100 residents, is indicative of the tremendous decline in population in a quarter of a century.

In 1866 we find Mark Twain at Hōnaunau (Clemens 1936:185). His remarks are too superficial to add anything of value to our knowledge of Hōnaunau, although he is the first one to mention the long stone we know as the Keoua Stone. In 1874 came Bodanz-Whetham (1878:78-77) whose remarks, again based on Ellis, add nothing new. In 1889 W. F. Brigham took a photograph of the village, one of the outside of the great wall of the pu'uhonua (see Fig. 13.1), and one of 'Āle'ale'a heiau platform and the inside of the pu'uhonua, which have proved most useful in evaluating the extent of the restoration of 1902. Also in 1889, D. H. Hitchcock made a rough sketch map of the ruins, and listed some of the features (Fig. 9.2). There must have been many Hawaiians who as visitors or residents knew much concerning the area and changes which had taken place in it, but it was not until the restoration attempted in 1902 that an effort was made to draw on this source, and no scholarly effort until 1919, when J. F. G. Stokes spent April to July at Hōnaunau village.

HISTORY OF LAND OWNERSHIP

The land section (ahupua'a) of Hōnaunau, containing some 7,120 acres, and running from the sea some 10 mi up on the slopes of Mauna Loa, was granted in the Great Mahele, or land division, of 1848 to Miriam Kekau'ōnohi, a granddaughter of Kamehameha I. Her first husband was Keli'i'ahonui, son of King Kaumuali'i of Kaua'i, and her second husband was Levi Ha'alelea, a descendant of the chiefs of Kona, who inherited property. In 1866 the administrator of the estate of the then deceased Haalelea sold this land at auction to W. C. Jones, agent for Charles Kanaina, the father of Lunalilo.* The sum of \$5,000.00 bid was not paid, however, and by court order, Charles R. Bishop received the land for this sum on April 1, 1867. Mr. Bishop seems to have bought the land as a present to his wife, Bernice Pauahi, a most fitting gift, in the light of her direct descent from the chiefs who had maintained the pu'uhonua. On March 25, 1891, six years after Pauahi's death, Mr. Bishop deeded the land to the Trustees of the Bishop Estate, who in turn leased that portion occupied by the pu'uhonua to S. M. Damon, one of their number. Mr. Damon undertook the expense of the restoration of the Great Wall, the Hale o Keawe platform, and the heiau platform of 'Āle'ale'a. The work was done under the supervision of W. A. Wall, surveyor, and was based on historic facts and upon traditional knowledge gleaned from local informants. Since 1921 the County of Hawai'i has had under lease from the Bishop Estate the pu'uhonua

*King Lunalilo. (DB)

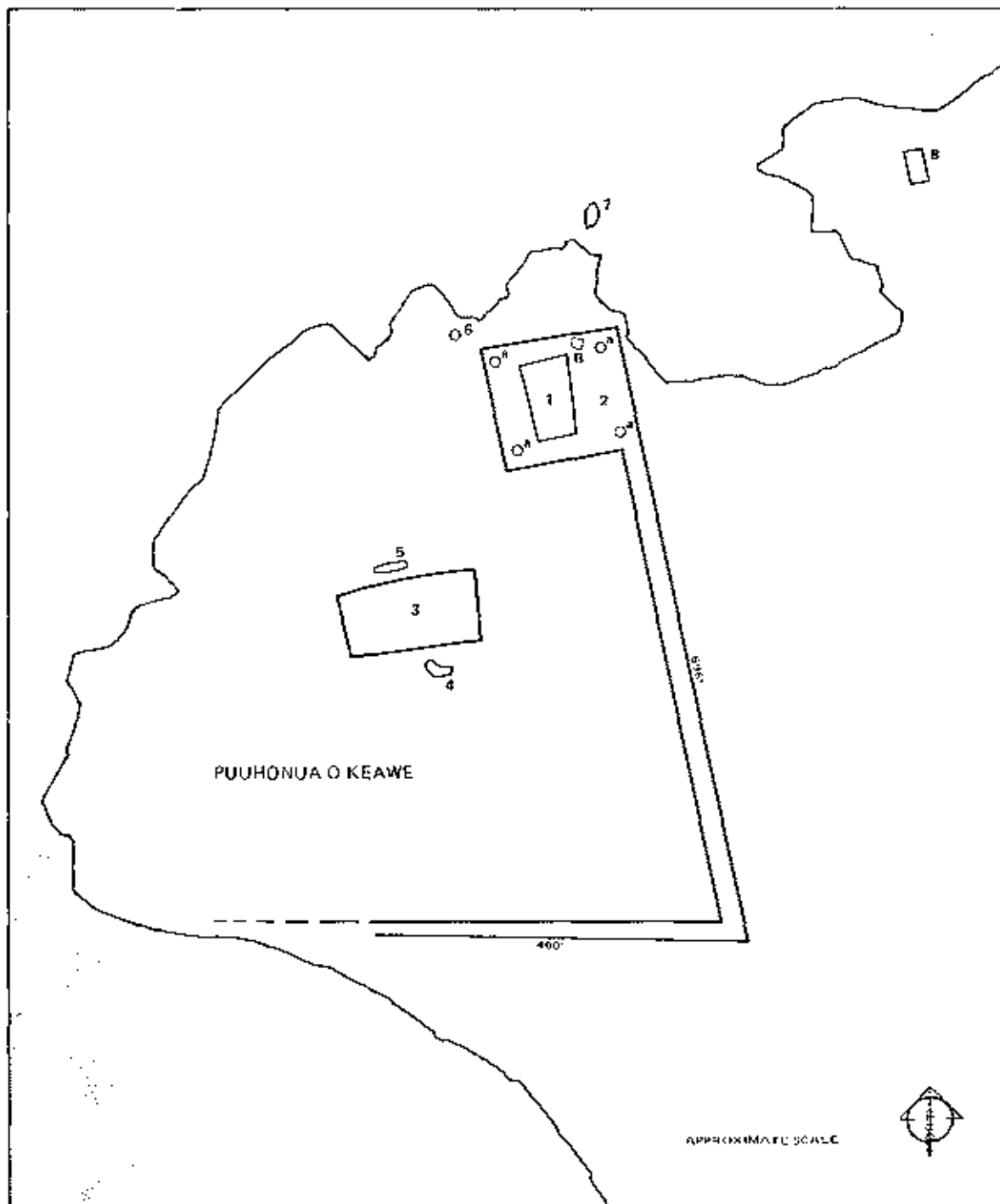


Fig. 9.2. SKETCH MAP OF RUINS AT HŌNAUNAU, WITH SOME FEATURES DESIGNATED (After D. H. Hitchcock 1889). (1) Hale o Keawe; (2) heiau, about 100 ft square, partly washed away, about 6 ft above sea level; (3) heiau, 125 by 60 by 8; (4) stone, 6 by 10 by 2 ft, front end is propped up, Ka'ahumanu; (5) Keoua's rock, 13 ft 3.3 at shoulder, 2.5 at head, 2 ft at foot; (6) where Kamehameha is said to have landed; (7) a long pole was fixed in a sunken rock, a point of safety; (8) site of old royal residence; (a) idols were always kept in these positions; (B) a deep hole under a cover of stone, 1 ft thick and 6 ft in diameter, bones were found in it after the sea washed away the facing wall.

proper and the adjoining picnic area, which form a County park. This lease is due to expire in 1961, and negotiations are under way for the U. S. National Park Service to acquire this and adjacent lands.

The adjacent land section (ahupua'a) of Kēōkea, came to the Bernice Pauahi Bishop Estate in this wise; it was granted to Kekuanāoa by Kamehameha III in the Great Mahele of 1848, and awarded July 20, 1854. It passed to his daughter, Ruth Ke'elikōlani, upon his death in 1868. When she died in 1883, by her will Kēōkea passed to her cousin Bernice Pauahi Bishop.

TIDAL WAVE DESTRUCTION

Tidal waves have played an important part in the history of Hōnaunau, as the low lava flats at the head of the bay and bounding its south side are most vulnerable to an unusual rise in sea level. The first great heiau platform with the pu'uhonua area was certainly destroyed by a great tidal wave far back in the beginning of its history. This or a later one, if the great wall had been built later, destroyed at least 80 ft of the west end of the south wall prior to Ellis' visit in 1823. In the time of Stokes' visit, in 1919, he heard the old Hawaiians refer to the Kai mimiki o Naihe (tidal wave of Naihe) as sweeping in from the northwest, crashing on the land, filling the royal fish ponds with stones and sand, flattening out the foundation of Hale o Keawe, breaking down the northern end of the great wall, pouring through Mr. Wright's goat pen within the enclosure, filling in with sand the spring where Keawe's bones were washed and the adjacent Makaloa pool, destroying vegetation, and ripping out the soil. This wave is held responsible for wrecking 100 ft of the west end of the great south wall, of contributing to the chaotic state of the old heiau platform, and of knocking away the whole northwest corner of 'Ale'ale'a platform.

Naihe was the chief of South Kona and guardian of the pu'uhonua until his death in 1831, and it would seem that the connection of his name with the tidal wave would imply it occurred in his life time. However, from Chester Lyman's plan of the pu'uhonua in 1846, it is obvious that no such wave had occurred up to that time. It seems possible that Naihe's name was coupled with the tidal waves through the surfing chant glorifying him and beginning "Ku ka nalu, ka nalu nui o Naihe--The wave arises, the great wave of Naihe."

Researches by Stokes have revealed that the island of Hawai'i was subjugated to two great tidal waves between 1848 and 1900, and some minor ones which could not have caused the major destruction. Of these two great tidal disturbances, one of April 2, 1868, and the other of May 10, 1877, the 1868 wave was not recorded as doing serious damage except on the southeast coast, but the 1877 wave resulted in general damage throughout the islands, in a rise of 15 ft of sea at Kealakekua Bay to the north of Hōnaunau, whereas in 1868

the rise had been 8 ft. Probably both these waves contributed to the damage reported for the "tidal wave of Naihe." The tidal wave of 1946 resulted in breaking down a corner of the Hale o Keawe platform and of the walls around the park approach.

A RECONSTRUCTION OF THE HISTORY AND FUNCTION OF
THE PU'UHONUA AND THE HALE O KEAWE AT HŌNAUNAU

Dorothy Barrère

A reconstruction of the early history of the pu'uhonua area at Hōnaunau must of necessity be based mainly on traditional knowledge, which is very fragmentary, and much of it seemingly contradictory. What fragments there are have been placed within a framework of the history of the island itself, its chiefs, their inheritances, and their wars. Once this framework was set up, many of the seemingly contradictory bits of information became evidence of the changes in the area, and found a place. With the observances of early explorers and visitors, tradition becomes history, although their interpretations of some details may not have been correct. Based on fragments of tradition, genealogical tracing, and archaeological evidence, it appears that the area had three main phases of construction. First was built an open platform heiau, the ruins of which are now called the "old heiau platform"; second, the heiau of 'Āle'ale'a; and third, the heiau Hale o Keawe; with the Great Wall being built during either the first or second phase of construction. On the basis of the genealogies it was more probably during the second.

There is not even fragmentary tradition of the establishment of the original pu'uhonua. However, concepts of refuge were part of Polynesian culture, and we may be sure that the chiefs of Hawai'i had only adapted a custom known to their progenitors. We turn to the genealogies to find a chief early in the history of Hawai'i who would have been in a position to establish or maintain the sanctity of a pu'uhonua by virtue of his uncontested right to rule his kingdom, in this case, Kona. We find such a chief in 'Ehu-kai-malino, contemporary with Liloa. A genealogical count of 25 years to a generation would place Liloa and 'Ehu about 1475 A.D. Traditions of Liloa are fairly full, and we find him the acknowledged supreme chief of the island of Hawai'i. Kamakau (1870d) says, "The other chiefs all around Hawaii remained under his rule and placed their sons under Liloa. It was customary in the olden days for some chiefs to serve others...one of his chiefs [was] named Laea-nui-kau-manamana, the son of 'Ehu-kai-malino, ruling chief of Kona, Hawaii." During Liloa's reign there was peace, and 'Ehu's pu'uhonua, if there was such, would probably have been used in its simplest form, that of a sanctuary for one who had broken a kapu and could flee there to place himself under its protection. The ruins of the old heiau platform may date from this time as the site of the original pu'uhonua heiau.

It appears that a ruling chief of a kingdom could and did declare certain lands or heiau as places of refuge. As long as he held undisputed power, these pu'uhonua were in force. However, if subjugated, the conqueror might abolish the existing pu'uhonua and designate others, or he might reaffirm the sanctity of the already established pu'uhonua. Thus we find places on Hawai'i and the other islands with traditions of having been pu'uhonua, but with no record of when they were established or when discontinued. If 'Ehu had a pu'uhonua at Hōnaunau, it may have been abolished after 'Umi, the son of Liloa, brought all Hawai'i under his sway, but it is equally possible that 'Umi would have maintained this area as the pu'uhonua for the Kona district. There is no mention of the pu'uhonua at Hōnaunau in traditional history until the time of Keawe-ku-i-ke-ka'ai, four generations after 'Umi. By this time the line of inheritance of the Kona chiefs was firmly established in the descendants of 'Umi through his son Keawe-nui-a-'Umi, who controlled Kona, Kohala, and Ka'ū. 'Umi's descendants through another son, Kumalae-nui-a-'Umi, controlled Hilo, Hāmākua, and Puna. The Keawe-ku-i-ke-ka'ai mentioned above was a son of Keakealani-kane, ruler of Kona, Kohala, and Ka'ū three generations after 'Umi. This Keawe is credited by one tradition as being the builder of the pu'uhonua and the Hale o Keawe. All other traditions state that the Hale o Keawe was built for Keawe-i-kekahi-ali'i-o-ka-moku, two generations after Keawe-ku-i-ke-ka'ai. Kanakau (1870a, 1871) himself gives both traditions. Again, genealogy will support the archaeological evidence, the latter being that the Great Wall of the pu'uhonua originally extended to the edge of the water, and that a portion of it was removed for the building of the Hale o Keawe. Thus we may accept both traditions, saying that Keawe-ku-i-ke-ka'ai reconstructed the old pu'uhonua by building 'Āle'ale'a heiau platform, and possibly the Great Wall, and that the Hale o Keawe was built for Keawe-i-kekahi-ali'i-o-ka-moku, c. 1850 A.D.

The Hale o Keawe was undoubtedly erected either by or for Keawe-i-kekahi-ali'i-o-ka-moku, as a depository for his and certain other chiefs' bones. Its function was more than that of a depository for bones, however, as it is specifically called a heiau, and the appurtenances of a heiau, such as images and altars, are mentioned in the traditions. Its chief function as a heiau was that, through deification of the chiefs whose bones were deposited there, the sanctity and inviolability of the pu'uhonua were placed under their supernatural protection, as well as the physical protection of the enclosure and the priests. The Hale o Keawe, also called Ka'iki-'Āle'ale'a, the little 'Āle'ale'a, was a heiau from Keawe's time, and the use of 'Āle'ale'a as the heiau for the pu'uhonua was probably discontinued upon its establishment. Supporting this statement are, the transference of the name 'Āle'ale'a, and the modern-day traditions collected by Stokes in 1919 as 'Āle'ale'a being a place for the chiefs to use and enjoy, rather than being a heiau, or sacred place for ceremonial worship.

If the above evidence is accepted, we find the pu'uhonua at Hōnaunau having been in existence, and perhaps in continuous use,* for some 300 years. The functioning of the pu'uhonua as a place of refuge ended upon the overthrow of the kapu system in 1819, but the Hale o Keawe was revered and maintained as the depository of the bones of the chiefs interred there until 1829, when Ka'ahumanu ordered its destruction.

Apart from traditional history we find legendary material on the pu'uhonua which throws some light on its function. In the legend of Kamiki (Ke Au Hou, Sept. 13 and 20, 1911) is a narrative of the acts of a priest upon the entrance of a refugee. The detail in which this is told implies a traditional knowledge of ancient rites and functions, and the prayer purportedly offered by the priest so in keeping with other recorded prayers that it may have been an actual prayer used by the priests at the heiau of the pu'uhonua in Kona in calling upon the gods.

In the story, Kamiki and his brother, Kamaka'iole, approach the pu'uhonua area at a time when an 'aha kapu (a ceremonial rite for the gods) has been announced and the sacred drums are being sounded. All those within hearing are required to prostrate, yet Kamiki and his brother continue walking. They are reprimanded by the watchmen for remaining upright. Kamiki replies that while he is fully aware of the kapu requiring prostration when the sacred drums of the gods are sounded, having seen the guards standing, he thought the drums were merely being sounded for the entertainment of the chief Hōnaunau-'ihi-kapu-maka-o-ka-lani. His excuse is not accepted, and the guards attack the brothers with clubs, but the two overcome them. The chief, hearing of this, sends his executive officer, Uia, to take the boys prisoners and conduct them to the place where they are to be tried. As Uia and his company surround them, Kamiki and Kamaka'iole escape, running swiftly into the heiau and prostrating themselves before a kahuna. Uia demands that the boys be turned over to him to be taken before the chief, but the kahuna refuses, saying, "This is a puuhonua and is kapu for those who seek refuge and the sparing of life here." Uia repeats his demand, adding that he will step in with his warriors and destroy them all, whereupon the kahuna retorts: "Are you crazy? Don't you know this is a puuhonua? Do you want the wrath of the gods to descend because of the shedding of blood within the sacred walls?" Uia, acknowledging that he may not enter, again asks that the boys be sent outside, and the kahuna replies, "That cannot be done. They have entered the place of protection and cannot be sent out to be killed. The chief knows this, and it is well understood by those under you. Why then do you want to trespass against the kapu of the gods?" Frustrated, Uia and his men retire. The kahuna, acknowledging that Kamiki and his brother are now under the

*Though not necessarily in North Hōlualoa. (DB)

protection of the pu'uhonua, calls out the names of certain gods in prayer. These names are significant as indicative of the 'aumākua (ancestral gods) of the chiefs of Kona* who were per se the gods of the pu'uhonua. The prayer given is as follows:

<u>Kane-hekili</u>	Kane of the thunder
<u>Kane-wawahi-lani</u>	Kane the sky breaker
<u>Kane-i-ka-pualena</u>	Kane of the dawn
<u>Kane-i-ka-malamalama</u>	Kane of the brightness
<u>Kane-i-koli-hana-a-ka-la</u>	Kane of the cutting through of the sun
<u>Kane-i-ka-molehulehu</u>	Kane of the dusk
<u>Kane-i-ka-wana'ao</u>	Kane of the early morning
<u>Kane-i-ka-pule</u>	Kane of prayers
<u>Kane-i-ka-makaukau</u>	Kane of preparedness
<u>Kane-kii</u>	Kane who fetches
<u>Kane-haka</u>	Kane who gazes
<u>Kane-i-ka-makahi-e-lele</u>	Kane of the eyes darting everywhere
<u>Kane-lele</u>	Kane of the leap
<u>Kane-koa</u>	Kane of the brave
<u>Kane-kaka'a</u>	Kane of the roll
<u>Kane-i-kokala</u>	Kane in the <u>kōkala</u> fish
<u>Kane-i-ko-kea</u>	Kane of the white sugar cane
<u>Kane-i-kaulana'ula</u>	Kane the famous red one
<u>Kane-huli-honua</u>	Kane overturner of the earth
<u>Kane-huna-moku</u>	Kane of the hidden island
<u>Kane-ki'ei</u>	Kane the peerer
<u>Kane-halo</u>	Kane who peers over and downwards
<u>Kane-'ohi'ohi</u>	Kane of the talkative
<u>Kane-milo-hai</u>	Kane of the milo offering
<u>Kane-ne'ene'e</u>	Kane who hitches along
<u>Kane-i-ahu-aa</u>	Kane of plentiful air
<u>Kane-i-ka-pohaka'a</u>	Kane of the rolling stone
<u>Kane-holo-pali</u>	Kane of the cliff runner or slider
<u>Kane-ulupo</u>	Kane who inspires while it is night
<u>Kane-i-ka-'onohi-o-ka-la</u>	Kane in the eyeball of the sun
<u>Kane-i-ka-pua'ena'ena</u>	Kane the red hot
<u>Kane-i-ka-molimoli-aloha</u>	Kane who inspires a feeling of nostalgic longing
<u>Kane-nui-akea</u>	Kane the all encompassing
<u>Ka 'ike nui, ka 'ike mana</u>	Of great knowledge, knowledge of <u>mana</u>
<u>Ka mana nui, ka mana palena 'ole</u>	Great <u>mana</u> , <u>mana</u> without limit
<u>O Kanaloa, O Ku</u>	
<u>O Lono-honua-mea</u>	Lono of the sacred earth
<u>O Pele-ka-wahine-'ai-la'au</u>	Pele the tree consuming woman
<u>O Hi'iaka-i-ka-poli-o-Pele</u>	Hi'iaka in the bosom of Pele
<u>O Meheanu</u>	Goddess who strikes a chill
<u>O Wahine-luanu'u</u>	Woman of the highest platform
<u>Ke-wahine-i-ka'e-o-kupuahi</u>	The woman beside the fireplace
<u>O Ka-ula-ke-ahi</u>	Goddess of the Flames
<u>O Luahine-kaikapū</u>	Old woman creeping with age
<u>O Ka-hina-a-ola</u>	The leaning-toward-life
<u>O Ka-la-mai-nu'u</u>	The sunlight from the high place
<u>O Ka-maunu-i-hala-ka-ipo</u>	The bait that catches the sweetheart

[From Pele through Kaulakeahi are fire goddesses; the next three are mo'ō goddesses.]

The islands darken,
The sky, the earth, darken,
The land, the sea, darken;

*...whose bones had been deified,...

Sacred is the sky,
 Sacred is the foundation of the earth,
 It is hot; there is an extension of life.
 Sacred! Prostrate! Prostrate to the kapu!
 The kapu flies away,
 It is concluded; it is freed.

[Fukui translation]

The incident in the story of Kamiki supposedly takes place in the time of the chief whose name, shortened to Hōnaunau, has been that of the land from time immemorial. As related, it well fits traditional information as to the pu'uhonua being a place of refuge from ancient times, the extreme inviolability of its kapus, the presence of watchmen or guards to enforce its sanctity, and the presence there of priests to perform religious rites and ceremonies.

The use of the pu'uhonua enclosure as a refuge for the vanquished in time of war is known, and a recorded instance in history is quoted from Ellis.

As soon as the death of Kauikeaculi [i.e., Kiwala-'ō] was known, a panic spread through his men, and they quickly fled in every direction. Many jumped into the sea, and swam to some canoes lying off the place, and the rest fled to the mountains or the adjoining puhonua [sic] (place of refuge) at Honaunau, about four miles distant. Among these was Karaimoku [Kalanimoku], then a youth, now principal chief in the Sandwich Islands [Ellis 1817:109].

Of most of the features within the pu'uhonua walls, no true history is recorded. The so-called "women's heiau," erroneously called Akahipapa through an early misinterpretation of translation, may not have been a heiau at all, but only a place of seclusion for the chiefly women during their periods of haumia (uncleanliness). The ko'a (fishing shrine) was a common feature of the seashore, and would not have merited even traditional memory of its builder. The presence of a stone slab pitted with holes for the game of kōhane bears out the supposition that 'Āle'ale'a had been discontinued as the ceremonial heiau for the area, for such stones were common at or near chiefly residences. 'Āle'ale'a, according to one informant in 1919 (Stokes Ms.a, Lo'e), was "a place for the chiefly child 'Ālealea." Just who this 'Ālealea was, the informant did not know, and this name has not been found in any genealogy searched to date. In 1919 all Stokes informants agreed that 'Āle'ale'a had been a heiau, and also a place for the gathering of chiefs. A later informant, Panui, a nephew of Lo'e, in 1957 described 'Āle'ale'a as being "the place of the kāhuna lapa'au (doctors)" who, he said, raised medicinal plants and cared for the wounds of those who fled from battle.

Two of the large stones adjacent to 'Āle'ale'a platform are named, the one on the north side being called the Keoua Stone, and the one propped up with smaller stones near the southeast corner being called the Ka'ahumanu

Stone. Informants have not been consistent as to which Keoua the stone was named for, Keoua Kuahu'ula or Keoua-kupu-a-pa-i-ka-lani. This latter Keoua was the accredited father of Kamehameha, and the high chief of Kona whose bones, deposited in a cave in the Ka'awaloa Bay cliff wall gave that section the name "Ka Pali Kapu o Keoua, The Sacred Cliff of Keoua." It was undoubtedly he for whom the stone was named, as the other Keoua, Keoua Kuahu'ula, son of Kalani'ōpu'u, was the Ka'ū chief who precipitated the war between Kamehameha and Kiwala-'ō, and who was years later killed and sacrificed by Kamehameha at the heiau of Pu'u Koholā in Kawaihae, Kohala. The naming of the Ka'ahumanu Stone commemorates a traditional story of Ka'ahumanu fleeing from Kamehameha's wrath after a quarrel, and is told in another section of this report. The stone itself may at one time have been an object of worship, as one informant so stated in 1919 (Stokes Ms.a, Kaloko).

Of the Hale o Keawe, comparatively much tradition and history has been preserved, although its actual builder is not known for certain. I'i (1869b) is vague on this detail, saying merely, "It may have been Alapai and all the chiefs of Kona who built the Hale o Keawe as a depository for the bones of Keawe. It must have been built either while Keawe was alive, or soon after that." One of Kamakau's versions (1871*) says, "One noted thing that was said of Keawe [Keawe-i-kekahi-ali'i-o-ka-moku] was that he built a house to contain the remains of the chiefs at Hōnaunau, Hawai'i, called Hale o Keawe. When Keawe died, his bones were enclosed in a wicker container, ka'ai. Those which were so enclosed were said to be in the ka'ai (ku i ke ka'ai)." In an earlier version Kamakau had said,

Keawe-ku-i-ke-ka'ai... was the one who built these places of refuge at Hōnaunau and the house to hold the bones of the chiefs. Because the other Keawe [Keawe-i-kekahi-ali'i-o-ka-moku] was a great chief and had his bones woven fast in basketworks like Keawe-ku-i-ke-ka'ai and laid in the place of refuge built by Keawe-ku-i-ke-ka'ai, the heiau was called Hale o Keawe [Kamakau 1870a].

Ellis visited the pu'uhonua at Hōnaunau in 1823, and includes this statement in his description:

The principal object that attracted our attention, was the Hare o Keawe (the House of Keawe), a sacred depository of the bones of departed kings and princes, probably erected for the reception of the bones of the king whose name it bears, and who reigned in Hawaii about eight generations back [Ellis 1917:124].

Fornander, whose information was received some 50 years later than Ellis, says, "Keawe [Keawe-i-kekahi-ali'i-o-ka-moku] had a son, Kanuha, who is said to have built the city of refuge, the 'puu-honua,' known as the Hale o Keawe, at Hōnaunau in the South Kona district" (Fornander 1880:131).

*Also, Kamakau 1961:64. (DB)

We have already touched briefly on the building of the Hale o Keawe, discovering Keawe-ku-i-ke-ka'ai as its original builder on the basis of archaeological and genealogical findings substantiating the building of the Hale o Keawe at a later time than the pu'uhonua wall. All other accounts agree in respect to placing its building at the time of Keawe-i-kekahi-ali'i-o-ka-moku. Regardless of who actually built it, the Hale o Keawe was a heiau from its inception, since it is established that the bones therein were objects of deification and worship. Also, no bones of women were deposited there, which would have been the case if it had been established merely as a resting place for the bones of a family.

Kamakau (1867) states that Kamehameha "established as heiaus for human sacrifices... Hale o Keawe and the puuhonua." Traditions of events antedating Kamehameha's time of supremacy over Hawai'i indicate that human sacrifices were offered there earlier. Perhaps Kamakau meant that Kamehameha enlarged the functions of the Hale o Keawe to include ceremonies necessitating the sacrificing of humans as part of the rites. If so, he is alone in his contention, as all other accounts give the Hale o Keawe as a heiau where human sacrifices were offered, but not that they were required. Human sacrifices other than those required by the ritual of a particular ceremony were placed on the altars of various heiaus, the victims for the most part being violators of important kapus.

The first human sacrifice made at the Hale o Keawe, if we are to credit tradition* (Stokes Ms. a, Lo'e), was that of Keawe 'Ai, a near and trusted relative of Keawe-i-kekahi-ali'i-o-ka-moku, who offered himself at the time of its erection to give the building itself mana. An historical account of a human sacrifice is related by Laura Fish Judd, telling of the breaking of a Kapu by the chiefess Kapi'olani and a girl companion, who ate of a variety of banana forbidden to women:

They concealed the fruit as well as they could with the palm of the hand and thumb, and rushed into the sea to bathe and eat the forbidden fruit. An eagle-eyed priest discovered them; they were tried for the ungodly deed and condemned to suffer the penalty, which was poverty, loss of rank, and to remain unmarried. This they must suffer, unless suitable expiation could be made. The priest suggested the sacrifice of a little boy, a favorite page of Kapiolani's as a suitable offering. He was immediately seized and carried to the sacred inclosure at Hoonau [sic], and was seen no more. Kapiolani called for the same old priest to come and sit by her, and say what he now thought of those proceedings... Kapiolani asked him what he did with the boy, 'He was strangled on the altar,' said he [Judd 1928:76-77].

*A late tradition. (DB)

Chamberlain's (Ms. b) memorandum (see Appendix) made at the time of the removal of the bones in 1829, mentions other sacrifices in connection with the Hale o Keawe, but the information he received is too akin to known exaggerations of the early converts in discussing their idolatrous past with the missionaries to admit of complete acceptance. It has been estimated that if Chamberlain's account were true, the number of victims sacrificed at the time of its building would have been more than 80, surely an implausible number when the building of a heiau* to Ku, the most exacting of Hawaiian rites, required only two or three (Malo 1951:159-176). It may have been an early misinterpretation of Chamberlain's memorandum that attributed these sacrifices to the Hale o Keawe, as the passage itself is ambiguous and may have referred instead to the Hale o Līloa at Waipi'o, Hawai'i. In the latter case, the same argument holds true against its acceptance. The report of the sacrifices purportedly made during the preparation of the ka'ai (basket containers for the bones) may also be dismissed as unlikely. Ka'ai containers were long used in Hawai'i, as we learn from Kamakau (1870d) and Malo (1951:108), but there is no report of the necessity of human sacrifice in their making. The value of Chamberlain's memorandum, and it is great, lies in the list of those chiefs whose bones had been interred at the Hale o Keawe, as will be detailed later.

Near the Hale o Keawe, at Kauwalomālie, was the site of the first meeting of Kamehameha and Kiwala-'ō after the death of Kalani'ōpu'u, grandson of Keawe-i-kekahi-ali'i-o-ka-moku. Kalani'ōpu'u was first the high chief of Ka'ū, and later ruler of Hawai'i, from a date some years previous to Captain Cook's arrival in 1778 until his death in 1782. Kalani'ōpu'u had willed the government to his son, Kiwala-'ō, and the care of the god Kū-kā'ili-moku, frequently referred to as Kā'ili, to his nephew Kamehameha. Soon after Kalani'ōpu'u's death in Ka'ū, the customary redistribution of his lands was made by the heir Kiwala-'ō, under counsel from his uncle Keawe-a-ma'u-hili. The dissatisfaction of some chiefs over this redivision of the lands was the basic cause of the war between Kamehameha and Kiwala-'ō, resulting in the latter's death and the breakup of the unified kingdom left by Kalani'ōpu'u. The fullest accounts of this meeting of Kamehameha and Kiwala-'ō are found in the newspapers Ka Na'i Aupuni (Jan. 13, 1908) and Ka Hoku o Hawaii (Aug. 25, 1921), and obviously both came from intimate traditions of Kona people, as they carry such detail as could only come from such localized sources.

The funeral cortege of Kalani'ōpu'u, having left Ka'ū aboard canoes, puts in at Hōnaunau to deposit the body of the dead king in the Hale o Keawe. The corpse is borne ashore and temporarily laid in a hēlau (a long, shed-like building) outside the wall in order that the chiefs and people may approach to mourn him. Keawe-a-ma'u-hili, mentioned before, another grandson of Keawe-i-

*Luakipi. (DB)

kekahi-ali'i-o-ka-moku and half-brother of Kalani'ōpu'u, announces that the last wish of the dead king was that his body be brought to Kona and "given over to Kanuha to care for." This Kanuha was of the Moana branch of the Kona ruling family, and is repeatedly referred to as "the arbiter of life and death, ka ilamuku o ke ola ne ka make." On the evening of the next day, Kalani'ōpu'u is laid within the Hale o Keawe, and Kamehameha arrives to mourn his uncle and to perform the 'awa ceremony for his cousin Kiwala-'ō, which was his duty as keeper of the god Kā'ili. This ceremony was to purify Kiwala-'ō from contamination of association with the corpse. There follows in the original texts a detailed account of the preparation of the 'awa, the kinds of water used for mixing with it, and the prayer uttered by Kamehameha as he prepares the 'awa for the gods. As in the case of the Kamiki episode told earlier, the wealth of detail betrays an intimate knowledge of the old rites. The first portion of the prayer offered by Kamehameha is identical with that offered at 'awa ceremonies witnessed by Pukui, differing only in the name of the god. On this occasion, Kamehameha offers the 'awa first to Kū, the all-embodying god of which the god Kā'ili was a part. As he purifies the 'awa by sprinkling it with sea water, there is a section describing various aspects of the sea, in keeping with a common device in Hawaiian prayers to produce a sonorous and impelling impact by repetition. Then follow the names of other gods, those who had the power to remove contamination, and the 'aumākua gods of the offerer. Again, as in the Kamiki prayer, the Kāne gods predominate. The prayer follows:

Eia ka 'awa o ke akua,
He 'awa lani wale no;
He 'ai na ke kamaiki;
Inu aku i ka 'awa lau-lani,
I ka 'awa a Kane i kanu
i Kahiki,
A ulu, a lau, a 'o'o no
i Kahiki
A ke ia a'e le a mama
'ia no i ka waha.
Ku i ke kape'e i ka 'apu.
O Hoaka-i-lani-ka-'aina-
ola,
Ia kini akua,
Ia 'oe ho'i o Ku, ua
ola ho'i.

Here is 'awa o god,
 Choicest 'awa only;
 Food from the child [the offerer];
 Drink of the prized leafed 'awa,
 Of the 'awa of Kane, planted in Kahiki,
 Which grew, leafed, and matured in Kahiki,
 From him who has chewed it in his mouth.
 [It] stands ready to be poured.
 O heavenly beings whose shadows fall upon
 the land of the living,
 To the myriad gods,
 To you, o Ku, you who are life.

Eia ke kai ku, ke kai
ala, ke kai ola,
Ke kai pupule, ke kai
behena, ke kai ulala,
Kai 'aumakua, kai nu'u,
kai ea,
Kai po'i, kai io'ona,
ke kai pili'aiku o,
Ua puni.
Ua puni ho'i na moku i
ke kai,
O hu'ahu'a kai wale,
o napanape ka wai;

Here is the still sea, the rising sea,
 the living sea,
 The crazy sea, the insane sea, the
 unbalanced sea,
 Ancestral sea, billowy sea, rising sea,
 Crashing sea, wrathful sea, overwhelming
 sea,
 Which surrounds us.
 The islands are surrounded by the sea,
 Everywhere is the foam of the sea, the
 water ripples;

<u>O ka wai 'eli a ke koena.</u>	This is the water [to mix with the 'awa] and what remains of it.
<u>O ke au miki, a o ke au ka,</u>	O receding current, O rising current,
<u>Au ka i uka, a au ka</u>	O current that runs ashore, that runs back
<u>i kai,</u>	into the sea,
<u>I ka 'ale'i, ai ka</u>	O rising billow, flattening billow,
<u>'ale moe</u>	
<u>I ka 'ale hokai ho'ie,</u>	O billow that mingles and rises again,
<u>I Kahiki e.</u>	At Kahiki.
<u>O ka lana a Kahiki,</u>	O float there at Kahiki,
<u>A hiki he nei make.</u>	Arrive there and be still.
<u>Ia 'oe ia e Lono;</u>	Hearken O Lono;
<u>Ia Ku-i-ke-kala;</u>	O Ku-the-releaser;
<u>Ia Lono-i-ka-'uweke;</u>	To Lono-who-opens;
<u>Ia Kane-i-ka-poha-ka'a</u>	O Kane-of-the-rolling-stone,
<u>Ho'oka'a 'ia mai i ke</u>	Roll hither to the presence of the moku
<u>alo o ka moku,</u>	[i.e., Kiwala-'ō],
<u>Eia ka 'awa la.</u>	Here is the 'awa.
<u>Ia Kane-hoa-lani, huli</u>	Hearken Kane-companion-of-heaven, turn
<u>mai ko ka lani,</u>	hither those of heaven,
<u>Ia Kane-lu-honua, lu mai</u>	O Kane-earth-shaker, shake hither those
<u>ko ke honua,</u>	of the earth,
<u>Ia Kane-huli-ko'a, huli</u>	O Kane-the-coral-overturner, turn hither
<u>mai na ko'a 'aine a</u>	the land coral and the sea coral,
<u>me na ko'a kai,</u>	
<u>Ia Kane-i-ka-wai-ola,</u>	O Kane-of-the-water-of-life, turn hither
<u>huli mai ke kai me</u>	the sea and the waters,
<u>ke wai.</u>	
<u>Ia Kane-i-ka-poha-ka'a,</u>	O Kane-of-the-rolling-stone, I am
<u>ke ho'oko aku nei wau</u>	fulfilling [the ritual of] the 'awa
<u>i ka 'awa.</u>	[ceremony].
<u>Ia Lono-makua, pau loa</u>	O parent Lono, all the 'aumakua and great
<u>na 'aumakua a me ke</u>	gods,
<u>akua,</u>	
<u>Hele wale o ke alaloe.</u>	Go [thou] on the long trail.
<u>Ua noa ka 'awa la,</u>	The 'awa [ceremony] has been made free,
<u>E ho'i ke kapu a na</u>	Let the kapu return to you [lit. to your
<u>pae-niho o 'oukou;</u>	rows of teeth];
<u>'Amama, ua noa ka 'awa.</u>	'Amama, the 'awa [ceremony] is freed [from
	kapu].

[Pukui translation]

The sequel of events following this 'awa ceremony is a recorded part of Hawai'i's history (Fornander 1880:303-312). Some chiefs, including Keoua Kuahu'ula, are disgruntled over the reapportioning of the king's lands, and the Kona chiefs are smarting from an insult delivered them by Keawe-a-ma'u-hili at the conclusion of his announcement concerning the disposition of Kalani'ōpu'u's body. Keoua, with the intent of setting Kamehameha and Kiwala-'ō at odds, performs an act of war by cutting down coconut trees belonging to Kamehameha, and killing some of his men. These victims he sends to Kiwala-'ō, in the hope that, by accepting them as offerings for the gods, Kiwala-'ō will thereby sanction his actions and arouse Kamehameha's ire. His hope is realized, and Kiwala-'ō does offer the dead men to the gods. The live captives whom Keoua also sent, Kiwala-'ō has put to death, and they are "offered together by him on the lele of the heiau of Honaunau, to be, perhaps,

'companions in death, moepu'u,' for his chiefly father who was lying in the Hale o Keawe."

Moepu'u were a customary feature of Hawaiian culture. On the death of a high chief, some, through love of their chief, died voluntarily so that their spirits would accompany that of the chief's, to serve him in the afterworld. Again, there were involuntary moepu'u, the victims being put to death in order that the chief would not lack for servers in the spirit world (Kamakau 1870b, 1870c). However, the account of the moepu'u offered by Kiwala-'ō (Ka Hoku o Hawaii, Sept. 22, 1921) is the only instance we know of that moepu'u were offered on a heiau altar.

Although written traditions have been clear that Kalani'ōpu'u's corpse was placed in the Hale o Keawe (Remy 1862:83-99), its removal long before the destruction of the house appears certain.* A Ka'ū tradition from Pukui has it that after some lapse of time, Kalani'ōpu'u's own sons and kahus took his remains back to Ka'ū, and placed them in a cave "either at Molilele or at Pohina cliffs." This is in keeping with a published record of burial caves (Ke Au Hou, July 5, 1911) saying: "The secret cave at Pohina, Ka-'u: It is believed that the bones of Kalani'ōpu'u were carried back to this place after Kiwala-'ō was killed by Kamehameha I at Keomo." Traditions of the depositing of Kalani'ōpu'u's body at Hōnaunau imply that this was but a ruse on the part of Keawe-a-ma'u-hili to obtain more Kona lands for his faction in the redistribution of lands, since it was the custom that wherever a departed ruler's funeral cortège passed, those lands would be considered as belonging to his immediate heirs. When plans were set at naught by Keoua's impetuous act which precipitated war, it is reasonable that the Ka'ū chiefs would take Kalani'ōpu'u's corpse back again to his own land to be deposited there.

In 1884 Edward Smithies, Deputy Sheriff of Ka'ū, was requested by King Kalākaua to obtain what information he could concerning Kalani'ōpu'u's bones, and from his letter to the King of October 27, 1884, is quoted:

I have made enquiries of Wm. Thompson respecting bones of Hawaiian Chiefs as you requested, and I have elicited the following information, viz; that he Wm. Thompson had learned from Keawe and Kaiānuī (both deceased) that the bones of Kalaniopu and Kaiāna were deposited in a cave near Honuapo, the entrance to which was a mile or more inland. That the ancients entered and traveled with lights (kukui) toward the sea until they arrived at the Pali of Pohina where, midway from the top of the pali there was a very small hole not large enough for a person to pass, but just sufficient size to admit the light of the sun, that the pali was concave from the top to the bottom, i.e. the top projects out far over the sea

*Andrew Bloxam is definite on this point: "Neither Terrecboo's...nor Tamehameha's bones were preserved there" (Bloxam, A., Ms.b). (DB)

which washes the perpendicular bluff below. As the pali is of prodigious height and the sea at the base very deep, the approach that way to the small hole would be impossible. There is no one now living that knows of the mauka entrance to the cave. The top can be seen from the Government Road which passes very near the sea. The above is all the information that I have been able to obtain up to the present time....

And finally, an extract from the Report of the Board of Genealogy of Hawaiian Chiefs, Honolulu, 1844, states: "The cave at Waiakea, Hilo...and the Cave of Pohina, Ka-'u, where [are] the remains of Kalani'opu'u and others of historic fame have been but partially explored."

The Hale o Keawe, we learn from John I'i, was regularly visited by Liholiho during his journeys to the various heiau of Hawai'i as his father's, Kamehameha's, representative to attend to prescribed rituals* to replenish and maintain the mana inherent in them. Because I'i left the only known eye-witness account of the functioning of the Hale o Keawe, his account is quoted in full:

The Hale o Keawe in Honaunau was called Ka-iki-'Alealea (The little 'Alealea), and was a puuhonua. Kaikiholu and Paka'alana on Hawaii, Kaka'e in 'Iao, Maui, Kukaniloko in Wahiawa, Oahu, and Holoholoku in Wailua, Kauai, were also places to which one who had killed could run swiftly and be saved. The person whose writing this is often went about them, including the Hale o Keawe. He has seen this house (hale 'aumakua ixi) where the bones were deposited, standing majestically on the left (or south) side of Akahipapa. The house stood by the entrance of a wooden enclosure, with door facing inland towards the farming lands of South Kona.

The heir to the kingdom entered the Hale o Keawe during his journey around to the various luakini heiau of Kahoia in Hilo, Waha'ula in Puna, and Punalu'u in Ka'u.** The journey began in Kailua, thence to Kawaihae, and from there on around the island to the Hale o Keawe. The appearance of the house was good. Its posts and rafters were of kaui wood, and it was said that this kind of timber was found in the upland of Napu'u. It was well built, with crossed stems of dried ti leaves, for that was the kind of thatching used.*** The peaked (kukuohi) appearance inside and outside of the house was

*...to conduct prescribed rituals.... (DB)

**The other three luakini were: Hikiau, Kona; Mo'okini, Kohala; and Honua'ula, Hāmākua (I'i 1958:160). (DB)

***"It was handsome because of the way it was made, with projecting stems of dried ti leaves that had been made into clusters (i pe'a 'ia) as its thatching." New translation of I'i text based on Kamakau description of pe'a thatching (Ke Au Okoa, Jan. 10, 1870). (DB)

good to look at. The compact bundles of bones (puku'i iwi) that were deified (ho'oakua 'ia) were in a row there in the house, beginning with Keawe's near the right side of the door by which one went in and out, and going to the spot opposite the door (ku'ono).

At the right front corner of the house were the unwrapped bones of those who had died in war, heaped up like firewood. In that pile of bones were the bones of Nahiōlea, father of M. Kekuaueo'a. The person whose writing this is saw his own father remove his tapa shoulder covering and place it on a bundle among the other bundles of bones. He must have asked the caretaker about all of them and their names, and they were told to him. That was why he did so. When the writer saw his father doing this he asked, "Have we a near kinsman in this house?" His father assented. There are some people who have relatives in this house of "life," but perhaps most of them are dead. The chiefs were descended from Haloa and so were their retainers (kauwa kupono). The chiefs were born, such as Lono-i-ka-makahiki and Kama-lala-walu and so on down, and so were the retainers [i.e., the junior members of the family].

After the chief 'Ioīani (Liholiho) had finished his visit to the house, a pig was cooked and the gathering sat to worship (ho'omana) the deified persons there. When that was done, the chief and those who went in with him ate together. After the eating was over, the kapu was removed. The travellers left the Hale o Keawe and sailed by canoe, landing at Kamakahonu in Kailua in the evening. There they met Kamehameha. That must have been in the year 1817*.

The next recorded visit** is that of Ellis in 1823, and two years later, that of officers and men of the H. M. S. Blonde, which had carried back to Hawai'i the bodies of Liholiho and his queen Kamāmalu who had died in London. Their accounts are quoted elsewhere in this report. Laura Fish Judd left the next historical record of a visit to the Hale o Keawe, the first time women had ever entered the sacred precincts. Because Mrs. Judd's account of this visit is placed in juxtaposition to her account of their trip to Waimea, earlier writers have been led to quote the date of 1829 for her visit to the Hale o Keawe. A check of contemporary journals, however, discloses that these two trips to Hawai'i were separated by over a year, and that Mrs. Judd was

*Not referenced in 1957 manuscript.

**The first recorded visit of foreigners to the Hale o Keawe was that of a party of Cook's men. Although they did not name the building, and did not recognize the significance of the Pu'uhonua area, there is no doubt that it was the Hale that they visited. At this time the deified bones of the chiefs were at Hikiau Heiau, but the images that had surmounted them were in this house. Quote in full from Cook (1869 ed., pp. 244-245). (DB) [Complete Cook reference was not given in Barrère's note and could not be ascertained.]

first at Ka'awaloa on September 13, 1828, returning to Honolulu on October 3, 1828. It was sometime during this three-week interval that she accompanied Kapi'olani to the Hale o Keawe, which she describes as follows:

It was during this residence at Kaawaloa that we visited the old "heiau," or temple, at Honaunau [sic], in company with Naihe and Kapiolani. It was then surrounded by an enclosure of hideous idols carved in wood, and no woman had ever been allowed to enter its consecrated precincts. Our heroic Kapiolani led the way, and we entered the enclosure. It was a sickening scene that met our eyes. The dead bodies of chiefs were placed around the room in a sitting posture, the unsightly skeletons mostly concealed in folds of kapa, or rich silk. The blood-stained altar was there, where human victims had been immolated to idol gods. Fragments of offerings were strewn about. Kapiolani was much affected and wept, but her husband was stern and silent. I thought he was not quite rid of the old superstition in regard to women.

A few months after our visit Kaahumanu came and ordered all the bones buried, and the house and fence entirely demolished. She gave some of the timber, which was spear-wood [kauwila], to the missionaries, and told them to make it into canes and contribution boxes, to send to their friends [Judd 1928:35].

Samuel Ruggles, the missionary who accompanied Ka'ahumanu when she had the bones removed, apparently left no first-hand account of the event. Hiram Bingham, however, reports it as follows:

The zeal of Kaahumanu led her as early as 1829 to visit the Hale o Keawe at Honaunau, a cemetery associated with dark superstitions, and surrounded with horrid wooden images of former generations. The regent visited the place not to mingle her adorations with her early contemporaries and predecessors to the relics of departed mortals, but for the purpose of removing the bones of twenty-four deified kings and princes of the Hawaiian race, and consigning them to oblivion. But at that time she thought Naihe was wavering in respect to their removal, and Kekauluchi, whose father's bones were there, she thought still cherished an undue veneration for them; and Boki she feared would treat her with abuse and violence if she should disturb the house or remove its mass of relics. But when she saw it ought to be done, she determined it should be done, and in company with Mr. Ruggles and Kapiolani, she went to the sacred deposit, and caused the bones to be placed in large coffins and entombed in a cave in the precipice at the head of Kealakekua Bay. In doing this she found an expensive article of foreign manufacture, comparatively new, placed near the bones of the father of Kekauluchi, and which appeared to have been presented as an offering since the date of the prohibition of the worship of idols [Bingham 1847:426].

By way of explanation we add that Kekauluchi's father was Kala'imamahu, half-brother of Kamehameha through the same father; Kapi'olani, daughter of Keawe-a-ma'u-hili, is the same chiefess mentioned before, and of historic fame as the defier of Pele; Naihe, her husband, was the son of Keawe-a-Heulu, and had inherited his father's position as a councillor to Kamehameha. Of Naihe, Judd (1928:75) says he was "guardian of those old tombs of kings and chieftains, which is an honorable and sacred trust."

Kamakau reports the visit of Ka'ahumanu thus:

The year 1828 is notable for the visit of Kaahumanu to Hawaii to...attempt the recovery of the bones of Lilinoe on Mauna Kea...It is said that Kaahumanu did not find the bones of Lilinoe, but only those of Liloa, Lono-i-ka-makahiki, Kauhela, and Lole at Waipi'o, and these she removed to Ka'awaloa. She also removed to Ka'awaloa the bones of all the chiefs up to the time of Ka-lani-'opu'u and Kiwala-'o which had been netted into baskets (ka'ai) and which completely filled the Hale o Keawe, and she destroyed the remaining bones with fire [Kamakau 1888].

Lacking a specific date for the removal of the bones, an approximate date has been worked out from various sources. We know that Ka'ahumanu was on Hawai'i from about December 6, 1828, until about January 15, 1829; that Mr. Ruggles was in Hilo on January 18; and that the young king Kamehameha III was in Kailua, Hawai'i, and met Ka'ahumanu there about January 15. Allowing time for Ka'ahumanu's first visiting Waipi'o, and undoubtedly having the bones removed* before the king arrived and Mr. Ruggles departed for Hilo, the event must have taken place during the last part of December 1828, or early in January 1829, the latter date having the weight of Bingham's account as support. The destruction of the house followed in a few weeks.

Levi Chamberlain and the Rev. E. W. Clark were at Ka'awaloa about the middle of February 1829, and Clark includes this comment in his total report to the American Board of Commissioners for Foreign Missions on their trip:

We passed Honaunau a little before dark in full view of the celebrated house of Keawe, which forcibly reminded us of the ancient superstitions of Hawaii. This house has lately been divested of all its sacredness. A short time since, Kaahumanu and other chiefs accompanied by Mr. Ruggles, removed from this house to Ka'awaloa the bones of 24 ancient kings and princes. The bones were put into two coffins and after funeral services deposited in the common burying place. The house is to be torn down and a school house erected in its place.**

*...removed from Hale o Keawe.... (DB)

**Not referenced in 1957 manuscript.

Chamberlain does not recount the details of their stay in Ka'awaloa, mentioning only that they had spent 5-1/2 days there. His memorandum (Chamberlain Ms.b) is the only source we have of the names of the chiefs whose bones were removed to Ka'awaloa. The whereabouts of his original memorandum, if it still exists, is unknown, but a copy presumably made by W. D. Alexander is preserved in the Hawaiian Historical Society Library, and a facsimile of it appended to this report* (Appendix).

On the basis of the 23 names listed by Chamberlain emerges evidence of the Hale o Keawe's function as a depository for bones.** An earlier paper (Stokes 1930) attempted to identify these 23 names, but, lacking sufficient genealogical data, led to an erroneous interpretation of this function. A study of the genealogies now available discloses that 14, and possibly 16, of the 23 chiefs were direct descendants of one chiefly mating. This common factor underlying nearly two-thirds of the names leads to the conclusion that the Hale o Keawe was primarily the depository of the bones of those of a closely-related family. This family stemmed from Keawe-nui-a-'Umi, c. 1525 A.D., whose son, Kanaloa Kua'ana, was the first of the hereditary rulers of Kona. Kanaloa Kua'ana, by marriage to Kaikilani, undisputed senior ranking descendant of Liloa, had one son, Keakealanikane, and two daughters, Keli'ioikalani and Kalani-o-'Umi. The mating of Keakealanikane to his full-sister Keli'ioikalani produced Keakamahana, a chiefess of highest possible rank. She, her daughter Keakealaniwahine, and her grandchildren through this daughter, who were Keawe-i-kekahi-ali'i-o-ka-moku and his half-sister Kalani-kau-lele-ia-iwi, were acknowledged as supreme in blood rank over all the chiefs of Hawai'i. All the other descendants of Keakealanikane and Keli'ioikalani through other matings, together with the descendants of their younger sister Kalani-o-'Umi, became junior members of this family, with all the obligations of duty, loyalty, and support such a family status involved in a society where seniority ruled.

Obviously not all the descendants of this family had a final resting place in the Hale o Keawe. Hawaiian custom was for a chief to "will" his bones to a trusted relative or friend for disposal, or lacking such designation, for the nearest blood kin to dispose of them, which was usually in the family's own burial cave. No doubt some of these chiefs were placed in the Hale o Keawe in accordance with such custom, but the earliest interments at least were surely chosen for deification to become immediate ancestral gods ('aumakua o ke ao) for succeeding generations. We have already pointed out that no bones of the woman chiefs could be put in the Hale o Keawe since it

*The Hawaiian Historical Society Library has since found the original list written by Chamberlain--a facsimile is in Bishop Museum. (DB--Nov. 17, 1960).

**...for the bones of the chiefs of one family. (DB)

was also a heiau. Also, no known priests of this family were found amongst the names listed. This further emphasizes the Hale o Keawe's function as a heiau, as kāhunas, as a class, were not objects of deification, although they were usually of the same blood strain as the chiefs they served. The priests of this family, whose own close blood kin were deified in the Hale o Keawe, thus had direct and perfect access to the family gods, not only to the 'aumākua o ke ao but through them, to the 'aumākua o ka pō (the ancestral gods of the remote past).

As to those who were in the Hale o Keawe, the 14 chiefs found to be direct descendants of one of the three children of Kanaloa Kua'ana were: Keawe-i-kekahi-ali'i-o-ka-moku (Keawe), 'Aha'ula, Kumuko'a, Kekoamano, Keawe-a-Kanuha, Ka-la'i-mamahu, and Ka-'o-lei-o-kū, all descendants of the pi'o mating of Keakealanikane and Keli'iokalani. In the junior lines were found: Kanaloa-i-ka-iwi-lewa, Ku'aiali'i, Keawe Lua'ole, Lono-a-Moana, Ni'ula, and Ka-wai-niu-lani. If an equation of names may be accepted, there are two: Ka-la'i-kua-hulu (Ka-la'i being similar to Ka-lani as a title) for Okua and Keawe Kapaulumoku for Keawe-a-Kapeleaumoku (their names, translated, being very similar*). These equations are offered on the basis of these chiefs also being descendants of Keawe, as are the six names following his in the listing above.

Once we assumed that the Hale o Keawe was a family burial place of Kona chiefs, then the remaining names on Chamberlain's list had to be of some degree of relationship to these known descendants. By Hawaiian custom, a relationship through marriage is as binding as a blood relationship, once there is a child born to link the two families. Of the seven remaining names on the list, two are easily identifiable as such relatives: Lono-kaua-kini (Chamberlain's Lono-honua-kini) and Lono-i-ka-ha'upu, both of whom are discussed more fully in later paragraphs. There is a fragment of tradition in each case which links to this family two more: Hukihe, a chief of Kona, and Ka-lei-o-kū. The latter was either Nanue Kaleiokū, one of Kalani'ōpu'u's warrior chiefs during his battles on Maui, or Nu'uaniu-a-Kaleiokū, Nanue's son, who was the leader of Kamehameha's band of warriors called the Kīpu'upu'u. The question then arises, why, out of innumerable "eligible" relatives, were just these four so honored?*** For a probable answer we turn to Malo (1951:191, Sec. 29-32), who clearly defines the "walls of defence" about a ruling chief, that is, those relatives who held positions of trust and honor in serving him. These four chiefs, relatives in some degree, must have filled such positions, and in addition must have been punahale (particular favorites of their chiefs), who granted them the honor of being interred with the

*...similar in meaning). (DB)

**Believe criteria was that they were great warriors. (DB)

immediate family. We are left with only three names on Chamberlain's list unaccounted for: Keohokuma, 'Umi-'o'opa, and Lono-a-koli'i.* We can only surmise that they were in the same category as the above.

The chiefs whose bones were deposited in the Hale o Keawe were not all of Keawe's generation. Those succeeding his, we would expect to find, but interestingly enough, there are six names of chiefs of an older generation than Keawe. This gives rise to the speculation that perhaps those predecessors of his had already been deified, and that their bones were transferred to the Hale o Keawe or, more likely, that they were removed from family burial caves either at Alahaka or Ka'awaloa cliffs, with the intent of deifying them together with Keawe.** These chiefs were: Keawe's own father, Kanaloa-i-ka-iwi-lewa, also known as Kanaloa-kapu-lehu; Keawe's "uncle" and close companion during life, Lono-a-Moana; Ni'ula, Ka-wai-niu-lani, and Ku'aiali'i, also "uncles" (by Hawaiian terminology, makua, meaning relatives of the parental generation) and Lono-kau-kini, Chamberlain's Lono-honus-kini. Here is a substitution of names of which there can be no doubt. Lono-honus-kini was of the Maui ruling dynasty, and father of Ka'ulahea. Although he was a blood uncle to Keawe's first wife, Lono-ma'a-i-kanaka, and was related by blood to a line from Liloa, he could not have fallen into any of the categories defined by Malo, since he was himself king of Maui (Fornander 1880:209). It is therefore quite reasonable that we equate this spelling with the name of Lono-kau-kini, a high chief of Kona, descendant of 'Ehu-kai-malino, and father-in-law to Keawe's sister-wife, Ka-lani-kau-lele-ia-iwi.

Of Keawe's generation we mention first Lono-i-ka-ha'upu, Lono-kau-kini's son. His name has been confused with that of Lono-i-kai-hopu of the Kaua'i ruling family, following Fornander, source of this erroneous equation.*** Confirming genealogies trace the descent of Lono-i-ka-ha'upu and his father, Lono-kau-kini, from 'Ehu-kai-malino's son, Laea-manamana, who received the Kekaha lands of Kona in perpetuity from Liloa (Fornander 1880:76). This Lono-i-ka-ha'upu was the husband of Ka-lani-kau-lele-ia-iwi, and grandfather of the twins Kamanawa and Kame'eiamoku, councillors to their nephew Kamehameha I. Another of Keawe's generation was his cousin Ka'aloa, and the 11 remaining identified names were of later generations. Of special interest amongst the latter names are those of Kamehameha's half-brother Ka-la'i-mamahu, grandfather of King Lunalilo, and that of Kamehameha's acknowledged son, Ka-'o-lei-o-kū, grandfather of Bernice Pauahi Bishop. Ka-'o-lei-o-kū died in Honolulu in 1818, and Peter Corney, who was in Honolulu at

*Lono-a-koli'i can be equated with Keawe-ku-i-ke-ka'ai. (DB)

**Perhaps they had been the gods of the pu'uhonua at Hōlualoa in the previous generation. (DB)

***See Fornander's (1880:298) story of his visit to Hawai'i. (DB)

this time, left an eye-witness account of the preparation of Ka-'o-lei-o-ku's bones before transfer to Hawai'i.

In addition to the deified bones in ka'apai at the Hale o Keawe were the unwrapped bones mentioned by I'i as "heaped up like firewood." I'i states that these were the bones of "those who had died in war," and that in the pile were the bones of Nahiolea, father of Kekuana'oa. This chief, Nahiolea, deserted Kamehameha when the latter came to O'ahu to wage war. He fought on the side of the O'ahu defenders and was killed at the Battle of Nu'uuanu, 1795. It may appear strange that his bones would be placed in the Hale o Keawe, and it is barely possible that they were placed there as a trophy, or object of degradation. However, it is more likely that it was because of his inherited right, through descent from Kalani-o-'Umi, to a place in the family burial place, and that some relative thought enough of him to accomplish this. If this is the correct explanation, it follows that the bones of "those who had died in war" were warriors of the family. These were probably the bones mentioned by Kamakau as having been destroyed with fire.

When the Hale o Keawe was emptied of its relics, and the missionaries had received their souvenir pieces of kauila wood, the house itself was torn down. Alexander (1890) states that "The house and fence were entirely demolished, and the sacred Kauila rafters were used in building a Government House on the site now occupied by Hackfeld & Co.'s building, which was therefore called 'Ka hale Kauila.'" The site occupied by Hackfeld & Co. at the time of Alexander's writing is at present that of the Liberty House in Honolulu. Some of the kauila timbers were possibly used for the Hale Kauila reported to have been erected in the vicinity of the present caretaker's house, and which may have been the site of the school house mentioned by Clark.

In speaking of the removal of the bones from the Hale o Keawe, Alexander says:

...the venerated deified bones were removed, deposited in two large coffins, and interred in a secret cave at Ka'awaloa, where they remained for nearly 30 years. Mr. Chamberlain made a list of the names of 23 chiefs, whose bones were then removed, and stated that five or six more were brought over from the sacred "House of Liloa" in Waipio....In January, 1856, Kamehameha IV, accompanied by a numerous retinue, made a tour of the windward islands in the British sloop-of-war, Vixen, Captain Meacham, arriving at Ka'awaloa, January 24th 1856. On the following night the venerable kahu, or guardian of the secret burial cave, was ordered to remove the stones that concealed the entrance. The coffins were then brought out by torchlight, and carried on board of the man-of-war, which brought them to Honolulu, where they were consigned to Governor Kekuana'oa....After the completion of the present Mausoleum

in Nuuanu, on the night of October 30th, 1865, the coffins of the former royal personages of Hawaii nei, including those brought from Ka'awaloa, were removed to it in an imposing torchlight procession [Alexander 1890].

Alexander's version must be accepted with some reservation. His account of the removal of bones from Ka'awaloa is partially confirmed by the Report of the Board of Genealogy of Hawaiian Chiefs concerning the remains of ancient Hawaiian chiefs:

Those of Liloa and Lono-i-ka-makahiki are now deposited in the Royal Tomb of Kawanakoa, Honolulu, Oahu, which remains were removed from the Cave at Hoaiiku, Kaawaloa, during the reign of the late King Kamehameha IV, and transported to Honolulu on H.B.M.S. Vixen, Captain Micheme, 1861 [sic].

This report, it will be noted, mentions only the bones of Liloa and Lono-i-ka-makahiki, which were presumably among those brought over from Waipi'o, but does not mention the Hale o Keawe bones. Alexander seemingly includes the coffins containing the bones from the Hale of Keawe as being amongst those removed to the Mausoleum at Nu'uauu, but nowhere in the various accounts of the removal of the royal remains to Nu'uauu are these coffins listed or even mentioned. Thus on the basis of Alexander's account, it has been assumed that they were left at the old mausoleum at Pohukaina, in the present Palace grounds. It may be that these two coffins are interred in the mound now marked as the site of the Pohukaina mausoleum, but it is equally possible that Kekuanoo'a did not have these two coffins placed at Pohukaina at all, if indeed they were taken from Ka'awaloa in the first place.

And so we end the story of the Hale o Keawe on the same note of question that we began it. Who originally built the house? What determined the selection of chiefs for deification there? What really has happened to their bones? Though much is known about its physical aspects, we are left with these questions partly unanswered and partly unanswerable. Perhaps it is fitting that this should be so, in accordance with the Hawaiian custom expressed in their saying, "Ho'okoe 'ia no kekahi--something has been withheld."

THE CONCEPT OF ASYLUM

Marion A. Kelly

ASYLUM IN HAWAII

In aboriginal societies it is not unusual for the punishment against any individual who commits an anti-social act to be immediate death, and the goal of war to be extermination. Hawaiian society was, generally speaking, no exception. However, within Hawaiian culture existed an intriguing element: specific sites were set aside in each district, and designated as places of refuge--sanctuaries for women, children, old or ailing men in time of war, for vanquished warriors fleeing from their would-be annihilators, for criminals fleeing from revengeful pursuers, and for lawbreakers fleeing from punishment. The sanctuaries were inviolable, and their protection extended to the guilty as well as the innocent.

How such an institution came into existence in Hawaii is the immediate concern of this paper. Its development from the already existing institutions and cultural patterns of Polynesian society, and its refinement in Hawaii is difficult, if not impossible to trace step-wise, but considerable evidence has been collected which allows for certain undeniable conclusions, however limited or qualified they must of necessity be.

The term for a "place of refuge" was pu'uhonua, literally, pu'u, hill, honua, earth. The Hawaiian historian, S. M. Kamakau (1870a) defined a pu'uhonua as a place to go to "escape and be saved from being taken prisoner or from being put to death." It may be that the word pu'uhonua was derived originally from a hill-type fortress. Such refuges are found throughout Polynesia. One attempt to explain its derivation comes from a story about the inhabitants of the island of Moloka'i. Upon being attacked by invaders from Maui, the defending population repaired to a hill from the top of which they rolled stones down on their attackers, thus saving themselves. And, the story goes, the hill became known as a pu'uhonua (Pogue 1856:21).

This same term is used also to designate caves of refuge. In areas where large lava tubes were found, Hawaiians sometimes used the particularly well-located tubes in which to hide from pursuers. They sometimes built stone walls across the lava tube caves near the entrances, allowing space for passage of only one person at a time. Although these caves were mainly defenses, they were called ana-pu'uhonua (ana, cave).*

*While the term ana pu'uhonua is known (Fukui), ana pa'e kava is the accepted name for refuge cave. (DB, MK)

However, the term pu'uhonua was used to indicate considerably more than a successfully defended hill or cave. The key to understanding the theory of places of asylum in Hawai'i is to be found in the relationship between the chief and his people. Between them was an interdependence which can be expressed in terms of the labor and productivity supplied by the people on the one hand, and the leadership and protection supplied by the high chief on the other. The position of the chief and its accompanying powers were inherited from his ancestors, and it was within his power to spare the life of, or extend mercy to any subject, regardless of guilt. This power of the high chiefs occasioned the term pu'uhonua to be applied to them.

High chief Līloa (c. A.D. 1475), undisputed ruler of the island of Hawai'i, was termed a pu'uhonua. One of his sons, 'Umi, who, having been raised by his mother away from the court of Līloa, in order to establish recognition of his high birth, gained admittance by stealth to Līloa's presence, threw himself into Līloa's lap, his only refuge among warriors dedicated to protecting their chief. Līloa spoke to 'Umi and in doing so extended him asylum which gave 'Umi the occasion to prove by presentation of the proper chiefly accoutrements that he was indeed Līloa's son. The Līloa-'Umi story is entirely in keeping with what is known of the powers of high chiefs throughout Polynesia. Even into post-European times this concept operated in Hawai'i, and the personage of Ka'ahumanu, the favorite wife of Kamehameha I, was confirmed a pu'uhonua by her husband, as were all the lands that belonged to her.* Of course, Kamehameha himself was a pu'uhonua (Kamakau 1870a).**

Today the best known of the Hawaiian places of refuge is the one at Hōnaunau, South Kona, Hawai'i. It is located on a relatively flat piece of land at the seashore. The only spot within the enclosure which bears any resemblance to a "hill of earth" is a sand dune that rises about 8 ft above the surrounding area. This could hardly be a successfully defended hill. More indicative of defense is the massive stone wall which protects the area from inland intruders. The presence of this heavy wall could be interpreted as evidence that a certain degree of physical protection was necessary as insurance against intruders.

Much more important than physical protection was the supernatural protection and sanctity of the surrounding area. Thus, each pu'uhonua site

*Kamakau (1961:312-313). (MK)

**Kamakau (1961:312) also wrote: "In Kamehameha's day the god Kuka'ilimoku and the lands sacred to this god were places of refuge; anyone who had forfeited his life might be saved if he ran and entered one of these lands sacred to the god; no blood could be shed there. Any violator of any law whatsoever who had been sentenced to die, if he could run and enter one of these lands would be saved; his troubles would be over." (MK)

was closely associated with a heiau. The heiau of the pu'uhonua at Hōnaunau at the time of European contact was Hale o Keawe. This association with religious structures indicates that a pu'uhonua as that at Hōnaunau was not merely a place of physical refuge, but more specifically a sanctuary. In a thatched house on one of the heiau platforms were kept the bones of deceased high chiefs, now deified. This was not a burial,* but rather a deification. Hawaiian burials per se were quite different (Westervelt 1904:150**). The powerful mana of these deified chiefs continued after life to surround the area and to afford protection to anyone entering the enclosure. The sanctuary at Hōnaunau*** was under the protection of the deified chief Keawe, and the one at Waipi'o Valley under Liloa.****

Kamakau (1870a) states that the places of refuge in ancient times were divisions of land cut off from a district. The examples he gives are not specific sites, but large land divisions which correspond to subdistrict divisions (ahupua'a). These lands were reported to have been considered very sacred and true places of refuge probably because they had belonged to persons of very high rank who themselves were considered pu'uhonua (Fornander 1880:278; Thrum 1896:75). McAllister (1933:18) reported the opinion of Lahilahi Webb, an authority on Hawaiian culture, "a tapu land was not necessarily a place of refuge." Except at Koloa,***** O'ahu, there is no evidence that specific heiau were connected with the function of these lands as pu'uhonua. Whether the large land-tract type of pu'uhonua preceded the site type is not determinable with the evidence available.

All the elements necessary to the establishment and function of places of refuge or asylum were present in Polynesian culture. Polynesian concepts of mana, or sacred power of the high chiefs were an integral part of the Hawaiian places of refuge. Each chief inherited his family's sacred power; other things being equal, the first born, because he was believed to have received the greatest amount, was usually considered the most powerful. Mana, it was believed, could then be preserved in the bones of a deceased chief who had been deified, and thereby his powers could be made to extend beyond his lifetime. To this end, exacting rituals were performed by priests (kahunas) and descendants of the lineage at the heiau.

*This was not merely a burial.... (DB)

**Also Bowen (1961:170-176) (DB)

***From the presence of structures named for them it is assumed that the sanctuary at Hōnaunau.... (DB)

****Stokes (1930:63-73) and Ellis (1917:126-127). (DB)

*****Kualoa? (DB)

Early in the history of post-European Hawai'i some American and British visitors began to study the language, customs, and institutions of the Hawaiian people. Many of these scholars were well acquainted with the Bible, and as was common practice in a period when the methodology of scientific inquiry was in its infancy, they often were satisfied that a quotation from the Bible was explanation enough. In an attempt to translate into its English equivalent the Hawaiian term pu'uhonua, as it applied to the sanctuary at Hōnaunau, early visitors used the term "city of refuge," which they selected from the Book of Deuteronomy. This was an unfortunate choice because the pu'uhonua at Hōnaunau was not a "city" or even a "village" of refuge. Although misleading, the term was perpetuated by other scholars (Westervelt 1904:150), and popularized by Mark Twain (Clemens 1872:526-529). And even Hawaiians, anxious to measure up to the standards expected of them by these European and American scholars and teachers, began to include in their stories of ancient customs certain elements to please their white brothers. The volume of evidence to prove the theory thereby expanded considerably.

Once the Biblical terminology had been applied to the pu'uhonua at Hōnaunau, the next logical step was to theorize on the connection between the two geographical areas, Israel and the Hawaiian Islands. Scholars of the Bible offered the explanation that the Hawaiians were surely the descendants of a lost tribe of Cushites who had migrated through Arabia and India, bringing with them the Hebrew idea of a "city of refuge" (Fornander 1919:234-235, 1878:118; Ellis 1842:IV:170). For the purposes of missionary work among the Hawaiians, this theory was popularized and became for all practical purposes quotable as fact (Malo 1951:8). The Hawaiians thus were conveniently identified as "children of God."*

One of the interesting examples of missionary inspired education was uncovered in a writing left by a minister and teacher at Lahainaluna. He explained that a refugee had to live within the enclosure of the pu'uhonua "until the chief died, then return to his land" (Pogus 1858:20). This information is lifted directly from the Biblical description of the cities of refuge of Israel, the word "chief" being supplied** for "priest." Nowhere in any other material collected is there indication that refugees remained within the enclosure for more than a few days (Ellis 1842:IV:167).

The point on which the theory of asylum seems most at variance with modern concepts is the question involving "guilt" and "punishment." To our way of thinking,*** a criminal must be punished for his crime, and failure to

*...conveniently called "children of God." (DB)

**...being substituted for.... (MK)

***According to Western concepts.... (MK)

do so is an injustice to the injured innocent. However, no story collected in connection with people entering a pu'uhonua to seek refuge gives any hint that a judgement was necessary to determine who was entitled to asylum and who was not. The reliable informants state flatly that all persons presenting themselves for sanctuary were in no way to be molested (Ellis 1842:IV:167; Kamakau 1870a). If a pursuer went too far, attempting to punish or kill a criminal who had already reached the pu'uhonua, the priest in charge of the sanctuary was duty bound to deter, or if necessary, to slay or have the pursuer slain. If a priest allowed one who had come within the pu'uhonua to be killed by his would-be avengers, the priest could be put to death by the high chief (Ellis 1842:IV:167; Thrum 1908:72). The pu'uhonua of ancient Hawai'i was indeed a secure refuge for those who reached it.

An important problem regarding the function of pu'uhonua was that of access. In the search to discover to what extent pu'uhonua were used throughout the island group, it became evident that every large land division (moku'āina) of each island had at least one, and perhaps on the largest island, Hawai'i, there were more than one in some districts. This latter cannot be stated with certainty because of the connection between a pu'uhonua and the ruling chief of an island or district. Where a chief is defeated in battle, his temples and institutions fall into disuse and new ones are established by the victorious chief. Thus, it is impossible to say when the structures, which are today cited as "ancient pu'uhonua," operated as such, for how long a period, and which were in operation simultaneously. The island of Kaua'i might be an exception to this. As Kamakau (1870a) stated, "Only on Kauai the old places [of refuge] remained because Kamehameha's wars did not extend to Kauai and hence these lands were not distributed to his war leaders. The government remained under the hereditary chiefs." And, it might be added, the pu'uhonua were continuously maintained. The best that can be done is to list all the pu'uhonua, their location, and the sources which claim them to have functioned at one time as pu'uhonua (see Report 12, this volume).

THE THEORY OF ASYLUM

Having established that Hawai'i had an institution which was based on the concept of asylum, the problem presented itself as to whether this concept existed in other areas of Polynesia, if so, to what degree and what forms did it take. Lastly, the question of what other societies had similar institutions had to be answered. Material again is scant, but the following pages are an attempt to present the available evidence.

ANCIENT GREECE

The human concept of asylum is apparently very ancient. Sacred places of refuge have occurred in many different types of societies throughout the world. Through such an institution people have expressed the social need for protection against blind revenge, and for securing peaceful order and reason in the society of man.

The word asylum stems from the Greek word asylon, meaning a place safe from violence, a sanctuary. Generally speaking, all Greek temples and altars were sanctuaries. It was a religious crime to remove by force any person or thing once under the protection of a deity. However, it was only a relatively small number of temples in which the protection afforded by the deity was strictly observed. One of the examples of a temple which functioned as a refuge was the ancient Greek temple of Diana at Ephesus. Its sacred area is said to have extended to some distance outside the immediate temple.

In ancient Greek society it was recognized that the people most frequently in need of sanctuary were slaves who had been maltreated by their masters, soldiers who were defeated and pursued by the enemy, and criminals who, fearing a trial, had escaped before sentence was passed (Encyclopedia Britannica: Asylum).

CITIES OF REFUGE IN ISRAEL

Perhaps the most famous examples of places of refuge in the ancient world were those "cities of refuge" found in Israel. Jerusalem is itself translated "City of Peace," and the Arabs usually designated this city by names expressing holiness or sanctuary. During a period when legal authority was being consolidated, the rural shrines of ancient Israel were abolished. People living any distance from Jerusalem needed a place of asylum in their own district. The Book of Deuteronomy (iv:41-43; xix:1-7, 11-13) describes the cities of refuge established to serve each large district, and the manner of their use.

Three cities were set up west of the Jordan, and later three east of the river (Joshua xx). To any of these cities a person might flee, and within its boundary be safe from blood revenge. Any person seeking sanctuary had to stand before the priests and the judges of the city of refuge while they made inquiry as to his innocence or guilt. Those judged guilty were returned to their own cities for punishment. Those judged innocent could live in safety within the walls of the city of refuge until the death of the high priest of the land, after which time they might return in safety to their home city (Numbers xxxv:6, 11-32).

ASYLUM IN EARLY CHRISTIAN TIMES

With the establishment of Christianity, the custom of asylum or refuge became part of the Christian church. The idea that a church could afford asylum to criminals or refugees was founded upon the belief in the contagion of holiness. Hence, it was sacrilege to remove the man who had gained the holy precincts; he was henceforth invested with a part of the sacredness of the place, and was inviolable so long as he remained there.

Roman law did not recognize Christian sanctuaries until toward the end of the 4th century when they finally established the privilege to within 50 paces from the church door. Later it was extended to include the church courtyard in order to provide some other place than the church for the fugitives to eat and sleep. Refugees were to leave all arms outside. Refusal to surrender weapons jeopardized their position, and they could then be seized in church. Capital punishment was to be meted out to all who violated the right of sanctuary (Encyclopedia Britannica: Sanctuary). The right of sanctuary is still recognized in countries where the church is politically strong.

In Scotland today can be seen what remains of a sanctuary cross. Located near Lindores, Fifeshire, is the famous MacDuff's Cross. MacDuff, it is said, was awarded special sanctuary privileges for his kinsmen after the defeat of Macbeth in 1057, and the succession of Malcolm III to the Scottish throne. Supposedly, clansmen within the ninth degree of relationship to the chief of the clan, if guilty of unpremeditated homicide, could claim refuge and be safe from capital punishment upon reaching the cross.

There are other remnants of sanctuary crosses in Cumberland and Cornwall. Because not much is known about their use, they have been estimated to be sign posts to guide fugitives to sanctuaries in the area (Encyclopedia Britannica: Sanctuary).

ASYLUM AMONG AUSTRALIAN ABORIGINES

There is evidence that even people of stone-age societies had places of refuge. For the Arunta people of Australia there are reported sacred "storehouses" which served as sanctuaries. These storehouses contained symbols of tribal ancestors as well as of especially powerful living tribe members. To these people, each symbol was an embodiment of the spirit and power of the individual it represented. The presence of these symbols in the storehouse endowed it and the surrounding area as a haven or refuge for men, and even for any animal, that might venture into it. Even the plants in the surrounding area were taboo and never touched or interfered with in any way. Women were forbidden to go near the storehouses, and no quarrels or displays of weapons were allowed in its vicinity.

Among the elements found in these sacred storehouses of the Arunta is one which was prominent in Polynesian sanctuaries: that of deifying powerful ancestors. These ancestors were the leaders who had inherited great spiritual powers. Symbols of these deities were then placed in a house, which by their very presence became sacred, and the area surrounding the house, following the rule of contagion, became hallowed ground (Spencer and Gillen 1927:I:108-110).

ASYLUM IN POLYNESIA

It has been said that all Tongan god-houses were sanctuaries to which a fugitive might flee, but there seemed to have been certain sanctuaries which were considered special places of refuge (Gifford 1929:324). A sanctuary in Tonga was a place consecrated either by express declaration or by the burial of great chiefs on the spot. War was forbidden in the area, and it was considered highly sacrilegious to attack an enemy or spill his blood within its confines. Some sanctuaries were considered safer than others, although the reason for this is not given. The strength of protection which a high chief might give his people depended on his own power as a leader and on the reliability of his priests, whose responsibility it was to insure the right of sanctuary to those who sought it. Where a place of sanctuary was consecrated by burial of great chiefs, some of its power to function as a refuge was derived from the inherited supernatural power of these great chiefs. Whenever a sanctuary fell into disuse or was not properly cared for, the security of a refuge was weakened or destroyed.

The most famous sanctuary in Tonga was Fanakava in Lapaha at the Tui Tonga's place of residence in Tongatabu. Most sanctuaries had enclosing fences within which was situated the house of the presiding deity, the house being occupied by the officiating priest or priestess (Gifford 1929:291). Another sanctuary, and one of the three considered very safe, was that of the god Tui Haa Fakafanua at Maufanga, Tongatabu. Unfortunately, not enough is known about these sanctuaries to be able to reliably estimate the importance of their role in ancient Tongan society.

In a story related by Gifford, a chief, Niukapu, fleeing from a revengeful pursuer, had the choice of three sanctuaries. Only one was considered inviolable, and that was one ruled by a priest named Kautea. Niukapu succeeded in gaining entrance to this sanctuary, and the priest accepted him as a refugee. The revenger, discovering this, ordered someone's finger cut off and sent to the priest. Etiquette demanded Kautea cut one of his own fingers off and send it as a return gift, which he did. Next, a human body was delivered to the priest Kautea. This called for a similar act in return, or the refugee would surely have to be given up to the pursuer. The priest's daughter generously offered herself in Niukapu's place. Immediately the priest had her killed, and presented the body to the would-be avenger.

This act was tantamount to the priest having offered his own life, which was considered preferable than to have a refugee die (Gifford 1929:300).

A place of refuge is mentioned by Mariner (1817) in connection with a violation of the right of asylum. It seems that a chief went on a foraging party with some friends. Their canoes landed near a consecrated enclosure called Gnacao. Here they met four of the enemy. Realizing their numerical disadvantage, the enemy attempted to flee to the consecrated place where they would have been safe. The chief, however, pursued them to the reedwork fence around the asylum. One of the refugees had actually placed a leg over the fence when the chief, blinded by vengeance, struck him a fatal blow on the head. Suddenly realizing what sacrilege he had committed, our chief was overcome with fear and hastily retreated to his fort. There a priest was consulted, and after much ceremony it was determined that a child should be sacrificed to atone for the sacrilege. This accomplished, the body of the child was carried to various houses consecrated to different gods with a prayer to each asking acceptance of the sacrifice as atonement for the sin committed (Mariner 1817:I:216-219).

Another European visitor of early days described a battle between two groups of Tongans. The European was helping one group against their enemies. A number of the enemy had taken refuge in a large burying place (Fiatooka), believing that the sanctity of the place would secure them from violence.

Our party however made an attack upon the place, and attempted to pull up the fence. But as the enemy within could not be seen, yet could see us, when any one attempted to pull off the reeds, they pierced him with their spears. They judged it best, therefore, to set fire to it; but the sanctity of the place deterred them. They applied to me: I threw a firebrand upon the thatch; it did not light for some time: at length it was all in a blaze. Many of them fled out, but they found no quarter: the rest therefore stood upon their defence, and fought desperately till they were all killed [Vason 1810:173].

Vason also describes a district called Mafanga, which was considered a sanctuary or country of refuge to those who fled there. After a complete rout of his enemies, the chief under whom Vason operated gave orders to pursue those who had fled to Mafanga for refuge. Arriving there, they took the refugees captive, but did them no injury. Of the total captured, they separated eight or nine of the chiefs and installed them on a small distant island where they could not escape; the commoners they disarmed and returned to their respective districts. In this way, Loogolala became the chief of the whole island, and appointed many of his friends as governors of the different districts.

The most famous of sanctuaries was Fanakava, a large green malae where the Tui Tonga held his kava ceremonies. Adjacent to this was a tract called

Fiehua, on which was situated a house of the god Finautauiki. This house was also considered a place of sanctuary (Gifford 1929:324).

The use of caves as a place of refuge was not unknown, although they are not associated with any supernatural protective powers, but were merely good defenses. A cave called Analahi (large cave), on Tongatabu, protected a group of refugees "for a considerable length of time"; the only entrance was so difficult that a single man could guard against an invading army (McKern 1929:90-91).

The Tongans had both elaborate fortifications and sacred places of refuge. Identified with the former were earthen walls or embankments, a fence of upright posts or heavily reinforced reeds, and often a dry moat. Such a fort was termed *kolo* (McKern 1929:80). Fortified valleys or mountain retreats are found in many areas throughout the Pacific. Their development is considered purely local, and as fulfilling a need for protection against enemies. The so-called fortified villages are merely forts large enough to accommodate an entire village for longer or shorter periods of time as is necessary. The fortified refuge is not to be confused with sacred sanctuaries, which may or may not contain elements of fortification.

One additional thing should be mentioned regarding Tongan sanctuaries, and that is a structure called a *fala hufanga* by Gifford (1929:324), but not elaborated upon by him. From its name it would appear that it is similar to the Tahitian *fare hua*, but all attempts by the writer to obtain information regarding the function of this Tongan structure have failed.

In New Zealand we find the term *punanga* (Best 1924:I:306), meaning a secret place of refuge to which refugees might retire in time of need, and usually located in an adjacent forest. Whether this term carried with it a sacred connotation is not known. However, the better known Maori *pa* (fortress, or fortified village) was well described in early literature. The people of an area might have both an open village (*kainga*) and a fortified village (*pa*) to which they could retire for protection in case of an enemy attack.

Tregear (1904:202-203) tells us that a prisoner of war might have his life spared by a chief of the victorious tribe, who accomplished the fact by throwing a mat over the prisoner and thereupon claiming him tabu. This is a concept similar to that which sometimes operated in Tahiti, Samoa, and Hawai'i. In all of these places there are stories describing defeated warriors or fugitives throwing themselves at the mercy of some high chief who had the power to extend his protection or to order immediate death.

Although there is no mention of sacred places of refuge in Maori literature which compares in any way with that which is found in Tongan material, there is one story of a woman name Hine who was so highly venerated

by her tribe that her home was held forever inviolable and sacred. Even when a warring party entered a fort in which she lived, her father was reported to have said, "Do not intrude on the courtyard of Hine." This was sufficient to deter the attackers. This story may explain a Maori proverb, "the courtyard of Hine must not be trodden by a war party." A refusal to do battle, or a message of peace was indicated by the phrase "Come to the courtyard of Hine."

The Marquesans had clan or family shrines which were the property of particular families, burial places of chiefs and priests, and depositories of skulls of a living person's ancestors. The right to deposit the skulls of one's ancestors in any given shrine represented kinship ties and the right of ownership in the tract of land in which the *me'ae* was located (Handy 1923:53-59). This custom, which decides whose bones shall be deposited in a shrine, shows up interestingly in the Hawaiian place of refuge at Honaunau. The literature available on the Marquesas makes no mention of such sacred places functioning as asylums.

In Samoa, as in other places in Polynesia, the usual punishment for murder and adultery was death. The family of the victim was free to seek revenge on the guilty person or a member of his family. In case of murder, the culprit and his family might flee to the house of the chief of the village for protection, or to the house of the chief of another village to which he is related on his father's or mother's side. Usually he was safe while he remained there. If the family of the victim pursued the murderer to another village, they would risk hostilities with those who protected the refugees (Turner 1861:285, 334). A chief felt honored that a fugitive would seek asylum with him. Such an act represented recognition of the chief's powers as a protector. In gratitude, a refugee might attach himself to his protector's staff and remain to serve him indefinitely.

An unusual place of refuge on Upolu Island was an old tree inland of one of the villages. It was considered a "place of refuge" for murderers and other capital offenders. A criminal who reached the tree was safe, and the avenger of blood, prevented from pursuing farther, had to wait for an investigation and trial. This is the only mention in the literature for all of Polynesia that a trial had to be held, and because it could represent the influence of Christianity in Samoan culture, as it has been found in other areas of Polynesia, such a statement from Turner (1861:64-65) should be repeated only if the reservations are noted. The Samoan story about this tree reports that long ago a high chief of the Atua district lived at that spot. After he died the house fell into decay, but the tree was fixed on as representing the departed leader, and out of respect for his memory it was made the substitute of a living and royal protector. It was called *o le asi pulu tangata*, the *asi* tree, the refuge of men. In explanation of this theory, an informant said that at one time a village had been without a high chief for

10 years. Anxious to have some protecting substitute, they fixed upon a large Q'a tree, and made it the representative of a high chief, and an asylum for the thief or the homicide when pursued by avengers.

Although these descriptions of sacred places of refuge in Samoa reveal no large temples, as those that were used in Tonga or in Hawai'i, all the essential elements were apparently present. The theory of asylum functioned in much the same manner, while only the form that it took was different. The strength of the protective force originated from the power of the chief.

In the interior of the district of Tahiti-nui is a large valley rather like a vast room surrounded by mountains which form the heads of other valleys emanating from them. This large valley was once an area designated as Te-piha-ia-Teta, the room of High Chief Teta, who extended hospitality to the refugees, and it formerly served as a refuge to which political offenders and others fled. Henry (1928:73-74) quotes from Tahitian lore the following poem:

Ha'apai-a-no'o is the room of refuge,
The land of the little clan of the strong,
The room of refuge!
A settling place for winds (strife) is Ha'apai-a-no'o,
Ha'apai-a-no'o is the greatest valley,
A room it is for Tahiti.
Tahiti goes thither in trouble,
To King Teta,
And escapes the searcher,
And escapes from battle,
At Ha'apai-a-no'o breadfruit is food for rats (so plentiful).

As far as we know, the use of this large valley as a place of refuge was not connected with the sacredness associated with places of refuge in Tonga and Hawai'i, but was rather a place to which the pursued would flee because the forest provided an excellent cover, food was plentiful, and even defensible positions were not difficult to find.

In some of the other references, however, we do find an element of sanctity and chiefly power used in connection with giving asylum to refugees. If, in time of battle, any high-ranking chiefs of the victorious army were known to be humane or known to have shown compassion in the past, or if any of the vanquished had formerly been on friendly terms with one of them, he might, by avoiding other warriors of the victorious army, risk his life further by finding such a chief, and, by prostrating himself in his path, supplicate the chief's compassion, or rush into his house and throw himself on the ground before him. Although his life would be endangered while he was seeking the chief, once he had gained his presence, none dared to touch him within the high chief's enclosure without his orders. Generally speaking, a chief thus appealed to would speak out or give a sign of recognition, and thus secure for the individual his safety (Ellis 1842:IV:161). This example, along with many others of a slightly different nature, confirm that the *alii* in Tahiti as throughout Polynesia held the power of saving a life or ordering death.

The power of the ali'i over life and death could be involved in other ways. A prostrate warrior, as he lay at the feet of his antagonist, wounded or disarmed, would perhaps supplicate mercy by crying, "Spare me, may I live!" and at the same time call out the name of the victorious warrior's high chief. The intention was to surround the victim with the aura of a tabu and sacredness attached to the ali'i by calling out the name of the high chief. Although not always certain, such action sometimes brought forth mercy (Ellis 1842:IV:292). This practice is similar to that of Christians who call forth the protection of their God in time of need by making the sign of the cross.

By far, the most secure refuge was a fortification (pa) prepared in the mountains before the battle, stocked with food, and having a secret and protected path to a source of fresh water. Of these there were several examples. For the most part they were natural fortresses improved by stone walls, and steep precipices, difficult to travel mountain paths, and defensible positions where heavy stones could be thrown down upon unsuspecting invaders. One of the forts on Huahine had walls of solid stonework 12 ft high, and, in some places, 10 or 12 ft thick, enclosing an area about 1/2 mi on each side, in which there were many fruit trees and several springs and a temple dedicated to their tutelary deity. An around-the-clock watch was kept from the tops of these stone walls during time of war, and within the enclosure were houses sufficient in number to care for the entire population of the area (Ellis 1842:IV:313-314). Thus we have certain elements found at Honaunau: the thick walls for protection, and a temple dedicated to a deity. Ellis does not mention that this was any more than a fortress, and any comparison will have to end there.

There was another type of refuge mentioned by Henry (1928:298-299, 312-313) which has overtones of the type used in Hawai'i. During times of war, the district contemplating battle would first select a secluded area and build a fare_hua (house of the helpless) in which to place their women, children, and disabled and aged men. Such a place was under the protection of "a priest of the god's cricket." No hostile party dared molest the fare_hua during action, but afterwards its sanctity no longer existed, and the warriors of the victorious armies routed out the vanquished from every corner of their land. Some might escape to a pa, or fortified area, inland, and others to a friendly distant district, but those found by the victors were usually killed, their crops destroyed, houses burned, and temples desecrated.

CONCLUSIONS

It is apparent from the material available that the Polynesian concept of a place of refuge is rooted in the inherited powers of the high chief. This is to be seen in the custom of declaring very high chiefs to be

pu'uhonua, of declaring certain lands belonging to chiefs with powerful mana to be pu'uhonua, and of placing the bones of deified ancestors in temples connected with specific sites which were thereby designated pu'uhonua. The ability of a chief to act as a refuge in turn stems from both his inherited sacred power, or mana, and from the political power or authority he is able to command. Thus the Samoan chief who gives asylum to a man from another district is able to do so because he controls enough people to defend his house and his district. The appearance of a refugee is indeed a compliment to his strength.

Also in Samoa, the use of a tree in place of a high chief is a symbol of the continued power-after-life theory on which the deified ancestor is based. The tree was chosen as the site of refuge to replace the house of the deceased chief. It was a symbol of the chief's powerful position during his lifetime.

In Hawai'i the institution of the pu'uhonua was much more fully developed than in any other area in Polynesia, with the one possible exception of Tonga. There were other Hawaiian institutions which had a unique development. The Hawaiian chiefs had advanced to a point where they alone of all Polynesian chiefs could demand and did receive complete submission from their subjects. The act of prostration by all commoners upon the appearance of a high chief or any of his servants* (because they might be carrying some article belonging to the chief) is evidence of the powerful position of the Hawaiian chief--a development unequalled elsewhere in Polynesia.

All the elements of Hawaiian pu'uhonua are to be found in other Polynesian areas. These had been transported to Hawai'i as part of the general cultural knowledge of a Polynesian background. They were elaborated upon and adapted to local needs and conditions. There is no evidence to justify looking to Israel or to other areas for the seeds from which the Hawaiians developed their concepts of asylum as represented in the pu'uhonua of Hōnaunau.

*Only if the kahys were carrying the chief's articles, and the kapu-ō was proclaimed. (DB)

ANNOTATED LIST OF PU'UHONUA IN THE HAWAIIAN ISLANDS*

Marion A. Kelly

ISLAND OF HAWAII

HALE O LONGO, NĀ'ĀLEHU, KA'Ū

The only authority stating that this heiau functioned as a pu'uhonua is Mrs. Mary Kawena Pukui, who gave the following story:

A Hawaiian man was being pursued. Why, no one remembers. He ran, and while he ran the owl 'aumakua (family god) came and told him to lie down. The owl scratched leaves over him, covering him so that his would-be avengers passed by him. The owl then led him away, but his pursuers, discovering the trick were after him again. The owl returned and, forcing him to sit against a rock, perched himself on the man's head, covering him with his wings. That spot has ever since been called Poopueo (owl head). It was then but a short distance from there to a temple called Haleplono (an agricultural heiau where shedding blood was tabu). The owl guided the refugee to the heiau and the priest extended him protection. The refugee, feeling indebted to the priest, became his apprentice and was taken into the family as a son. The priest's name was Alapai.

HAULELANI OR PAKIHA, HŌLUALOA, NORTH KONA

Stokes reported that Haulelani was "described by residents as a puuhonua...built in the time of Keakealani, queen of Hawaii about eleven generations back" (Stokes Ms. b). He also believed that this was the same heiau described by Ellis (1917:88-89) as Pakiha, although the name Pakiha and that of a nearby village, Kaluaokalani, mentioned by Ellis were unknown to Stokes' informants.

Reinecke comments,

If Pakiha and Haulelani be identical, the pu'uhonua has been extended considerably makai for purposes of cultivation, as the dimensions are now approximately 200 x 500 ft. [270 x 210 ft. given by Ellis]. The interior certainly has been torn up for cultivation....On the east the wall is about fourteen feet thick and eight feet high; about the same on the south; on the north only about eight feet wide and eight feet or less in height, widening into a low platform near the makai end. There is no makai wall [Reinecke Ms.].

*I'i's list is not included. (DB)

On a sketch map by Kekahuna (1950) appears an enclosure labeled "Pakiha Enclosure" located adjacent to another enclosure entitled "Pu'uhonua Enclosure." The "Pakiha Enclosure" might be the same structure as that mentioned by Stokes and Reinecke, and which they called Hauelani heiau. Kekahuna describes the Pakiha enclosure as having been the residence of "Queen Kekealani" on the land "Kekuaokalani."** Whether Kekahuna is using Ellis as his source is not known, but it seems to be the case in this instance.

HAUOLA, HĀMĀKUA

Thrum (1908:41) mentions a heiau called Hauola as having been at one time a pu'uhonua in Hāmākua. Hudson (Ms.:193) states that all trace of this pu'uhonua has been lost.

HŌNAUNAU, NORTH KONA

The site of Hale o Keawe heiau and the largest pu'uhonua in the Hawaiian Islands.

KAPUANONI, KAHALU'U, NORTH KONA

Thrum (1908:72) stated, that this was a large heiau, described as an ancient pu'uhonua and luakini built in the time of Lonoikamakahiki. Tradition has it that when Malaihi was its kahū (keeper), a native fled to it from Pāhoehoe and was followed in by his pursuers, seized, and taken away without remonstrance, which violation coming to the ears of the king, he had the keeper slain and sacrificed on the altar of 'Ōhi'amukumuku.**

Stokes (Ms.b) reported that the grandson of this heiau's last priest informed him this heiau was built by Kalani'ōpu'u. Stokes did not mention that this was reported to be a pu'uhonua.

KE'EKŪ, KAHALU'U, NORTH KONA

Located directly on the shoreline, this heiau was said to have been one in which human sacrifices were offered. It was reported to have been built by Lonoikamakahiki, and also to have served as a pu'uhonua (Stokes Ms.b).

Reinecke (Ms.), using the same informant as did Stokes, noted that this was "a heiau of first rank, for sacrifice and also a pu'uhonua." His informant was Malanui, whose grandfather was the priest of Kapuanoni heiau. The walls of Ke'ekū were exceptionally heavy and strongly built. Foundations

*See I'i (1959:6, 134), Keolonahihi was the residence of Keakealani. (DB)

**This would be reason enough to discontinue it and remove the pu'uhonua to Ke'ekū, North Kona. (DB)

were located to the south of the main structure which were said to have been the site of Hale-o-Papa (House of Papa). A petroglyph located on the rocky ledge supporting Ke'ekū is reported to be a picture of Kamalālāwalu, a defeated chief of Maui.

MALULANI, KIOLAKA'A, KA'Ū

This heiau was described to Stokes (Ms.b) as having been a place of refuge, and the location of a house called Hale o Keola (House of Keola)."

MOKUOLA, HILO

Thrum (1908:56-57) reported the island of Mokuola, located in Hilo Bay, as having been a pu'uhonua, and that it included part of the mainland across from the island on which was located a heiau of luakini class and called Makaolu. The northern part of the little island, which was the place of refuge, was known as Kaula'i-nā-iwi (where bones are placed to dry or air). The earliest reference to Mokuola as a pu'uhonua is found in Bloxam's (Ms.a) original papers concerning his visit to Hawai'i in 1825.

PĀKA'ALANA, WAIPI'O VALLEY, HĀMĀKUA

According to Ellis (1917:273), the walls of Pāka'alana were inferior to those at Hōnaunau, and its enclosure smaller, but it appeared to be of greater antiquity than Hōnaunau. Its Hale o Līloa (House of Līloa) was supposed to have housed the bones of Līloa, a famous chief and father of 'Umi,** who reigned about 15 generations back. A rudely carved stone image about 6 ft high stood at one corner of the wall and was said to have been an image of Līloa.

Fornander (1880:73) comments that the builder of this heiau is unknown,*** but it was supposed to have existed before the time of Kiha, as it figures in the legend of Mo'ikeha. Kila, Mo'ikeha's son, was accused of breaking an eating kapu, and entered the place of refuge within the heiau of Pāka'alana, "a place where the violators of any kapu could be saved from punishment" (Fornander 1916:134). The taboos of Pāka'alana were the most sacred on Hawai'i, and remained so until its destruction and spoilation of all the royal associations in the valley of Waipi'o by Ka'ekūlani, King of

*House of Life (cf. I'i 1959:139). (DB)

**Ellis says Līloa a grandson of 'Umi. More likely. (DB)

***See Na'i Aupuni, Dec. 2, 1905, "Pā ka makani Ko'olau wahine." Built in time of Kahaimolea, five generations after Pili. (DB)

Kaua'i, and confederate of Kahekili, King of Maui, in their war upon Kamehameha in 1791.

Thrum (1908:57) adds that Lono was one of the gods of this temple in the time of Kiha, and it was here that Ika, chief of a bandit clan, with his companions was slain by Kiha and sacrificed upon its altar. Stokes (Ms.b), following Ellis, mentions Pāka'alana as a famous pu'uhonua.

WAHA'ULA, PŪLAMA, PUNA

Fornander (1880:35-36) says that in the original enclosure of this heiau was a sacred grove which contained one or more specimens of every tree growing on the Hawaiian group. Although he mentions this heiau as a very important one in Puna, he does not say that it was a pu'uhonua. Thrum says that the heiau of Waha'ula

...also had a puuhonua, or place of refuge, in connection with it, where those having broken kapu, or in times of war, might flee to from their pursuers and escape all penalty. Opinion differed, however, as to its location, some maintaining a place called Hale-o-kii (House of the Image), about a mile distant from the heiau, on the adjoining land of Kahaulea was the puuhonua of the district; while others held that the leveled area outside the walls to the southwest was the mecca [Thrum 1908:52].

He further comments that the present area (as he saw it) would not embrace a grove of trees, and thus he believes that the renovations and rebuildings done under several different chiefs (Thrum 1908:48-54) must have made it smaller than its original size.

An interesting comment by Stokes (Ms.b) notes another heiau called Waha'ula, but located in the land of Kamā'ili, Puna, was claimed by local residents to have been the original heiau of Waha'ula, and that the stones were taken to Pūlama to build the large Waha'ula heiau at that place.

Note

No information has been found which gives a pu'uhonua site for the district of Kohala, Hawai'i. It is likely that one existed there, but any knowledge regarding such a site has been lost.

ISLAND OF MAUI

KA'ILI, PU'UHAQA, HANA

A land division under the protection of the god Kūka'ilimoku which was made a land of refuge by express declaration of Kamehameha I (Kamakau 1870a).

KĀNEMALOHEMO (KEAKALAU'A'E), POPOIWI, KAUPŌ, MOKULAU

Walker (1931:210) claimed this heiau to have been called Keakalau'a'e, and that it was used as a pu'uhonua. He measured its size as 168 ft by 330 ft. Fornander (1880:133) said it was built by Kekaulike, King of Maui, just before a raid on Hawai'i in the early part of the 18th century. Thrum (1909b:48; 1938:129) lists Kānemalohemo as a heiau, but not as a pu'uhonua.

KANIOMOKU, HANA

Kamakau (1870a) says this was a land belonging to Ka'ahumanu, and made a pu'uhonua by Kamehameha I. The name appeared listed by Thrum (1909b:48) as an ancient heiau and place of refuge. Later Thrum said,

Confusion prevails relative to the formerly listed Kanimoku heiau and place of refuge of the district. Some maintained that the heiau of this pu'uhonua was called Keaumuku; others held that it was simply the place of refuge of the district and held no temple. It is famed, however, as the place where Kaahumanu, the favorite queen of Kamehameha I, was brought at an early age from her birthplace at the base of Kauiki and reared till well grown. A visit to the locality revealed no indication of a heiau structure [Thrum 1917:53].

However, in his 1938 "List of Heiaus and Sites," the name Kaniomoku appears as "an ancient heiau and alleged place of refuge" (Thrum 1938:129).

KUKUIPOKA, WAIHE'E

This is listed by Thrum (1909b:48; 1938:130) as a place of refuge for West Maui and also a heiau. Kamakau (1870a) lists it as a land belonging to the god Kūka'ilimoku, and having been made a pu'uhonua for Kahukuloa, Maui.

LAHAINA, WEST MAUI

Pogue (1858:21) listed Lahaina as one of the pu'uhonua of Maui where men were free when they entered it.

LANAKILA, KA'ALAE, HANA

Thrum (1917:54) reported that Lanakila was a medium-sized heiau which afforded refuge in time of war.

OLOWALU, WEST MAUI

Pogue (1858:21) listed Olowalu as a pu'uhonua on Maui, where men were free when they entered.

PO'AIWA, PO'AIWA, WAI'EHU

Po'aiwa was reported by Thrum (1918:126) as a pu'uhonua and heiau.

POLI-POLI, NAPOKO

A land division under the protection of the god Kūka'ilimoku which was made a land of refuge by express declaration of Kamehameha I (Kamakau 1870a).

PO'OPU'UPA'A, WAIHE'E

Pogue (1858:21) listed Po'opu'upa'a as a pu'uhonua where men were free when they entered.

PU'UNAU (PAUNAU), LAHAINA

Pu'unau was named by Kamakau (1870a) as one of Ka'ahumanu's lands made a pu'uhonua by Kamehameha I.

WAIPUKUA, WAIHE'E

Waipukua was listed by Kamakau (1870a) as one of the lands of Ka'ahumanu made a pu'uhonua by Kamehameha I.

ISLAND OF LĀNA'I

HALULU, KAUNOLŪ, KEĀLIA

The most imposing ruin on Lāna'i stands upon the west bank of Kaunolū valley, 200 ft from the sea. It is the heiau and place of refuge named Halulu, which was still in use sometime between 1778 and 1810, when Kamehameha I was in the habit of visiting Kaunolū (Emory 1924:62). Thrum (1909a:41) gave the name of this pu'uhonua as Kaunolū, at Keālia, and mentioned the name of the priest in charge as being Papalua.

ISLAND OF MOLOKA'I

KAHO'ONOHO, MOANUI VALLEY, APUHI PŌHAKUPILI, KONA

Here, it was reported to Thrum (1909a:54), a very important chief was buried. His bones were safe because this heiau was "a temple of refuge and

tabu." Stokes (Ms.b) states that a heiau in Moanui Valley which corresponds in measurements to the one Thrum described as being Kaho'onoho should be called Kakahaku. Stokes makes no mention that this was a pu'uhonua. He also placed a heiau named Kaho'onoho in the land of Pohakupili (five lands distant from Moanui Valley). He reported that this was very small in size, but that its placement on a promontory and the size of its retaining wall would indicate its importance.

KĀ'ILĪ, HĀLAWA VALLEY, KO'OLĀU

Stokes (Ms.b) notes the Pu'uhonua of Kā'ili, but he did not visit the location. Keola (1893) in identifying Kā'ili pointed to the site which he located at the foot of a steep pali.

KALANIKĀULA, KEŌPUKALOA, KONA

This is a sacred kukui nut tree grove named after a powerful priest (kahuna). "Here fugitives sought and received refuge and sanctuary" (Cooke 1949:153). There is doubt whether this grove of trees was a pu'uhonua in the same sense that Hōnaunau was, but it may have functioned in this capacity because Lanikāula was a very famous and venerated kahuna with a great reputation as a prophet and counsellor. It well may have been that he was powerful enough to give refuge and sanctuary to fugitives.

KALUA'AHU, KONA

When Kamehameha attacked Moloka'i and killed many of the people, those who fled to the land of Kalua'aha escaped death. Kamakau (1870a) states that this land was designated as a pu'uhonua by Kamehameha I because it belonged to his favorite wife, Ka'ahumanu. Anyone who fled to this land could escape punishment and death (Pogue 1858:21).

KAWELA, KONA (On the boundary between Kamalō and Kapulei, Kawela Gulch)

Cooke (1949:111) stated that this was a pu'uhonua, and then he described its similarities to a fortification. Phelps states,

...all could point as well to its having been a heiau as a fort. It is true that his place at Kawela was a natural defense position; but so, indeed, was practically any ridge on Moloka'i. On

the whole I feel that it had served, probably successively, both functions. Originally a heiau, at one time it happened to be used as a position of defense or a refuge and thus acquired its designation by local tradition [Phelps Ms.:Site 34].

KUKAUA, KAWAIILOA, PELEKUNU VALLEY, KO'OLAU

Stokes (Ms.b) wrote that although this was called a pu'uhonua by local residents, it distinctly had the appearance of a fort, and that its name Kukaua was a corruption of the word pu'ukaua, a fort.

MAPULEHU, KONA (Adjoining land of Kalua'aha)

This land was declared to be a land of refuge by Kamehameha I because it had belonged to his favorite wife, Ka'ahumanu (Pogue 1858:21).

OLOKU'I, BETWEEN PELEKUNU AND WAILAU VALLEYS, KO'OLAU

Oloku'i was identified as a pu'uhonua by Pogue (1858:21), and located north of Pelekunu Valley. This is the location where Moloka'i men sought refuge from invading Maui warriors. The Moloka'i people climbed this hill to escape from the enemy, and, upon being pursued, they rolled stones down on their enemies, thus saving themselves.

PĀKU'I, BETWEEN 'UALAPU'E AND MANAWAI, KONA

Thrum (1909a:40) listed Pāku'i as being a heiau of pu'uhonua character, but his "Complete List of Heiaus and Sites," in 1938, mentions no pu'uhonua for the island of Moloka'i.

PU'UALI'I, ELIALI'I, WAILAU VALLEY, KO'OLAU

Although this was termed a pu'uhonua, Stokes (Ms.b) comments that when he visited the site he felt the situation suggested merely a heiau rather than a pu'uhonua.

ISLAND OF O'AHU

HAUNUNĀNIHO, WAIMĀNALO, KO'OLAUPOKO

A small hill said to have been famous in olden days as a place of refuge, and recognized by all chiefs (McAllister 1933:18, 191).

KAILUA, KO'OLAUPOKO

Kailua is a large area of land which was considered sacred and a land of refuge (Kamakau 1870a).

KAWALUNA, WAOLANI, NU'UANU VALLEY, KONA

Fornander (1880:280) connects this heiau with Kualii'i, a high born chief from Kailua. Kamakau (1865) said: "The sore-eyed are at Waolani, the crippled are at Waolani, the lame are at Waolani, the bald-headed are at Waolani, the humpbacked are at Waolani." Alexander (1891:45) goes further and says, "Waolani was sacred to fugitives and the sick." Tucker (Ms.) carries it a little further and says that this was a pu'uhonua for the sick and infirm, and he also gives an expression which was used by older Hawaiians in his day, "Kela Kanaka o Waolani" (That Man of Waolani), which was a phrase of derision and contempt for one who is crippled. This heiau was thought to have been back of the O'ahu Country Club, but the exact site is not known today.

KAWIWI, WAI'ANAE

Kamakau (1870a) reported this to be a place of refuge in time of war, and further stated that it was not like Hōnaunau. It is not connected with a heiau, but is more like an extremely inaccessible mountain retreat.*

KUALOA, KO'OLAUPOKO

This is a land which was considered a very sacred place and a true place of refuge where a man condemned to die was saved if he entered it (Kamakau 1870a). Exactly why this was considered sacred land is not known for certain. It may have been that a very high-ranking chief or chiefess resided there at one time, and the land thus assumed a sanctity. Some opinions hold, however, that "tapu land was not necessarily a place of refuge" (McAllister 1933:18). It should be pointed out that on this land was located the pu'uhonua of Puakea, which may have some bearing on the fact that the land itself was sacred (McAllister 1933:16B-170).

LĀ'IE, KO'OLAULOA

McAllister (1933:18, 157) was told by several Hawaiians living at Lā'ie that this land was formerly an ancient pu'uhonua. Pogue (Ms.:31) also stated that Lā'ie was an ancient place of refuge, and that the boundary on the Kahana side was called Pa-pa'a-koko (Fence that held the blood).

*cf. I'i (1858:97), in text he called it a pu'u kawa, translated as "stronghold." (DB)

PUAKEA, HAKIPU'U, KUALOA, KO'OLAUPOKO

"This is a large three terraced heiau, still in existence; an ancient place of refuge to which is coupled the name of Kaopulupulu as the supervising priest" (Thrum 1909a:42). However, in his "Complete List of Heiaus and Sites" in 1938, Thrum did not mention any as pu'uhonua for O'ahu. McAllister (1933:168-170), following Thrum, names Puakea as a pu'uhonua.

WAIKANE, KO'OLAUPOKO

A land division named by Kamakau (1870a) as sacred and also a refuge.

ISLAND OF KAUA'I

HAUOLA, HO'EA VALLEY, WALAWA, KONA

Rice (1923:45) said that "Ola sent the Menebune to build a heiau at the mouth of the Wailua River, which was to be called Hauola, after the famous city of refuge of his father at Kekaha." If this information can be relied upon, then it may be that the heiau Hauola is the place of refuge at Kekaha referred to by Kamakau (1870a).^{*} Because Hauola does not conform to the long, narrow shape of two other pu'uhonua on Kaua'i and one on Ni'ihau, Bennett (1931:49) feels that it may not have been a pu'uhonua. Thrum (1907:83) does not mention this as a pu'uhonua.

HIKINA'AKALĀ, WAILUA-KAI, PUNA

Dickey (1916:15) claimed the name of this ancient pu'uhonua to be Hauola. He located it a little east of the mouth of the Wailua River, and on its south side. "Here," he explained, "a murderer or one liable to death because of violating a kapu might flee from the pursuer and be safe. The gates were always open to the fugitive, who could rush in, thank the principal idol for safety and after remaining within the walls a few days, be immune and leave..." (Dickey 1916:15). The actual heiau of Hikina'akalā he located in the southeastern part of this place of refuge.

Thrum (1924:34) dubbed it "long-fellow" because of its shape; 395 ft in length, 50 ft in width at the rear, and 80 ft in front. Some of the walls measured by Thrum were 6 ft high, 11 ft thick, and constructed of heavy stones. He also noted the ruins of another structure at Waimea [nearly at the opposite side of the island] of the same name, but he expressed some doubt as to whether the one at Waimea was truly a pu'uhonua. Pogue (1858:21) stated

^{*}Kamakau says "Kekaha ko Mana--Kekaha for Mana," not at. (DB)

that this pu'uhonua was for the use of the districts of Puna, Ko'olau, Ha'aleleā, and Nēpali.

HIKINA'AKALĀ, WAIMEA, KONA

Thrum (1907:39) located this pu'uhonua in Waimea Village, but he added that while "some report it as a place of refuge...others assert that the crossing of the river [Waimea River] to Makaweli was the only pu'uhonua in this section of ancient Kauai."

KEKAHA, KONA

Kekaha was said by Kamakau (1870a) to have been the place of refuge for the land of Mānā. Whether this refers to a particular site or to the entire area known as Kekaha is not known.

KEONEKAPU-A-KAHAMALU'IHI, WAIMEA, KONA

Kamakau (1870a) states that in the time of Kahamalu'ihi this was the place of refuge on Kaua'i for the district of Waimea. The exact site has not been identified. Fogue (1858:21) mentions this pu'uhonua as the place of refuge for Waimea, Mānā, and the lands adjoining Kona.

PUNOUNOŪ

Bennett (1931:49, 131) mentioned that this structure was considered by native informants as a place of refuge which is located on top of the hill mapped as "Puu Auau." The structure itself has been completely demolished, and the hill planted in pineapples.

WAIKALUA, KĪLAUEA, KO'OLAU

Thrum (1912:41-42) says some people referred to this structure as an ancient pu'uhonua, but there is nothing definite about their information. The heiau is located on a bluff overlooking the ocean at about 1,000 ft elevation.

WAILUA, PUNA

Named by Kamakau (1870a) as the place of refuge for the entire Puna districts on Kaua'i. It could be that he referred to the famous pu'uhonua of Wailua, Hikina'akalā.

ISLAND OF NI'HAU

KIHAWAHINE, PALI KOAE, LEHUA

Thrum (1907:43) included this structure in his list of heiau as a pu'uhonua. It was built in the long, narrow style of the pu'uhonua of Hikina'akalā at Wailua-kai, Kaua'i, and the one of the same name at Waimea, Kaua'i.

ARCHAEOLOGICAL FEATURES OF THE PU'UHONUA AREA

J. F. G. Stokes

THE GREAT PU'UHONUA WALLDIMENSIONS OF THE WALL

The east wall is now 623 ft long, and varies in width at the base from 23 ft on the north to 17 ft on the south, and in height from 8 to 12 ft, due partly but not entirely to the undulation of the ground. The south wall is 365 ft long, with an average width of 16 ft, and a height comparable to that of the east wall.

Ellis (1917:120) in 1823 measured the enclosure, and by including the platform supporting the House of Keawe, obtained a distance of 715 ft for the long side, and 404 for the short side. He gave the height of the walls as 12 ft, and the thickness as 15 ft. Lyman (Ms.:Dec. 2, 1848), after his visit in 1846 states that they had measured the wall "from the entrance at the south end of the platform of the house, and found the east side to be 600 feet and the southern 400." From Lyman's plan (Fig. 9.1) it is evident that this 600 ft measurement was from the entrance through the east wall at that time, as he gives the width of the house platform as only 50 ft. Hitchcock, in 1889 (Fig. 9.3), obtained a length of 697 ft by including the house platform. By this time, a great tidal wave had torn away some of the platform. Hitchcock gives the length of the south wall as 400 ft, mentioning that an extension of it was "waved washed away." This south wall can be traced for 90 ft beyond its present end, through the occurrence of the base of a cross-wall, making its original length at some time at least 460 ft. It probably once extended out on Paniau flat to as far as the sea, except perhaps for an opening. The western border of Paniau flat, in its higher position in relation to the land to the south, forms a natural boundary.

The photograph taken in 1889 of the middle part of the outer face of the north wall* (Fig. 13.1), when compared with one from the same point of view taken in 1919 (Fig. 13.2), shows that in the reconstruction, perhaps a foot or 2 ft in height of the original wall has been lost in this section.

Where the walls cross sand beds or sinks floored with muck, there had been some collapses, as shown in the photo of 1889 (see Fig. 13.20). Those who worked on the 1902 reconstruction reported breaks at the depressions 100 and 180 ft, respectively, north of the southeast corner.

*Should read "east wall." (DB)



Fig. 13.1. WALL OF PU'UHONUA AT HŌNAUNAU. Exterior face of middle portion. Photo taken in 1889 by W. T. Brigham. BPBM Neg. No. 1486.



Fig. 13.2. WALL OF PU'UHONUA AT HŌNAUNAU IN 1919. Exterior face of middle portion of great east wall. BPBM Neg. No. 3472.

(Note by K. P. Emory: The present termination of the north wall* was arbitrarily set in the 1902 construction, and the 3 ft bench, along its north face, and the indentation, 5 ft wide and 7 ft deep, have been put in as an accommodation to those who wish to climb to the top of the wall. If Ellis' measurements and estimates were accurate, and there is no reason to suppose they were not, the wall extended another 5 ft north in his time. Remarkable is the fact that the continuation of the outer face of the great wall was found, upon removal by Stokes of stones (Fig. 13.3), to continue through the present platform of the Hale o Keawe at what is now the front of the second terrace, approaching from the north, and there is every indication that the south face of the great wall extended through this platform also, because the present path into the enclosure will be observed at this point to rise in order to pass over large, deeply embedded stones, and on the opposite side of the platform, stones embedded in the sand are nearly in line, and in between Stokes was able to trace the facing part way. Stokes has noted also several very large boulders extending in a line with the east face of the great wall out towards the point of the 'Akahipapa flat, suggesting that the wall at one time may have extended that far. However that may be, it is certain that the great wall, at some time in the past, extended as far as the water's edge. When the platform of Hale o Keawe was installed, the base of this wall was incorporated into it. The shelf nearly 3 ft wide and 2 ft high, which runs at present along the outside of the east wall from the entrance southward to the wall crossing the ponds, has been added since 1919. It obscures the great size of some of the foundation blocks.)

The irregular course of the great wall may have been due to poor planning, but some of the turnings may be explained by the desire to avoid a spring on one side and a fishpond on the other.

Such was the destruction of the south wall by tidal waves that in 1902 over 100 ft of the west end was restored, but in the restoration the wall was swung slightly to the north of the original line, as revealed by the trench we dug (Fig. 13.4).

(Note by K. P. Emory. A break in the east wall, close to the north end and 600 ft from the south end, for the entrance into the enclosure, was made prior to 1846, as shown on Lyman's sketch (Fig. 9.1). This may even have been an original

*Should read "east wall." (DB)

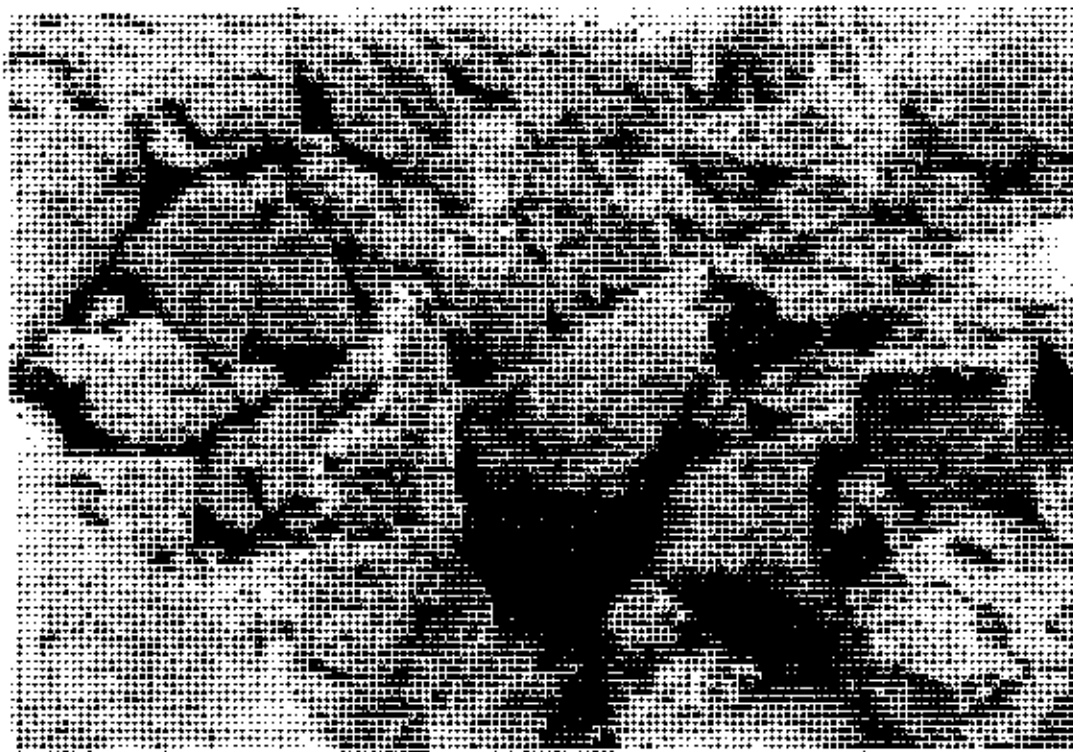


Fig. 13.3. BASE STONE IN A CONTINUATION OF THE GREAT WALL. Stones removed from back of the present lowest terrace at Hale o Keawe revealed this large stone. Photo taken c. 1919. BPBM Neg. No. 2069.

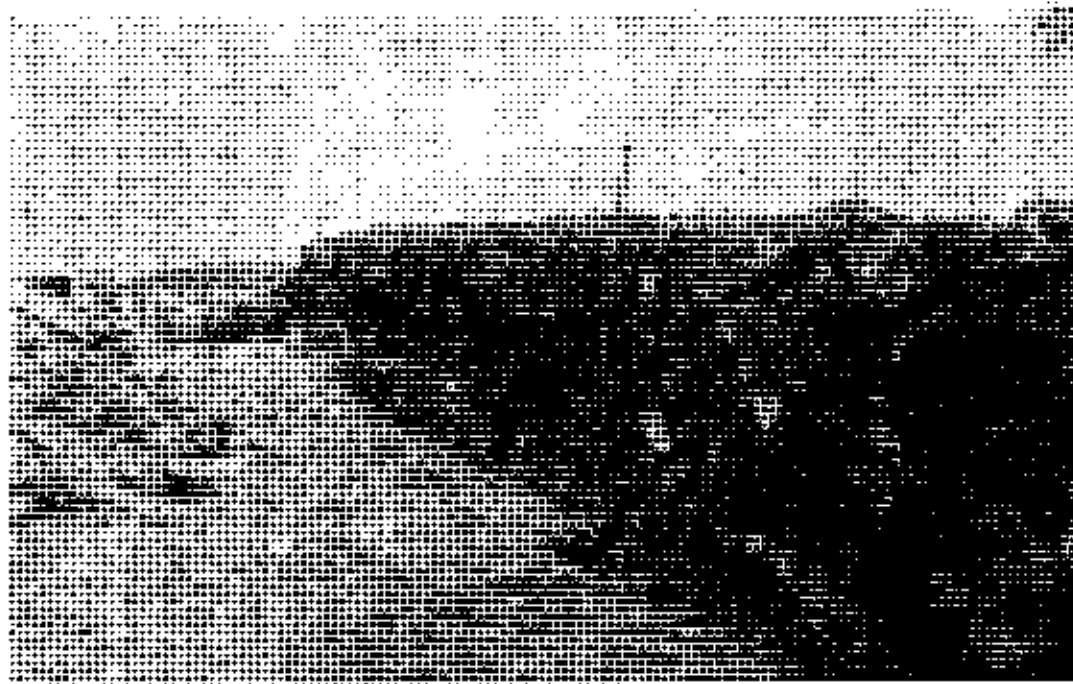


Fig. 13.4. EXTERIOR FACE OF WEST END OF SOUTH WALL OF PU'UHQNUA, SHOWING BASE STONES OF ORIGINAL FACING AND DEFLECTION OF RECONSTRUCTED WALL NORTHWARD. Photo taken c. 1919. BPBM Neg. No. 3489.

entrance, as Ellis (1917:127) says: "This [Pu'uhonua] had several wide entrances, some on the side next the sea, others facing the mountains." It is noteworthy that just north of this point of break were observed in 1919 the foundation stones of a wall, and south of it a rough, low, modern wall extended southward (see dotted lines on map*), and which had functioned as a goat or cattle pen, according to information obtained at the time. This wall on the south was probably part of the wall of the goat pen indicated on Lyman's map of 1846 (Fig. 9.1.)

CONSTRUCTION OF THE GREAT WALL

As in all Hawaiian masonry, the stones are dry laid, but fitted together in the facing with more than usual care, a flat side exposed in the facing. The east wall is faced for a distance of 175 ft from the north end with sea-worn or weathered slabs and blocks, many of large size and placed on edge or on end (Fig. 13.5). The largest stone is in the outer facing 115 ft from the north end. It measured 6.5 ft high, 5.3 ft wide, and 2.0 ft thick (Fig. 13.6). The continuation of the east wall southward, and the south wall, are faced with smaller stones which are not sea-worn or weathered.



Fig. 13.5. INTERIOR FACE OF GREAT EAST WALL, NEAR THE NORTH END.
The man is pointing to a spot where a conch trumpet had been hidden.
Photo taken c. 1919. BPBM Neg. No. 3489.

*The 1957 manuscript did not specify which map is being referred to here, but it could have been Map 1.



Fig. 13.6. LARGEST STONE IN THE GREAT PU'UHONUA WALL. Exterior face, near north end. Photo taken c. 1919. BPBM Neg. No. 3471.

In erecting the wall it should be noted that a firm base was not prepared by the removal of soft material down to bedrock. For the greater part of the route, the base stones rested on lava which was undoubtedly bare when the walls were laid up. The portions of the walls which were found collapsed when the reconstruction of 1802 was commenced were those which rested on soft ground. In trenching along the outside of the east wall it was found that for 47 ft from the north end, the base stones rested on sand. The full depth of sand was not ascertained, as in spite of bracing, the reconstructed wall collapsed during the operation. However, at one point a measurement had been taken, and it was found that the base of the wall was 2 ft below the present sand level and 2 ft above the bottom of the trench. On the opposite side, at the corner, the sand was 2 ft deep, and the wall base 1 ft above the lava bed (Figs. 13.4 and 13.7). Base stones in the south wall of that portion described as a niche to the west of Hale o Papa, rested on 3 in. of sand on one side of the wall and on 1 ft of sand on the other. The lava bed is low here. Near the end of the traceable continuation of the south wall, also where the lava dips, other base stones were found resting on sand.



Fig. 13.7. TRENCH ALONG EXTERIOR FACE OF GREAT EAST WALL, NEAR THE NORTH END, SHOWING FOUNDATION STONES LAID ON SAND. Photo taken c. 1918. BPBM Neg. No. 3473.

A remarkable feature of the construction was revealed at places where the interior of the wall had been exposed by collapses or removal of stones. This was a labor and material savings, hollow construction for many stretches of fill, known to the local Hawaiians as pao (caverned) construction, and accomplished by laying lava slabs or columns across spaced walls or upright piers or columns, and having several tiers of these. Figure 13.8 represents a diagrammatic cross section of the great south wall, and Figure 13.9 shows how such work proceeded, in a theoretical extension of the end of the south wall, demonstrated by Hawaiian workmen. This type of construction has been observed nowhere else in the Hawaiian Islands except at Hōnaunau, and in the heiau platform of Alahaka, 1/2 mi to the south, in Kōōkea land section. It takes advantage of the local lava beds and the way they are, or can be, broken up.

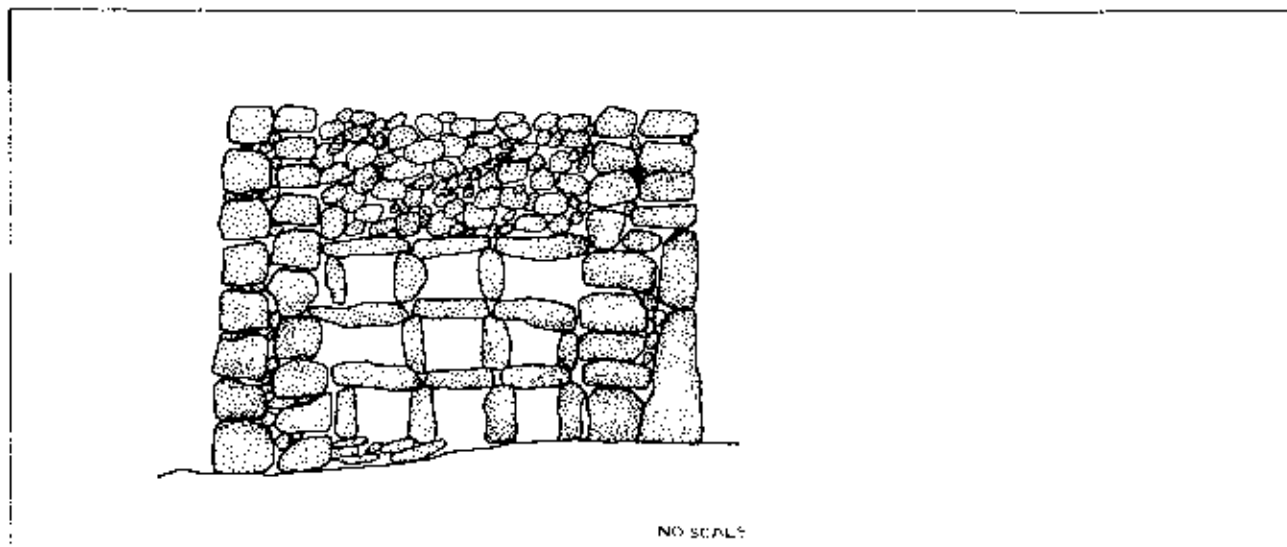


Fig. 13.6. SCHEMATIC CROSS SECTION OF GREAT WALL OF PU'UHONUA, SHOWING OPEN PAO CONSTRUCTION.



Fig. 13.9. TECHNIQUE USED IN CONSTRUCTION OF THE GREAT WALL AT HŌNAUNAU. Demonstration by Hawaiian workmen in 1919 for a theoretical extension of the end of the south wall. Such hollow fill is known as pao construction. Three tiers bridge the space between an outer and inner retaining wall of the great wall. BPBM Neg. No. 28611.

Two parallel walls, 3 to 3.5 ft wide and 8 ft apart, were erected in this reconstruction, and as they went up the space between was filled in with the pao construction. The side retaining walls were carefully faced within and without, but the largest and best stones were set in what would become the outside face of the great wall. Between the two retaining walls, and at right angles to them, stone piers were set up (hō'okū) some 2 ft apart to receive stone slabs laid horizontally (hō'omoe) between them. Another row of piers was set up parallel to the first, and some 2 ft from it, and stone beams laid across this also. The space between the first and second row was bridged by stone beams laid at right angles to the other beams, across from pier to pier, or with their ends resting on the other beams. Small stones were wedged in between the horizontal, and the surface filled in and levelled off with small stones forming a rough pavement (kīdapa). After a section of this fill construction had been completed, an upper deck of the same construction was commenced, and so on until three tiers had been erected. Then the remaining space between the retaining walls would be filled in roughly, and the top levelled off in a pavement.

Some of the supporting piers were made up of several stone blocks placed one on top the other, but most of them were simply single basaltic columns set on end. Some horizontal pieces rested on indentations of the inner face of the retaining walls.

Breaks in the middle portion of the exterior face of the south wall, revealed in 1918 glimpses of the pao construction (Figs. 13.10 and 13.11). In Figure 13.10, a second tier is exposed. On entering this cavity to observe the structure, eight sets of columns could be observed westward, as far as could be seen in the dim light. It happens that the pier on the left showing in this photograph is made up of four stones placed one on top the other, but the other piers were one-piece columns. A break in the wall a little north of the last, gives glimpses of three tiers of pao construction (see Fig. 13.26).

The pao construction is obviously a technique developed from the stone chambers or vaults to be seen in house and burial platforms, where a row of slabs set a foot or two apart are bridged over with slabs.

The pao construction was not found for the full length of the south wall. At intervals it changed to ordinary fill of rough stones, a construction known as hakahaka (vacant spaces), a term applied when stones were placed angularly to each other in order to fill space with little labor. Before the pao construction could be resumed, it was necessary to face this fill. It was evident that the builders would first select from among the stones brought to them those most suited for pao construction, and that when these had been used up, the odd-shaped stones were then piled in the hakahaka manner, and the section they were working upon finished off with a cross-facing.

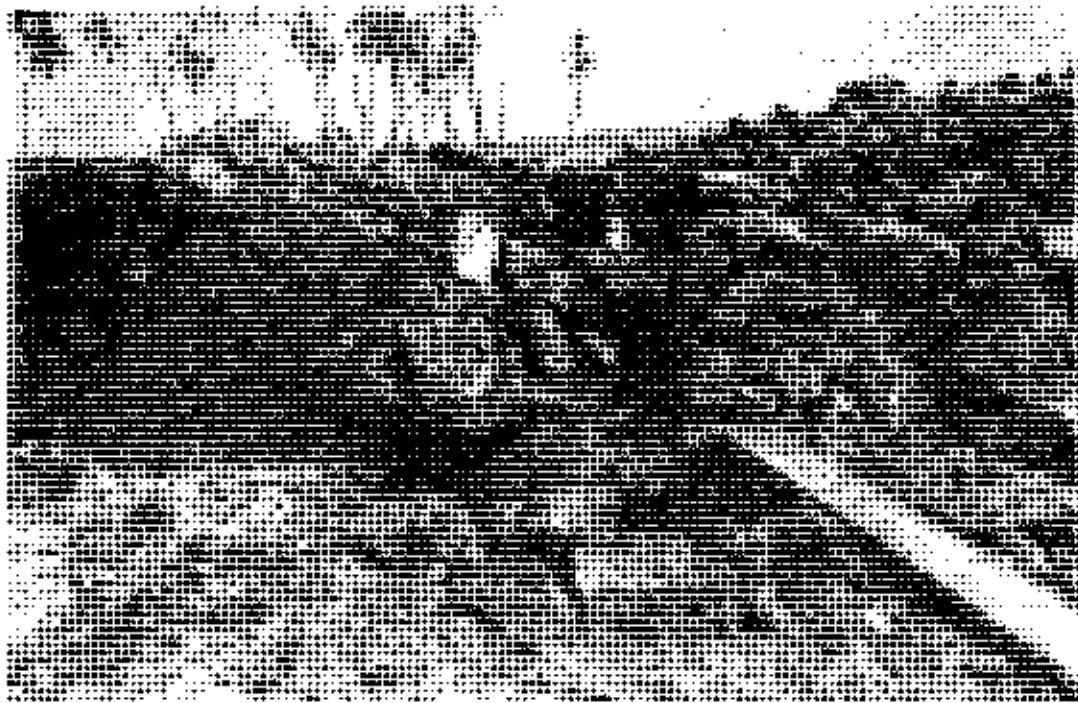


Fig. 13.10. A SECOND TIER OF PAO, REVEALED IN BREAK IN THE EXTERIOR FACE OF THE MIDDLE PORTION OF THE GREAT SOUTH WALL OF THE PUNUHONUA. First break to the north. Photo taken c. 1919. BPBM Neg. No. 3484.

The portions of the wall where the cross-facings were present seemed to have been the weakest. The wall collapsed at three places as the sand was being removed from along side the base. In two of the three, the break occurred at the cross-facing, while the third revealed a filling of bakahaka construction.

This cross-facing, extending upward to the top of the wall, was found in many places. Twenty-seven sections were thus marked off, varying in length from 20 to 65 ft. Could the walls have been examined in its original condition or before it was resurfaced in 1902, it would probably have been found that the sections were twice as numerous, and that they ranged in length from 10 to 25 ft. Where observed, they are so marked on the plan,* with the direction of the facing indicated. The directions of these facings reveal that the wall was built in sections. When in a section both ends are faced, that section must have been finished as a unit before the adjacent sections were added. When a section has not been faced at either end, it is clear that it was put in between the adjacent sections, and afterwards, the southwest corner was completed and faced on the north and west before the adjacent sections were ordered. Ellis stated that in 1823 "holes were visible in the top of the wall where large images had formerly stood, about four rods (22ft)

*The 1957 manuscript did not specify which plan is being referred to here, but it could have been Map 1.



Fig. 13.11. THREE TIERS OF PAO, REVEALED IN COLLAPSES IN EXTERIOR FACE OF MIDDLE PORTION OF GREAT SOUTH WALL OF THE PU'UHONUA. Second break to the north. Photo taken c. 1919. BPBM Neg. No. 3482.

apart throughout its whole extent." No holes were noted in 1902, but if they did originally exist in Ellis' time, it would seem that one image was placed in each section of wall.

If the southeast corner of the great wall is examined, it will be noticed that the corner section was completed and faced on the north and west. Adjoining the west facing, another section was added and faced. Then follows a section without facing, indicating that workers on the wall to the west of this section had completed their portion of the wall, facing it with a cross-wall, and then this section of the wall without end facings had been added. Now, proceeding northward from the corner of the great wall, one may observe that a short section of wall had been added to connect with a portion of the wall already built. Four more sections to the north is one section which had been faced at both ends. These three sections to the south of this section faced at both ends, are all faced on the south, while on the north is one section faced on the north and then a section filled in to connect with a south-faced section to its north. Here we seem to have a unit of construction, the initial point or section being the section of wall faced at both ends. One section was added on the north, three on the south, before sections were added to connect with a unit completed on the north and with the corner on the south. More to the north and the west of the portions of the great wall described, the sections identified are longer, but this is probably

due to the intermediate lines of demarkation being obliterated on the surface. Our examination, as far as it goes, brings out a probability that there were at least seven units of construction, or seven groups of workmen engaged in building these walls, and that the groups worked simultaneously. In this connection, what my Hawaiian informants said about the building of the wall by the men impressed for the work from the ahupua'a land sections extending 4 mi to the north and 5 to the south, is highly interesting and seems probably true. The number of ahupua'a land-sections within these miles is nine. With such a labor force working simultaneously, it does not seem impossible for the great wall to have been erected in five days, each of the nine or so groups erecting a section in a day.

SOURCE OF THE STONES

A native account is to the effect that the stones were brought from Paumoa and Alahaka in the adjoining Kēōkea ahupua'a to the south. This statement may be correct in part, as the lava breaks up readily into columns in that locality, as at Hōnaunau. The greater part of the material, however, was without doubt gathered from nearer sources. In the vicinity of the pu'uhonua the surface of the lava is broken in many places. Depressions of one or more feet in depth are common, and these have had their edges broken in a way which does not suggest weathering alone. There are very few loose stones in the vicinity of such places, and so there is little doubt that they served as primitive quarries.

THE ANCIENT HEIAU PLATFORMS

DIMENSIONS

West of 'Āle'ale'a heiau lay a vast heap of loose rocks, stones, and pebbles in a trilobed area indicated by dotted lines on the plan (Figs. 13.12 and 13.13). The heap extends over an area having a maximum width of 175 ft and length of 325 ft. The form of the pile suggested the effects of successive tidal waves coming from the southwest and the northwest.

Ellis (1917:128) mentions that within the pu'uhonua "were three large heiaus, two of which were considerably demolished, while the other was nearly entire." As the well-preserved one, through the measurements given by Ellis, is the 'Āle'ale'a platform, the two "considerably demolished" ones must have been situated in the area of the great heap of stones. Since Ellis' time, the ruins would have been subjected to at least two tidal waves.*

*There have been several interpretations of Ellis' meaning. (DB)

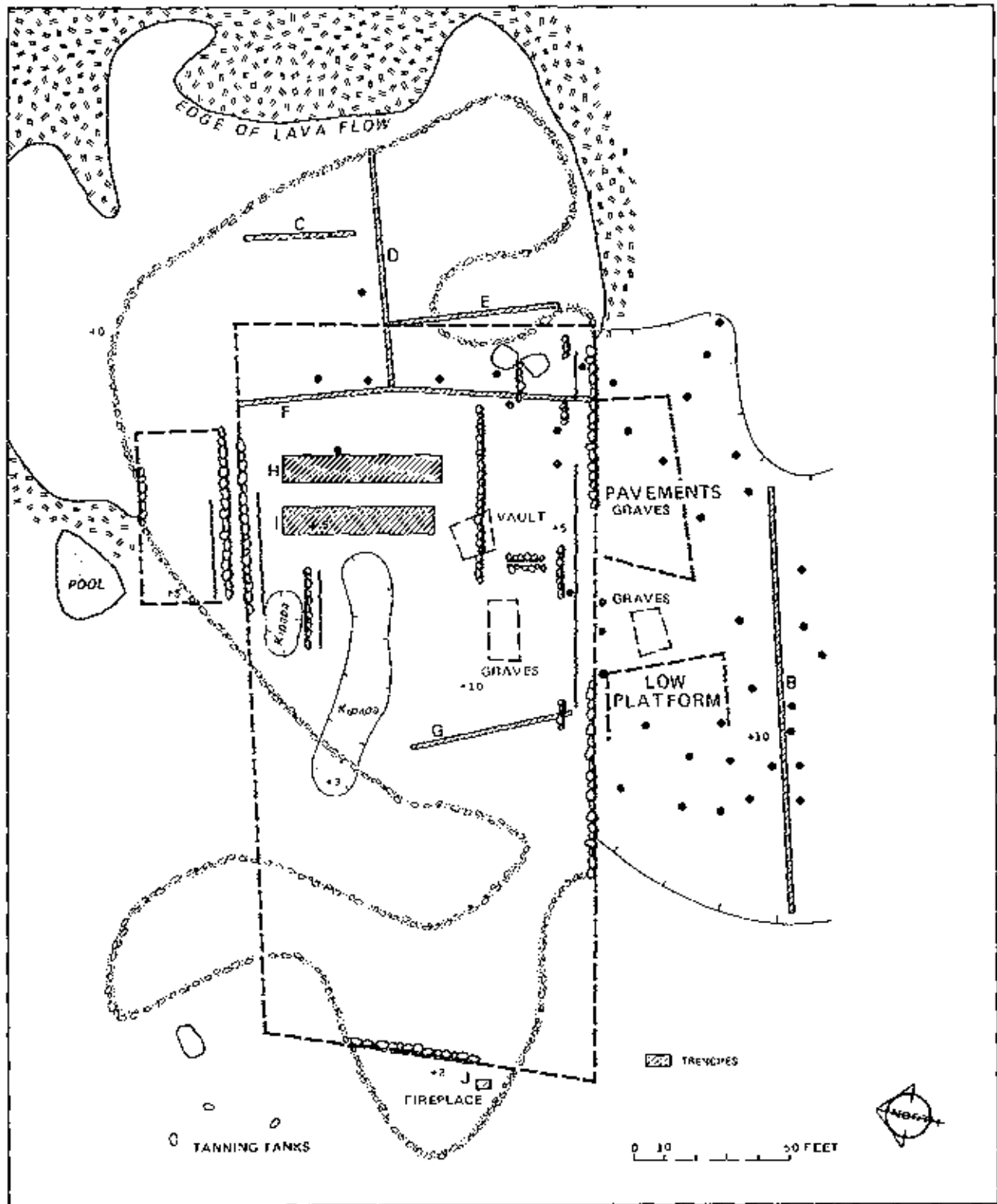


Fig. 13.12. PLAN OF RUINS OF OLD HEIAU WITHIN THE PU'UHONUA AT HŌNAUNAU. (B-I) trenches made in 1919 to determine structure of ruins and underlying ground; (J) ancient stone-lined fireplace; (+ numbers) heights above mean sea level; (*) coconut trees.



Fig. 13.13. RUINS OF OLD HEIAU PLATFORM WITHIN THE PU'UHONUA AT HŌNAUNAU. View looking south. Photo date unknown. BPBM Neg. No. 3457.

Without doubt, also, stones were taken from this area for the construction of 'Ale'ale'a platform. Disturbances of a later date have added to the general disarrangement. Tombs have been built on the site and to the south, the stones for which seem to have been taken from the mound. Damage too has been caused by treasure seekers, tearing up the pavements.

Following out of alignments of facings has resulted in determining that at least one massive platform, about 110 ft by 320 ft, its long axis east and west, stood here, and probably a small platform just to the north, 28 ft wide and 60 or more ft long. The plan (Fig. 13.12) shows by dotted lines the areas where trenches were put through in the effort to determine the shape and construction of the original structures which had been erected here.

The western lobe of the area is composed of the largest stones, held in place partly by their own weight on the bare lava, but mostly by being cemented by lime in the sand on which they stood. The smaller rocks and stones have generally been sifted out and carried by the sea to the main heap, the northern borders of which are lined with loose rocks. The small eastern lobe is almost entirely composed of small and large pebbles. The surface stones are generally rounded, as though sea worn or weathered, in strong contrast to the sharp-edged stones which were found beneath.

The middle portion was the highest, where it is marked with an elevation of 9.32 ft above mean tide. The contour of the heap inclines sharply on the west, but declines gradually to the east. The lava bed generally dipped slightly to a longitudinal middle line, and was highest on the south side.

A close examination revealed on the north and west a few lines of stones still standing in position, and on the south the tops of a line of stones partly under the sand. From these may be picked out the lines of the original north, west, and south walls of a platform similar to 'Āle'ale'a, but larger.

The west wall was very distinct for part of the way. The lava bed dips here, and has filled with lime sand which has become mortar-like in consistency, due perhaps to the presence of fresh water. Some of the massive facing stones of the first course have been held in place by this inert sand. Digging beyond this line to pick up other lines proved profitless.

The eastern wall could not be found. In trenching through the heap to find it (trench D), the loose stones were followed down for 4 ft, and loose free sand for another 5. Bottom was not reached for the whole length, as seeping water filled the trench and caused it to collapse. The sand was generally free of stones, and there were none in place indicating walls. At the juncture of trenches D and E, the eastern edge of a level portion of lava was met with, and a few small stones in line here suggested the wall. Further investigation showed that the line was accidental. A beginning of the wall might have been suggested by the presence of two boulders near the southwest corner. They measure about 7 by 9 ft in plan, and are 3 ft thick. However, their sides are so very rounded that they would be unsuitable for wall building. They are so weathered in appearance, unlike the stones in the vicinity, that they probably antedate the time of pu'uhonua by many centuries. In all the debris on this northeast side, the large facing stones were absent. We may conclude that the wall ran on the lava to the west of trench E, and that after this heiau platform was damaged by some tidal wave and abandoned, many of its stones were taken to build the more recent 'Āle'ale'a. The absence of support on the east may well explain the peculiar flow of stones in that direction.

The trenches F and G, dug to examine structural features and to pick up any parallel lines of stones running east and west, produced some results only towards the south. However, although the Hawaiian laborers employed had already become familiar with the hollow pao construction of the walls, and worked very carefully, the method was changed, and two picked men were set to work removing surface stones with their hands in order to expose the kīpapa, that is the pavings underneath which would show pao construction. A portion of kīpapa, in sight west of center, was followed to the east, and found to

undulate considerably and with an irregularity not in accord with the contour of the ground, and the height of the supporting piers found varied very much.

Two other parallel shallow trenches made in the same way through the middle of the heap along its shorter axis gave varying results. That on the west showed gap construction similar to what had been previously found. In the eastern trench, however, only loose stone was found, suggesting a general collapse of the east-central portion of the heap, rather than fill with rough stones.

The southern wall could be traced for a greater extent than any of the others. The eastern portion required but little excavation to reach bedrock. On the west, however, the sand had accumulated to a depth of 3 ft. On referring to the plan (Fig. 13.12) it may be observed that these two separated portions are not exactly in true line, a feature noticed also in 'Āle'ale'a and the great walls. This irregularity is not due to tidal wave action, as the corresponding inner wall continuing beyond the gap is straight.

In the plan, the principal face of the south wall, which must have been a retaining wall for the platform, is indicated by a thick line. The south wall is really composed of two parallel walls, as in the great pu'uhonua, and filled in between with loose stones. Alignment of base stones of facings show that each of these two retaining walls was faced on the inside as well as the outside. The thickness of the outer wall was 6 ft, a greater thickness than could be observed in the two parallel retaining walls of the great pu'uhonua wall.

Towards the eastern end there are stones suitable for facings, which are laid on the side instead of the edge. The western portion is faced with large slabs, as was the northern part of the great east pu'uhonua wall.

Figures 13.14 and 13.15 show the trench dug to reveal this south wall, and it may be seen that many of the larger facing slabs were found as they had fallen. In replacing them, it was ascertained that the original minimum height of the platform at this edge had been 4 ft above the immediate contour, but 10.36 ft above the datum point. One of the slabs had an even surface on one side, but a large bulge on the other. The latter had been worked down, as though to make it fit into line.

Another wall on the north, approximately parallel to the last and 3 to 4 ft away, is a single line of stones faced to the south. The space between walls was followed to the lava bed 1.5 ft below, but nothing was found to suggest an explanation of the proximity of the walls to each other. The single line of ho'onihō was not intended as the original southern boundary of the platform, as might be supposed, as it lacks the large facing slabs. It was without doubt intended as a bracing wall.

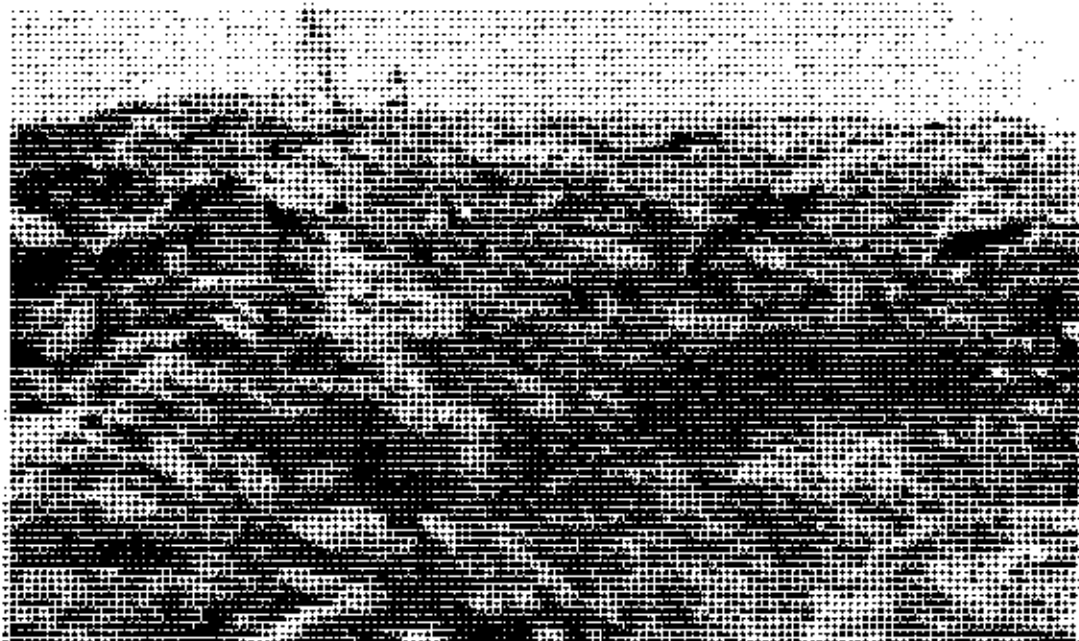


FIG. 11. 14. MAJOR SOUTH WALL OF PLATFORM, LOOKING WEST FROM MIDDLE. PHOTO TAKEN
c. 1919. BPBM Neg. No. 3461.

Another single-lined wall is 25 ft to the north, and faces to the south. It does not continue through the vault, but its line was picked up again to the west. Between it and the main south wall, and at right angles to both, are two short lines of wall base stones facing each other, and only 6 in. apart. (Note by K. P. Emory. Was this a section of a vault for hiding things?) Another short line facing to the north and parallel to the major axis of the platform may be noted towards the east. All this section is low, perhaps because it furnished the stones for the many graves on the south. It is difficult to explain the object of this wall except as a bracing wall, and for this purpose it would seem to be too light.

As has been mentioned, the filling-in of the middle section of the ruins is that of pao construction, which is traced to a short piece of wall apparently double-lined, and facing to the north. It probably did not continue to the east. The pao construction occurs again between the last mentioned stone line and another, parallel and further to the north. This is unquestionably double lined, and some of the stones in its northern line are slabs like the other exterior facings. It would be taken as the northern boundary of the platform, except that there are base stones of another double-lined wall parallel to it and only 4 ft to the north, with its principal face facing to the south. These walls are 5.5 ft wide. There is little filling between them which is very rough and quite unlike the laid pavement in the



Fig. 13.15. TRENCH REVEALING OUTER FACE ALIGNMENT OF BASE STONES OF SOUTH RETAINING WALL OF OLD HEIAU PLATFORM. Viewed from middle, looking east. Photo taken c. 1919. BPBM Neg. No. 3462

vicinity. Still more to the north is a short thick line of facing, many base stones of which are columns laid horizontally. Those would have been very suitable for *paq* construction, though somewhat longer than those found in this structure.

We might be inclined to regard the space between this and the last wall as part of a terrace lower than the main platform, but one of the large facing stones now inclined inward, yet with its base in position, would indicate the height of the wall here as at least 8.5 ft, so that we may conclude that here was another platform of equal height.

All the northern lines of base stones were held in place partly by paving and other stones which had become wedged in, and partly by sand which has sifted in between. The lava on which these stones rests is lower than the portion to the west from which loose material has been swept away.

'ĀLE'ĀLE'A HEIAUDIMENSIONS

The platform which is now known by this name is nearly rectangular in plan with walls varying from vertical to a slope of 1 in 20. Ellis (1917:128) states that it was nearly entire in 1823, and was "a compact pile of stones, laid up in a solid mass, 126 feet by 65 and ten feet high." These are almost exactly the present measurements, except that the height varies from 8 to 11 ft according to ground contour. The platform rests on a portion of the latest lava flow, which raises its base a few feet above its surroundings.

CONSTRUCTION

The walls of the original portions are faced with slabs set on edge (Figs. 13.16 and 13.17), weathered or sea worn as in the northern portion of the great east wall. Two of the facing stones had been worked down by pecking, both near the northeast corner. That on the north had undergone but little change, but that on the east (Fig. 13.17) had been reduced over almost its entire face. The edges, however, did not seem to have been worked. The north and east borders of the platform were both bent inward (see the plan on the map*), an unusual feature for a Hawaiian structure of this size.

The paō construction in the interior was of similar construction to that in the great walls, except running longitudinally through the middle was a double line of bracing walls.

RECONSTRUCTION

The restoration of 1902 consisted of rebuilding the whole of the western end and levelling off the paved surface, in addition to building steps in the southern wall for the convenience of visitors. Two of the workmen of 1902 volunteered the information that there had been a mound of stone on the surface of 'Āle'ale'a, near the middle of the eastern end. The situation of this mound corresponds with that of the stone base of the 'ānu'u or lananu'umamao, often termed the "oracle tower," the most important feature in a temple, and one which has been preserved on many temple sites.

'Āle'ale'a heiau is described today as having been a temple for pleasure, where the chiefs reclined and relaxed to look over the country or watch the hula. Its present rough surface was covered with smooth beach pebbles. Formerly, access to it was by means of a ladder of kauila wood which

*The 1957 manuscript did not specify which map is being referred to here, but it could have been Map 1.

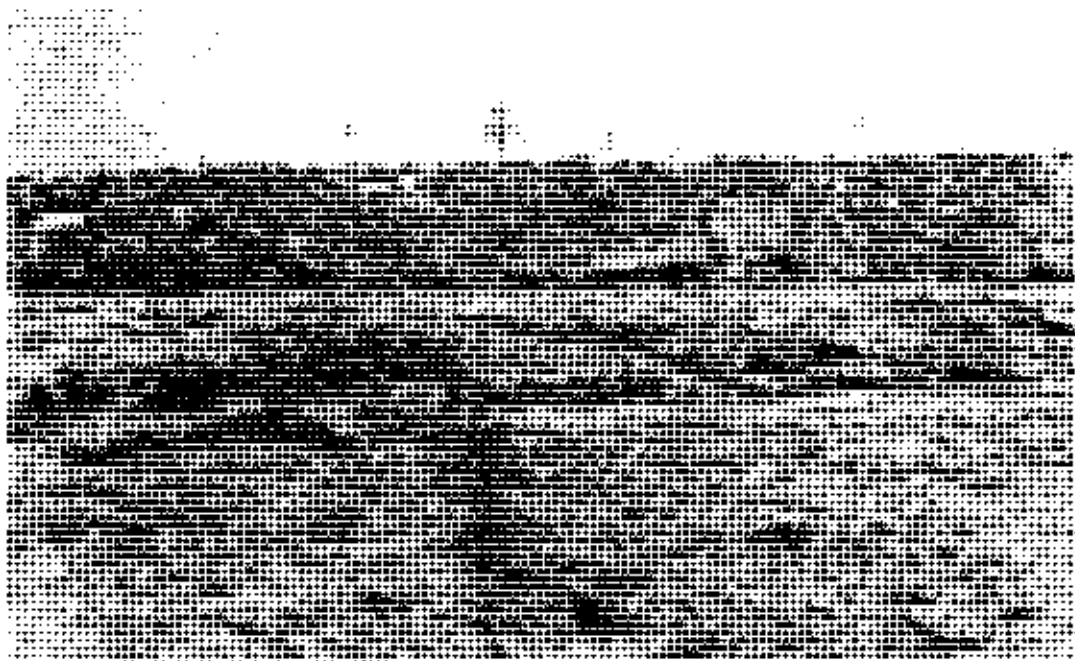


Fig. 13.16. 'ĀLE'ĀLE'A HEIAU PLATFORM, WITHIN THE PU'UHONUA ENCLOSURE AT HŌNAUNAU. View looking south. Photo taken c. 1919. BPBM Neg. No. 3450.



Fig. 13.17. ORIGINAL FACING IN THE NORTH WALL OF 'ĀLE'ĀLE'A HEIAU PLATFORM NEAR THE NORTHEAST CORNER. Note the middle stone in the row of three at the base, which had been worked down to a flat face. Photo taken c. 1919. BPBM Neg. No. 2066.

the keeper of 'Āle'ale'a platform produced from his house and set up. When the chiefs departed, the ladder was placed again in storage.

(Note by K. P. Emory. Kēkahuna, on his map of 1952, places a house site on the east side of the platform and calls it the house of the priest of 'Āle'ale'a, and another on the south side on which he says there stood a ti-leaf-thatched hut in which chiefs and priests held ceremonies. Twenty-two feet from the southwest corner of 'Āle'ale'a he regards some stones as the site of a fisherman's shrine, one which he mentions is a large stone, face down, which has two depressions in the face in which stone fishing deities were set up. On the north, two upright stones are standing, which Stokes told me were not there in 1919. These are designated by Kēkahuna as "stone idols." The house sites and shrine are not as well defined as on his map.)

PLATFORM OF THE HALE O KEAWE

DIMENSIONS OF THE PLATFORM

From the fact that Ellis (1917:128) included the platform on which the Hale o Keawe stood in his measurement for the east boundary of the pu'uhonua, obtaining a length of 715 ft, and that Hitchcock (1889), before the restoration but after the tidal wave, by also including the platform, obtained a measurement of 697 ft, plus the statement of local people who had seen the platform before restoration, proves that it extended out towards 'Ākahipapa flat by at least 10 and perhaps by as much as 15 ft from its present position. Ellis (1917:124) gives us an idea of the size of the area on which the house stood, in saying that the house, 18 ft wide and 24 ft long, was surrounded by a fence which left an area paved "with smooth fragments of lava laid down with considerable skill," in front and at each end of 24 ft. This would mean a minimum of 72 ft of paving beyond the end of the great stone wall, or from the north border of the platform towards the stone wall. Lyman (Ms.) gives the dimensions of the platform on which the house stood as "50 feet by 50." His dimensions could well refer to a house platform set on a paved court. Hitchcock, who saw this whole area in ruins in 1890, estimated it was "about 100 feet square" (Fig. 9.1). The present platform (Fig. 13.18) is 58 ft from north to south, and 66 ft from west to east, not counting the eastern-most terrace which is an entirely modern addition of the 1902 reconstruction, as I learned from Mr. Wright, the foreman. Lyman's mentioning that the house stood at the back of the platform, and his drawing so indicating, fixes the original width as no less than 50 ft. Kamakau speaks of a refuse pit (luapa'ū) north of the house near the entrance, and in 1919, a great slab which had covered it, found by the workmen of 1902, had slid into the sea through the collapse



Fig. 13.18. PLATFORM OF HALE O KEAWE. Note the man sitting within an artificial niche near the right corner. View looking south. Photo taken in 1919. BPBM Neg. No. 3438.

of the retaining wall. It was returned to the platform for resetting (Fig. 13.19). The fact of its fall into the sea shows it was near the present north edge. The workmen of 1902 reported that more than two skeletons were found in the cavity under the stone.

Ellis (1917:124) places a group of 12 images in a semicircle at the southeast corner of the space that was enclosed by a wooden palisade, their pedestals planted in "a pile of stones neatly laid up in the form of a crescent, about three feet wide and two feet higher than the pavement." This being the case, the house could not possibly have stood at the place of the raised platform erected in the reconstruction of 1902 as its site, but at least 12 ft further north.

(Note by K. P. Emory. The main traditional history concerning Hale o Keawe has been covered by Dorothy Barrère in the section of this report on its function and history. But Stokes collected from Lo'e, wife of Ma'inui, the following legend which had sprung up about Kamehameha concerning the days before he became lord and master of Hawai'i. While the truth of it cannot of course be vouched for, and seems rather improbable, it does



Fig. 13.19. STONE SLAB AT HALE O KEAWE, WHICH COVERED THE LUAPA'U, OR SACRED PIT INTO WHICH REFUSE WAS DEPOSITED. Photo taken c. 1919. BPBM Neg. No. 3441.

illustrate typical legends about Kamehameha;* and her naming the guardians of Hale o Keawe gives information worth preserving.

A near and trusted relative (iwikusamo'o) of Keawe named Keawe-ai was formerly in charge of Alealea, and his son, Aue succeeded him, and lived at Hale o Keawe. After Keawe died, Aue became guardian of Hale o Keawe as the king's tomb, and the guardianship continued in the family. During the time of Aue's son, Kihaulani, Kamehameha came in the night, landed at Akahipapa, passed on the inland side of Hale o Keawe and entered it. He went to the place of Keawe's bones and was about to carry them off, when Kihaulani who had secreted himself therein, cried out, "E kalani (oh chief)." Kamehameha, being taken by surprise, left without removing the bones.

Kihaulani's son was Kuahuia, and Kuahuia's son Kaanaana, whose son was Makia. Keawe-ai's full name was Moolki Keawe-ai (Lizard Keawe-ai), because he was tattooed with small lizards on his face, 2 on eyebrows, 2 on back of cheeks, and one on his chin.)

*An earlier version by Thurston in Mid-Pacific magazine. All utterly implausible. (DB)

HALE O PUNI

Adjacent to the Hale o Keawe platform, to the west, was a heap of rubble, which on being cleared revealed edgings of a rectangular platform (Fig. 13.20). The men said that this was the site of the Hale o Puni or Hale o Kapuni, the priests' quarters. The priests' quarters were also pointed out as to the south.

HALE O PAPA

A stone platform approximately rectangular in plan, measuring 25 by 30 ft, and its level surface 1.5 to 3 ft above the adjacent lava, is attached to the inner face of the south wall of the pu'uhonua by a low wall. The low wall was built later than the platform, apparently, but all accounts are to the effect that it is ancient.

The restoration of 1902 included the resurfacing of the platform. The structure, as found, had an ordinary filling of rough stones. The facing stones do not point to particularly careful work, and this feature suggests a later period or that the purpose of the platform was of minor importance. However, the method of structure is no indication of the comparative age of the structure. There is no occasion to suppose this structure was built in modern times.

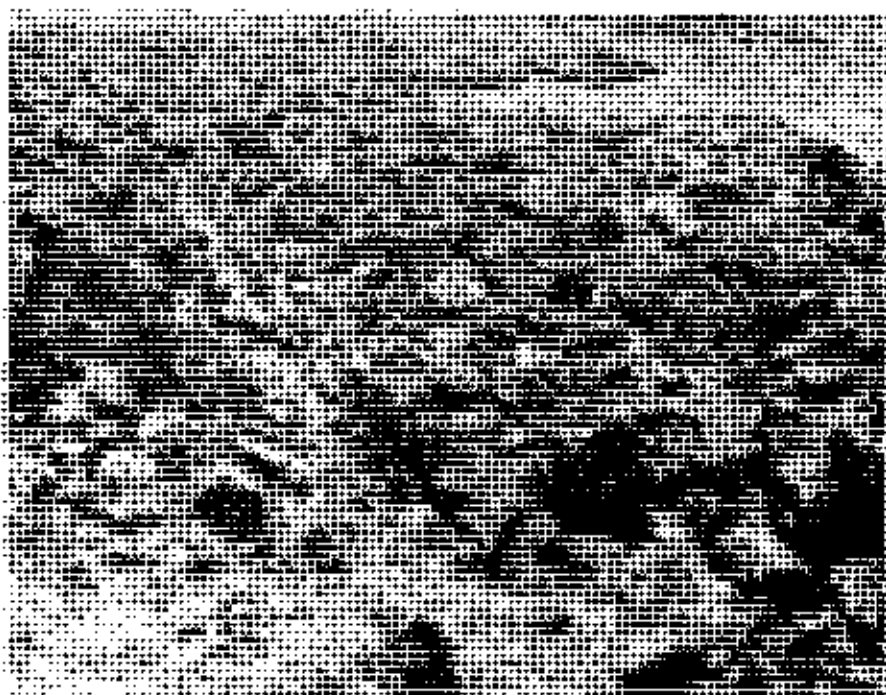


Fig. 13.20. TRENCH REVEALING SOUTH FACE OF PLATFORM OF HALE O PUNI (HOUSE OF THE PRIEST NAMED PUNI). View looking west. Photo c. 1919. BPBM Neg. No. 3445.

(Note by K. P. Emory. The designation Hale o Papa was given to this platform from the fact that one of Stokes' informants described it as a heiau for women, and Hale o Papa is the term for such a heiau. Kekahuna takes exception to this, on his interpretative map of 1952, and claims it was a platform for the menstrual house of the chiefesses. Either could be correct. However, there would be a Hale o Papa attached to a religious center such as this, and I am inclined to favor the earlier information.)

'ĀKAHIPAPA FLAT

The tongue of lava off to the north side of Hale o Keawe, attached to the shore at low tide, is called 'Ākahipapa. It is known as the place where refugees could land after swimming from the rock Pu'u o Ka'ū, across the bay. On it a tall spear is said to have been set up from which a white flag flew to mark the entrance to the pu'uhonua. Instead of a spear, my old guide Ma'inui (Fig. 13.21) mentions an idol as the goal. Hitchcock (Fig. 9.3) mentions "a long pole in a sunken rock, a point of safety," and Dampier shows in his sketch (Fig. 8.3) what looks like the trunk of a coconut tree rising near the end of the flat.

On the surface of the larger southern portion of the flat are three tanning tanks; a large petroglyph of linear human form, about 4 ft long and 2.5 ft wide; and a papamū, or rows of pittings, 10 by 11 rows, for the game of kōnane (Figs. 13.22 and 13.23). On the smaller, outer part of the flat are some 41 pot holes and 8 rows of 3 pittings each for a game which my informant Lo'e, wife of Ma'inui, said was called pāhi'uhī'y, and resembled checkers.

(Note by K. P. Emory. Kekahuna calls the outer part of the flat Malihini, a name which was applied by Lo'e to a little underwater depression just bordering the south of the larger portion of the flat.

On the shore just west of the flat, Hitchcock marks a spot as that where Kamehameha landed (Fig. 9.3). This is probably intended for the place where he landed when he came to meet his cousin Kiwala-'ō, before hostilities began. John I'i, in the Kuokoa of March 20, 1889, speaks of Kamehameha landing "in back of Akahipapa" from his single canoe named Noikū, with his canoe paddlers:

No sooner had his foot touched ground when those on shore were ready with spears of hau wood to hurl at him [a custom observed upon the landing of a chief]. This they did, and those on land

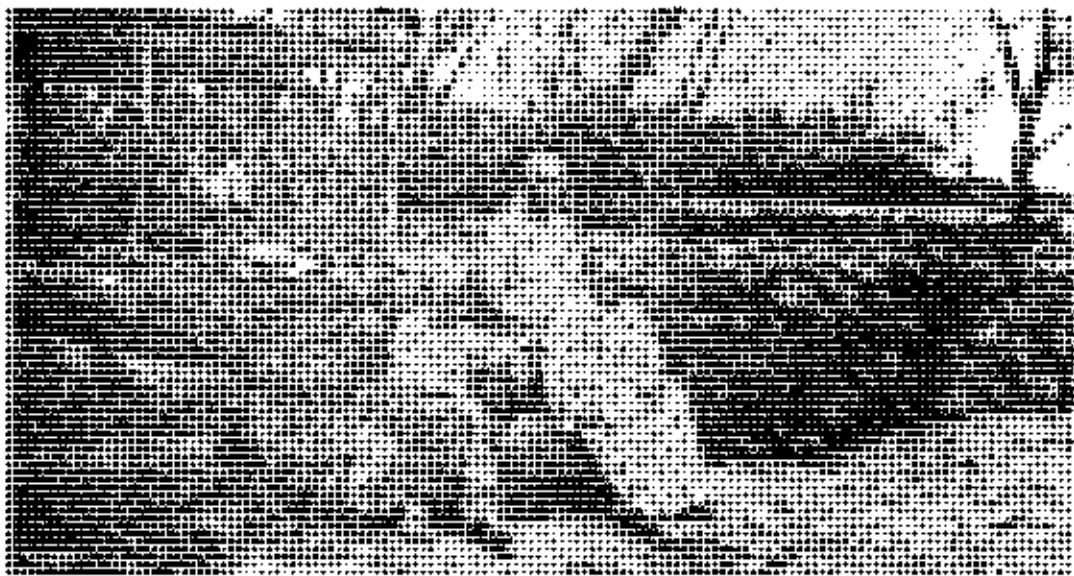


Fig. 13.21. MA'INUI (LEFT), KA'APUNI (MIDDLE), AND LO'E (RIGHT), AT STEPS IN THE NORTH WALL OF THE PARK ENCLOSURE, FRONTING THE LAND KA-IHIU-WA'E AT HŌNAUNAU. Ma'inui was reportedly 95 years old when this picture was taken. Lo'e is Ma'inui's wife, and Ka'apuni is their son. Photo taken in 1919. BPBM Neg. No. 3419.



Fig. 13.22. PETROGLYPH ON 'ĀKAHIPAPA FLAT. Photo date unknown. BPBM Neg. No. H300.



Fig. 13.23. PĀPAMŪ ON 'ĀKAHIPAPA FLAT.
Photo date unknown. BPBM Neg. No. H299.

watched with admiration as Kamehameha thrust them aside as easily as dashing off bathing water. A person remained near the chief with a container of water for his bath...Kamehameha then went up to see his cousin Kiwalao [I'i 1889].

It is not certain from I'i's account, whether "in back of Akahipapa" meant the place marked by Hitchcock or the cove of Keone'ale.*)

*From his vantage point on the mauka side of Hale o Keawe, believe I'i meant Hitchcock's mark. (DB)

SHELF BUILT INTO THE SOUTH WALL

A bench or shelf, 12 ft by 17 ft, 3.5 ft below the top, built into the south wall of the pu'uhonua by omitting part of the second and top tiers and facing the disturbed portion, was said to be ancient.

Of the accounts given me, one of which was that it served for the posting of a guard, the following seems to be the most reasonable. In preparing for capturing the man-eating shark, niuhi, the body of a dead man or pig was placed under the shelf and left for several days. Decay being sufficiently advanced, the body was wrapped in ti leaves, and suspended from the connecting booms of a double canoe, and carried out to sea. Reaching a suitable place, a man with a sharpened stick began to stab the bundle to release the decomposing fluid. A shark was expected to pick up the scent and follow, gulping the oily water as he swam, a process believed to dull his senses. He finally arrived between the two hulls of the canoe. A reception prepared for the shark was two rods, each with a noose at one end and the shaft padding through its companion noose. With one noose slipped over the shark's head, and the other over its tail, it is only necessary to slide the rods in opposite directions to secure him.

I would not have paid attention to this story except for the fact that the Bishop Museum has in its collection two weathered dishes used for holding decomposing human bait for sharks and employed by the chiefs in sport. When the sharks had been drawn to the spot, the chiefs jumped overboard and fought them with wooden daggers.*

WALLED ENCLOSURE WITHIN THE SANCTUARY

Lyman's sketch map of the pu'uhonua (Fig. 9.1) indicates a wall extending from an entrance thru the great wall on the north, around to 'Ale'ale'a platform, and then back to the great wall. It was designated as a goat pen. Running from the southeast corner of 'Ale'ale'a to the great wall was a stone wall, the western half of which was 6 ft high and wide, built of selected, well-placed stones, and was not modern. It shows in a photograph taken by W. T. Brigham in 1889 (BFBM Neg. No. 28802**). It was, however, probably built later than 'Ale'ale'a. The eastern half, on the other hand, was very loosely built and looked modern. The land is low here, and I was told that the tidal wave swept through this part. It undoubtedly swept away a continuation of the well-built wall.

*cf. Beckley (1883) (DB)

**This photograph was not included in the 1957 manuscript.

Through the western portion of the wall, at a distance of 50 ft from the corner of 'Āle'ale'a, a hole 1 by 1.5 ft had been put through the base of the wall. A cross facing through the wall at 41 ft from the corner of the heiau marked the former position of a passage. Emory informs me that all this wall connecting 'Āle'ale'a platform with the great wall has been removed in recent landscaping.

In 1919 a wall with a branch formed part of an enclosure along the line indicated by Lyman from the entrance. An account was current during my visit that this wall penned up refugees for various purposes, but upon taking down a section of it around a coconut tree a mark was found on the lower portion of the tree which we discovered was made by the man standing beside it, about the year 1885 (Fig. 13.24). He also made the mark higher up. These have been whitened in the photograph to make their observance easier. These are marks made by lessees of coconut palms, a practice at the time. The engineer of the reconstruction of 1902 told me these walls served for goat and calf pens of former residents of Hōnaunau.



Fig. 13.24. WALL ENCLOSING A GOAT OR CATTLE PEN, WITH A SECTION AROUND A COCONUT TREE REMOVED. Note markings at the base of the tree indicating the right of a lessee to take coconuts from it, at a cost of fifty cents per tree per annum. The letter K and the cross at the top stand for Kakolika (Catholic). Photo taken in 1919. BPBM Neg. No. 3443.

MINOR FEATURES WITHIN THE PU'UHONUA ENCLOSURE

THE KEOUA STONE

On the north side of 'Ale'ale'a heiau lies a great stone which had been partly dressed in ancient times, in an attempt to square it. It measures 13.5 ft long, and averages 2.5 ft wide and thick. In 1919 it lay with one end against the heiau platform, where it had evidently been carried by a tidal wave, and on the side exposed to the sea, the letters "KEOUA" had been hammered out by a steel tool.* In turning it over and moving it 10 ft to the east, it was found to fit within the space encompassed by six post-holes anciently drilled in the lava, as marked by pegs we inserted (Fig. 13.25), and we assume this to be its original position.

Local tradition about this stone is that a chief named Keoua was in the habit of taking** his men fishing, and while they were so occupied he would lie out on the stone and sleep. Mark Twain (Clemons 1938:185) in 1866 spoke of it as having been brought hither many centuries ago on the shoulders of a high chief to be used as a lounge. A natural rust-colored concavity near one end marks the place where his head is said to have rested, while his feet almost reached the other end of the stone. Variants give his height as equal to or exceeding the stone's length. The concavity may have suggested to the compilant of a local geography an identification of the Keoua stone as a sacrificial altar, but killing within the pu'uhonua would seem to have been prohibited.

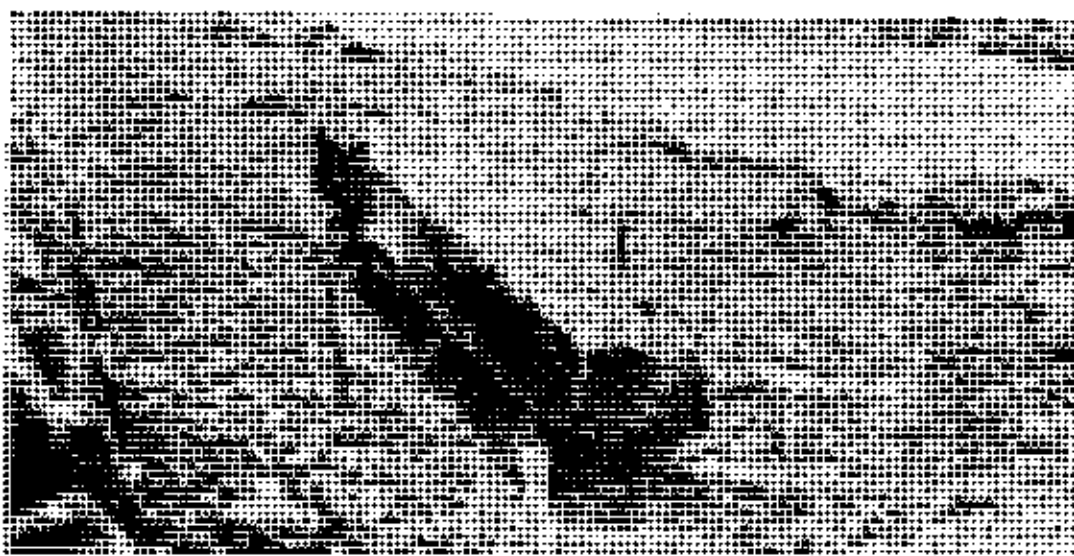


Fig. 13.25. KEOUA STONE IN RESTORED POSITION NEXT TO THE NORTH SIDE OF 'ALE'ALE'A HEIAU. Photo taken c. 1919. BPBM Neg. No. 3451.

*Perhaps just the name of the doodler. (DB)

**...habit of sending.... (DB)

Were posts inserted in the six holes about the stone a canopy of coconut leaves overhead, and a mat underneath would have made this a comfortable stone to lie upon.

The question naturally arises regarding the incompleteness of the stone. The top, as now placed, is finished. The two sides need only a little more pecking. What is now the bottom was part of the original lava surface, and was practically smooth enough, while the ends would almost do as they are. The answer may be found in Kamakau's tradition of the fighting king 'Umi, who ruled over the island of Hawai'i, and part of Maui:

When Umi felt that his end was not far away, he conceived the idea of building a mausoleum of large lava blocks to house his body, and transmitted orders to all his relatives and their retainers to prepare the same, a fathom or more long, a yard wide and half a yard thick. . . . Umi died before the work was complete [Ke Au Okoa, Dec. 15, 1870]."

Kailua, in North Kona, apparently was the assembly point, and 50 years ago a hotel there was approached by a magnificent flight of steps of these dressed stones, and they had been put to use in other places.

Possibly the Naha stone on the grounds of the Hilo Library was one of the stones intended for Umi's tomb. It, like the Keoua stone, never reached completion. Much less advanced in dressing than either are the two stones known as Pōhaku o Ka'ū near the sea at Inanui, at the northwest corner of the pu'uhonua area (Fig. 13.26).

(Note by K. P. Emory. In 1939 I saw the stones Stokes speaks of as being in the steps to a hotel, in the steps to Ocean View Inn, and fortunately photographed these (BPBM Neg. No. 16933"). They have since been cemented over, and a new hotel erected in place of Ocean View Inn called the Lihikai. The Bishop Museum has two of the worked stones from Kailua in its court, one measuring 70 by 24 by 15 in., and another B7348, measuring 31 by 16 by 7 in., and Hulihe'e Palace has several in its yard which were salvaged when the sea wall between it and the wharf was broken in 1957 to widen the road. They were found incorporated into the middle of this wall.)

A Ka'ū tradition relating to the Keoua Stone, given by Mary Kawena Pukui in 1957, relates that Kanaka'ole was a man of a kahuna family of Ka'ū, born about 1800 A.D. He was very tall. Once, on a trip to Kona, he and his companions went to see the Keoua Stone at Hōhaunau. Someone suggested that

*This translation is not quoted from "Ruling Chiefs" (Kamakau 1961), but another translation, possibly Thrum. (DB)

**This photograph was not included in the 1957 manuscript.

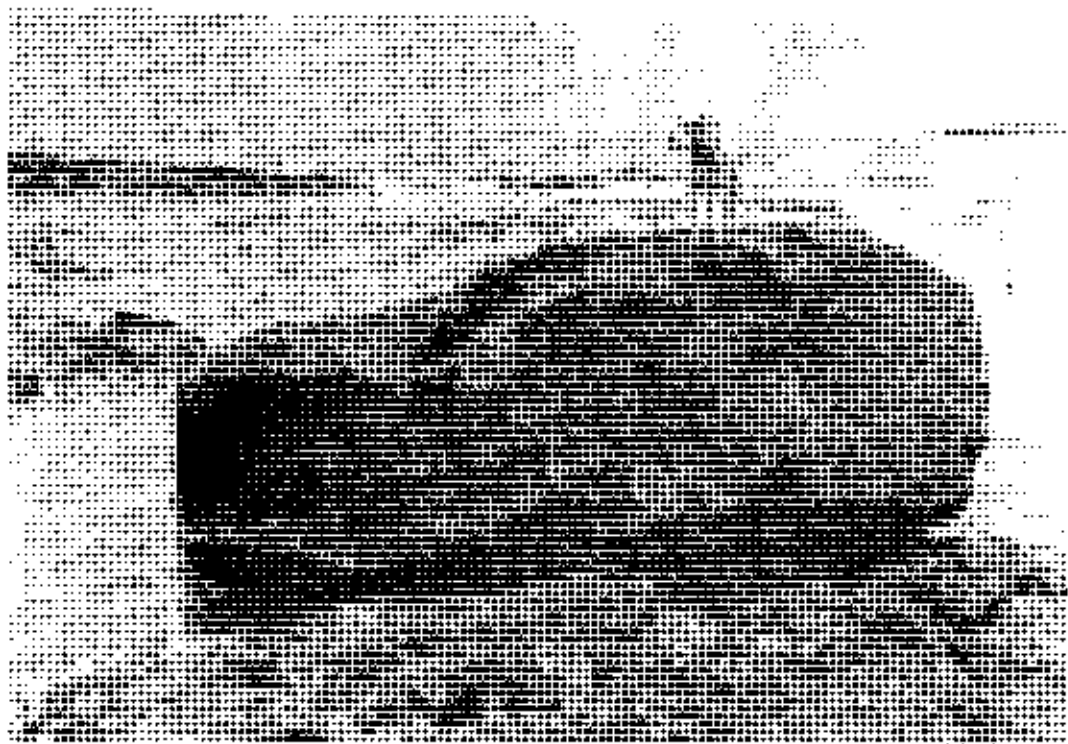


Fig. 13.28. PŌHAKU O KA'Ū. One of two stones known by this name at Inanui. The one pictured was evidently in the process of being quarried and dressed. Picture taken c. 1919. BPBM Neg. No. 2071.

Kanaka'ole lie on it, to see how his height compared with Keoua's. It was seen that he was taller. The Ka'ū family's story is that because the Kona people felt that there should be no one who could claim to be taller than Keoua, they had some Kona kahuna 'anā'ānā pray Kanaka'ole to death.

THE KA'AHUMANU STONE

Just south of the southeast corner of 'Āle'ale'a heiau is a large rough rock, 11 by 6 by 3 ft, set up on blocks of stone, about 1.5 ft above the ground (Figs. 13.27, 13.28, and 13.29), and known as the Ka'ahumanu Stone, after an oft-told incident. As related by my informant Lazaro,* Ka'ahumanu, the favorite queen of Kamehameha, left him one day after a quarrel. Accompanied by her pet white dog she travelled southward along the coastal trail to Lae Mamo, the north point of Hanauma Bay, where she took to the sea, swimming with her dog across the bay. Landing at Inanui, she hid behind one

*Details not given by Lazaro are interpolated here. (DB)



Fig. 13.27. THE KA'AHUMANU STONE, THE SOUTHEAST CORNER OF 'ĀLE'ĀLE'A HEIAU PLATFORM, AND THE OLD WALL CONNECTING THIS CORNER WITH THE GREAT WALL. Picture taken in 1919. EPBM Neg. No. 3454.

of the large rocks called Pohaku o Ka'ū and rested a little; the dog meanwhile climbed up onto the rock (Fig. 13.26).

Kamehameha, in pursuit, had reached Lae Mamo, and not seeing Ka'ahumanu decided that the local natives had hidden her in their houses. He proceeded to smoke her out by setting fire to the grass houses, beginning with that at Kahapa'akai. When the arsonists had reached about half way along the north side of the bay, one of them saw the white dog on the rock and informed Kamehameha. The burning was stopped, and Kamehameha and his servants proceeded around the bay.

Meanwhile, Ka'ahumanu left the shelter of her rock and walked around to the far side of 'Āle'āle'a heiau, where she hid beneath the rock which now bears her name. The searchers spread out, and as one of them approached, the dog barked, revealing the place of Ka'ahumanu's concealment. Reconciliation fortunately followed.

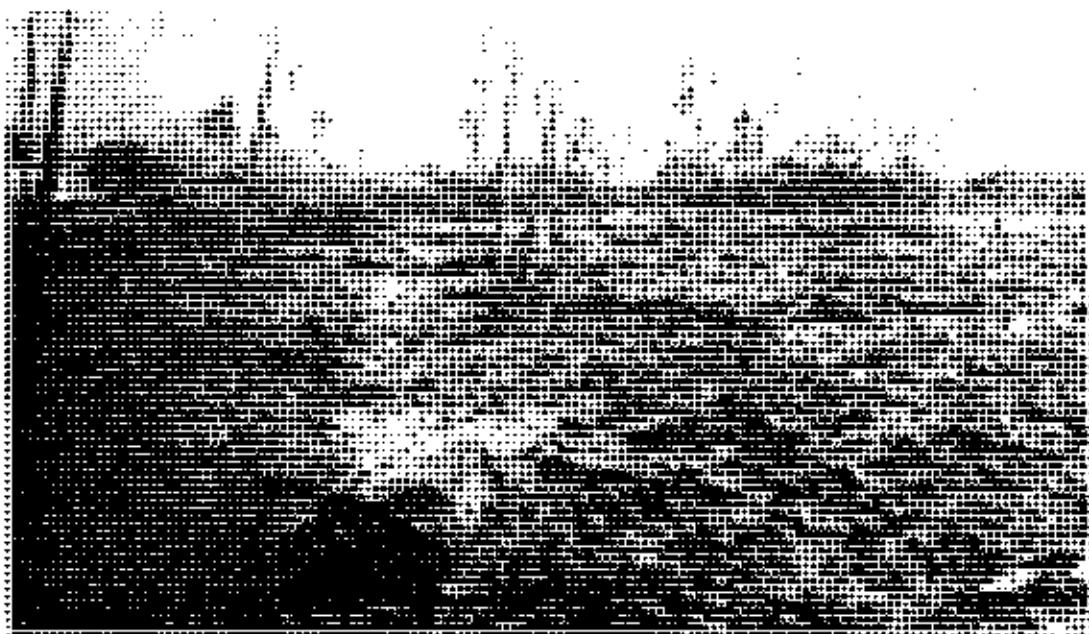


Fig. 13.28. INTERIOR OF THE PU'UHONUA IN 1889. Viewed from 'Ale'ale'a platform, looking towards the southeast corner. The Ka'ahumanu Stone is in the foreground. BPBM Neg. No. 28801.



Fig. 13.29. INTERIOR OF THE PU'UHONUA IN 1919. Same view as that of Fig. 13.28. The Ka'ahumanu Stone is in the foreground, and the kōnane stone is to its right. BPBM Neg. No. 3445.

STONE FOR THE GAME OF CHECKERS, KŌNANE

Twelve feet to the southwest of the Ka'ahumanu Stone was a block of basalt 2 ft wide, 2.5 ft long, and 1 ft thick. Its upper surface is pitted with rows of holes, 9 by 11 rows, marking the positions of the black and white pebbles with which the checker-like game of kōnane was played. Such a game stone is called a papamū, and this one is now called the papamū of Ka'ahumanu.

PŌHAKU NĀNĀ LĀ, STONE FOR LOOKING AT THE SUN

Word was received that formerly a rock was standing erect, and on its flat face were incised pictures of "The sun, moon, and stars," and that one of the tidal waves had upset it into a pool. The authority was regarded reliable enough to go the expense of raising the rock, and I sent to Honolulu for our chain hoist. The name of the rock is Pōhaku Nānā Lā, translatable as "Stone for Looking at the Sun." While waiting for the hoist, I quizzed old Ma'inui about the alleged markings, and was told there were none. Further questioning brought out the information that the rock merely figured in a child's game. Part of the rock rested on the edge of the pool and the other in the pool itself, making a submarine tunnel. With the sun in the right direction, a youngster could dive through the tunnel with eyes open and see the sun like a bright glowing green ball.* Figure 13.30 shows the soles of a boy who obligingly demonstrated the process.

SPRING

Where the wall from 'Āle'ale'a heiau met the great east wall of the pu'uhonua, and just to the south of it, is a spring which had been filled with stone brought in by tidal waves. We dug it out in 1919. Keawe's bones were said to have been washed here.

MAKALOA POOLS

These pools in the southeast part of the enclosure have the makaloa sedge growing in them, a reed which furnished material for the making of fine mats.

KEKUAL'O POOL

This is one of the pools useful for practicing the art of narcotizing fish with the plant 'auhuhu (*Tephrosia piscatoria*) (Figs. 13.31 and 13.32). It was here I was given a demonstration of the method which I have described fully in my paper on Fish Poisoning in the Hawaiian Islands (Stokes 1921:219-

*Hayes says like a blue pearl. I agree! (DB)

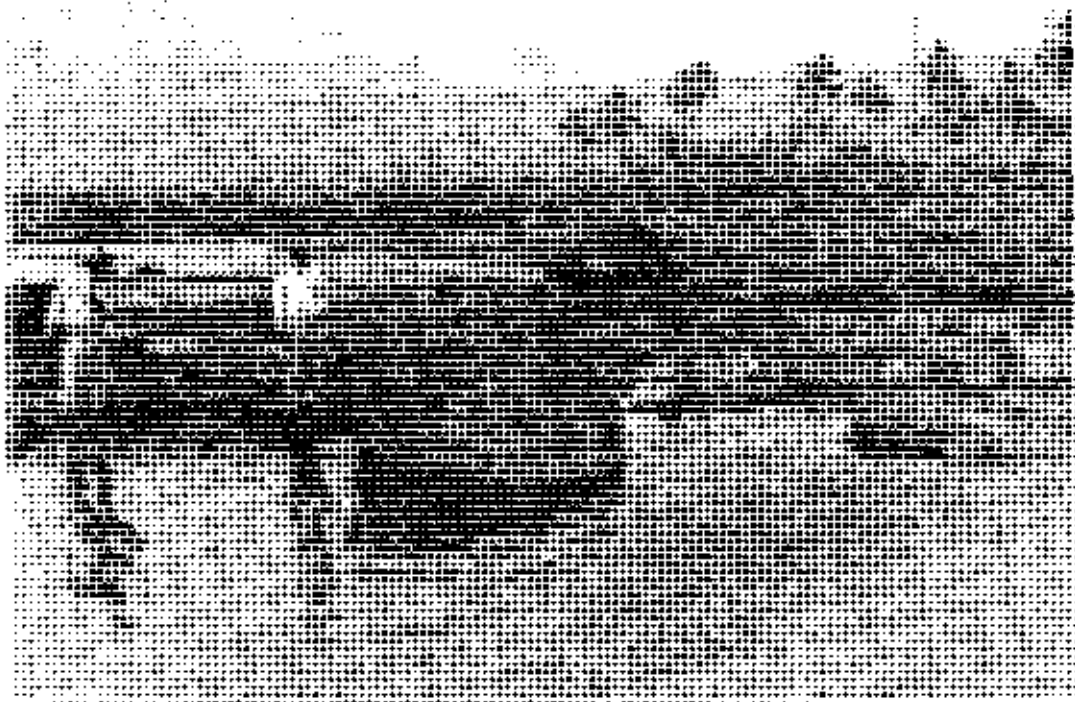


Fig. 13.30. PŌHAKU NĀNĀ LĀ AT THE EDGE OF A POOL WEST OF 'ĀLE'ĀLE'A HEIAU. Photo taken c. 1919. BPBM Neg. No. 2070.



Fig. 13.31. POUNDING 'ĀUHUHU SHRUBS TO USE IN NARCOTIZING FISH. Photo taken c. 1919. BPBM Neg. No. 3514.



Fig. 13.32. NARCOTIZING FISH IN KEKUAI'O POOL, HÖNAUNAU.
Photo taken c. 1919. BPBM Neg. No. 3522.

233). Not only here, but at Inanui way to the north and at other places not more than 200 ft from the sea, the surface of the lava gives evidence of heavy battering. Questioning brought the answer that the marks were caused by the beating and comminuting of the 'auhuhu plant for narcotizing fish. Two methods were followed at Hōnaunau. In the tidal pools such as Kekuai'o, the pulverized plant was loosened in the cracks of the rock. The fish soon came into the open in a dazed condition, or died being unable to escape. In the second method, a net was stretched across an indentation in the reef, and the 'auhuhu thrust into the holes or cracks in the reef face. Almost immediately, the sap began to dissolve in the sea, causing the fish to break for the open water, where they were caught by the net.

ARTIFICIAL CONCAVITIES IN THE LAVA

In many places in the lava beds within and without the asylum may be seen artificial concavities of different sizes and shapes, and natural concavities which obviously have been partly shaped. Some of them are basins where tapa or fish nets were dyed, some of the smaller ones are mortars for pounding salt, seaweed, bait for chum, or sea urchins to get rid of their

spines and shells. But some of them are obviously post holes and holes for supporting images, flag poles, or tabu signs. A few may be simply boundary marks. They have been made by cracking the lava with hammer stones or by abrasion with hammer stones and pounders. Some of the hammer stones have been picked up within and without the enclosure, a typical one being a reshaped body of an adze (Fig. 13.33) which shows heavy battering at both ends and along the edges. The typical shape of a post hole is illustrated in Figure 13.34. In many of the holes it would be necessary to wedge the post with small stones or to lay large stones around it for support.

Seventy-five feet south of Hale o Puni is a platoon of 18 holes in rectangular formation about 2.5 ft apart (Fig. 13.35, rectangle A). The size of the completely-shaped holes ranges from 3 by 3 in. to 5 by 5 in., diameter and depth, while other holes at cracks or showing prismatic sections range from 4 in. in diameter and 7 in. in depth to 7.5 in. in diameter and 10 in. in depth. From analogy with Ahu'ena heiau at Kailua, illustrated by the early voyagers, we may visualize here a group of warning images, such as the image shown in Figure 13.36, and possibly an offertorium on which those not allowed to enter the heiau Hale o Keawe, might place their gifts.

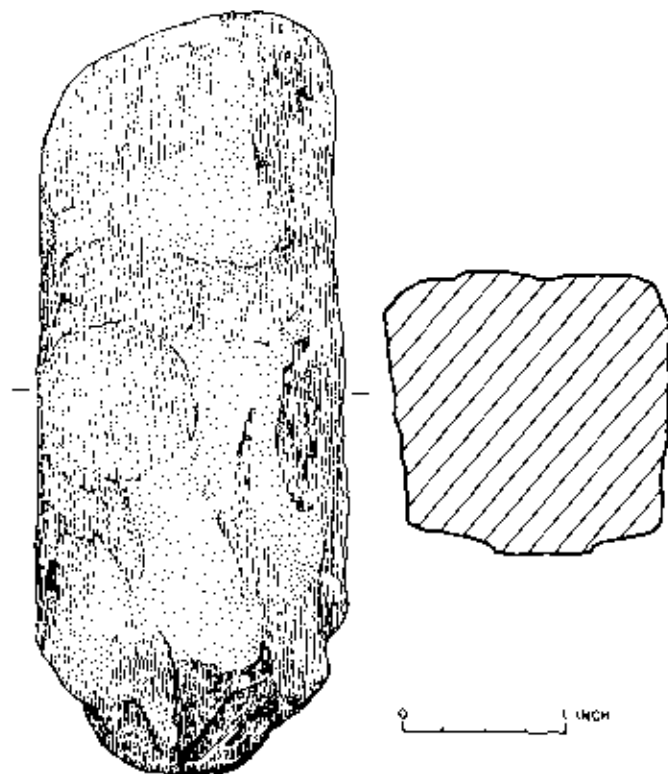


Fig. 13.33. HAMMERSTONE FOUND BESIDE THE GREAT WALL OF THE PU'UHONUA.
BPBM Artifact No. B1851.

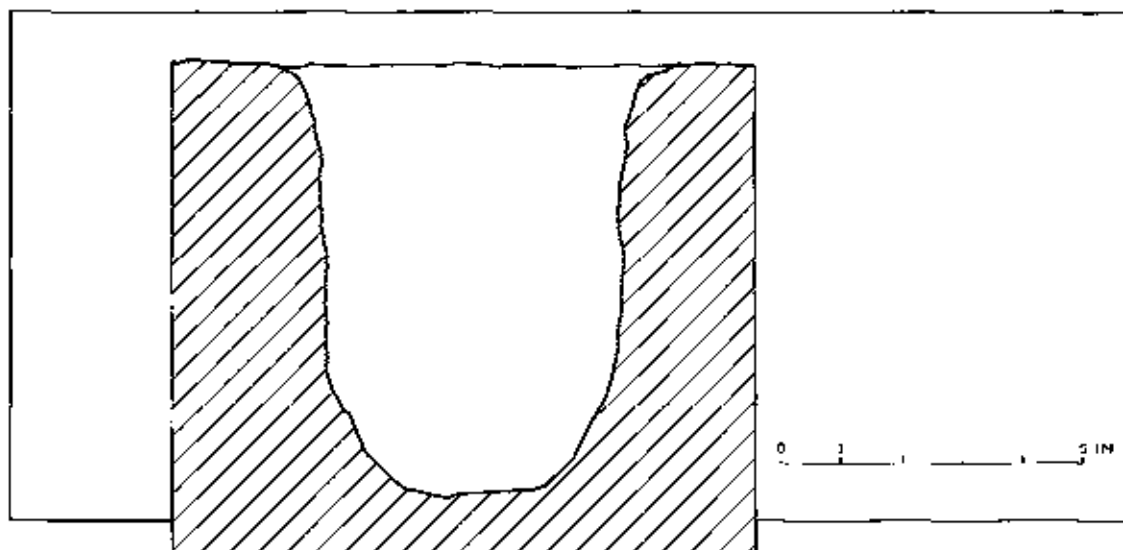


Fig. 13.34. OUTLINE OF A TYPICAL POST OR IMAGE HOLE IN THE LAVA (After Stokes 1957).

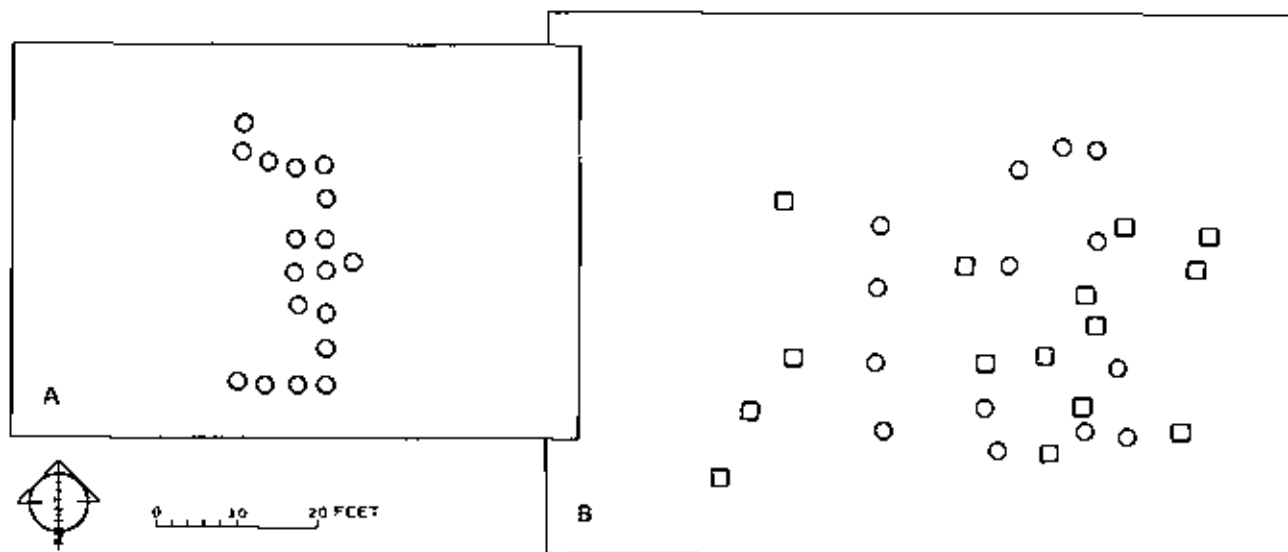


Fig. 13.35. POST OR IMAGE HOLES IN THE LAVA AT HŌNAUNAU (After Stokes 1957). (A) group of holes south of Hale o Puni; (B) group of holes at Kukui-iki, the square holes represent places where the lava has been broken out in prisms.



Fig. 13.36. WARNING FIGURE OF WOOD OVERLAID WITH TAPA
(After Stokes 1957). In British Museum, London.

Five other concavities of similar size to the foregoing are to be found 40 ft northwest, near the water's edge. They may have served for warning images or flags, as the refugees from the north are said to have entered in this vicinity. Ellis (1917:126) speaks of a "low fence" in the northwest part of the enclosure, what he saw may have been the bases of weathered images set up in these concavities (Fig. 13.37).

Just to the north of the northwest corner of 'Āle'ale'a heiaū, is a set of concavities as though to support figures greeting a canoe entering Keawewai inlet. Four concavities are arranged in a row east and west, where a corner is turned, and five additional concavities extend a line southward. Within

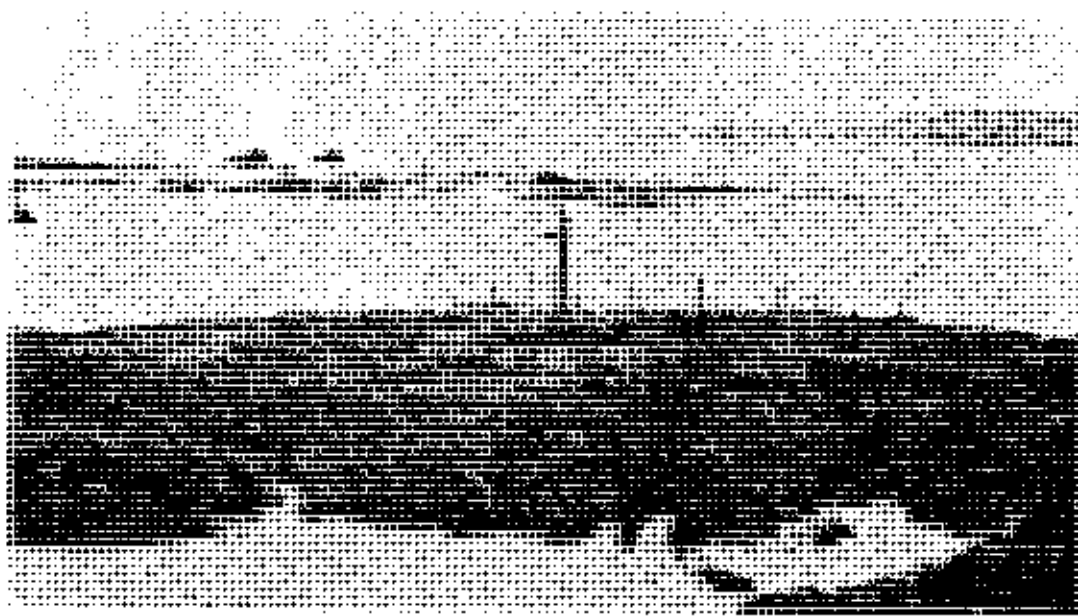


Fig. 19.37. LINE OF CUP MARKS. Sticks have been placed in the cup marks to indicate the position of posts of a fence west of Hale o Keawe platform. Photo taken c. 1919. BPBM Neg. No. 3453.

this space is one square concavity and a basin 10.5 in. wide, 9 in. deep. Nearer the heiau is another basin, 16 in. wide, 8.5 in. deep.

At the head of Awawaloa inlet, a group of about 30 holes indicates another area where posts or images were set up. Here the lava is about 3 ft higher than the surrounding area, and from this spot there is a commanding view up and down the coast. The diameter of the holes range from 7 to 10 in., and the depths from 7 to 27 in. Following the arrangement of the drill holes, it might appear that an attempt had originally been made to arrange them in rank and file, spaced about 8 ft apart. This may have been so. However, the situation at the intersections of cracks would also explain the spacing and approximate regularity.

BURIALS

Sixty feet north of the end of the south wall is a concrete tomb, and adjacent to it a pavement probably marking graves. Lyman, on his map (Fig. 9.1), places two graves here, so they were present as early as 1846. Adjacent to and south of the old heiau platform was a graveyard, as indicated by pavements, and within the heiau platform were at least two vault burials.

STONE IMAGE HAWA'E

In the "Hawaiian Ethnographic Notes," Vol. III, page 486, in Museum manuscript files, is a copy of a paper of Hon. C. R. Bishop, written by an old native man of Kona, Hawai'i, and translated by Mary Kawena Pukui, which speaks of a stone image in a sea cavern at Hōnaunau.

Hawa'e was the name given to a god who was worshipped by the ancients of these islands. In the legends about this god, he was famed for his mana, strength and helpfulness toward those who kept him. In the stories of the kahuna classes, Hawa'e was the seventeenth from Haumea. Several times four hundred large wooden images were known and called by the name of Hawa'e. Because they were so heavy that they could not be taken everywhere, they were kept in secret caves in the mountains of Kona, Hawaii, and stone images were made as substitute for the wooden images....

The second stone image named Hawa'e is twenty feet or more in height. This image is in a sea cavern on the seaward side of the famous Hale o Keawe at Honaunau, South Kona. This is the story of the tossing in of this image. The chief, Ehu Kaipō [called in genealogies 'Ehu-kai-malino], commanded the kahuna to toss the image into the sea to dedicate the sea for the drowning of victims. If the chief wished to have a prisoner of war killed, or one who had broken the kapu of the chief, or some other misdemeanor worthy of death, then the victim was taken to the edge of the sea cavern. A rope was tied to his neck weighted with a big stone. Before pushing him in, the kahuna prayed to Hawa'e in this manner: "O Hawa'e in the day; O Hawa'e in the night; O Zenith; O Horizon; O Hawa'e who lies in the dark, sacred sea of Kane, the sacred sea of Muliwaioleua; the drowning sea of the heavenly one. 'Amama, the prayer has flown."

Then the man was let down into the sea. The chief held his head and pushed him down into the water saying, "Lie still in the sacred sea of your lord." He was so left until he was dead, then he was lowered away down and tied to the stone image, Hawa'e, that lies immovable in the bowels of the ocean.

(Note by K. P. Emory. The chief mentioned in this story, 'Ehu Kaipō, or 'Ehu-kai-malino, is the same one as may have constructed the original pu'uhonua at Hōnaunau. He was contemporary with Liloa, c. 1475 A.D. His kapu, or prerogative, of drowning victims was the kapu lumaluma'i, "drowning kapu," the prerogative of various chiefs of the islands, including Kualii'i.

Just south a few feet of Lae Limukako is a cove at the bottom of which is a stone formation resembling a pig. Kekahuna

had it pointed out to him as a demi-god named Pua. Possibly this is the stone image named Hawa'e.")

FEATURES ALONG THE SOUTH SIDE OF THE SOUTH WALL

CUP MARKS

A remarkable arrangement of cup marks was found along the south side of the great south wall of the pu'uhonua. Sticks were set up in them to show their position in Figures 13.38 and 13.39. Their position is also shown on the map (Fig. 13.40). At the southeast corner, a single peg near the wall is fronted by a row of four others, which in turn is fronted by another row of five. Extending outward and forward of each flank is another peg. In none of the holes does the depth quite equal the diameter, the nearest being 5.25 in. in diameter and 5.5 in. deep. The range of sizes is from 4 by 2.5 in. to 7.5 by 6 in., diameters and depths, respectively, the first undoubtedly being incomplete. If tall uprights were placed in them they would have had to be supported by stones placed around their base.

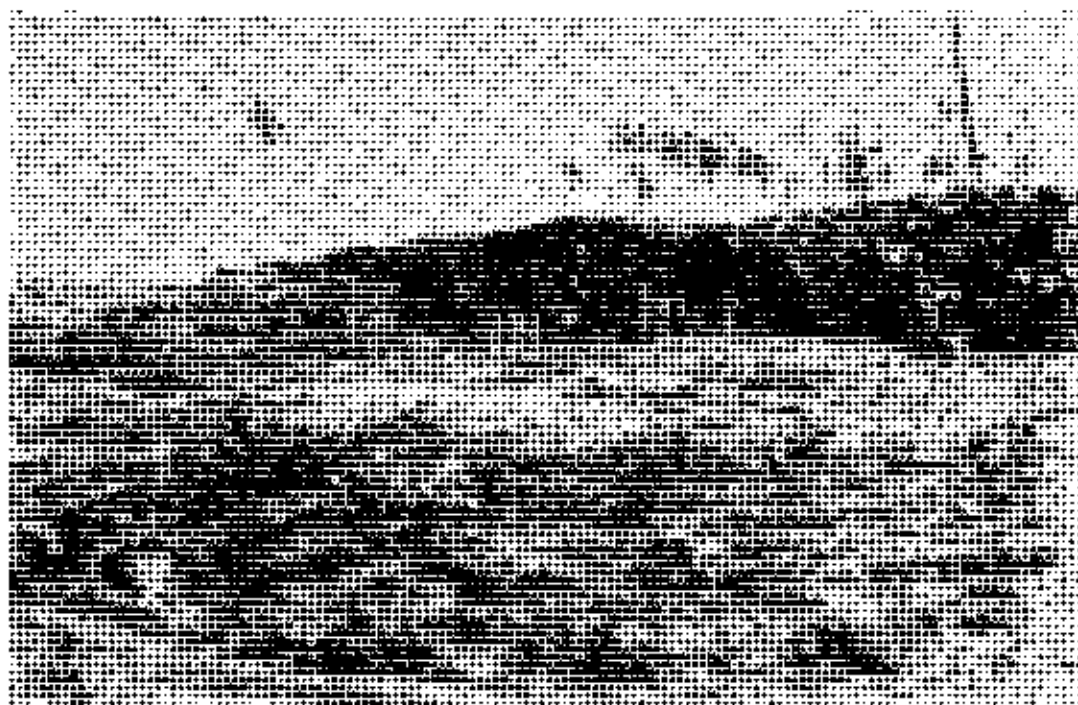


Fig. 13.38. SOUTH WALL OF THE PU'UHONUA. Stakes have been placed in ancient artificial holes that were made in the lava bed to support images or stakes. View looking west. Photo taken c. 1919. BPBM Neg. No. 28612.

*Especially since Pua was a sorcery god. (DB)

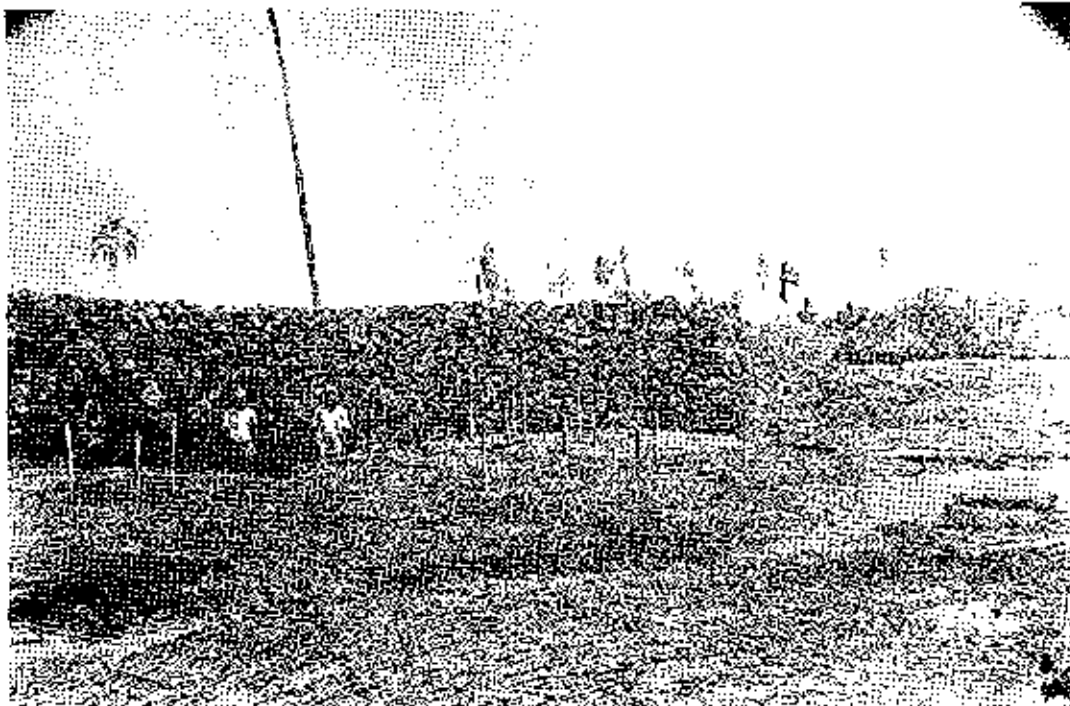


Fig. 13.39. SOUTHEAST CORNER OF THE PU'UHONUA WALL. Stakes have been placed in ancient artificial holes that were made in the pāhoehoe lava to support images or stakes. Photo taken c. 1919. BPBM Neg. No. 3478.

The two outriders on the flanks are part of an alignment extending about 75 ft to the southwest, and then bending to the northwest. On the first leg of this alignment the holes were found to increase irregularly in depth until the northwest leg was reached, when the depth is distinctly greater than the diameter. Between this alignment and a depression next to the great wall are other concavities, not laid out with regularity.

Opposite the midpoint of the south wall was another group of concavities. Some of these holes were relatively quite deep, one being 6 in. in diameter and 12 in. deep. Some 20 ft to the southwest, a group of widely scattered prismatic and deep holes was observed, as well as a few which appear to have been drilled. The largest of the latter is elliptical in cross section, 10 by 12 in., and 21 in. deep. Eighty-one feet south-southwest of the end of the south wall was a rectangular concavity where old Ma'inui said he had seen a wooden image set up, 3 ft high. The concavity was at the top of a lava swelling, and measured 20 in. square at the surface, 12 in. square at the bottom, and 12 in. deep. The image, well outside of the great wall, is said to have been the southern limit or entrance to the asylum.

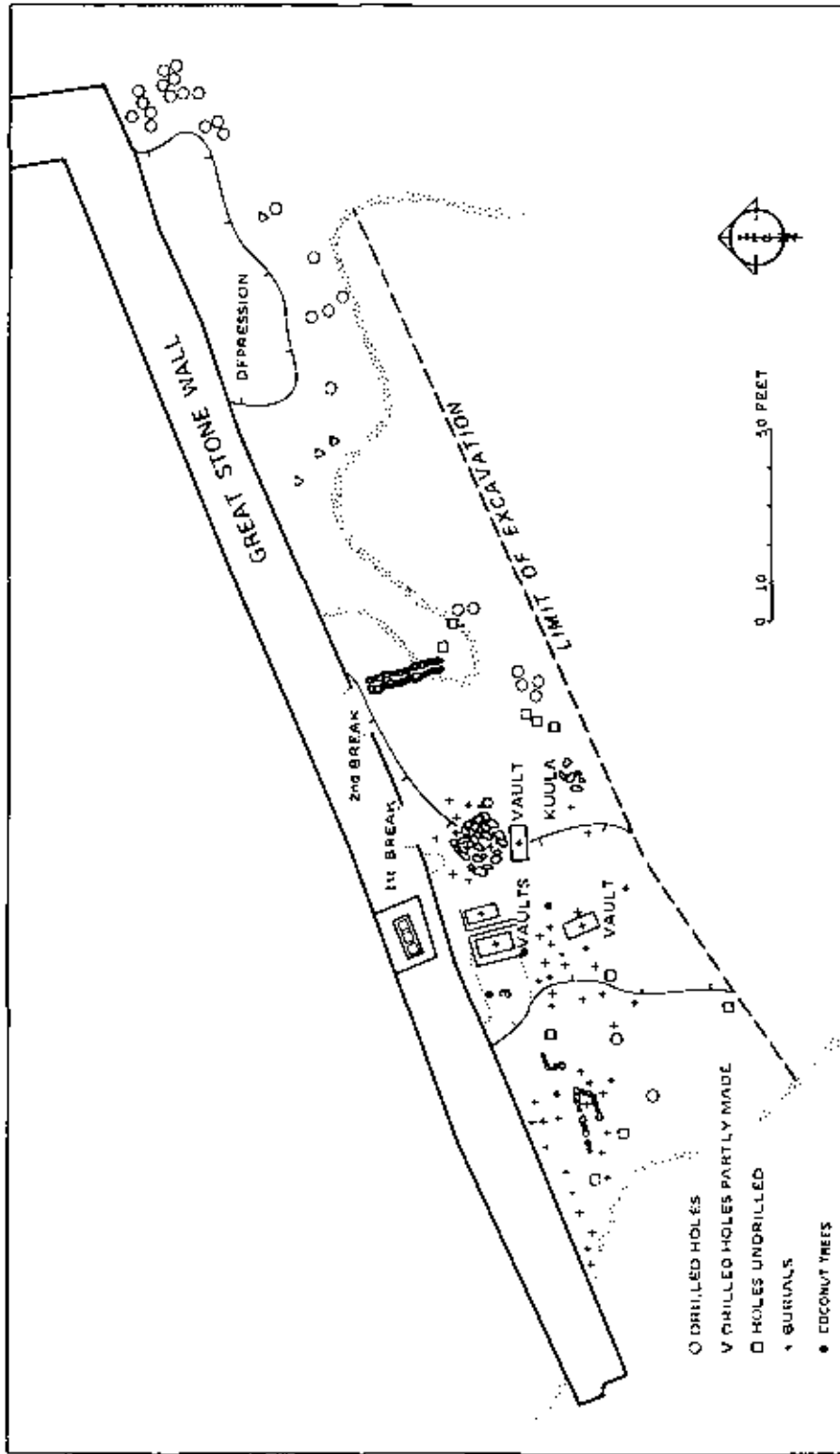


Fig. 13.40. PLAN OF SOUTH WALL OF THE PU'UHONUA AT HŌNAUNAU (After Stokes 1957). (a) unexcavated area; (b) rough pavement.

KŪ'ULA, FISHERMAN'S SHRINE

A large natural stone, with smaller stones clustered around it (BPBM Neg. No. 3493~), 50 ft southwest of the bench in the south wall of the pu'uhonua was pointed out as a kū'ula, or fishing shrine to the god Kū'ula. Clearing the small stones away, my workmen found what they identified as bones of two very young pigs, no doubt the remains of offerings. (Note by K. P. Emory. This kū'ula no longer exists.)

BURIAL GROUND

The area adjacent to the west end of the south wall was a burial ground until recent times. One of my workmen had a grandmother who was buried there. In excavating the area south of the wall (Fig. 13.40), more than 50 burials were encountered, 3 of them in vaults, of recent date (Fig. 13.41). Some of the others may have been pre-European burials, as they were buried in the flexed position (Fig. 13.42).

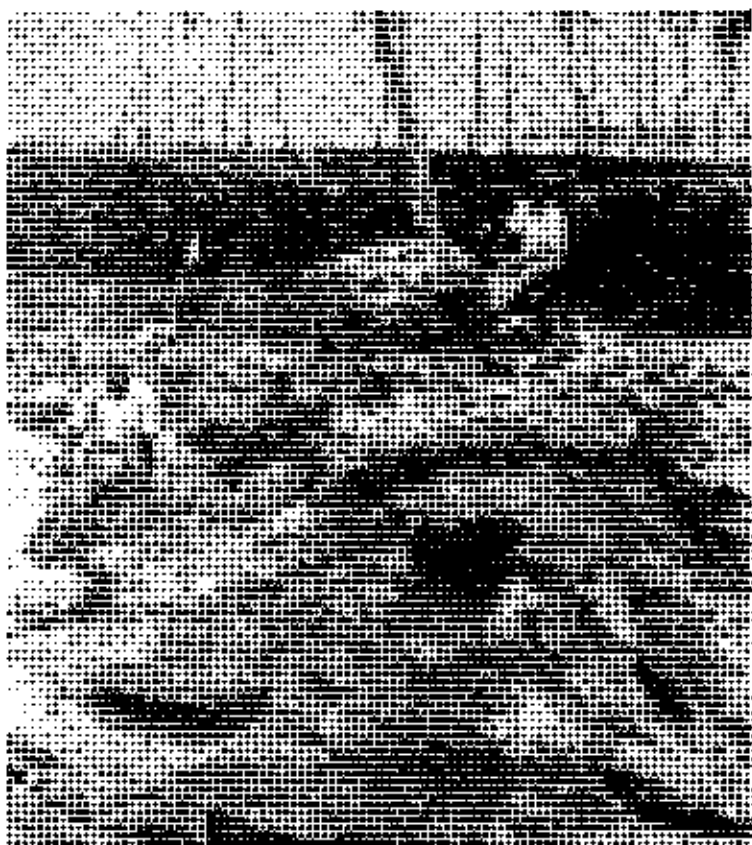


Fig. 13.41. BURIAL VAULT OF POST-EUROPEAN PERIOD. Thirty feet south of south wall of the pu'uhonua. Exposed to show the vaulting and the skeleton layed out at full length. Photo taken c. 1918. BPBM Neg. No. 3496.

*This photograph was not included in the 1957 manuscript.



Fig. 13.42. ANCIENT BURIAL, IN FLEXED POSITION, SOUTH OF THE PU'UHONUA'S SOUTH WALL. Photo taken c. 1919. BPBM Neg. No. 3502.

CROSS SECTION OF A LOW MOUND

In the excavating, a cross section was made through the middle of the area south of the wall tangent to a coconut tree, in the hopes of learning something of the geological and cultural history of this ground. The result is shown in Figures 13.43 and 13.44. The tidal wave of the last half of the last century piled up about 2 ft of small stones and sand around the base of an old coconut tree. The depth of 2 ft below it could have been accumulated in a short time. Therefore, the whole bank against the wall of the enclosure can not be relied upon to give us an idea of its age, as it seems to be of very recent formation.

(Note by K. P. Emory. The only reliable method of determining the age of the wall would be by radiocarbon dating of charcoal left by man directly under and antedating the wall. This method has been available only since 1950.)



Fig. 13.43. CROSS SECTION OF A LOW MOUND 25 FT SOUTH OF THE SOUTH WALL.
Photo taken c. 1919. BPBM Neg. No. 3503.

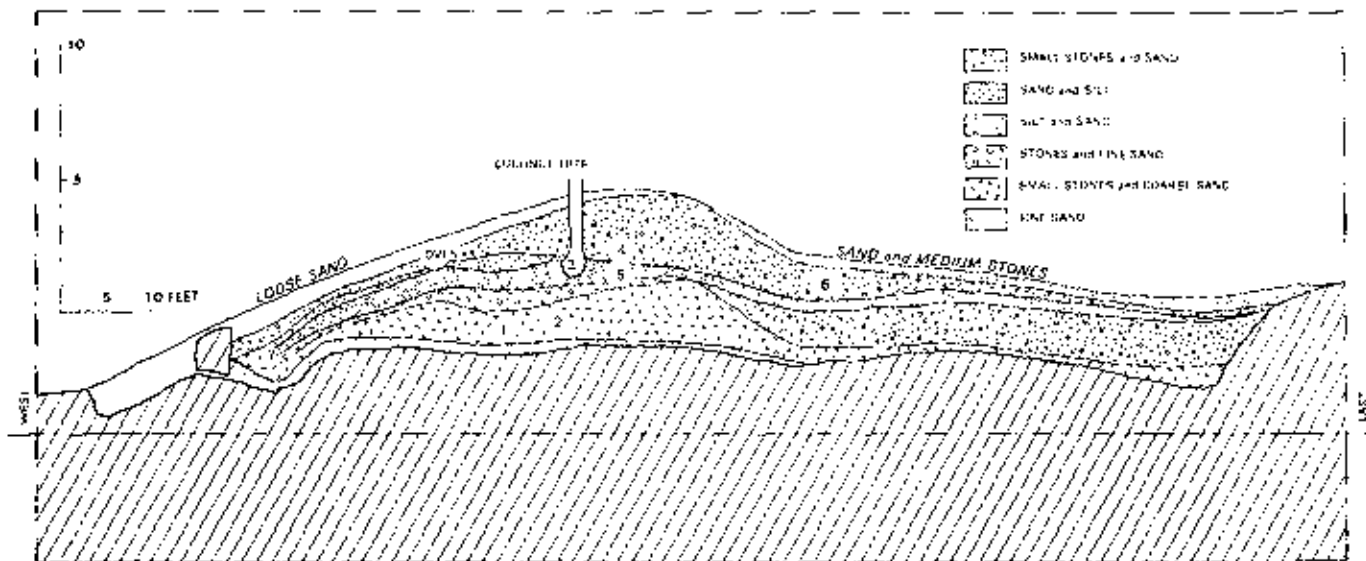


Fig. 13.44. PROFILE OF A LOW MOUND JUST SOUTH OF THE PU'UHONUA'S SOUTH WALL (After Stokes 1957). (1) coral file and worked pencil-urchin spine; (2) two worked pencil-urchin spines; (3) worked shell; (4) fragment of slate; (5) coral polisher; (6) worked pencil-urchin spine.

FEATURES PERTAINING TO EARLY HAWAIIAN LIFE IN THE HŌNAUNAU BAY AREA

J. F. G. Stokes

I can best acquaint you with the features of the old Hawaiian culture which I found about the bay of Hōnaunau in 1919, and which for the most part must still exist, by taking you on a tour of them.

Approaching the village from the north along the road built in 1918, the first for wheeled traffic, we pass through seemingly endless lava flows, rough and forbidding in appearance, descending to the sea on the right. The main flows are in broad ridges, but the surface, with its hills and hollows, suggests a black ocean solidified while in a storm. As we reach the crest of the last ridge, we see below us a striking contrast of colors, the deep blue of Hōnaunau Bay, the yellow beaches, and the green foliage of many trees, these environments of the present limited village making a beautiful relief from the barren lava around and beyond.

The road descends on a steep grade to the head of the bay, but as we near the outskirts of the original village, we stop at a sleeping cave formerly used by travellers (Fig. 14.1). It is part of a lava bubble, its roof being the lava surface which is broken in places. It extends on both sides of the present road, which, after much filling, has passed through the middle. It lies between two branches of the ancient trail, one of which swings to the northeast and goes to the upland, the other turning to the south and passing through the rear of the village. The ancient trail has been following the indentations of the coast at a distance of from 200 to 300 ft from the shore, and came from the village of Kīpū and beyond.

We may descend to Lae Mamo, the northern point of Hōnaunau Bay, as did the travellers of a hundred years ago and more. We pass over the black lava, level in places for a few feet or a few fathoms, and then broken by a little gulch or rugged knoll. The path over the smooth surface is unmarked, since bare feet and leaf sandals have left no trace. We know we are on the trail, however, as just ahead is a break which is bridged by a causeway, paved with a double line of closely laid flat lava blocks, and leading in the right direction. These pavements, called kīpaepae, are all there were to indicate the trail. A little farther on, the lava is broken up, but travel is still comfortable as the kīpaepae are found again. After passing partly around an abandoned goat pen, we lose the trail temporarily, since the kīpaepae cannot be found, its paving stones having no doubt served some modern utilitarian purpose.

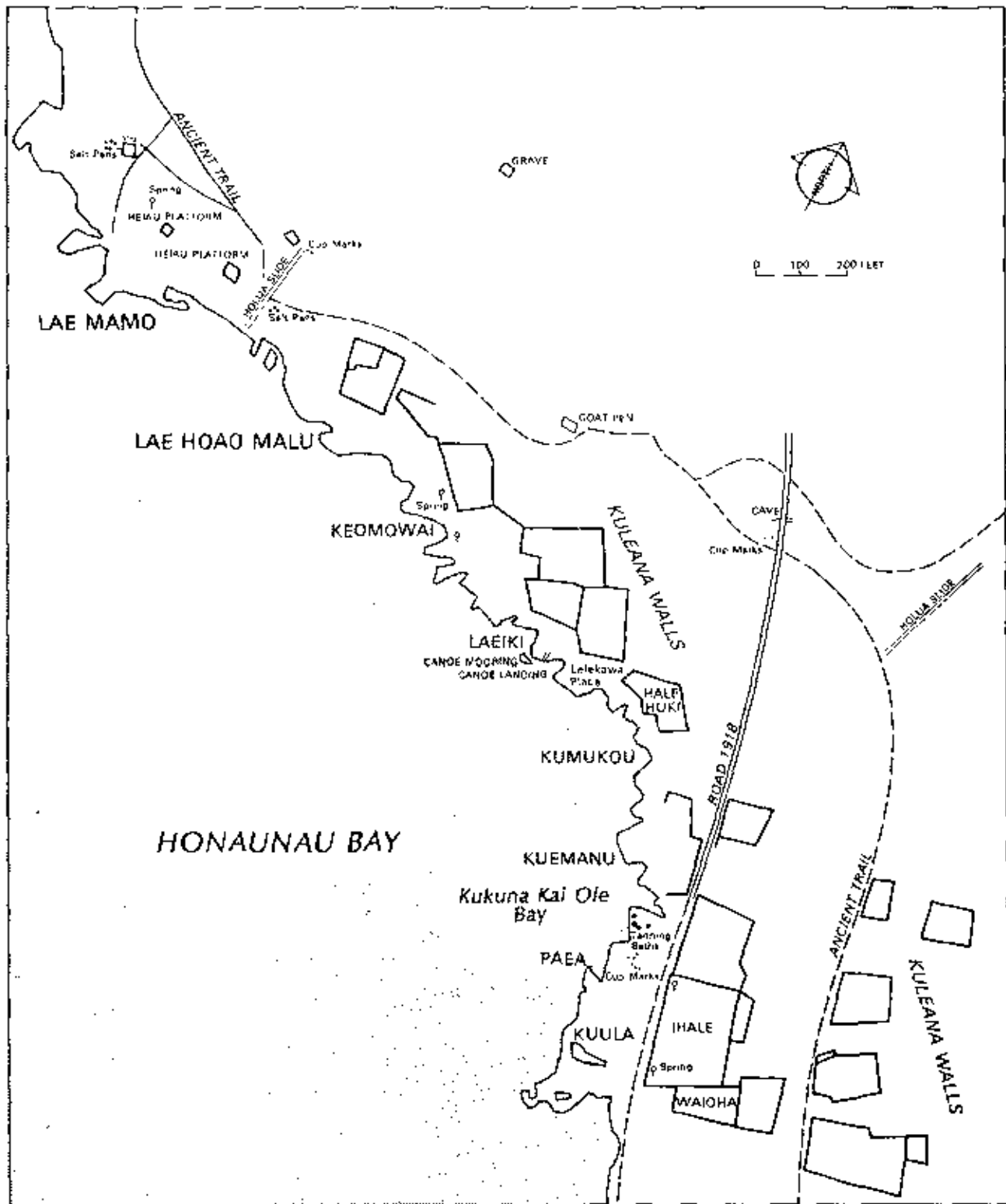


Fig. 14.1. HŌNAUNAU BAY AREA (After Stokes 1919).

We have been passing at the back of a former part of the village, and a century ago we could have met the scattered lines of grass houses of the commoners. The houses would have appeared on their small stone-platformed foundations, unenclosed by the modern stone wall which the introduced animals made necessary. A large proportion of the commoners in the village lived in this bare section, which supported but little vegetation. But such as it was, it was put to use. At least four dryland shrubs, a bush, and a bunchgrass were present: the *'āuhuhu* (*Tephrosia* sp.) for narcotizing fish, the yellow-flowered *'ilima* for leis, *'uhaloa* and *noni* for medicine, and *pili* grass for house thatch. This scarcity of vegetation was not regarded as serious, however, as there was the trail which led inland to the cultivation patches, and the sea was in front with its fish and its seaweed waiting to be taken.

The small house platforms have generally disappeared, and in place of them are the *kūleāna*--home sites of the land division of 1849. The house sites are less in number but greater in size, each enclosed with its modern stone wall. The occupants of these have in turn disappeared, with few exceptions, and back against the lava slopes are other low platforms of stone, similar in proportion but slightly smaller than the former house foundation--a method of burial which seemed to have largely replaced burial in caves, under missionary influence. In the vicinity are several large enclosures with high walls--pens into which goats were driven.

If we continue past the last *kūleāna*, we may again find relics of old Hawai'i, as across our path is a toboggan slide (*kahua hōlua*) with its sloping, paved runway somewhat disturbed and lacking its former surface of dried grass; however, its lines and those of its possible "betting pen" or wrestling pens are still fairly distinct. It seems not difficult to conjure up the crowded spectators, full of excitement as they wagered on their favorite contestants, some steadily losing the property to which they might lay claim and finally staking, in turn, their children, their wives, and their own bodies.

Passing on, we again find the *kīpaepae*, but this time in smooth sea-worn stones, known as *'alā*, placed singly in line--the form generally found near the shore. It continues on its serpentine route to the north, to *Kīpū*, as mentioned, and so on to Kealakekua Bay, where Cook's officers waited in vain for the return of their captain.

As *Kīpū* is not of interest at the moment, we may turn off at one of the branches of the trail and examine the ruins of one of the Kona coast salt factories. The name of the place is *Kahapa'akai*, meaning "to scratch salt." It was a house platform of stone, 2 to 4 ft high, an enclosure on the north, and the remains of a terrace on the west. There is a double line of salt pans along the northern edge of the terrace (Fig. 14.2), and a few more along the western edge, and it would seem that they had originally been arranged along

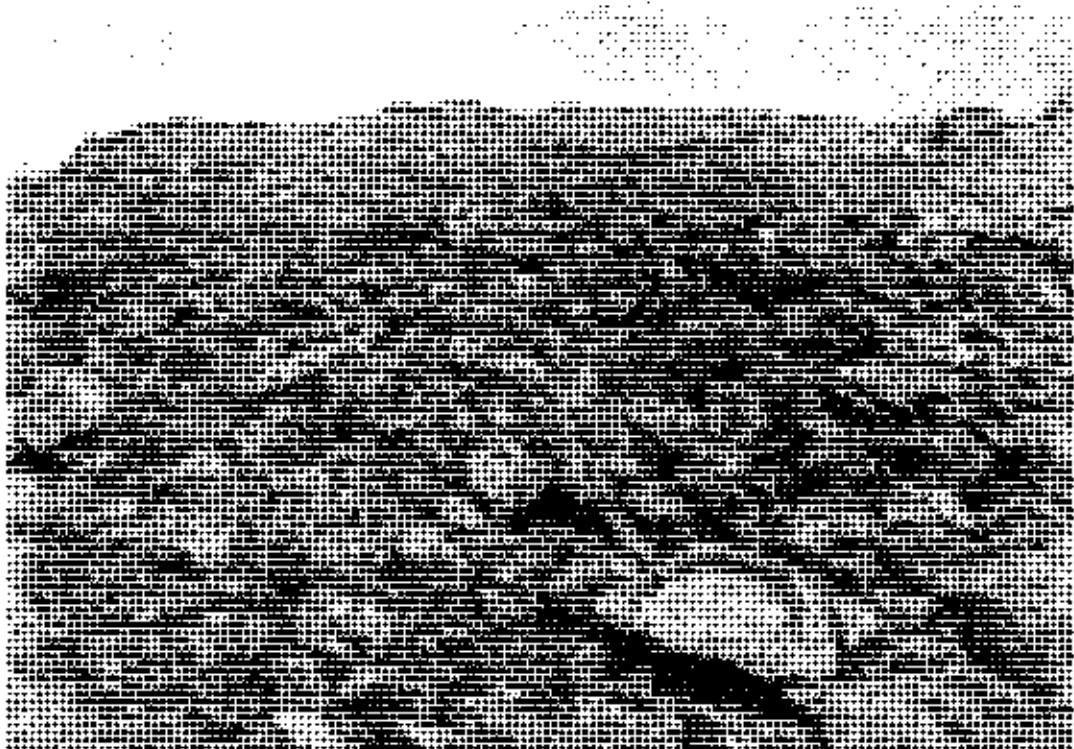


Fig. 14.2. SALT PANS AT KAHAPA'AKAI, HŌNAUNAU BAY. Photo taken c. 1919. BPEM Neg. No. 2065.

three sides of a rectangle, the platform being the fourth side. Probably a path ran between the rows of pans. The terrace has been much disturbed, and many of the salt pans overthrown, probably by a tidal wave. Twenty salt pans are still in position.

The pans are stones, slightly weathered, measuring from 15 to 40 in. across. The upper surface has been set level, and hollowed to a fairly even depth of from 1-1/2 to 2 in., the outline of the concavity is fairly even. The capacity of the pans is from 1 to 5 gallons of water. In these, sea water was evaporated, the process requiring 3 or 4 days. The crystallized salt was then scraped up with sea shells, *ʻopihī* (limpets) and portions of *leho* (cowry), packed in bags of pandanus leaves, and bartered to the people from inland. Salt prepared in this way, according to the aged informant, was valued highly, as it was soft (fine) and savory, not hard and bitter like that made in the large earth pans as on O'ahu.

This ancient industry was carried on here by a man and his wife until about 1833.

Two pans may be seen on the side opposite the platform, one of which was in process of being deepened. A broken beach pebble of very compact

basalt was found near the platform. All its angular edges have been blunted by abrasions, and it is undoubtedly the kind of hammer with which the work was done. In later days some of the pans were removed, deepened with metal tools, and used as troughs for feeding pigs. Salt was also obtained by the evaporation of the spray and water left by high tides in small hollows along the edge of the sea. The crystals were pounded in place with a stone, and in time the natural hollow became a small mortar.

The mention of salt may remind us that we are thirsty, and we may find a spring 100 ft to the southeast of the platform. It is a cleft in the lava, descending vertically, and with portions of the walls projecting irregularly. There is room for a nimble climber to squirm down into the cleft and obtain the water, which cannot be seen from the surface, about 25 ft above. Two other springs, similarly situated, may be found along the north shore of the bay. They are only approximately indicated on the plan (Fig. 14.1).

Proceeding along the shore towards the head of the bay we meet with two small platforms of stone, 4 and 6 ft high, respectively. These are the foundations of two minor temples for fishing, rain, and food crops.

And after again crossing the line of the toboggan slide, we find a collection of six salt pans in a disturbed condition. Various place names are mentioned, but requests for explanations of the meanings cause difficulties. We pass many small gulfs eroded by the sea. At the head of some of them are "jumping-off places" called *lele kawa*, where children and others enjoyed the sport of jumping from the height into the sea. The most favored place is noted on the map (Fig. 14.1), where a jump of 30 ft may be made. At this place also is a canoe-landing (Fig. 14.3), up the west side of the inlet. There is also provision for mooring a canoe across the mouth of the inlet by means of holes cut in projecting rocks on the east and west, and about 3 ft above sea level. The distance between the mooring blocks was 58 ft. The hole on the east was broken off in a storm five or six years ago. The canoe was normally moored in calm weather, and drawn up the slide if rough.

We have been passing the commoners' dwellings, and now come to a high, well-built platform called *Hale Huki*, the residence of a former chief of *Hōnaunau*. The spring in front is more accessible than those we have passed, and is still in use.

As we reach *Ku'emanu*, we find on a prominence some inclined holes cut in the surface of the lava. These were for the support of long poles projecting over the sea, and which served to keep the fish set line from fraying against the rocks on the shore. The fighting *ulua* was taken here, where the water is very deep. The line was left out for several hours at a time, attached by a light cord to the end of the pole, and, the cord breaking when a fish was hooked, the fisherman was thus allowed free play with the



Fig. 14.3. CANOE MOORING AND LANDING PLACE AT LAEIKI, HŌNAUNAU BAY. Two children are sitting by the site of a canoe mooring hole on the east (left of photo), and one child by another mooring hole on the west (right of photo). Photo taken c. 1919. BPRM Neg. No. 2048).

line. The practice continues in other places, and in modern times a bell is sometimes fastened to the pole.

After passing around Ku'emanu, we leave the sloping lava and reach the more ancient lava flat which continues for a mile or so to the south. We find the beach sand extending inland for 100 ft or so and beyond the modern walls, and sustaining luxuriantly growing exotic trees, with an occasional old coco-palm. We also find the lava broken through in places by foreigners to tap the underground streams. We may still remain in old Hawai'i, however, if we remember that the rough sloping ground beyond the foliage was where others of the commoners lived, while the chiefs occupied the pleasant spots in front of us. The latter may be concluded by the presence in the lava of artificial pittings and cup marks. Some are inconspicuous and easily overlooked, while others are deep enough to support upright sticks. In this vicinity they may be taken as boundary marks of some tabued place.

As we move along the shore, we find more concavities worked in the lava, most of them now being under water at high tide. Some are oval, about

the size and shape of a baby's bath tub, and were used for tanning nets; others of smaller size are circular, and were mortars for pounding the tasty seaweeds; smaller ones yet were for pounding salt; while on the edge of the lava and overlooking the sea may be seen others, still smaller, for pounding crabs and sea urchins as *hauna*, or *chum*, to attract fish. Some large single mortars further down the coast were also used for dying tapa. At Laekole (Map 1) we find an aggregation of old mortars joined together by channels (Fig. 14.4), and used for the same purpose as those to the north. It will be noticed in the illustrations that the main tank was originally three mortars which have been broken together in use. The only details remembered are that *noni* root was pulverized and mixed with salt water to produce a yellow dye. We must not get the idea, however, that a mortar was only used for one purpose. As it grew in size by use it would undoubtedly serve the purpose for which its size adapted it.

The tanning tanks above ordinary high tide are still in operation. Bark of the *kukui* (*Aleurites triloba*) is comminuted in a dry tank with a heavy stone (about 30 lb in weight) which is dropped and thrown on to the mass by the fisherman in a standing position. The tougher pieces are picked out and hammered by smaller stones on the edge of the basin until reduced, and then sea water is added and the bark allowed to steep for about 10 minutes. The

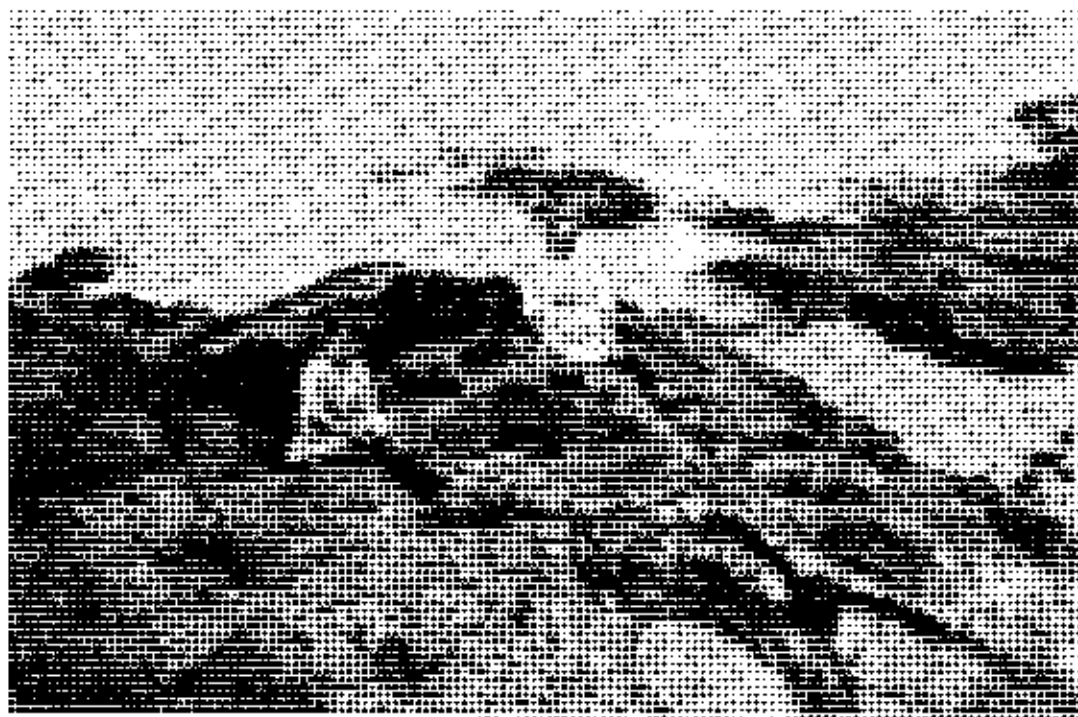


Fig. 14.4. MORTARS AT LAEKOLE, HŌNAUNAU BAY, USED FOR DYING TAPA.
Photo taken c. 1919. BPBM Neg. No. 2044.

tannin is quickly released. The bark is then removed, and the net immersed for 24 hours if a new one, or from half an hour to an hour if previously tanned. If in constant use, the net is tanned again every two to four weeks.

Adjoining Laekole on the south is a place called Ku'ula, from the fact that formerly there was an offertorium or temple there to this god of fishing. All that remains of the temple is a large stone, which the sea has moved. At Ku'ula is a sink, and another at Pu'uehu to the south, which fill with brackish water at high tide. From analogy with other places in Kona, these were no doubt used for removing the salt from the body after swimming in the sea.

Our road to Pu'uehu, however, was apparently barred in former times, as we find irregular lines and rows of cup marks, much more distinct than those we saw before. Are we inside or outside the sacred boundary, and does it bar access to the small harbor or to the land? It cannot have been for the protection of the Ku'ula, as such places were not regarded with the veneration of the great temples. The riddle would appear to be solved when the older people explain that Kapuwai is the name of the harbor, and that into it pour springs of freshwater which were tabued to the commoners by the chiefs. As other ancient springs in the vicinity were on tabued ground, the plight of the commoners apparently compelled the consideration of the chiefs. The former had their watering place at the spring called Waiho'i, now filled with sand, at the northeast corner of the harbor.

We may avoid the boundary marks by keeping along the edge of the sea until we reach the northern point of Kapuwai's diminutive harbor. This is called Pu'u o Ka'ū. We find around us many ancient mortars and tanning tanks, which are under water at half tide, but looking across the water to the southwest, we may see the massive stone platforms and wall of the pu'uhonua. In the same direction, and as though reaching towards us, is a low-lying tongue of lava called 'Ākahipapa, on the northern portion of which there formerly stood some idols. The route we have been following along the shore of the flat is that taken by refugees when coming from the north, but at Pu'u o Ka'ū they must take to the sea and make their way to a flag or an idol on 'Ākahipapa, where they will receive sanctuary. The water is shallow here, and were we to follow a route bending to the west, we might cross in a maximum depth of 4 ft. In the direct route there are one or two places where we would have to swim.

To the west of us, where there is a light surf, are two shoals. That on the south contains a cavern, known as Lua Manō, where the natives say a shark (i. e., a shark god) once lived.

Avoiding the sea and turning to the east, we follow along the northern shore of Kapuwai baylet until we come to Ka'elehuluhulu. Here we find three

alignments each of three cup marks in the lava, nine marks in all. One of the informants stated that they had been for posts of shelters, at the water's edge, under which the chiefs' wives were accustomed to lounge and eat newly-gathered *loli* (*Holothuria*) and sea urchins.

From here we may pass the site of Waiho'i spring, and travel along a lane leading inland. The portion in the village probably follows the ancient route, but beyond, the road is probably modern as a little to the south we find portions of ancient trails, first leading to the east, and then to the northeast. The latter were without doubt the former routes, as the gradients followed are more comfortable than the direct road. This road branches near its western end, near the place where it crosses continuation of the Kīpū road we followed previously. The branches were probably the original streets of the village. Alongside the northern branch is a place called Waieha, where formerly lived a chiefess called Kamahukilani. At the joining of the southern branch with Ponehakeone was another place called Ko'olau, where a chief was said to have resided. This lot has no indication of an ancient house site. But on the lot adjoining it on the north there is a high platform, which was probably the real site.

Before moving on, let us consider the ancient trail from Lae Mamo which, from description, follows the route marked on the map and continued all the way to Ka-wai-o-Pele in Kēōkea. The kīpaepae was found in two stretches of about 100 ft each, in Kēōkea, paralleling and about 15 ft distant from the government trail, but it was not found between Ka-wai-o-Pele and Hōnaunau. The strength and eyesight of our aged informant Ma'inui were too feeble for him to assist in the search, so we must conclude that the route lay along that since adopted by the government. The lava along the road, or trail, as it passed through the village was smooth enough to render paving unnecessary. This route some hundreds of feet inland from the shore was occasioned by the proximity of the royal residence.

Crossing the trail are remains of two toboggan slides, in addition to the one previously mentioned (Fig. 14.1 and Map 1). One to the north of the village has been almost entirely demolished, but the other on the south is longer and in better condition (see the plan and profile made by Bishop Museum party of 1957 [Fig. 14.5]). Near its lower end I observed some petroglyphs of ordinary pattern. (Note by K. P. Emory. We searched for these in 1957, but could find no trace of them.) A hundred feet north of the two watering places named Kōlea and Keone'ele was a depression enclosed by a low wall, oval inside and rectangular without, which wall, Emory informs me, has now been destroyed for material of a new cattle wall adjacent to it. Although no information was to be had locally concerning this ancient enclosure, its proximity to the toboggan slide suggested some arrangement for sports such as boxing or wrestling.

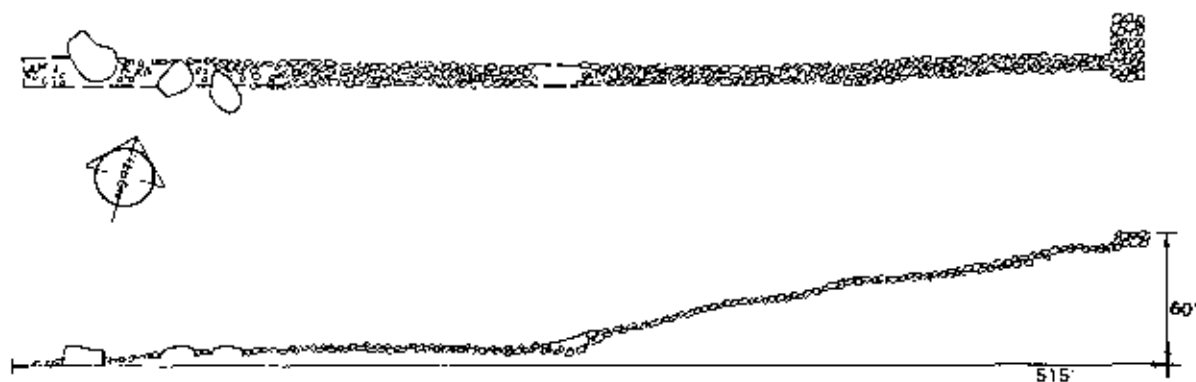


Fig. 14.5. RUINS OF SHORT HŌLUA SLIDE BACK OF HŌNAUNAU (After Stokes 1957).

We may now return to Kapuwai (Map 1), and continue around the southern shore. The lava juts out into the little harbor, and on the western side of the peninsula, about the middle is a palm mold, under water at low tide, from which gushes a supply of freshwater. This is the spring from which the harbor takes its name. The mold is 1 ft in diameter, and 1.5 ft deep. The flow of water is quite strong, welling up above the surface of the sea at all tides. Other springs are to be noticed at low tide emerging from under the lava flats on both sides of the tongue.

The local natives explain that the water was tabued by the chiefs. In the royal precincts to the south is another spring called Papailei, of which nothing was remembered but the name.

As we return from Kapuwai spring we find a line of pittings and cup marks pointing towards the northeast corner of the park enclosure. If we continue along the present road we will find, after passing the sand, three other cup marks alongside the wall of the opposite enclosure. More to the south, other cup marks will be found in the vicinity of the trail until we reach the great wall of the pu'uhonua to the southwest. These cup marks were undoubtedly the eastern and southern boundaries of the king's premises. The light walls we have been passing are modern, those of the two enclosures on the north having been built about 1868, while the southern portion was built about 1875.

The coconut grove referred to was planted by high chiefess Pauahi (Mrs. Charles R. Bishop) about 1867, probably as a part of the ceremony of the taking possession of the newly acquired land. Three of the participants were found, one of whom returned from a neighboring village for the event. Their account was that the men dug the holes, Mrs. Bishop placed the nuts with her own hands, and the local women covered them over with earth. A great feast followed. The participants were people who were born on the land.

On the western side of the enclosure and between the wall and the shore are more cup marks, a group of seaweed mortars, and a tanning tank, the latter under water at high tide. A little more to the south is the spring Papailei, previously referred to. Here a basin 2 ft square and 8 in. deep has been broken out of lava; but the work looks too fresh to be ancient. The water of this spring, as at Kapuwai, is excellent.

We are now on the eastern shore of Keone'ele cove. It was undoubtedly the king's private harbor. The heavy wall adjoining Papailei spring is the retaining wall of a large house platform. The southwest corner had been broken down; but it was originally 8 ft high on the sea side, and was restored by the City and County in 1919. What remains is fairly level, and is 6 in. above the ground on the land side, the land rising somewhat to meet it. This platform is known to some natives today as Kauwalomālie. The same name is applied, or extended, by others to the land on the north and also to the remains of a platform on the east of Keone'ele. We may be safe in concluding that Kauwalomālie was the name of a whole section indicated as the king's residence by the bounding cup marks south of Kapuwai. Just what part of the king's establishment stood on this platform on the east side of Keone'ele inlet, it is difficult to say. The local account is that the house standing on this platform was for various amusements of the chiefs, such as the games pūhenehene, and kīlu. Another account is that it was the king's canoe house. But while the size and shape are suitable for this purpose, its situation with regard to the water is not. It might well be regarded as the official reception hall. In 1830 a large house standing here was used as a school, which one of the informants had attended.

It was impossible to locate all the other houses of the king's establishment. There was a very old frame house to the southeast of the large platform. It rested on a smaller platform which looked ancient. Adjoining it to the northwest is a pit called 'Inau Poho. No particulars could be obtained of the latter except that the name was used in ho'opa'apa'a (punning contest of wit) with Pu'uehu, previously mentioned. There are five cup marks in front of this platform, two pairs and a single one. The pairs are 12 ft apart, and suggest places for standards as though in front of the king's dwelling. (Note by K. P. Emory. Kekahuna [1852] refers to the pair of large holes as kānoa, bowls into which the 'awa was filtered, and the smaller holes as places where torches were set up.) The only other platform was a small one in the northern portion of the coconut grove, suggestive to a degree of a guard house. Probably the grass house shown standing in this vicinity in a photograph taken in 1889 (Fig. 14.6) was set upon this platform. I was told it was erected about 1888, and that it was leased to a Chinaman for storing coconuts.

The name Keone'ele is applied to the white sands extending from the cove to the great wall of the pu'uhonua. It is doubtful if the sands extended

that far in early days. The name means the-black-sands, and in digging south of the site of the Hale o Lono, black sand underlay the white. (Note by K. P. Emory. Kekahuna gives the name Kame'ele to the sands immediately at the head of the beach.)

The coconut trees I saw in this area were planted in 1908, but a few palms in the vicinity belonged to an earlier grove visible in a photograph of Hōnaunau Bay taken by W. T. Brigham in 1889.*

To the south are the king's fishponds, Kaloko. The wall of 1875 passes through the middle of that on the south. The water in them is supplied from the underground springs, and rises and falls with the tide. The portion inside the wall is still kept in condition, but that outside has been abandoned, and is partly filled with mud. However, the water rises enough at high tide to furnish water for cattle. (Note by K. P. Emory. Kekahuna [1952] gives these ponds the name He-lei-palala. The name Kaloko simply means the pond.)

Cup marks may be noticed in an irregular line along the southeastern border of the pond--no doubt tabu signs of the king's preserves. Slightly to the east of the line between the ponds and the king's dwelling was a well, the water of which was said to be particularly good.

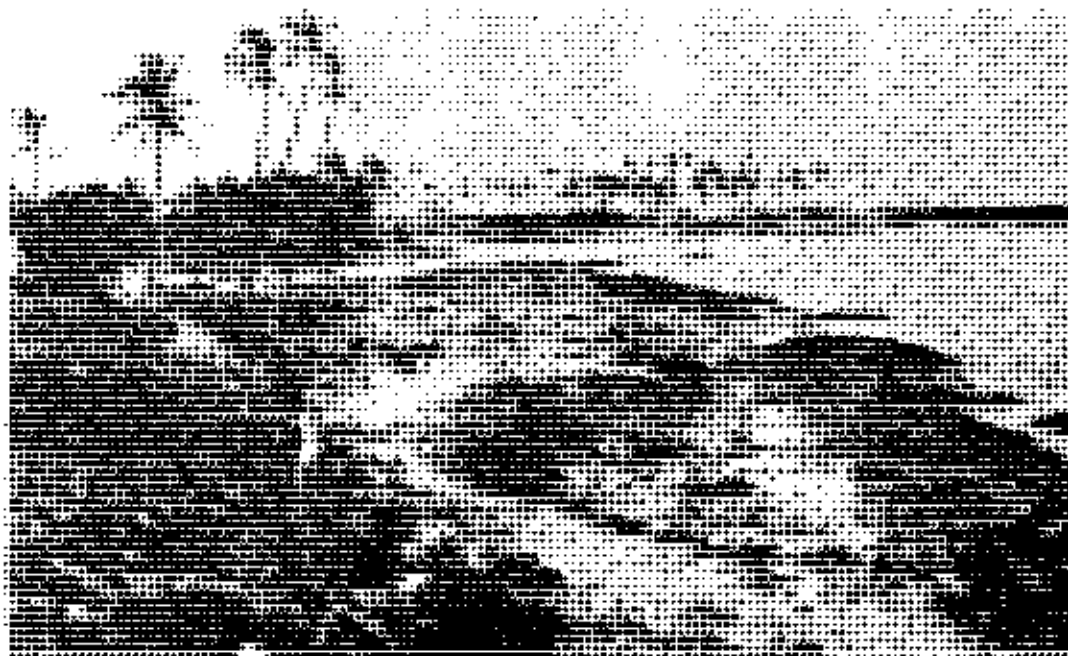


Fig. 14.6. VIEW OF HŌNAUNAU IN 1889. BPBM Neg. No. 28800.

*This photograph was not included in the 1957 manuscript.

South of Keone'ele Cove stood, according to local informants, a Hale o Lono, a secondary grade of temples not used for human sacrifice but for the four periods of prayer held monthly for eight months of the year.

Midway we may pause and see to the north a tongue of lava called Kaule-lewalewa (under water at high tide) with a line of four vertical holes along the eastern border, and the beginning of another hole on the other (Fig. 14.7). They are about 2 ft square, and the intermediate two in the line of four are 3 ft deep, and all others about 1 ft and apparently incomplete. The deep holes were filled with sand and pebbles. My 93-year old guide said he had seen an idol of *kauwila* wood set up in the deep hole to the south. It had head, eyes, ears, mouth, and arms, but he was unsure about the legs. Men were set to work cleaning out the holes, and soon brought me, from the southern hole, three pieces of wood which thy identified as *kauwila* wood, as did the Museum botanist. The guide was not present, but when I brought him over to confirm his statement, he did so without hesitation, not knowing the *kauwila* fragments had been found.

The three pieces of wood together would have formed a plaque 8 or 10 in. across, and 1 to 2 in. thick, with the upper part eaten by teredos, and lower part still solid and rounded off.

It might seem that a double row of four images had been planned for the mausoleum's sentinels, and never completed. While a subsidence which may have been going on has submerged this part, and more.



Fig. 14.7. POSSIBLE IDOL HOLES, WITH POSTS SET IN THEM, AT KAULELEWALEWA, ADJACENT TO KEONE'ELE COVE, HŌNAUNAU. Photo taken c. 1919. EPBM Neg. No. 3427.

ARCHAEOLOGICAL FEATURES OF
HINTERLAND AND KEAMOALI'I OF HŌNAUNAU, KĒŌKEA, AND KI'ILAE

Kenneth P. Emory

HINTERLAND OF HŌNAUNAU

Back of Hōnaunau Bay and southward of the road leading to the uplands is an empty area except for several pens, a number of graves marked by platforms, and a hōlua slide (Maps 3 and 4). Stokes has described the ancient trails, which we were also able to pick up, and which cross the old irregular wall which runs along the uplands roughly parallel to the park boundary. The lower part of the south branch of the trail running inland is so wide and has been so well constructed as to suggest its remodeling to accommodate horses. Through much of the length of those trails, stepping stones reveal the ancient parts, as these were to make the foot traveller comfortable. Stokes believes that where the north branch of the trail crossed the road, another trail bore off to the south to connect, in the vicinity of Wainoni, with the "Kamehameha Highway," the old government trail to Ho'okena village. However, no trace of it can now be found.

From the northeast corner of the proposed park area to the concrete tomb, at the southwest corner of that quadrangle, runs an irregular rise overlooking the bay (Map 3). In the eastern part of the quadrangle lie two groups of graves, that on the east is a compact group of some 15 graves marked by rectangular piles of stones; that on the west by 5 rectangular platforms placed as shown on the map. These vary from 2.5 to 4 ft in height, depending on the unevenness of the ground.

In the center of the area are two small enclosures being used as pig pens in 1957.

The hōlua slide which Stokes noted, we were able to trace as far as shown on the map, but not across the road (Map 4). To us the slide appears never to have been completed, because of the lack of stones at the part which meets the bottom of the slope. The platform at its beginning does not have the shape of a take-off, and may actually be a later platform, perhaps serving as a tomb (Fig. 14.5). This may have been designed for a practice slide.

KEAMOALI'I IN HŌNAUNAU

At Wainoni, just east of the ponds adjacent to the asylum, is a nicely-paved house site. This area had been set aside for a school in the 1850s, and

a Protestant church is to be seen standing upon it in a photo taken in 1889 (Fig. 13.28).

South of Wainoni is a wall built since Stokes' visit in 1919, which parallels the old Kamehameha Highway and turns westward to connect with the *kuleana* (house lot) walls present in 1919 (Map 2). An ancient spring has been surrounded by a wall and developed into a water place for cattle. It was named Keone'ele, and adjacent to it on the north was a smaller spring named Kōlea, which has been obliterated since 1919. Along the south side of Keone'ele spring is an upright stone set solidly in the ground, and measuring about 1 ft square and 2 ft high. An ancient terrace platform paved over its western end with pebbles and waterworn stones adjoins a pen. Further west are remnants of ancient house platforms, one on each side of an old wall.

The house platform on the north has a grave attached on its north, and an ancient grindstone at its southwest corner. It is enclosed in a *kuleana* awarded to one named Kaliai, according to the Land Commission Award 7219:2. It is described there as a *pā hale* (house enclosure), and stated that it is on the land Keamoalii, and was given to Kaliai in 1840 by 'Uwēloa, who had had it enclosed in that year. In describing the lands on each side, the land on the north and east was said to belong to the *konohiki*, that is, the man in charge of the *ahupua'a* of Hōnaunau. The land bordering its south was said to belong to Kaheanui, and that on the west to Manuwā. Along its south border, it is written, ran an *alaŋui* (road or trail).

We come across the name 'Uwēloa again in connection with the *kuleana* now in the name of George Douglas, and connecting with the *kuleana* just described at the northeast corner. It was given, according to the records with the Land Commission Award 9473:1, to 'Uwēloa, or 'Uēloa, by his "parent" Kekuiapoīwa, in 1800, who enclosed it in that year. Keamoali'i is spoken of as a land division known as an *'āli*. The land on the north is described as belonging to Kaheanui, and the land on all the other sides to the *konohiki*. The 'Uwēloa house site (*pā hale*) contains a large, well-built, stone platform on which the Douglas house, recently burned down, was placed. This is probably an ancient platform. On its eastern end lay an ancient grindstone. Kekuiapoīwa was the name of Kamehameha's mother, and possibly the mother or aunt of 'Uwēloa.*

The lot north of the one just described contained no house foundation. In its northeast corner was a broken salt pan, perhaps used for a pig trough. south of the beach road are the ruined walls of house lots, and the remnants of one old house platform.

*No. Kamehameha's mother died in his youth. This Kekuiapoīwa who gave the land in 1800 was simply another of the same name. (DB)

On the shore at Pae'iki is a remarkably clear cut papamū (Fig. 15.1) with 13 by 15 rows of pittings, frequently awash at high tide. Adjacent to it is a natural canoe landing, and to the south of it a barely discernable papamū. Inland, before reaching the road, are two more papamū, the farther one larger and more distinct, with 12 by 14 or 15 rows of pittings.

NORTH KĒŌKEA

Near the boundary mark Pa'aiea is a solitary petroglyph of simple, linear human form, 1 ft long, which may have marked the ancient boundary between Hōnaunau and Kēōkea. Following along the boundary, we come across a large stone platform, 45 by 100 ft, averaging 5 ft high, which served as a cemetery, containing one concrete tomb, but with no names or dates. Originally this probably was a foundation for houses. Two platforms, 1 ft higher than the main platform, are paved with smaller stones. Further inland is a natural column of lava, perhaps a splatter cone, which rises about 15 ft above the surrounding area, and is named Pōhakuloa. It served to mark the boundary between the two adjacent ahupua'a. Following the boundary line across the old highway and onto the heights, a high rough wall, as much as 5 ft high and 4 ft wide at spots, circles an outcrop of lava forming an oval enclosure 85 by 110 ft in diameter. Kekahuna believed this was a plot for growing sweet potatoes, and the walls were to prevent goats from entering. Two hundred feet south of this enclosure is a small, rough, stone platform against a lava bank which contained a short cave. In the cave were bones of a child.

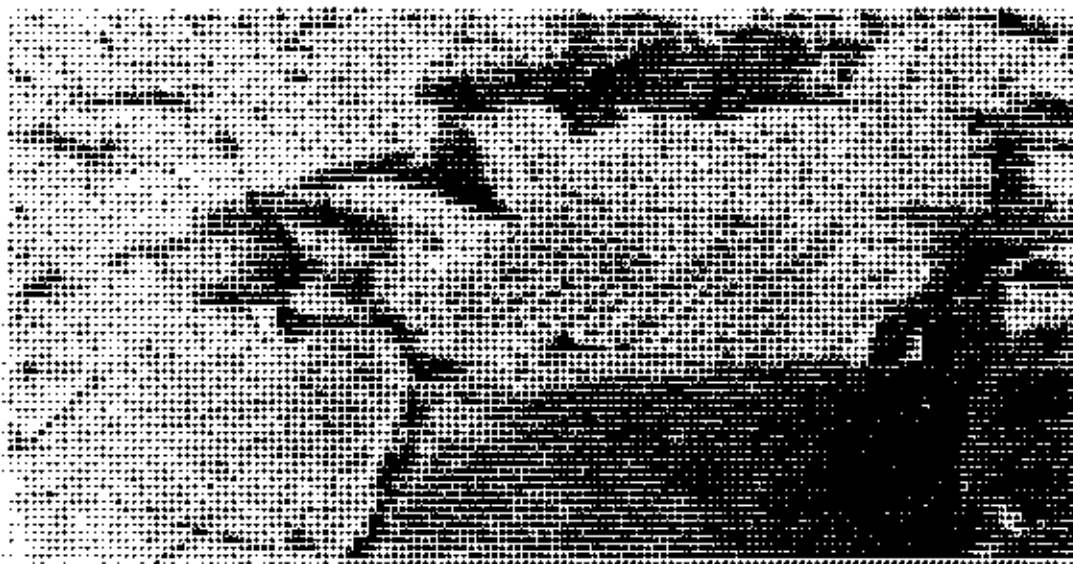


Fig. 15.1. PAPANŪ ON THE SHORE AT PAE'IKI. Photo taken c. 1919.
BPBM Neg. No. 3508.

Returning to the shore, the first important site along the east side of the beach road is the house site of Unea Akana, marked by the stone and plaster walls of an old house, a concrete cistern built on an old house platform, and surrounded by walls of the kuleana. At the southwest corner of the lot is a pavement of large waterworn stones marking an ancient house site, and between it and the house of Akana is a small pig pen. Behind it are growing hala and loulu-palm trees which probably surrounded all the old house. The next house lot to the south, that of Clara De Mello, with a modern dwelling upon it, has had added to the east two cattle pens and a wall connecting with the wall running parallel to the Kamehameha Highway. One of the concrete troughs built into the walls is dated March 5, 1945. A windmill had been placed over a well known in 1919 as Waikulu, and in the southeast corner of the great enclosure on the east, a redwood water tank and a pump house had been abandoned.

The De Mello property in 1853 came into the ownership of Manuia from his parents in 1819, according to Land Commission Award 9467, and was located in the 'ili of Alaka'i. It lay adjacent to the property of Muki on the south, who received his portion from Uhai in 1840; Land Commission Award 9470 states this. Uhai seems to have been the konohiki (manager) of Kēōkea at the time he witnessed that the little lot at the northwest corner of the Aona property was given to a man named Makoi by his parents in 1819, as stated in Land Commission Award 9469, which places it also in the 'ili of Alaka'i.

Just south of the De Mello place are the remains of an ancient house platform adjacent to a pen, with foundation stones of an old wall enclosing an area on its south. Inland are a number of graves and the remnant of an old wall. Nearer the Kamehameha Highway is another house platform with pens attached. In 1945 the U. S. Army set up a firing range upon its northern side, which accounts for two adjacent, small, narrow, coral-paved platforms, one higher than the other, constructed from materials of the old site.

South of this old house platform, at a distance of 150 ft, is a heiau platform, 50 by 60 ft, filled with heavy stones, and remarkable for the natural rock column which rises 10 ft above the pavement midway between the sides at the north end (Fig. 15.2). The column is of lava, and has been roughly shaped into rectangular form. It occupies the position of the lananulu (oracle tower) of heiaus, and would seem to have served the same purpose. The surface of the platform is now in rough condition, but smaller stones were observed at the south end, a facing across the platform at 20 ft from the north end and 1 ft higher, and a short section of facing along the west side framing a rough mound on its west, which may be a burial mound.

A pit in a jog at the northwest corner may have been a sacred refuse pit, or a pen, or the enclosure of a well. Naluahine, 95 years of age, gave us as the name of this heiau, Ma'o, which he said was the name of a bird,



Fig. 15.2. NATURAL ROCK COLUMN AT THE HEIAU 'ŌMAO, NORTH KĒŌKEA.
Photo taken c. 1957. BPBM Neg. No. H284.

later he called it 'Ōma'o. Panui, of equal age, knew of the heiau, but said he did not know the name, and doubted if Naluahine really did. Ma'o is also the name of a heiau at Wai'aha in north Kona. Stokes, in 1908, noted this Kēōkea structure, but obtained no information about it. His plan (BPBM Neg. No. 3379C*) simply states it as a "structure at Keokea." However, it was included in his heiau plans.

South of 'Ōma'o heiau are the ruined walls of a large enclosure containing one small house platform paved with coral pebbles.

CENTRAL KĒŌKEA

Central Kēōkea (Map 5) contains the house site of King Keawe, a full-length hōlua slide, an ancient heiau, shelters, and burial caves in the spectacular cliffs of Alahaka, and a famous lava tube called Waiū-o-Hina, Breast-of-Hina, which emerges in the face of the sea cliff.

*This photograph was not included in the 1957 manuscript.

KEAWE'S HOUSE SITE

The house site of Keawe (Fig. 15.3) has fortunately been well preserved. It is not only of great traditional interest, but it exhibits the plan of a chief's establishment, for certainly the three adjacent house spaces accommodated the three most important houses of a chief: his *hale mua*, or house where the men ate and worshipped their family gods; the *hale noa*, the sleeping house of the family; and the *hale 'āina*, where the women ate. We can only speculate as to where each of these three houses stood, but probably the *hale mua* stood on the central and highest platform, the *hale 'āina* on the north, and the *hale noa* on the south. There seems also to have been located here a canoe shed (*hālau*) between two of the house platforms, where a canoe not in constant use could be stored. Uhai, who appears to have been the *kōpohiki* of Kēōkea in 1840, gave this land to one named Kawelo, and it was awarded to him in 1853 by Land Commission Award 9465. It would be interesting to know who Kawelo was to have been given such a choice site.

A few pieces of crockery reveal the site as having been occupied in historic times, but its original composition does not seem to have been seriously impaired by such use. Old Naluahine claimed one named Kama'i lived here in the 1870s, and that he built the goat pen to the northwest of Heiau Alahaka. Both our old informants, Naluahine and Panui, spoke of the site as the residence of Keawe, but Naluahine went further to say it was Keawe-nui-a-'Umi, or Keawe I, and that in later time Kiwala-'ō occupied it.

Just to the south of it is a small, rectangular platform, which Kekahuna identified as a *kū'ula* (fishermen's shrine), an identification which he made also of the site at the head of 'Īlio Point, where it is probably just the rectangular stone platform which served as a shrine. The adjoining platform and enclosure may have been the quarters of the officiating kahuna.

'ĪLIO POINT

On 'Īlio (Dog) Point is an indentation where one may look down through about 8 ft of water to a stone formation resembling a dog (Fig. 15.4). According to Kalokuokamaile, whom I saw in 1924, the name of this dog was Kēōkea, and the *ahupua'a* of Kēōkea derived its name from it. However, Mary Kawena Pukui regards Kēōkea as a contraction of Ke-one-kea, the-white-sand. Panui, in 1951, recited a legend of this stone which was recorded by Homer Hayes on tape (BPBM Tape Haw19). In brief, translated, it is this: "After Pele and Kamapua'a divided the island, Pele destroyed all the *kupua* (supernatural beings) on this side of the island, including the dog that is in the sea at Keokea. His name is Anahulu." It is interesting to note that in reciting the story to Hayes he said the dog was called Anahulu, Ten Days, because it is on the tenth day that a puppy opens its eyes. However, when I

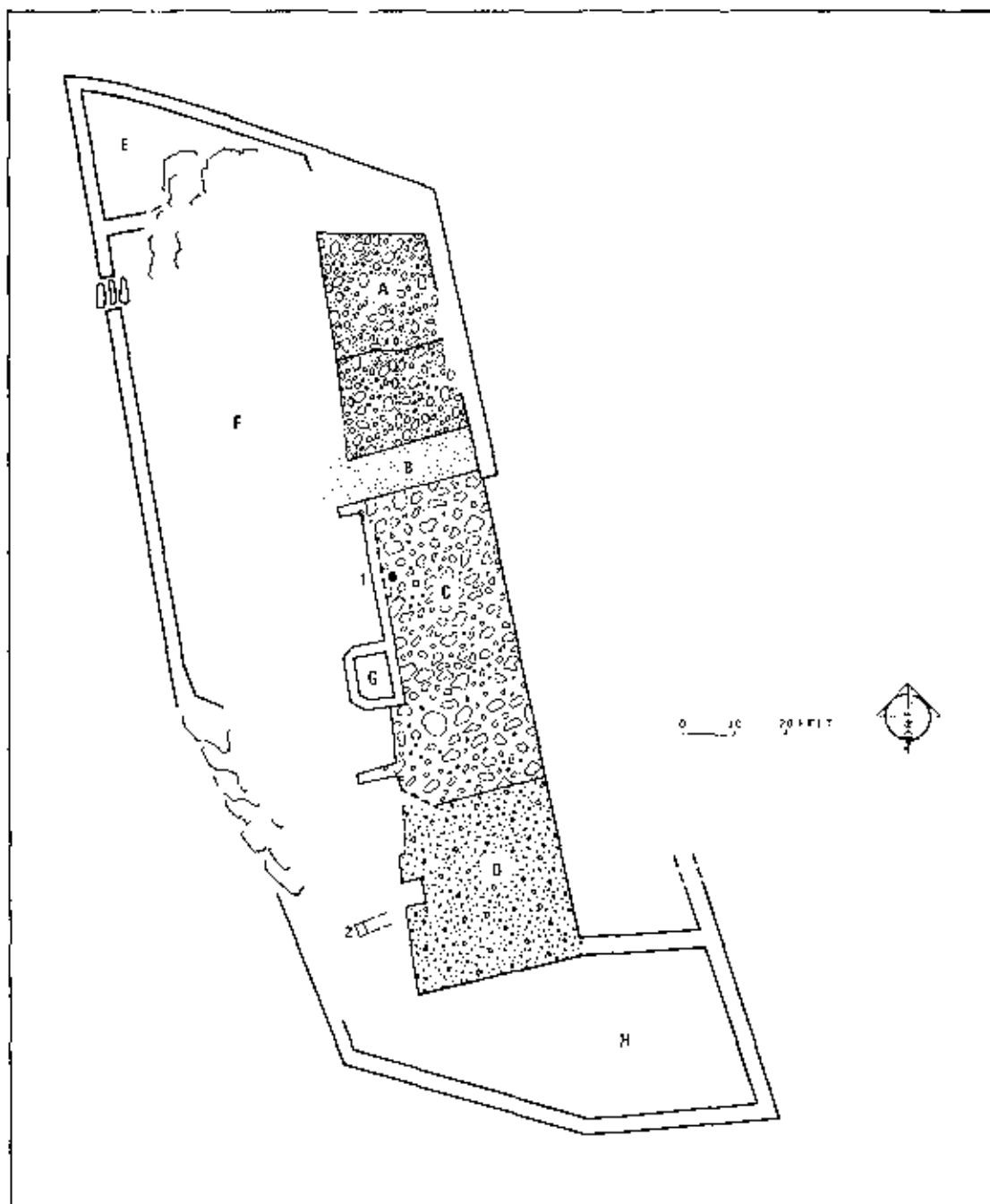


Fig. 15.3. PLAN OF DWELLING SITE OF KING KEAME, PAUMOA, KĒŌKEA (After Emory 1857). (A) platform paved with pebbles, probably the location of the women's eating house (*hale ʻāina*), the north section is higher and more finely paved than the south; (B) corridor between platforms, sanded, probably place for canoe hulls; (C) highest platform, paved with large stones, probably location of men's house (*hale mua*); (D) finest paved of the three platforms, probably the common sleeping house (*hale noa*); (E) enclosure blocked in by high lava ledge; (F) courtyard; (G) recently-constructed pen; (H) yard; (1) *papamū* (pitted stone slab on which the game *kūpane* was played); (2) entrance to a narrow vault extending about 6 ft.



Fig. 15.4. INDENTATION ON 'ĪLIO POINT WHERE AN UNDERWATER STONE FORMATION RESEMBLES A DOG. Photo taken c. 1957, BPBM Neg. No. E17-9.

talked with him at his home in Ke'ei in November 1957, he said that the dog was called Anahulu because he came from Pu'u Anahulu in North Kona, and this was the explanation of the name which Kekahuna had heard from his informants.

SITES NEAR KEAWE'S DWELLING

To the north of Keawe's dwelling site is a large modern enclosure with a corral attached, the building of which robbed the enclosure on its north of most of the stones from its east wall. Within the enclosure is an excellently-preserved house platform in two steps, finely paved with coral pebbles. It has a jog in its northwest corner, where is located a stone chamber, which Stokes learned had served as a chicken coop (Fig. 15.5). It was closed by a stone slab. When we examined the structure in 1957, a pen had been built in front of this vault, filling out the corner.

On the north of this platform, which Naluahine said also was used by Kamai in the 1870s, is level ground where a house must have stood, as it is floored with coral pebbles and an ancient grindstone lay before it.

Returning to the shore, a number of tree moulds in the lava may be observed inland from Ki'i Point (Fig. 15.6). They resemble exactly those at

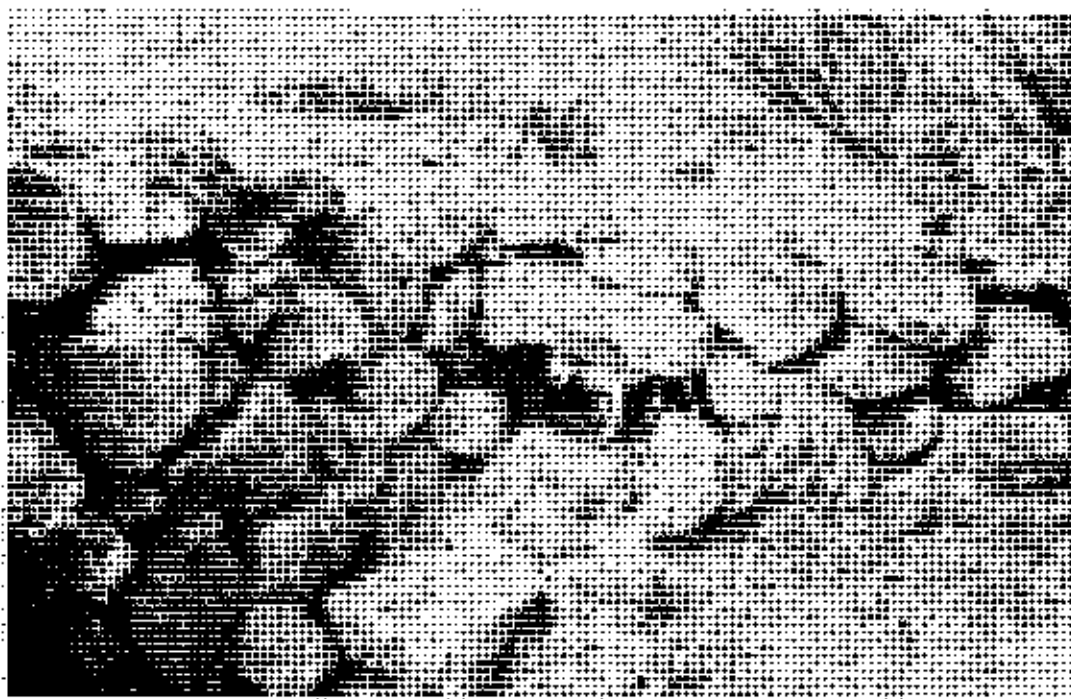


Fig. 15.5. ANCIENT HOUSE PLATFORM AT PAUMOA, KĒŌKEA. Note the stone vault in its northwest corner, which served as a chicken coop. Photo date unknown. BPBM Neg. No. 2045.



Fig. 15.6. MOULD OF A PRONE TREE TRUNK, PROBABLY THE PRITCHARDIA PALM, AT KI'I POINT, PAUMOA, KĒŌKEA. Photo taken c. 1957. BPBM Neg. No. H325.

Hōnaunau Bay. These have frequently been called moulds of coconut trees, but this is an ancient flow, in all probability predating the arrival of the Hawaiians whom we believe introduced the coconut. A close examination by Edwin Bryan and myself has convinced us these are not coconut trees, as the trunks moulded are too slender. We believe they represent the narrow-stemmed indigenous *Pritchardia* palms, which grow naturally in the area today, and which certainly could have been here in prehuman times.

From Ki'i Point the shore curves in to form the north side of Alahaka Bay, and 200 ft away a point of lava has had a cavern pierced through it by wave action. This arch is known as Ka-wai-o-Pele, the-water-of-Pele (Fig. 15.7).

The path which leads from the end of the beach road to the ancient highway passes the inland end of Keawe's house site, where on the left are the remains of the foundation of a stone and mortar chapel, and on the right a papamū pecked in the lava.

THE KAMEHAMEHA HIGHWAY

This highway is accredited to King Kamehameha I. It runs along from the end of Hanauma Bay to the south end of Alahaka cliffs, up the cliff by a well-built stone ramp paved with heavy waterworn slabs, and southward towards

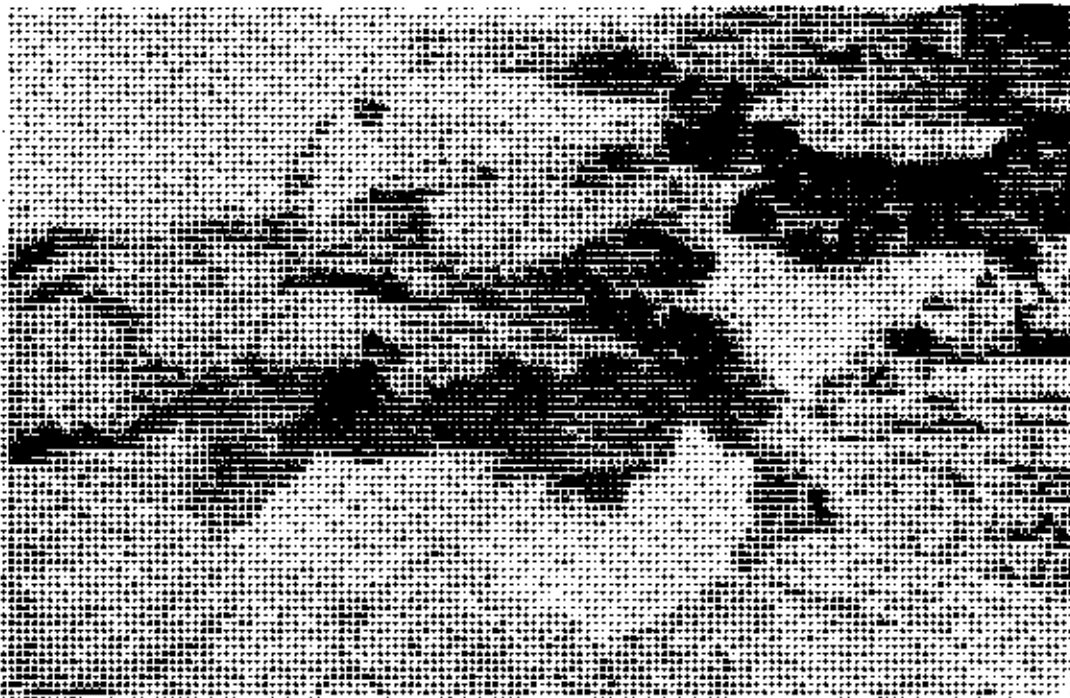


Fig. 15.7. NATURAL ARCH CALLED KA-WAI-O-PELE, KEŌKEA. Photo date unknown. BPBM Neg. No. 2053.

Ho'okena. Over much of its length across Kōōkea it is built up like the bed of a railroad, 10 ft wide, and in spots paved with coral, sand, and pebbles. One might judge it entirely modern, but Mark Twain, in July 1866, puts it in the time of Kamehameha or earlier. He speaks of it in these terms:

We walked a mile over a raised macadamized road of uniform width; a road paved with flat stones and exhibiting in its every detail a considerable degree of engineering skill. Some say that wise old pagan Kamehameha I planned and built it but others say it was built so long before his time that knowledge of who constructed it has passed out of the traditions....The stones are worn and smooth, and pushed apart in places, so that the road has the exact appearance of those ancient paved highways leading out of Rome which one sees in pictures [Clemens 1938:191].

Naluahine claimed the highway was built by Kamehameha III, and that in early times a ladder enabled the traveller to surmount the cliff, hence the name Alahaka, Road of the ladder. The road, as it appears at present, was certainly built to accommodate travel by horseback, but it must have followed the ancient trail. Remnants of an older alignment of its southern end as it approached the cliff are traceable, as shown on Map 5. The ramp, with its heavy flag stones, is the most impressive part of the highway. On Land Commission Awards of 1853 it is called Alanui Aupuni, Road of the Government.

THE GREAT HŌLUA SLIDE

Inland, back of Alahaka cliffs and to the northeast, is the start of the 1290-ft hōlua slide (Fig. 15.8) which terminates back of an ancient house platform at Paumoa. It has long gone undetected because of the removal of stone for the old highway and for the wall which crosses it before meeting the Alahaka Cliffs. The upper part, fortunately, is virtually intact, and the lower part could be easily restored because the boundaries of it are traceable. A hōlua sled is preserved in the Bishop Museum (Fig. 15.9), and William Ellis gives an excellent account of the sport.

The horua has for many generations been a popular amusement throughout the Sandwich Islands, and is still practised in several places. It consists in sliding down a hill on a narrow sledge, and those who, by strength or skill in balancing themselves, slide farthest, are considered victorious.

The papa, or sledge, is composed of two narrow runners, from seven to twelve or eighteen feet long, two or three inches deep, highly polished, and at the foremost end tapering off from the under side to a point at the upper edge. These two runners are fastened together by a number of short pieces of wood laid horizontally across. To the upper edge of these short pieces two long tough sticks are fastened, extending the whole

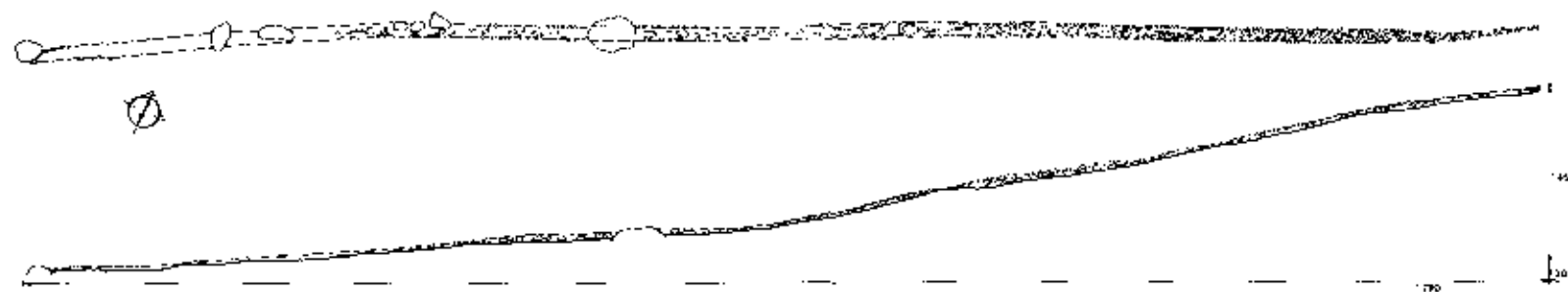


Fig. 15.6. THE LONG HŌLUA SLIDE AT KĒŌKEA (After Emory 1857).

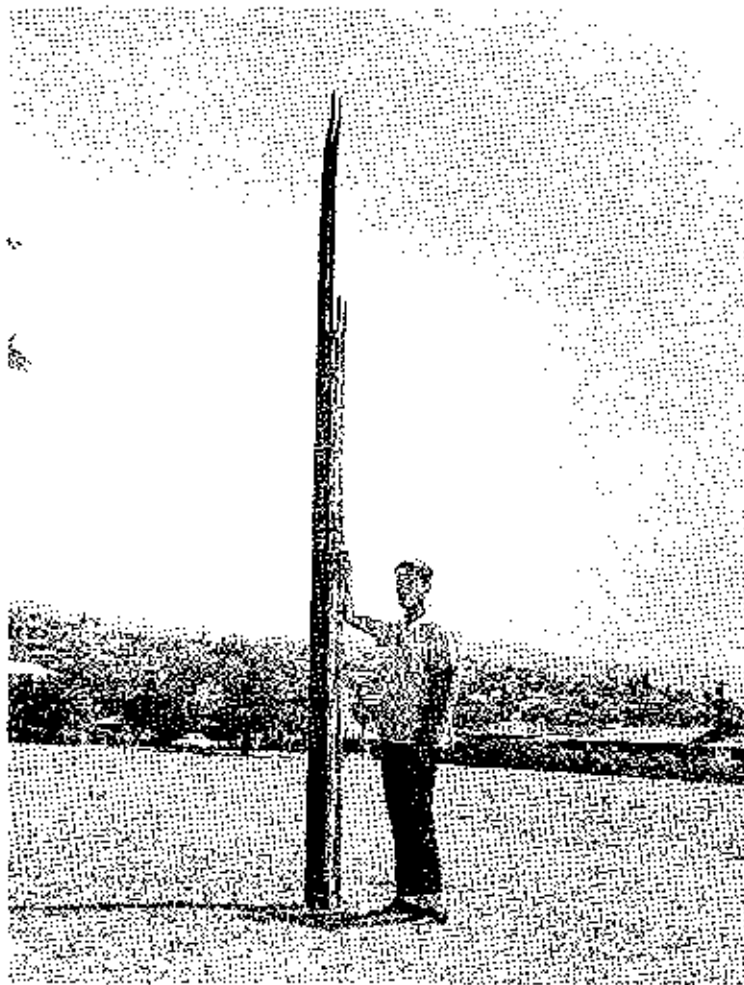


Fig. 15.9. HŌLUA SLED IN B. P. BISHOP MUSEUM COLLECTION.
Photo taken in 1957. BPBM Neg. No. 26855.

length of the cross pieces, and about five or six inches apart.

Sometimes a narrow piece of matting is fastened over the whole upper surface, except three or four feet at the foremost end, though in general only a small part for the breast to rest on is covered.

At the foremost end there is a space of about two inches between the runners, but they widen gradually towards the hinder part, where they are distant from each other four or five inches.

The person about to slide grasps the small side-stick firmly with his right hand, somewhere about the middle, runs a few yards to the brow of the hill, or starting-place, where he grasps it with his left hand, and at the same time with all his strength throwing himself forward, falls flat upon it, and slides down the hill, his hands retaining their hold of the side-sticks, and his

feet being fixed against the hindermost cross-piece of the sledge.

Much practice and address are necessary, to assume and keep an even balance on so narrow a vehicle, yet a man accustomed to the sport will throw himself, with velocity and apparent ease, 150 or 200 yards down the side of a gradually sloping hill [Ellis 1917:219-320].

THE ALAHAKA CLIFFS

The cliff (Figs. 15.10 and 15.11) is the site of three major burial caves, which we have indicated on the map*, and a number of shelters. Ellis, in 1823, was immensely impressed with the spectacle of this cliff with the cascades of solidified lava festooned over it, forming archways. He noted the burial caves and the cave and bluff shelters:

As we passed along this vaulted avenue, called by the natives Keanake'e [The-turning-cavern], we beheld a number of caverns and tunnels, from some of which streams of lava had flowed. The mouths of others being walled up with stones, we supposed were used as sepulchers. Mats spread upon the slabs of lava, calabashes, etc., indicated some of them to be the habitations of men; others, near the openings, were used as workshops, where women were weaving mats, or beating cloth. Some, we also saw, used as storehouses, or depositories of sandalwood [Ellis 1917:130-132].

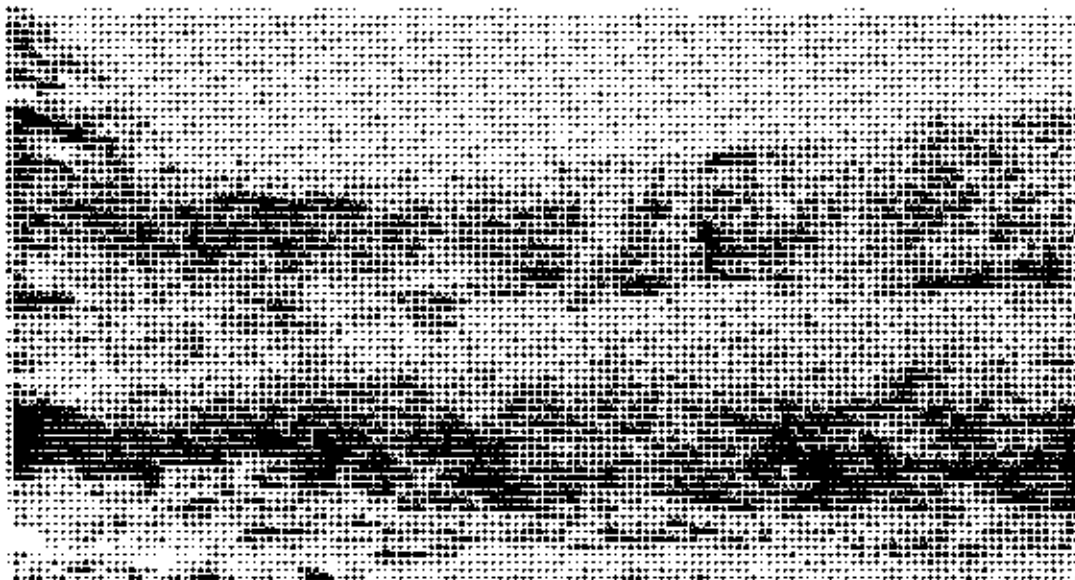


Fig. 15.10. ALAHAKA CLIFFS, KĒŌKEA, SHOWING LAVA FLOW FESTOONING. A section of the old Kamehameha Highway is in the foreground. Photo taken in 1919. EPBM Neg. No. 2054.

*Map 5.



Fig. 15.11. LAVA FLOW OVER ALAHAKA CLIFFS, KĒŌKEA.
Site of a shelter east of Alahaka heiau. Photo
taken in 1919. BPEM Neg. No. 2050.

At the north end of the cliffs, where they become low, turn, and disappear, is a large natural shelter formed by the mouth of a lava tube. It is reached by two entrances which slope down to its floor, about 20 by 40 ft in area, with the roof some 25 ft above it at the highest point. The floor has no depth of deposit, but on it waterworn stones serving for paving and for seats, charcoal, candlenuts, some sea shells, and the skeleton of two pigs, and a dog mandible show its use as a shelter. It leads into a small lava tube, which had been walled off, where are the skeletal remains of at least 12 individuals, among them children, all in poor condition with all intact crania removed. No cloth or buttons were seen, indicating these were ancient burials.

Around the bend in the cliffs, where they commence to rise to some height, is an excellent little shelter, with a floor space 10 by 25 ft, and a platform and wall in front. On the floor were fragments of a wooden bowl, fragments of gourd containers, fire sticks, large waterworn slabs, sea shells, pig bones, etc. Collectors had dug into one corner of the floor since my first visit in 1953.

Further to the south, along the base of the cliffs and directly back of a small, almost entirely natural platform overlooking the flat land of Alahaka, is a small shelter. This was partly walled, and contained some gourd fragments and pig bones.

Above the shelter just described is a small cave, about 12 ft deep, with the floor strewn with lava fragments shaken down upon it by earthquakes and landing upon the burials within. At least five children or babies were buried here, because five frontal bones were observed. A very small baby was buried in a gourd container. It had been first wrapped in white European cloth with a green and red print, then in tapa cloth with a design in red and black. There were at least four other such gourd containers in fragmentary condition and much eaten by worms.

In exploring along the whole length of the top of Alahaka cliffs, it was only above this that we came across any structure. Here, George Ruhle reports a small stone platform or cairn near the edge of the cliff.

Between the cave just mentioned and the important lava-tube burial cave to the southeast is a small shelter formed by a cleft in the cliff, rather high up, which contained cowrie shells, candle nuts, and animal bones, and served as a one-man shelter.

The cliff now begins to dip lower, and we reach a point where it is easily scalable. By following along near the top of the talus slope, we come to a cave entrance which had been carefully walled on both sides. The lava flow over the top of the cliff above seems to have dripped onto the outer part of these man-made walls, but a very careful scrutiny did not substantiate that this was so. The narrow entrance leads downward to a wide tube which has a short branch to the left, continues inward about 80 ft, and then forks. The floor had been carefully levelled in places with blocks of lava, and on the sides, shelves built in. Along the shelves were laid burials. These extended well into historic times, as revealed by buttons, European cloth, and glass beads. However, there were older burials, and originally the mouth may have served as a shelter, because here we found the usual debris of a shelter floor. At least 12, probably many more, individuals were buried here, among them 1 child.

Further to the southwest of this burial cave, by 250 ft, having an opening clearly observable up on the cliff, and reached by an easy climb, is

the entrance to another important burial cave, where modern coffins had been burned to destroy them. This too must have been used in ancient times, but its heavy use up until the beginning of this century has obscured the original burials. The place has been frequently visited and ransacked, many whole unburnt bones, clothing, a hair brush, modern buttons, clutter the chambers. This is undoubtedly the cave which Mark Twain mentions in a humorous episode where his friend enters to investigate and backs out in a hurry when he bumps his nose on the corner of a canoe-coffin (Clemens 1938:194).

Just to the north of this burial cave, the cascading lava flow, which Mark Twain described as a petrified Niagara, takes on a striking character, where the top of it has been detached from the cliff. Under the arch is a deep and long shelter, which, however, does not seem to have been much used. Its entrance on the south offered a better place for a shelter, and gave evidence of terracing to provide working space.

Around the corner of the high pinnacle to the south, which rises 84 ft above the level of Alahaka heiau platform, two conspicuous lava tube openings lead into tubes with branches, which we followed for some distance, but found no burials. Below their entrances was a shelter floor with some animal bones, perhaps goat bones, and indications of some use through a few sea shells, and waterworn stones serving as seats.

Near the east end of the cliffs, a natural shelter has been provided by an arching lava flow, and on its floor are tell-tale waterworn stones used as seats, and sea shells indicating use as a shelter. The floor has no depth of earth to it, and so would be useless for archaeological excavation. However, this and other shelters along the cliffs were ideal as workshops because of the shade they afforded, and their dampness which made them suitable for storing and working pandanus leaves for mats. This particular cave was surely one of those seen occupied by Ellis.

Where the cliff turns again, and alongside the ramp, is a natural shelter which had been extensively used, and above it are lava tubes which we found empty upon exploring them. At the upper end of the stone ramp (Fig. 15.12), a shelter on the north leads into a lava tube known as Waiū-o-Hina, Breast-of-Hina, because near its seaward end, two stalactites resemble the breast of a woman. It is 160 ft long, varies in width from 10 to 15 ft, and in height from 2 to 6 ft. Where it emerges on the cliff it appears to be more than 20 ft above the deep water at the base.

ALAHAKA HEIAU

Lying within the amphitheater formed by the cliffs of Alahaka is the stone platform of an ancient heiau, 80 by 90 ft, and at its highest point above the surrounding lava floor, 8 ft high (Fig. 15.13). It is remarkable

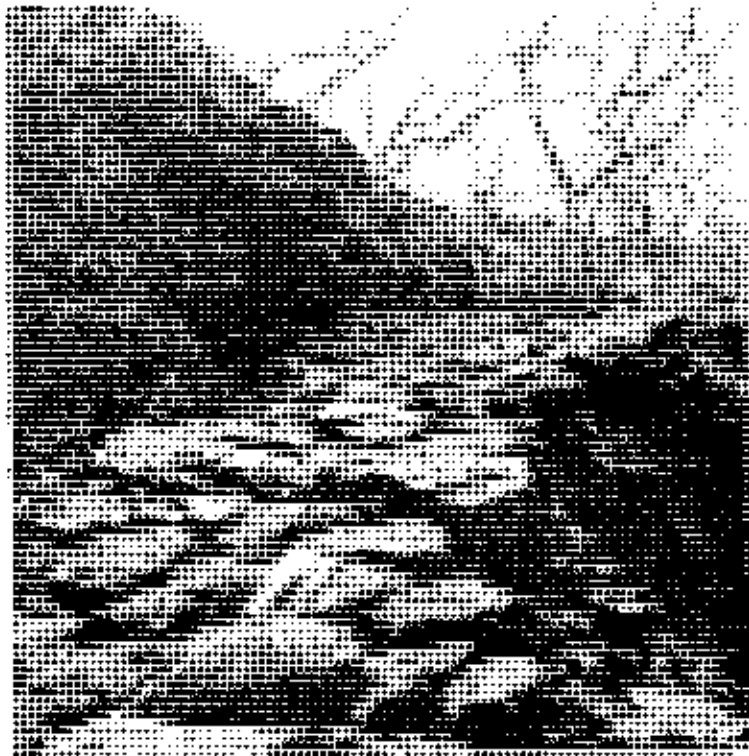


Fig. 15.12. RAMP OF KAMEHAMEHA HIGHWAY, AND ENTRANCE TO WAIŪ-O-HINA LAVA TUBE, KĒŌKEA. Photo taken c. 1957. BPBM Neg. No. H328.

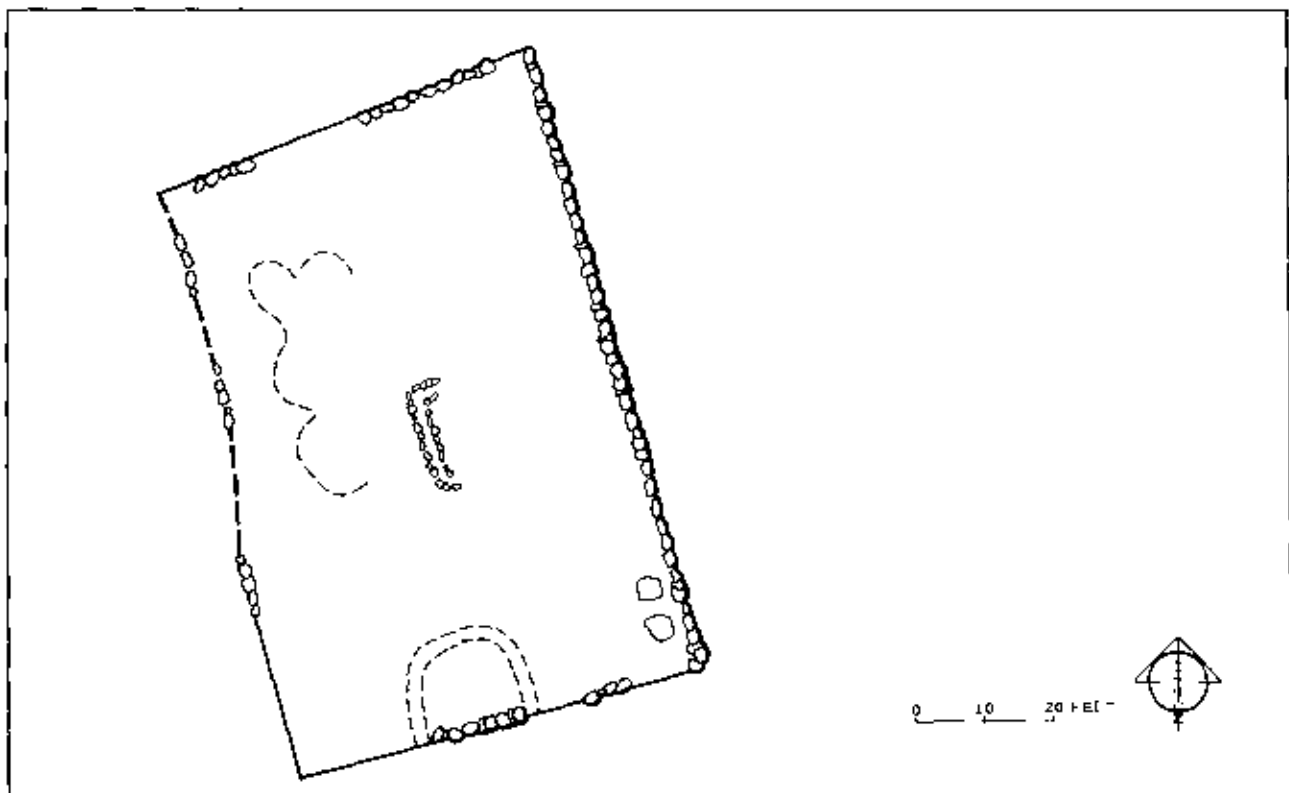


Fig. 15.13. PLAN OF ALAHAKA HEIAU, KĒŌKEA (After Emory 1957).

for its facing of carefully fitted lava stones with a flat, vitreous surface exposed in the face of the wall (Fig. 15.14), and for its pao (vaulted) construction (Fig. 15.15). All through the greater part of the platform, glimpses into the hollow underpinning may be had, where the pavement has been torn up perhaps by curiosity seekers, perhaps for stones to build the goat pen 150 ft northwest. The southern end was lower, and distinct divisions in the pavement were originally present. A long, careful, and detailed study of alignments and original surface pavements would enable a reasonably good restoration to be made of this heiau.

Stokes was told in 1906 that this was not a heiau, but in 1919 an old woman, a former resident, said it was a heiau named Hale o Lono, and that human sacrifices were not offered here. Hale o Lono can be a descriptive name for heiaus where human sacrifices were not offered. Reinecke (Ms.) collected the name as Heiau Walahaka, which is of course, Heiau Alahaka, and merely a descriptive name. Kekahuna gathered the name 'Ī-maka-kōloa, which is the name of a famous chief. Undoubtedly it is a quite ancient heiau, probably contemporaneous with 'Āle'ale'a heiau which has the same construction.

HOUSE PLATFORM AT BASE OF CLIFF

Before the old highway turns to mount the cliff, the remains of an ancient house platform can be observed against the cliff. It consists of one platform, 20 by 40 ft and 2 ft high, placed on a larger platform. The cliff in back rises to a height of about 50 ft. Here is where a guard lived, according to Kekahuna.

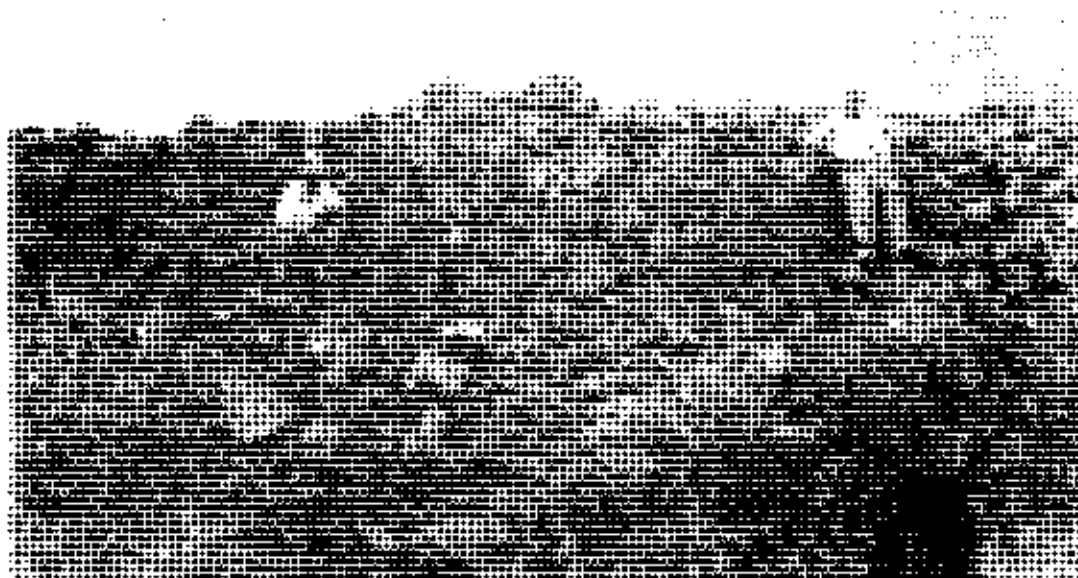


Fig. 15.14. EAST FACE OF ALAHAKA HEIAU. SHOWING SKILLFUL PLACEMENT OF LAVA BLOCKS WITH THEIR VITREOUS, UPPER FACE FORMING THE OUTER FACING OF THE GREAT PLATFORM. Photo taken c. 1919. BPBM Neg. No. 2036.

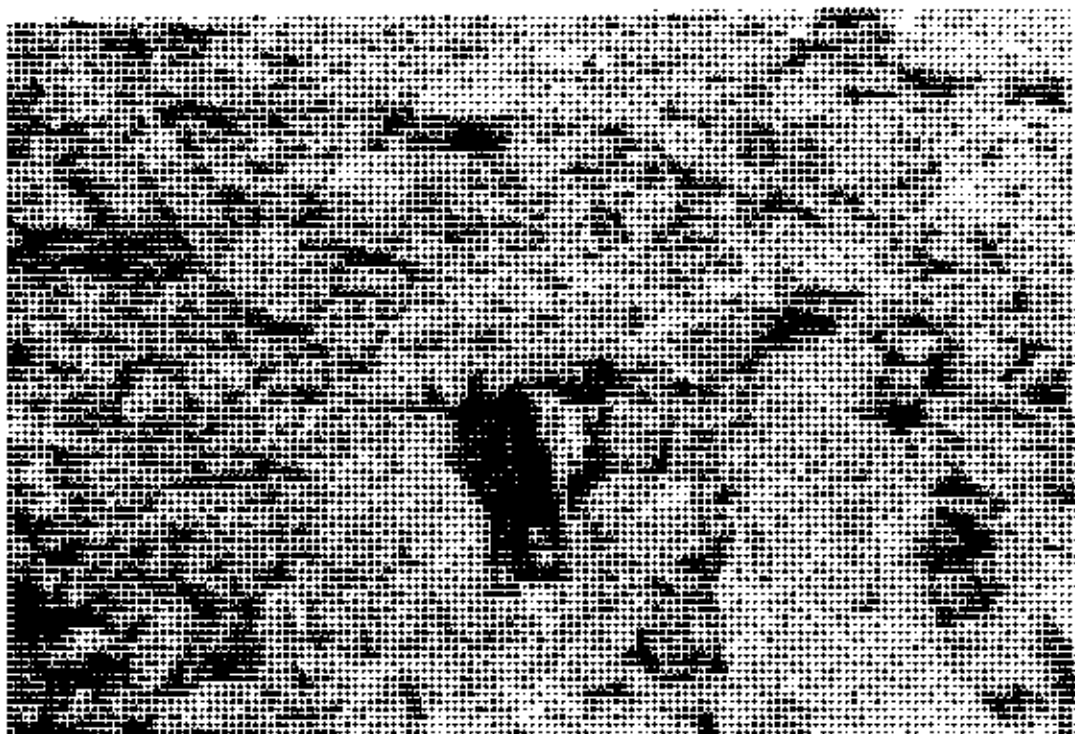


Fig. 15.15. BREAK IN THE FLOOR OF ALAHAKA HEIAU, SHOWING HOLLOW CONSTRUCTION OBTAINED BY SETTING SLABS ACROSS UPRIGHT STONES. Photo taken in 1919. BPBM Neg. No. 2058.

SOUTH KĒŌKEA

Mounting the Alahaka Cliffs by the stone ramp, we pass back of Pukakio Point and Hinalea Cove to the first ruins of consequence, those of the establishment of the Jno. Ahu family, abandoned for more than a score of years. This seems to have been built on an old site of some consequence, but the modifications have been so great as to obliterate its ancient character. We learn from Land Commission Award 9464 that this *pā hale* (house site) in the 'ili (land section) of Pa-ilima, Kēōkea, was awarded in the 1850s to one named Maka'ike, who had received it from his parents in 1819. At the same time we learn that he had been given 19 taro patches and 9 sweet potato patches inland in the 'ili of Papua'a, in Kēōkea, from one named Polani, in the year 1839, and 6 potato patches (*kīhāpai 'uāla*) in the 'ili of Uluka'a, in Kēōkea, from one named Ka'awa, in 1840. Thus he was well provided with products from the sea and the land.

On the south of the point,* Alahi'i Cove in Ki'ilae Bay provided deep and sheltered waters for small steamers to enter for the unloading of lumber and commodities in exchange for salt, goat, and cattle hides. Whale boats and canoes, through most of the year, could glide up to a natural rock shelf and easily embark passengers and freight.

Across the old highway we come to the outskirts of Ki'ilae Village, where stone walls enclose house lots. Some of these walls are old and tumbled down, others quite new. The first enclosure on the north (Map 6) takes in land around a height overlooking the highway, and in its central part a lava bed provides a natural platform for a dwelling which seems to have stood here, judging from midden material. Likewise, the enclosure to the south must have had a dwelling for the same reason, and a papamū on a portable stone rested here. The third lot has two old house platforms, at one of which a small enclosure surrounds a concrete tomb. The next lot south has a small, typical house platform, and the enclosure next to the boundary between Kēōkea and Ki'ilae had a modern establishment erected on it not long before, as decaying house timbers, discarded metal pots, broken crockery, gave abundant testimony. But in front of a stonewall pen in the middle of the lot is part of a fine ancient paving of large waterworn stones, and in the back part of the lot, the foundation stones of an ancient house, while into the new wall along the south border are incorporated numerous waterworn boulders which must have been in an old house platform nearby, for the ground here is strewn with midden material. In the southwest corner of the lot an artificial basin, 1 ft in diameter and 1 ft deep, had been pecked into the top of a stone ledge.

This last lot is recorded in the Land Commission Awards as award 9463, to one named Holua, who received it from his parents in 1819. It is stated to be in the ʻili of Papua'a-iki, in Kēōkea, and that Holua received a taro patch in the ʻili of Piahulihuli, in Ki'ilae, in 1840.

KI'ILAE

We cross now into Ki'ilae, a village which owed its importance to Ki'ilae Bay and to the well, Wai-ku'i-o-Kekela, Pounded-well-of-Kekela, over which a windmill was erected in recent times.

Chiefess Kekela-o-ka-lani was the mother of Queen Emma, the wife of Kamehameha IV. She resided at Ki'ilae on the beautiful house platform overlooking the well in the early and middle 1800s. Kalokuokamaile of Nāpō'opo'o wrote out for the Bishop Museum in 1923 this story concerning the well.

*Ahinehina Point. (DB)

Story of the Pounded Water of Kekela

An elderly man and his wife were living in the middle of the cultivable (kūla) lands of Kiilae, South Kona, Hawaii. The work of these two was the cultivation of sweet potatoes. Also with these two old people was a dog. While they cultivated this land, and the days were very long, they could not understand the doings of their dog. While they cultivated near the mouth of a certain cave their dog appeared from inside of it, and came out wet with water.

The old man said to the old woman, "Do you see anything unusual?" Answered the woman, "No, I don't." Said the old man "Let's wait until tomorrow, then you will see and we will both see it." The old woman did not understand the words of her husband. They lay down that night with their dog. The old man observed their dog more closely and he noticed when the dog went out. He did not neglect to notice the time of his going. He watched closely until the time the dog left. At the time the dog went, he followed quickly. The dog entered the cave. He noticed when he went in and when he came out again.

The two cultivated their sweet potato garden; and near to the time the dog was to return to them, the husband said to the wife, "Let's go to the opening of the cave and there do our work." They went to the opening of the cave to cultivate. Said the man to his wife, "I have an unusual thing to show you." "What unusual thing?" "Do you see our dog?" "Not in the least." Said the man, "Let's stay here until our dog returns. We are going to receive riches and benefits from our dog. Let's wait until he returns. He will come soon." While they were talking the dog came, and his fur was wet with water. Said the husband to his wife, "Now do you see our dog? Yes; and do you understand?" "No." "Don't you see the fur of our dog is wet with water? Yes; indeed; there is water perhaps inside this cave. Tomorrow we will go with the dog into the cave. Maybe the water inside will be lucky for us, who live in this land without water."

They made several strings of kukui nuts and bound them together with green ti leaves so they would not burn all at once and quickly use up the nuts. This was a light for entering into the cave. When they entered with their dog, they went along inside the cave until they reached a place they couldn't go through, the entrance being very narrow. They returned outside, leaving the dog. While they came out of the cave, the old man said to his wife "Let us make this known to the overseer of this land, and, perhaps, obtain this water." The report was sent to the overseer, and several men were sent to go with the dog. The men went to the place where they could go no farther, only the dog being able to go on. This was made known to the ali'i who was living at Kiilae, this water of the dog's. She asked her kahunas about it, whether it was really water or not. The

kahunas of Kekela looked and saw that it was truly so, that it was really water, and with great labor could be obtained. This water was there to be obtained from the rock.

This water was near the seashore. It was a mile from the entrance of the cave to the seashore where the spring was. That cave has been called the Cave of the Dog to this day and forevermore. The kahunas pointed out the place to hammer a certain rock with another rock. The work of the men was to go upland to fetch firewood to be lighted on top of the rock of the spring.

It was lighted to burn red hot, then a rock hammered onto the rock set on fire, then the rock that was lighted burst open. The strange thing was that the travelling company coming from Ka-'u to go to Kohala could not go, they were stopped there and sent upland for shoulder loads of firewood. And so with the people going to Ka-'u-- they were stopped there and sent up for shoulder loads of firewood. Truly this spring was made here, beside the road that goes to Ka-'u, Hilo, and around the island of Hawaii. Therefore, no one who passed by could escape. The alii's work was continued right on top of this hard rock mound, without knowing there was water underneath this mound. But she listened to the words of her kahunas. The men fetched firewood and it was a long time that they hammered with patience at the rock until the water was obtained. Ea, wonderful indeed was the making of this spring; only on the paying attention of the alii to this doing of the kahunas. Here let it be said, the pointing out of the kahunas was correct. Eight feet were pounded through that rock mound before water was found. And here is this spring that lies here by the road. It was called after the name of the alii whose work it was. That was Kekela. The name of this spring to this day and forever, and a famous deed it is indeed, "The Pounded Water of Kekela."

[Barrère translation]

Among chants in the Bishop Museum composed for Malia Ka'oanaeha Davis is the following which eulogizes Ki'ilae and the well Wai-ku'i-o-Kekela, and mentions the cliffs of Alahaka.

Pau 'ole ka mana'o
Ka nani o Ki'ilae,
O ka 'iwa kiani
Malu iho na pali.
Pali a o Alahaka
O ka haka kau 'ia
O ku'u mana'o,
I mana'o aku au
E iho i ka wai
Wai-ku'i-a-Kekela.
Hu'elani, ku'u hoa,
Kuluku'u 'ole ihi.
Ua lawe e ka iho
O ka huelopoki,
Oni ana i ka maka
Na lae makawalu.

Endless is the thought
Of Ki'ilae's beauty,
Of the soaring frigate bird
Casting a shadow on the cliffs.
The cliff of Alahaka
Is the perch on which
My thought rests,
As I think
Of drinking the water
Of Wai-ku'i-a-Kekela.
Hu'elani, my companion,
Never relaxes.
Taken along at the prow
Of the whaleboat,
Passing before the eyes
Are the many points of land.

Na Hau o Ma'ihī.
 Mai maihi ʻōe
 I ka pili ua pa'a.
 Au ana i kai
 Na lehua o Pinaoao,
 Pauku me ka hala
 O Ha'imoeipo
 Ku'u ipo 'iliāhi,
 Ke pukonakona,
 A o Ki'ilāe nei.

O Hau breeze of Ma'ihī,
 Do not remove
 The bond that holds fast,
 Floating out to sea
 Are the lehua of Pinaoao,
 Combined with the hala
 Of Ha'imoeipo,
 My sweetheart (sweet as) sandalwood,
 A stalwart person,
 Here in Ki'ilāe.

[Pukui translation]

'Īlio Cave, or the Cave of the Dog (Fig. 15.16), leading to the well Wai-ku'i-o-Kekela, we found to be a refugee cave with three entrances or exits inland. We have traced its outlines roughly on Map 7. The uppermost entrance led by an artificially narrowed passage into a shelter, the floor of which we excavated for an analyses of its content and for charcoal for a radiocarbon date. This charcoal is now at the Yale University Geophysics Laboratory for dating*. Our report on this cave will appear eventually among our reports of archaeological excavations. Although it lies outside the proposed park area, its study can throw important light on the life of those who inhabited this part of the coast.

The house platform of Kekela is one of the finest examples extant of a foundation for a Hawaiian house, with its pavings of large, flat, waterworn stones and of beach pebbles.

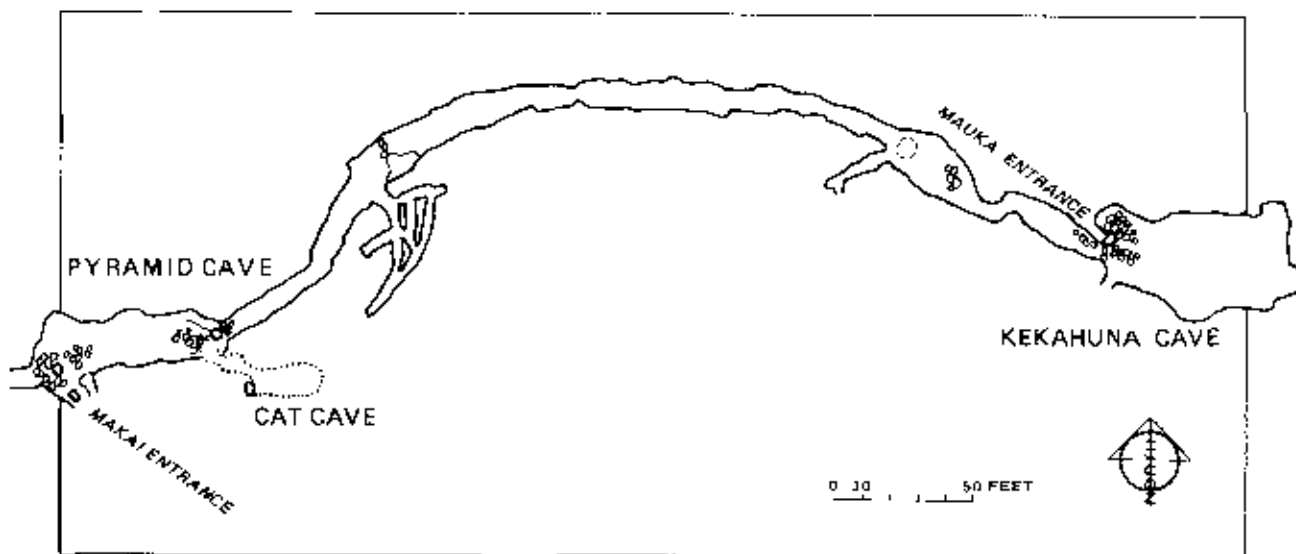


Fig. 15.16. PLAN OF UPPER PART OF 'ĪLIO CAVE, KI'ILAE (After Emory 1957).

*Information on file in the Dept. Anthropology, B. P. Bishop Museum, indicates that the sample was neither processed nor returned by the Yale University Geophysics Laboratory.

Kekahuna, according to his interpretative map, received information that the two small structures east and south of Kekela's platform were heiaus. The one on the east named Pua-hala, serving as a heiau for the increase of food (heiau ho'oūlu'ai), and the one on the east as an astronomical heiau (kilo hōkū heiau). He recognizes more divisions and features than we could find. The structure on the south had coral incorporated into it, and is what we would be likely to regard as a ko'a (fisherman's shrine).

Across the old highway from the well is the house site of one named Pawai. In front of it is a stone slab, 9.5 by 5 ft, identified by Kekahuna as used in the pounding of poi. North of this house site is an old terrace faced with a line of heavy boulders, and north of this a small enclosure, fronted by a paved terrace, which Kekahuna calls a kū'ula (fisherman's shrine). North of this is a finely-built platform with an upper terrace and waterworn stone slabs forming a pathway. This structure was given the name Heiau Ka'apua* by Kekahuna's informant. In the top of a lava mound back of the heiau and kū'ula is an old, artificial poho (basin), 2 ft in diameter and 1 ft deep, with stones placed around it set in concrete. Horses could be watered here.

Further north are the remnants of two ancient house platforms, the northernmost one having been occupied into historic times, as evidenced by rotting timbers and broken crockery.

Going now to the boundary mark K+K, we cross over a small lava tube which opens out onto the sea cliff from an opening across the road on the inland side. This is used by fishermen to store their bamboo poles. Following up the boundary line now marked by a wire fence put in during a year or two previously, we pass the disrupted pavements of two small houses, a small cave shelter, and then at a distance of 400 ft from the shore, come upon a very rough pavement designated by Kekahuna as Kumu-ko'a Heiau, where "students received graduate training for the priesthood." We found it quite impossible to trace out the divisions he makes for this platform on his map of August 14, 1956, and his house foundation for the priests, which he placed a few feet to the northwest, appeared as no more than an outcrop of loose stones. East of "Kumu-ko'a" heiau, a small, rough platform has been named Kole-aka Heiau by Kekahuna's informant, who claimed that here priests received their preliminary training before going on to Kumu-ko'a. We observed a small fireplace framed by stones set on edge, in the middle of this platform.

In the northwest part of the proposed park area is an old platform which seems to have been a house platform paved with some waterworn slabs. This platform has been converted into a burial place.

*Ka'akapua on map, probably correctly. (DB)

Following down the old Ki'ilae trail from upland, we pass large walled enclosures on both sides, serving now as pasture enclosures.

On the north a cluster of three small platforms, rising in two tiers and paved with coral stones, marks graves of recent date, as shown by the mortar holding retaining walls together. When the trail passes through a gate, we come to a level space on its north adjoining a depression used as a pen. Here a house once stood, as indicated by some paving. Across the wall to its north is an ancient platform paved with large waterworn stones, and rising in three terraces. We note on Kekahuna's map that he links this platform with one lower down in an assemblage with many divisions which he calls "Hale 'A'ama Heiau." We know of a heiau of that name at Hōlualoa in north Kona. A frame house had stood on the lower platform, its timbers not entirely rotted away, and broken crockery lay on its surface.

North of the enclosure of the two above platforms, in the adjacent enclosure, is an old house platform as well made and preserved as the Kékela house platform. A frame house had been built on this also, and Kekahuna has notes that this was a house site of Manunu. The concrete tomb on its north, and broken crockery, again indicate its occupation until recent times.

Returning to the Ki'ilae trail, in the first lot on its south is a neat enclosure back of a paved terrace, which Kekahuna's informant says was a heiau kuku-kapa (tapa-making shrine), and behind it a very rough rectangular pavement. To the south a paved area lies in front of a knoll, and towards the front of the lot a house foundation in two levels faces on a wide terrace.

The lot to the south of the last contains in its upper half a very rough platform and two small pens, and across the wall in front of it the remains of an old and nicely-paved house platform in two levels. The concrete tombs at the southwest corner of this enclosure have no names or dates upon them.

GLOSSARY OF HAWAIIAN TERMS

'a'ā	Rough, broken lava
'aha	Sennit, cord
'aha kapu	Consecrated sennit; sacred assembly
ahupua'a	Land division usually extending from sea to uplands
'alā	Dense, waterworn, volcanic stone
alanui	Road, trail
ali'i	Chief
'amama	Finished, to finish a prayer
ana	Cave
ana pe'e kua	Refuge cave (the accepted version)
ana pu'uhonua	Refuge cave (a known version)
'anu'u	Tower of an ancient heiau
'auhuhu	The legume <i>Tephrosia piscatoria</i>
'aumakua	Family or personal god
'aumākua	Plural of 'aumakua
'aumakua o ka pō	Ancestral gods of the remote past
'aumakua o ke ao	Immediate ancestral gods
'awa	The shrub <i>Piper methysticum</i>
hakahaka	Vacant space
hale 'aumakua iwi	Building where ancestral bones were kept
hale poki	Shrine where the bones of dead chiefs were kept
hala	The pandanus or screw pine (<i>Pandanus odoratissimus</i>)
hālau	Long house
hale 'aina	Women's eating house
hale mua	Men's eating and worshipping house
hale noa	Family sleeping house
haumia	Uncleanliness
hauna	Chum used to attract fish
heiau	Pre-Christian place of worship
heiau ho'oulu 'ai	Heiau for the increase of food crops
heiau kuku-kapa	Heiau for beating/making kapa
hōlua	Sled
honua	Land, earth
ho'oskua ia	Deified
ho'okū	To stand, set upright
ho'omoe	To sleep, lay vertically
ho'omana	To worship
ho'oniho	To lay stones interlocking
ho'opā'apa'a	To argue

hula	Native Hawaiian dance form
'ili	Land section, usually a subdivision of an ahupua'a
'ilima	The shrub <i>Sida fallax</i>
i pe'a 'ia	Made into clusters, as in ti-leaf thatch
iwikuamo'o	Near and trusted relative of a chief who attended to his personal needs and possessions, and executed private orders
ka'ai	Basket container for human bones
kahu	Honored attendant, guardian
kahua hōlua	An open place for hōlua sliding
kahuna	Priest, expert
kāhuna	Plural of kahuna
kahuna 'anā'anā	Sorcerer who practices black magic
kahuna lapa'au	Medical doctor
kānoa	Bowl, as for kava; hollow of land
kapa	Barkcloth
kapu	Taboo, sacred
kapu lūmalūma'i	Drowning kapu
kapu'o	A cry proclaiming a taboo on the approach of a sacred personage
kauila, kauwila	The native tree <i>Alphitonia ponderosa</i>
kīhāpai 'uala	Sweet potato patch
kilo hōkū heiau	Heiau for observing and studying the stars
kīlu	A game where the player chanted as he tossed a quoit towards an object placed in front of one of the opposite sex; if he hit the goal he claimed a kiss
kīpaepae	Stone pavement
kīpapa	Pavement, level terrace
koa	The native tree <i>Acacia koa</i>
kōkala	The porcupine fish (<i>Diodon</i> spp.)
ko'a	Shrine
kōnane	Ancient game resembling checkers
konohiki	Headman of an ahupua'a land division under the chief
kou	The tree <i>Cordia subcordata</i>
ku i ke ka'ai	To place in a sennit container
kukui	The candlenut tree (<i>Aleurites</i> spp.)
kūkūohi	Sharp, steep
kula	Plain, field, or pasture
kuleana	Property, portion, title, jurisdiction
kū'ono	Nook, cranny; inside corner
kupua	Demigod, especially a supernatural being possessing several forms
kū'ūla	Any stone god used to attract fish
lapanu'u	High frame where heiau images were placed

lanānu'u mamao	Oracle tower
lele	Sacrificial altar or stand
lele kawa	To leap feet first from a cliff into water without splashing
leho	Cowry shell
lei	Necklace of flowers
loli	Sea slug (<i>Holothuria</i> spp.)
loulu	Native fan palms (<i>Pritchardia</i> spp.)
luakini	Large heiau where ruling chiefs prayed and human sacrifices were made
luapa'ū	Refuse pit in the luakini or temple enclosure
makaloa	The perennial sedge <i>Cyperus laevigatus</i>
makua	Parent, or any relative of the parents' generation
māmāne	The native leguminous tree <i>Sophora chrysophylla</i>
mana	Supernatural or divine power
mauka	Inland, towards the mountain
milo	The tree <i>Thespesia populnea</i>
moepu'u	Person who dies in order to serve as a companion or retainer to a deceased chief
mo'o	Lizard, reptile of any kind
noni	The Indian mulberry (<i>Morinda citrifolia</i>)
niubi	A large, grey, man-eating shark
Ōhi'a lehua	The tree <i>Metrosideros polymorpha</i>
Ōpihi	Limpet (<i>Helcioniscus</i> spp.)
pā hale	House lot
pāhi'uhī'u	A game: throwing darts at a target, or pushing a stone with sharp sticks to a goal
pāhoehoe	Smooth, unbroken type of lava
pāli	Cliff, precipice; steep hill
pao	Cavern
pāpamū	Kōpape board
pe'a	Style of thatch construction
pia	Polynesian arrowroot (<i>Tacca leontopetaloides</i>)
pili	The grass <i>Heteropogon contortus</i>
poho	Depression, hollow
poi	Cooked taro corms, pounded and thinned with water
pūhenehene	A game where a stone or piece of wood was hidden on a player and the other players tried to guess on whom it was hidden
pūku'i iwi	Bundle of bones
pūnāhele	A favorite
pu'u	Hill
pu'uhonua	Place of refuge, asylum
pu'ukāua	Fort, fortification, stronghold

tape	Variant of kapa
tapu	Variant of kapu
'uhaloa	The small, downy weed <i>Waltheria americana</i>
ulua	Certain species of crevalle or jack
wā	Space, interval, as between objects

Appendix

COPY OF CHAMBERLAIN'S MEMORANDUM

The venerated and deified bones of former kings and chiefs of Hawaii, which had been deposited at Honaunau in the house of Keawe, have recently been removed, the wrappers taken off, and the bones deposited in two coffins and buried in a cave at Kaawaloa.

List.

In one coffin.

Keohokuma
Okua
Umicopa
Keaweluaole
Keaweakapeleaumoku
Kuaialii
Kaaloa
Lonoakolii
Kaleioku

In the other coffin.

Kalaimanahu
Kaoleioku
Okanaloaikaiwilewa
Keawe
Kumukoa
Lonoikahaupu
Hukihe
Kekoamano
Keaweakaraha
Niula
Kowainiulani
Lonoamoana
Lonothonuakini
Ahaula

Five or six more were brought over from the house of Liloa at Waipio. At the setting of every post and the placing of every rafter, a man was sacrificed, and at the thatching of every wā, a man was offered as a sacrifice.

In regard to those at Honaunau, at the pulling off* the flesh, at the putting up of the bones, at the putting on of the kapa, and at the winding on of the string (sennit), the same with regard to those at Waipio; and also in the making of the basket in which the bones of Liloa, Lonoikamakahiki were deposited, a human sacrifice was made at the different stages of the work.

The above is a copy** of a memorandum made by L. Chamberlain.

*...pulling off of the flesh....

**"Copy" meaning a retyped version of Chamberlain's memorandum.

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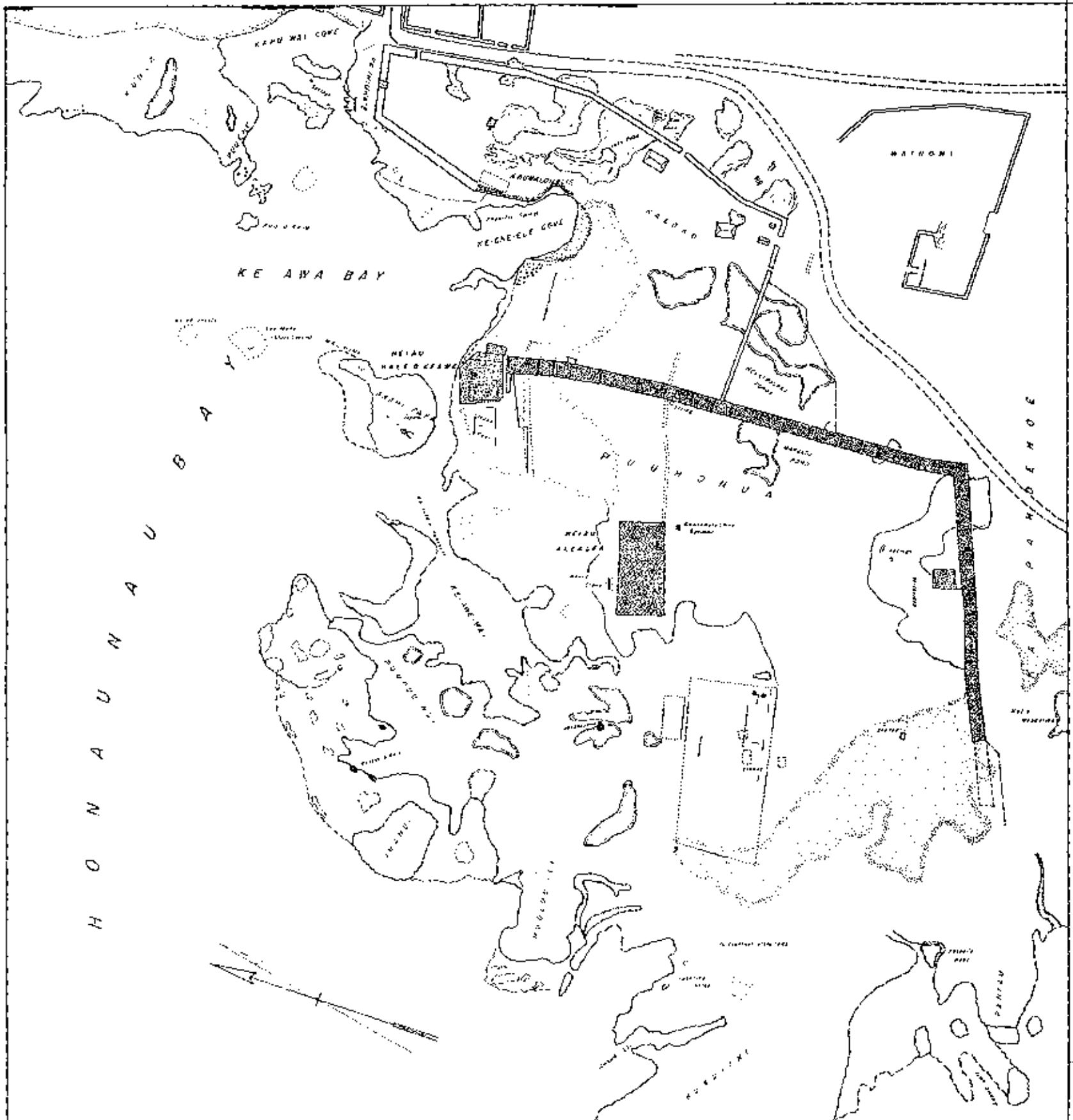
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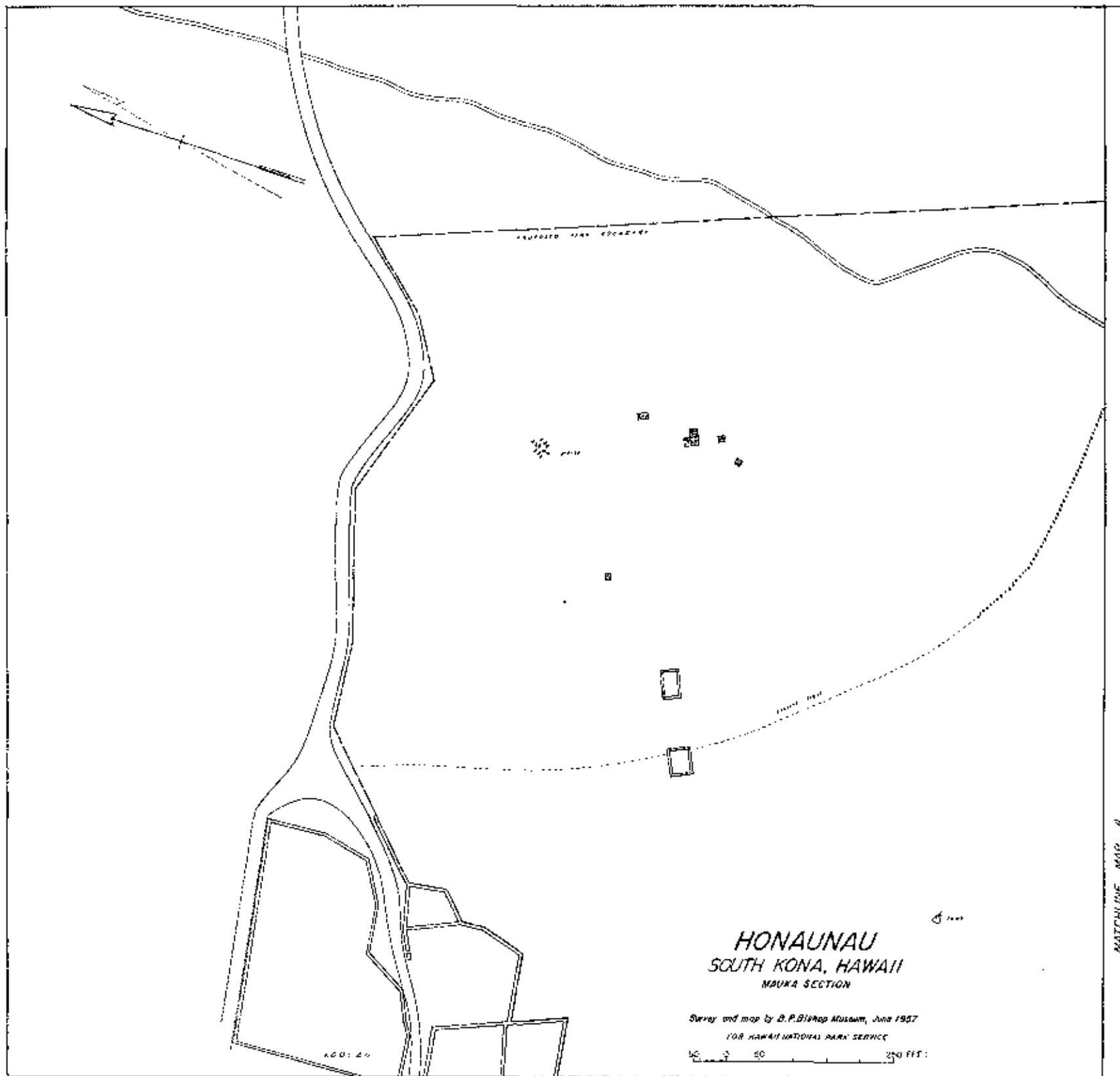
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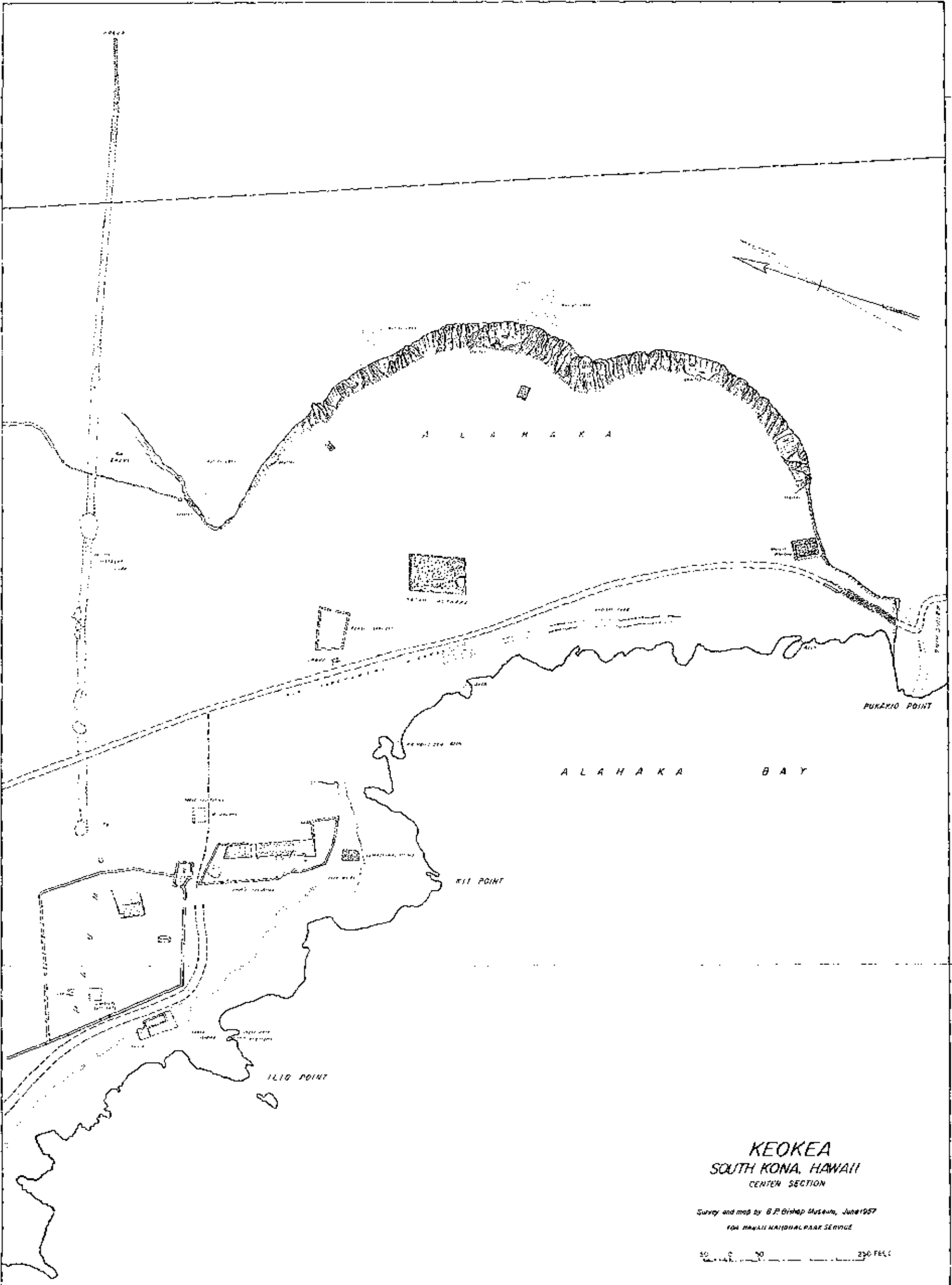
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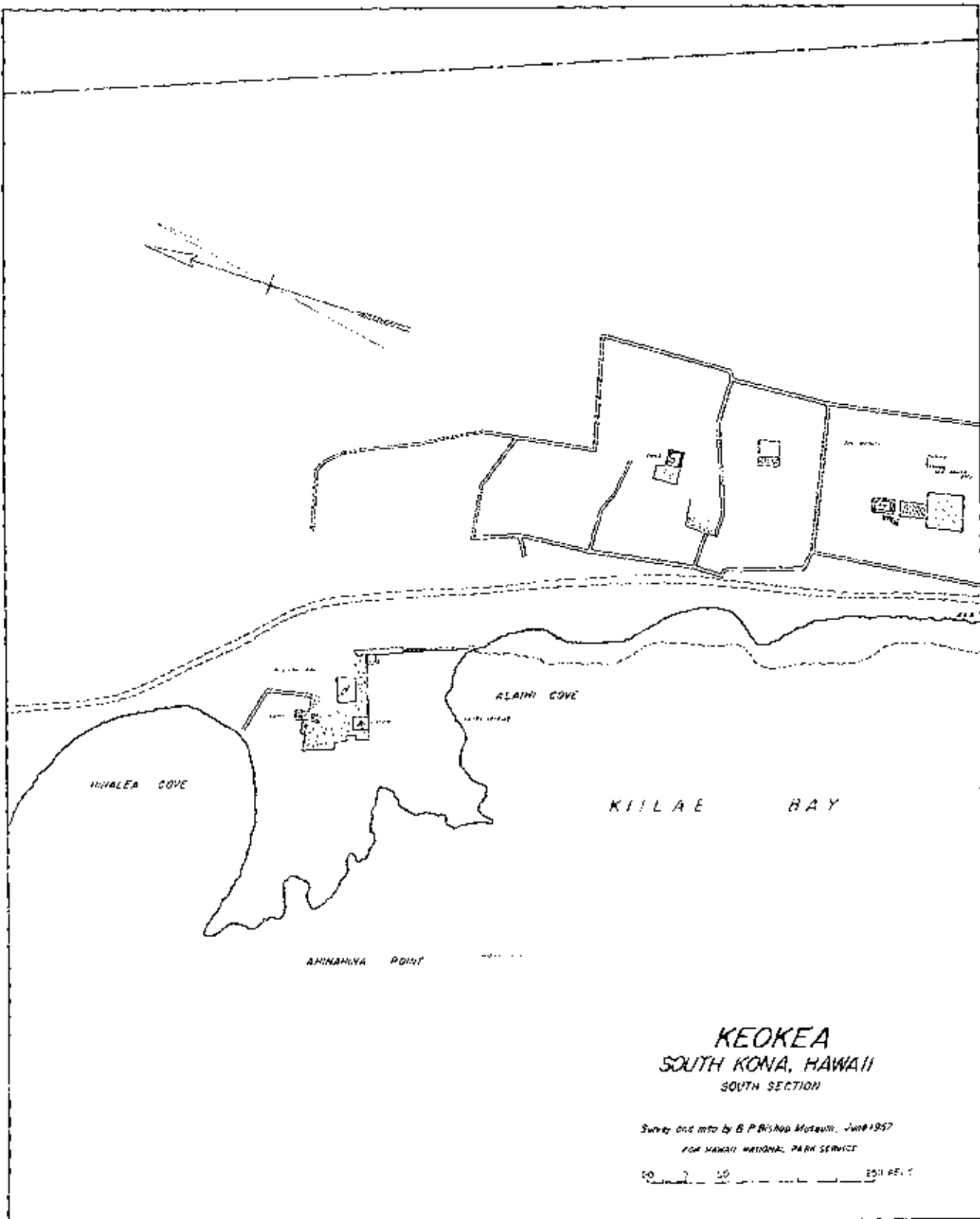
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