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ORIGINS

And the source chanted . . .
I lean upon the winds,
That they may blow.

The Pacific—rimmed by fire, its first inhabitants born of an ice age—proved the staging ground for one of man's most epic achievements: the peopling of the myriad islands of Oceania.

Some thirty thousand years ago, when the world was still in the grip of the last ice age and sea levels markedly lower than present, a dark-skinned land people from Island Southeast Asia—Indonesia, the Philippines and Taiwan—first began penetrating the margins of the Pacific, gaining footholds in Australia, and New Guinea and its nearby islands. With the end of the ice age, sea levels again rose as much as 270 feet, causing land bridges to submerge and distances to increase so much between landfalls that the Pacific's first settlers were effectively isolated.

With the melting, the Pacific came to embrace an incredible sixty-eight million square miles, one-third the surface of the earth, or an area almost twenty times the size of the United States. As the first pioneers of the Pacific were essentially land-oriented hunter-gatherers, continued exploring of the Pacific vastness was precluded by the inability to cross open ocean to the nearest visible islands.

Some six thousand to seven thousand years ago—again from Island Southeast Asia—came the next attempt to explore the Pacific, this time by Austronesian-speaking river and coastal people. With the greatly increased post ice age sea levels, distances between landfalls dictated that this second generation of Oceanic settlers possess at least a modest maritime capability. Necessary technological and environmental adaptations followed. That speakers of Proto-Austronesian, a language ancestral to all Polynesian languages, had canoes is attested to by linguistic studies revealing that these people had words for the outrigger canoe and its various parts. Slowly developing were the roots of a seafaring tradition that would herald the first of several phases of open ocean exploration that can best be compared to man's exploration of space.

Frail, wonderfully organic canoes powered by plaited leaf sails and human sinew gingerly took to undiscovered seaways. The legacy of the canoe had begun. Its most eminent inheritors would be the Polynesians. In some Polynesian cultures, arrival in a certain canoe would come to be viewed as a higher distinction than descent from the chief who came in that canoe.

The first canoes manned by the brown-skinned people of Island Asia began arriving in New Guinea and its southeastern outliers at least 4,500 years ago. Steadily these fledgling mariners moved from New Guinea through the Melanesian archipelagoes of the Solomon Islands and the New Hebrides southwards and eastwards, eventually arriving in Fiji sometime around 1500 B.C. Radio-carbon dating indicates that by 1200 B.C. some of these seafarers had reached what would come to be called western Polynesia, comprised of uninhabited Tonga, Samoa, and nearby islands.

A cultural sequence of telltale pottery forms (Lapita ware), adze types, and settlement patterns have enabled archaeologists to trace a clearly marked maritime settlement route of early Pacific seafarers—some destined to be future Polynesians—through Melanesia and into western Polynesia. The archaeological evidence suggests that soon after initial settlement in Tonga and Samoa the evolving Polynesian cultures began diverging from one another.

For the next thousand years the unique dynamics of a small and isolated island setting nurtured the development of the Polynesian culture and a base of seafaring knowledge that would forever meld the Polynesian to his canoe. Kirch suggests that "a major impetus to the evolution of what we call Polynesian culture was provided by a set of oceanic environmental selection pressures encountered by Lapita colonizers as they gradually extended their distribution eastward."

About the time of the birth of Christ, the Polynesian people had come of age. There were stirrings in the islands of Samoa. Inspired by a formidable array of their own gods and relatively secure in their canoes and attendant marine and navigational technology, daring Polynesian outriders weaned themselves from mother Samoa and neighboring islands, scattering in all directions. Some went northward, others downwind and westward into the outliers. One group, no doubt taunted by infrequent but predictable westwinds, made a spectacular thrust into the vast and unexplored eastern Pacific. Linguistic, archaeological, and anthropological evidence suggests that a single foothold—probably the Marquesas—was gained. At about the same time or shortly thereafter, Tahiti and the rest of the Society Islands were apparently settled either from the Marquesas or Samoa.

From these eastern Polynesian centers, the Polynesian first settled nearby islands and then began his dogged probing to the farthest inhabitable reaches of the Pacific. So intense was this period of voyaging and exploration that in the single millenium beginning with the birth of Christ, the Polynesian would establish his culture as the most geographically dispersed on earth. By 1200 A.D. he had settled remote Easter Island to the east, Hawai'i to the north, New Zealand to the south—in short, every habitable island in a sweep of blue roughly equal in size to the entire land

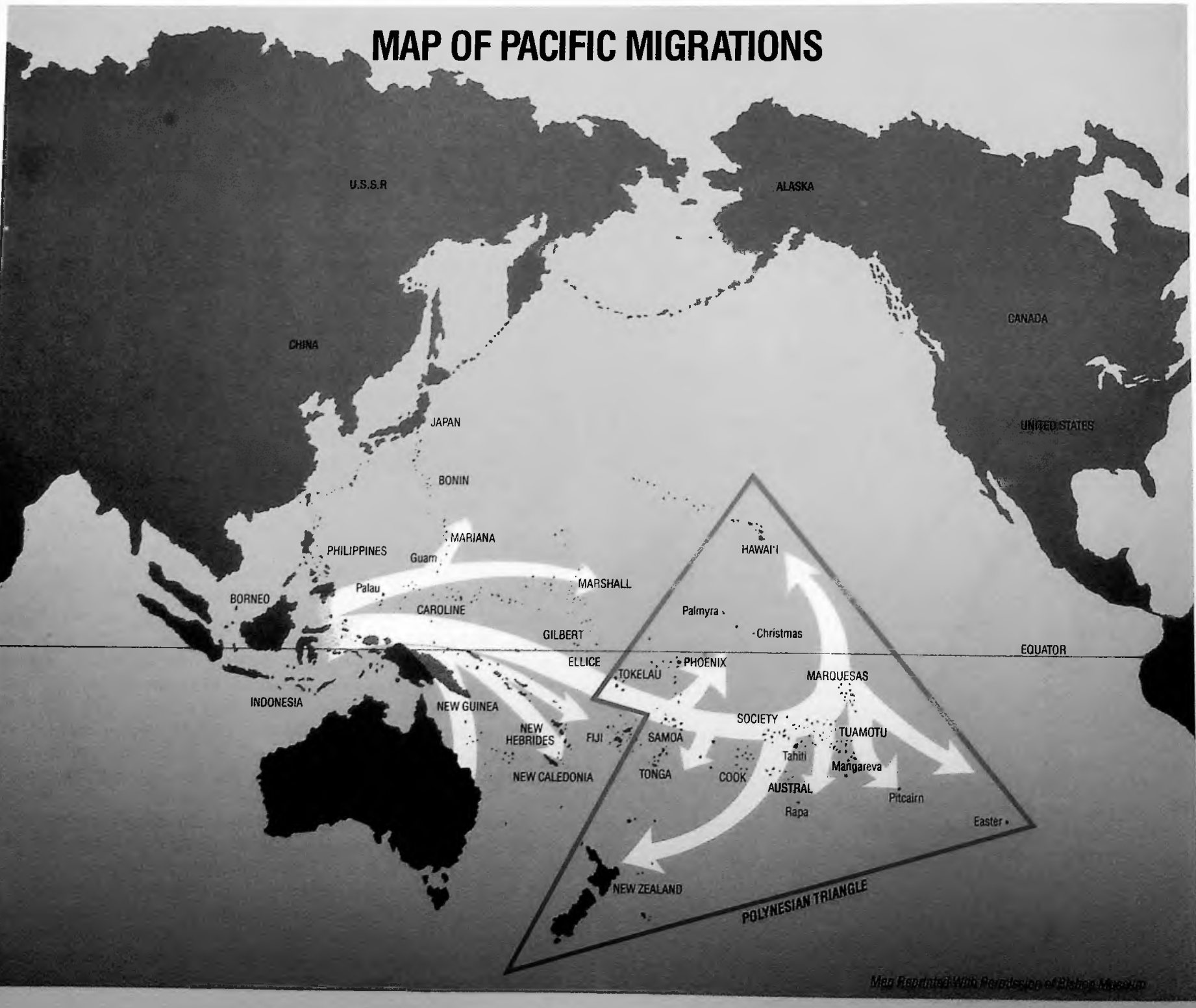
mass of the western hemisphere. He had turned a trackless blue desert into a network of familiar seaways where there were but two units of land for every thousand of water—an uncommon achievement by uncommon people.

It would be centuries before western man would venture out of sight of land. Hawai'i, land of the most geographically isolated culture on earth, would be discovered and settled more than a thousand years before Captain Cook was born.

In its import, the voyaging canoe stands to ancient Polynesian culture as the invention of the wheel to ground transportation, as the spaceship to man's spirit: epitome and climax.

A proposed sequence *of island discoveries by Polynesian settlers as adapted from Bellwood (1979) and Jennings (1979)* (below). *Continuing archaeological investigation into Pacific island cultures is constantly filling the gaps in man's knowledge of Polynesian migration routes.*

Approaching storm clouds *threaten a lone canoe* (right).



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2
VOYAGING

Here are the canoes, get aboard
Come along and dwell in green-clad Hawai'i
A land discovered in the ocean
That rose up amidst the waves
From the very depths of Kanaloa . . .

Flying forty to sixty miles an hour, housing a navigation system more sophisticated than a moon rocket, the *kōlea* or Pacific Golden Plover migrates annually from the Siberian and Alaskan north to spend the winter in various tropical Pacific islands. Weighing only ounces and flying nonstop for distances up to four thousand miles, the indefatigable plover unerringly returns year after year to the same spot on an island. The equivalent energy output for a man would be to run four-minute miles continuously for eighty hours. How this bird navigates is still a mystery, although it is known that to some extent it uses the sun and stars as well as the earth's magnetic field. Why some will stay in Hawai'i or the first island reached, and why others, after a brief rest, continue flying to other islands—the Marquesas, Tahiti, and points south—is unknown.

We know through surviving legends and traditions that early Polynesians were acutely aware of the flight patterns and the general behavior of all island birds. They knew that certain migratory birds, including the plover, were not capable of feeding from or resting on the ocean, thus limiting their flight range. The Polynesians also knew that these birds arrived at the same place every year, and their time of arrival almost to the exact day.

Most importantly, the early Polynesian observed that the incoming and outgoing course bearing of these migratory birds was always precisely the same. Although he would not have known how far these birds had come, he undoubtedly knew that somewhere along their migration route there had to be a landfall. Remaining to be learned was what "starpath" coincided with that bearing.

There is an intriguing reference in Hawaiian traditions to the *kōlea-a-me-Kahiki*—the plover from Kahiki (ancestral homelands). This ancient name, virtually unknown now in Hawai'i, is significant in that it indicates the early Hawaiian was aware that the plover migrated regularly to and from Kahiki. In fact, he did not even consider the *kōlea* a local bird, believing it rather a native of Kahiki.

Although speculative, it is likely that these unpretentious winged navigators beckoned to the intrepid Polynesian to take to yet untried seaways that traced their ageless flyways.

As late as 1812, *Pacific islanders continued to leave their ancestral homes, such as this Marquesan valley* (above), *embarking on voyages to unknown islands.*

Re-creating the voyaging craft *of the ancient Polynesian, this modern 60-foot replica, the Hokule'a, retraces their routes across the Pacific* (right).

Motivations

To the early Polynesian, an irrepressible seafarer, the beckoning of the sea and the call of new islands were unceasing. Eternally arising is the question of what moved the Polynesian to push his frontiers far beyond what seemed necessary or technologically possible—far beyond the reaches of his mind. Adventure, exploration, colonization, raiding and conquest, exile, economics, social banishment, escape from defeat, famine, drought, population pressure, accidental drift—all are possible reasons for leaving one's homeland.

Numerous examples exist of the Polynesian's spirit of wanderlust. Botanist Joseph Banks, while traveling with Captain Cook in 1776, noted voyaging Raiateans who returned "often remaining several months from home, visiting . . . islands of which they reported to us the names of nearly a hundred." Several years later in the early 1800's missionary John Wil-

liams was informed of a Raiatean chief Iouri who as an "enterprising spirit . . . determined to go in search of other countries." After apparently having navigated his canoe to Rarotonga six hundred miles away and then returning home, it "became an object of ambition with every adventurous chief to discover other lands." One can still see Pacific islanders setting out on voyages of several hundred miles or more for reasons no more vital than to visit friends, enjoy the experience, or to one-up fellow seafarers.

At the other extreme Captain David Porter, visiting in the Marquesas in the early 1800's, tells of large parties of voluntary exiles being encouraged by the priests to leave the Marquesas for legendary 'lands,' and of hundreds of people having so departed over the years. Porter goes on to write in his 1812 journal of canoes, provisioned with plants, animals, eating stores and other items, preparing to set out on voyages of resettlement. "The grandfather of Gattenewa sailed with four large canoes in search of land, taking with him a large stock of provisions and water, together with a quantity of hogs, poultry and young plants. He was accompanied by several families, and had never been heard of since he sailed. Temaa Tipee and his whole tribe, about two years since had many large double canoes constructed for the purpose of abandoning their valley, and proceeding in search of other islands, under the apprehension that they would be driven off their land by other tribes; but peace took place, the canoes were taken to pieces and are now carefully deposited in a house, constructed for the purpose, where they will be kept in a state of preservation to guard against future contingencies.

"More than eight hundred men, women and children, Wilson (an Englishman who was living in the Marquesas and spoke Marquesan) assures me, have, to his knowledge, left this and the other islands of this and the Marquesas Group (Hiva Oa, Tahuata, Fatu Hiva) in search of other lands . . ."

Beyond motivations, the controversy goes on as to what degree the Polynesian controlled his movement and dispersal into the Pacific. Was it accidental or planned? A comprehensive computer simulation analysis of drift voyaging showed that it was very unlikely that canoes could have drifted from their western Polynesian starting points to the islands of central and eastern Polynesia. Furthermore, this landmark study showed that the probability of drifting from eastern Polynesia to Hawai'i, New Zealand or Easter Island was negligible to zero. However David Lewis, an authority on non-instrument navigation, notes "There is ample evidence that involuntary drift voyages continuously took place, in addition to planned journeys, both within close contact-zones and between them.

Deliberate and accidental voyages, far from being opposed, would seem to be complementary categories, and inter-island communication may perhaps best be apprehended as a combination of the two."

Anthropologist Ben Finney sums it up well: "The basic data on winds, currents and canoe performance serve to emphasize the probable intentional character of the overall Polynesian thrust into the Pacific. The Polynesians were sailors who had the craft and seamanship skills to move their frontier half way across the Pacific against the direction of prevailing winds and currents."

Design

"The view of nature held by any people determines all their institutions." The reverse too holds true in that a person's culture always influences his attitudes towards nature. In Polynesia, the voyaging canoe embodied the essence of a people and culture whose origin and survival were tied to a delicate balance between a capricious ocean and the finite resources of an island sanctuary.

An ingenious organic concoction of wood, sap, fiber and leaves perfected by centuries of life-and-death interaction with an unforgiving sea, the Polynesian voyaging canoe stands as supreme testimony to the Polynesians' resourcefulness and spirit. A neolithic people, the Polynesians had so artfully designed with nature that they had settled every habitable island in an ocean area much larger than the European continent hundreds of years before the Europeans had even ventured out of sight of land.

With a few exceptions, the voyaging craft of Polynesia were double canoes. Though the voyaging canoes displayed a wide range of general design features, most were probably "V" or "semi-V" in cross section to prevent excessive lateral drift. These voyaging canoes were typically not hollowed out from single logs; rather they were built up with strakes or planks on a one- or several-piece keel. The carefully adzed and fitted strakes were sewn to the keel and each other with coconut sennit and then caulked, usually with molten breadfruit sap congealed in water. In his comments on voyaging to Hawai'i, Samuel Kamakau states that "the canoes of the voyagers who sailed from Kahiki to Hawaii were made of fitted pieces," but that in the time of Laka they were made from single logs. Kamakau's early observation is presumably derived from oral traditions.

Exactly what an ancient voyaging canoe to Hawai'i looked like will never be known. However, borrowing certain design features common to different voyaging canoes of Polynesia, and avoiding localized adaptations and known foreign influences, it could be that such a vessel looked something like the *Hōkūle'a*, the sixty-foot, double-hulled canoe built for voyaging in 1975 by the Polynesian Voyaging Society. Some scholars, however, maintain that the hulls of an ancient voyaging canoe would have had a more pronounced "v" shape in cross section than those of the *Hōkūle'a,* citing the canoe types in use at the probable Marquesan and Tahitian debarkation points.

A Samoan 'alia canoe, ***the last double canoe of its type,*** **(above left)** ***was built in the early 1900's for the German Kaiser. Delivery proved difficult, however, and it was left to rot on the beach.***

The plank-built ***voyaging canoe, Tevaoroa-ia-Raka*** **(below left),** ***the last of its kind, was photographed by Dr. Kenneth Emory on Vahitahi Island in the Tuamotus in 1930.***

Double-hulled voyaging canoes were surely more narrowly spaced than modern catamarans. This was due primarily to the limited ability of the wooden cross-pieces and coconut fiber lashing to withstand the phenomenal stress the ocean imposes on a widetrack double-hull craft. Probably as a result of this narrow hull spacing, the sail area was kept relatively small (three hundred square feet on the *Hōkūleʻa*) as a safety factor to prevent overturning. Furthermore, the strength limitations of the *hala* leaf material made large sails more likely to rip. The sail design of the *Hōkūleʻa,* a Polynesian "sprit," seems to have been fairly widespread throughout prehistoric Polynesia and is probably representative of the type of sail that an early voyaging canoe might have used in coming to Hawaiʻi.

Considered performance accurate, though constructed with modern materials, the *Hōkūleʻa* is able to make a 70- to 75- degree course to windward. While not an outstanding performance by today's standards it is very likely comparable to an ancient voyaging canoe, or for that matter to an early European ship. The canoe in moderate to strong tradewinds is able to average 3 to 5 knots on a course into the wind and 6 to 10 knots on a beam or down-wind leg. An average day's run for the *Hōkūleʻa* is about one hundred miles. A run of 130 miles, though, for a twenty-four-hour period is not unusual. Some days have been as high as 150 miles or more.

Conversely, western-designed vessels, such as those the Europeans used to rediscover the Pacific, were generally a good deal slower than a typical Polynesian voyaging canoe was under comparable conditions. Early European explorers in the Pacific commented on the remarkable speed and maneuverability of various Pacific islanders' canoes compared to their own relatively cumbersome craft.

The European tended to view the ocean as an adversary. As though to overpower the ocean while maintaining a bond to *terra firma*, Europeans almost blindly transposed concepts of land-based architecture to a very dissimilar marine environment. Their awkward craft reflected the Europeans' lack of communion with the world Polynesians called home—the ocean. Naval architecture was a highly developed science to the peoples of Oceania. Well integrated into their marine environment, early Pacific peoples designed craft that were sea kindly, calculated for speed and in some cases so hydrodynamically advanced that it would not be until the 1800's that man would build faster sailboats. The flexible lashing mode of joining two hulls that so characterized Polynesian voyaging canoes and so shocked European observers for their supposed fragility is just now being recognized as often superior to a rigid form of attachment. Pacific historian G.S. Parsonson writes: "There is abundant evidence to show that the ships [canoes] of Polynesia and Micronesia were much more weatherly than contemporary European vessels."

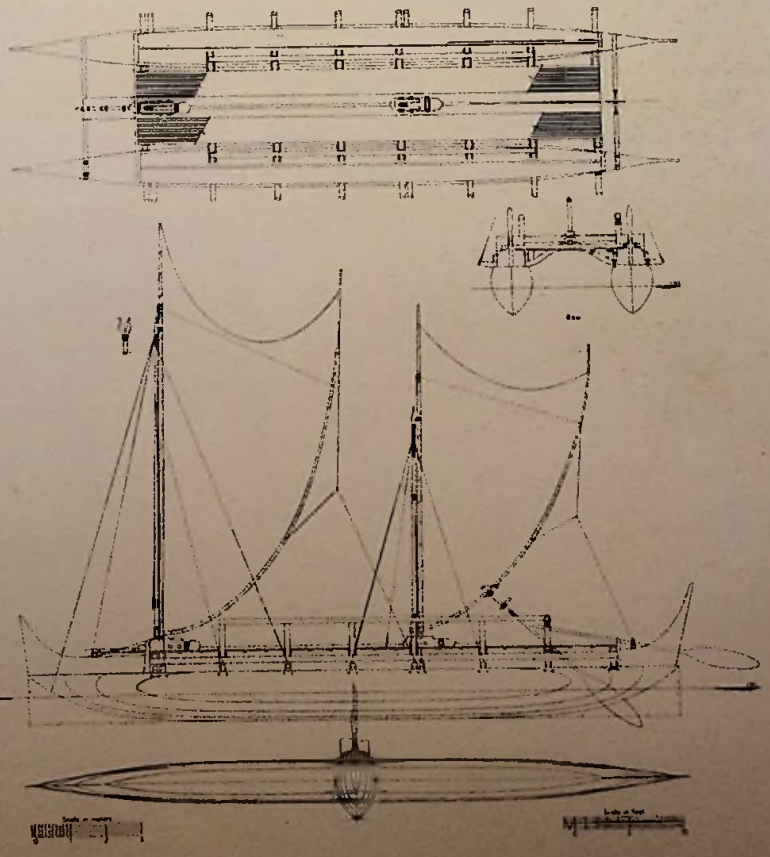
The recent voyages of the *Hōkūleʻa* demonstrate that such canoes were quite capable of negotiating journeys of great distance. Judging from her performance, the voyages of traditional Micronesian voyaging canoes of the nineteenth and twentieth centuries, and analysis of other Polynesian canoes and traditions, it would not be unreasonable to assume certain voyaging canoes had ranges of between three and six thousand miles. Presuming one accepts a six thousand-mile range, a voyaging canoe could conceivably leave Tahiti, come up as far as the latitude of Hawaiʻi and still return safely home if no land were found.

Navigation

"His head all same as compass." Such were the immortal words, in 1860, of a captain of a canoe that had just arrived after a voyage of several hundred miles across open ocean without the aid of navigation instruments. He was casually comparing the skills and abilities of his navigator to the compass of the astonished master of the ship *Morning Star.* Having no instruments, charts or written language, the ancient Polynesian navigator charted his pathways in his mind: he read the stars; he listened to the winds; he observed telltale flotsam and jetsam; he understood the language of the sea. Of an elite brotherhood, the highly trained master Polynesian navigator possessed a vast body of knowledge relating to the observation and interpretation of natural phenomena and an astounding memory. A typical Polynesian navigator had a demand recall of up to two hundred different star positions as they would rise or set at any given time of the year, effectively giving him a star compass.

Where today's navigator finds his position with instruments without regard to his departure point or knowledge of his previous day's position, the Polynesian navigational system depended upon knowing one's departure point. The Polynesian navigator set out on a known course bearing, noting and where necessary correcting for any weather or sea conditions that would throw him off course. He could at any time mentally retrace his course and point to his place of departure, or if his destination were known, point to that. Most importantly, it must be realized that the navigator of Oceania did not think as a modern navigator does in terms of distance, a position fix, or coordinates of latitude and longitude. Rather, the Polynesian viewed his progress in units of time along a continuum, which was hopefully never broken by a contrary sea or a capricious storm.

POLYNESIAN VOYAGING CANOE
HŌKŪLEʻA
LOA 62'-4"
LWL 54'-0"
BEAM 17'-6"
DRAFT 2'-6"
SAIL AREA 540 □'
DISPLACEMENT 25,000 LBS



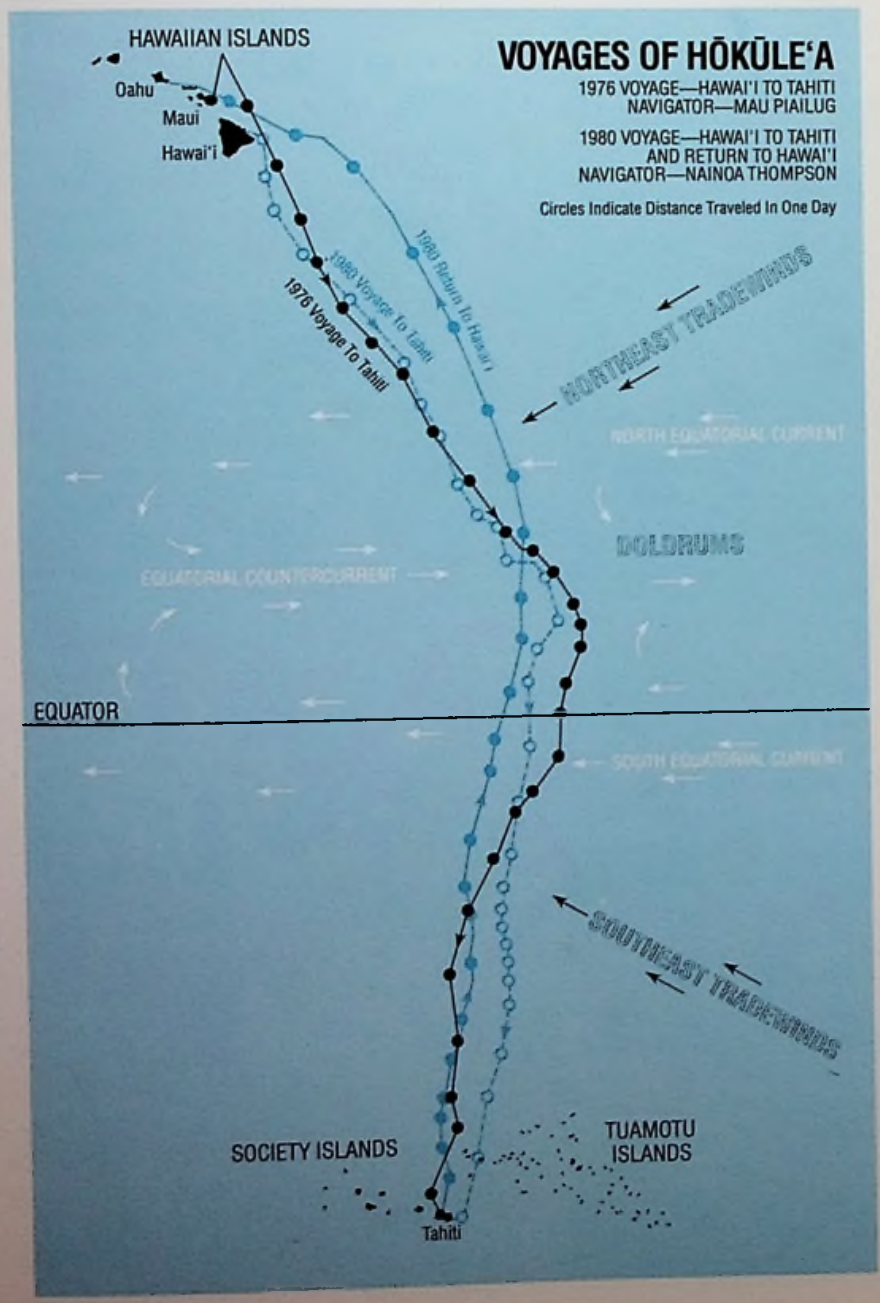
To the Polynesian navigator the stars were his closest friends and staunchest allies. With the night sky appearing as an inverted pit, the navigator steered his canoe by following known "starpaths"—trails of light—across the cosmic darkness. To a navigator, a starpath was a known succession of rising and setting stars by which he guided his canoe. As steering stars rose too high to be useful or set too low in the horizon behind him, a following star would be aligned. It was not necessary for successive steering stars to have the exact bearing as the preceding ones, for compensations and adjustments would be made by the navigator. The navigator using familiar starpaths was typically aware of the need to adjust for leeway and currents.

The starpath method has its greatest usefulness when sailing in an east-west direction. For north-south voyaging, observing the elevation above the horizon of certain known stars served as clues to latitude. Additionally, a zenith star system apparently was employed. This entailed identifying stars whose courses would always trace an imaginary east-west line directly over a particular island.

Contrasting design *of European and Polynesian vessels is evident in this scene of Kealakekua Bay* (below) *as rendered by Thomas Heddington, an artist with Captain Vancouver's expeditions to Hawaii in 1792, 1793, and 1794.*

The Kolea, *or Pacific Golden Plover* (above right), *migrating yearly from its arctic nesting grounds to Hawai'i and other Pacific islands, may have been an indication to the early Polynesians in the South Pacific that there was land to the north.*

The prevailing tradewinds *demanded that voyagers from Tahiti to Hawai'i and vice versa keep well to the east of their island destination to avoid the potentially disastrous outcome of arriving downwind of their goal. Depicted* (below right) *is a map of the three routes successfully navigated without instruments by the Hokule'a in the years 1976 and 1980.*



In the case of voyaging to Hawai'i the navigator would sail north, but knowing he would be set to the west by the prevailing winds and sea conditions, he always made as much progress to the east ("easting") as he could. Arcturus—the Hawaiians called it *Hōkūle'a*—the zenith star for Hawai'i, passes almost directly overhead. Upon sighting *Hōkūle'a* and hopefully having gained enough "easting" to be upwind of the Hawaiian chain, the navigator would turn downwind until he picked up signs of land. If he missed the island—or thought he missed it—but knew he was at the right latitude, he might then begin tacking back and forth into the wind hoping to find his destination. The Polynesian system of navigation did not require pin-point accuracy, although the navigator was in many instances capable of that too. Rather, he would aim for a block of islands. In the case of Hawai'i, the navigator had an expanded landfall to hit, many hundreds of miles wide and long. The mountain Mauna Loa can, on a clear day, be sighted as far as ninety miles off. Were it erupting, as it then very regularly did, its glow would have been seen even further.

An interesting Hawaiian tradition is found in an 1865 document entitled, "Instructions in Ancient Hawaiian Astronomy" by Kane-akahoowaa, who was a counselor to Kamehameha I: "Take the lower part of a gourd or hula drum *(hokeo)*, rounded as a wheel, on which several lines are to be marked as described hereafter. These lines are called *Na alanui o na hoku hookele* (the highways of the Navigation stars) . . . If you sail for the Kahiki groups, you will discover new constellations and strange stars over the deep ocean . . . When you arrive at the *'Piko o Wakea'* (Equator), you will lose sight of the *'Hoku paa'* (North Star); and then *'Newe'* will be the southern guiding star, and the constellation of *'Humu'* will stand as a guide above you, *'Koa alakai maluna'*."

While stars, planets, and the moon were a navigator's most reliable aids, wind, currents and especially ocean swells helped vitally in determining course and progress. At almost any given time in the Pacific, several wave systems, each with a different height, length, shape and speed are criss-crossing each other. To all but the most skilled observer the resultant sea condition appears bewilderingly disorganized. The skilled navigator, though, would easily sort a sea condition into its different component swells, their characteristics, and their effects on the canoe's course. By analyzing the roll and pitch of the vessel over the wave the navigator could ascertain the desired course. Contrary to what a westerner might expect, "holding course by swells seems always to be a matter more of feel than sight—which emphasizes the value of the art on overcast nights."

Polynesians were extremely adept at weather forecasting, not surprising in that more often than not their survival depended on this capability. Barring the most unusual of circumstances, the navigator would wait for favorable weather conditions before departing on any kind of voyage further than out of sight of land. Sometimes he would wait months or even years before favorable weather conditions graced his departure.

Where today's sailor reads a satellite weather map before departing, the Polynesian learned to read a tapestry of cloud, sea and animal signs. From observing the behavior of certain sea worms, shellfish, crabs, starfish and other shoreline organisms, noting the changing sound of surf on the reef, discoloration of the nearshore waters, a peculiar twinkling of stars, and telltale cloud formations, the Polynesian could piece together quite an accurate short- to medium-term weather forecast. Banks, traveling with Captain Cook, found "that for three days ahead, while not infallible, they [Tahitians] were generally accurate and had many ways of foretelling the common weather."

Anthropologist Craighill Handy says, "it is impossible to convey even a hint of the quality of mind and sensory perception that characterizes the human being whose perpetual rapport with nature from infancy has never

been broken. The sky, sea and earth and all in and on them are alive with meaning indelibly impressed upon every fiber of the unconscious as well as the conscious psyche." Though there was some skepticism then, as there is now, as to the methodology of the Pacific islander's forecasting, the fact remains that almost all early western explorers openly acknowledged that the Polynesian had far more ability in this matter than they. To this day, the visting westerner is often astounded by many Polynesians' ability to accurately forecast the weather for several days in advance.

Climatologists suggest that the gods were on these voyagers' side. Recent findings suggest that the premier years of Polynesian voyaging and exploration coincided with what is sometimes called the Little Climatic Optimum, a period given to warm gentle trades, few storms, and probably more frequent and enduring westerlies.

Provisioning

"Mr. Handy has seen . . . *ma* [fermented breadfruit] a hundred years old, which is occasionally eaten at the present time." This was admittedly an unusually old batch (though still edible); the preferred aging time for fermented breadfruit in the Marquesas was about ten years. The Polynesians preserved most of the meals they would need for a long canoe voyage by drying or fermenting either raw or cooked food. Compact, light, nutritious and almost spoilage free, the voyagers' diet would have consisted of fish and other marine organisms, bananas, sweet potatoes, yams, breadfruit, taro, pandanus flour and other regional favorites. For the beginning of the voyage there would have been a number of fresh food items—sweet potatoes, yams, taro, breadfruit, drinking coconuts, bananas and sugar cane.

Undoubtedly there were trolling lines out all day, every day. However, on some runs, as from eastern Polynesia to Hawai'i, there was a wide swath of relatively unproductive ocean, where marine life is scant. Thus in voyaging to Hawai'i one could not depend on catching many fish. The *Hōkūle'a,* which both times took courses very probably similar to ones used many centuries ago, did catch some fish, though most of them within several hundred miles of an island group. Even under the most ideal conditions, it would have been nearly impossible to catch enough fish to sustain a canoe full of people and animals.

A hearth lined with stone, coral and sand and fueled by coconut husk and shell enabled the voyagers to cook at sea. Water was carried in gourds and sections of bamboo and stored along with drinking coconuts wherever space or ballast needs dictated. If a canoe encountered or could seek out a rain squall, water supplies could be supplemented by collecting water as it ran off the sail; if water was critically short people could temporarily subsist on the moisture found in the flesh of freshly caught fish, turtles, sharks and other marine organisms. Salt water could not effectively be used to stretch a dwindling water supply; it only hastens the dehydration process. Water rationing was undoubtedly practiced.

Floating zoos, Polynesian voyaging canoes carried pigs, chickens and dogs which were intended as breeding stock for a new settlement, though they could also be eaten if stores dipped perilously low. Rats were sometimes uninvited passengers and may have occasionally provided an emergency meal.

Experience had taught the Polynesian that very few edible plants grew on previously uninhabited islands, so with him he took a traveling garden. To Hawai'i he brought about two dozen varieties of plants, though probably not all at the same time. Slips, cuttings, tubers and young plants were first swathed in fresh water-moistened moss, then swaddled in dry *ti*-leaf, *kapa* (bark cloth), or skin from the banana tree. Finally, these bundles were put in *lauhala* (pandanus leaf) casings and hung from the roof of the

canoe's hut. Here they would best be protected from lethal salt water and salt spray. In a few cases, he took seeds.

On the first voyage of the *Hōkūle'a* down to Tahiti, an attempt was made to transport many of the same plants the Polynesians originally brought with them to Hawai'i. Working with only fragments of the once sophisticated horticultural techniques the Polynesians employed to ensure viability, some plants died. However, most survived and were planted upon arrival in Tahiti. The dog, chickens and pig taken down on the *Hōkūle'a* adapted readily, arriving in Tahiti in excellent health.

But not all the ancient voyages would have been as successful as the two Tahiti trips of the *Hōkūle'a.* There undoubtedly were instances where voyagers missed their landfalls, had to sail with storm-damaged canoes or for other reasons found food and water running dangerously low, necessitating extreme rationing. However, man's ability to live on as little as eight hundred calories a day (thirty-two hundred calories being an average daily intake) for weeks on end and to stretch his water with rain catchment and moisture from fish flesh provided a certain cushion in difficult voyages.

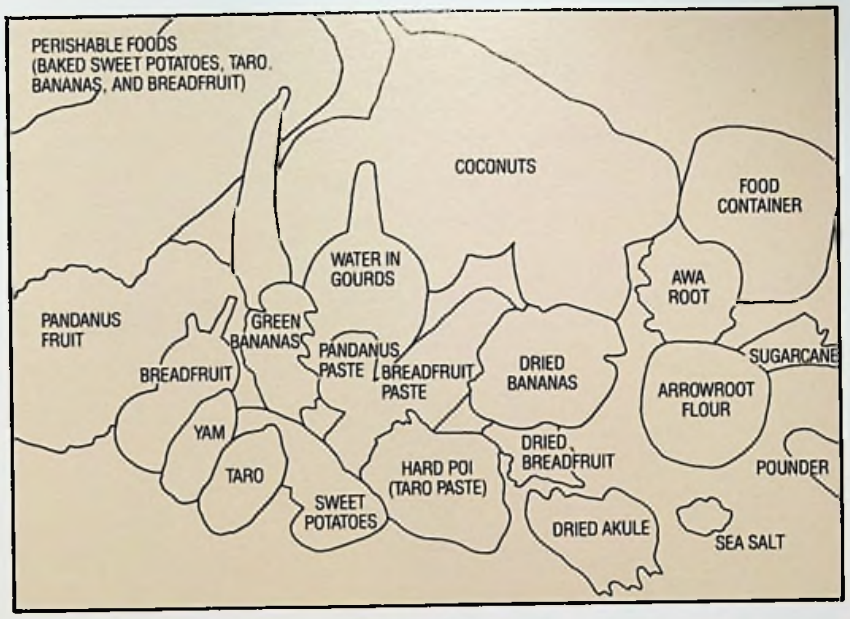
Writer G. M. Dening, in an article on Polynesian geographic knowledge, has compiled an extensive and authenticated list of accidental and deliberate voyages that took place in the Pacific in the last hundred years. One point in particular stands out—survivability. There are a great many accounts of hapless sailors going weeks and months with only the scantiest food and water supplies. Cannibalism was not uncommon. Nevertheless, they survived, and in many instances thought nothing of their ordeals.

The involuntary drift voyage of two Tahitians in 1964 serves as an excellent example of the Pacific islander's resourcefulness and resilience. The men wanted to go from Bora Bora to Maupiti some thirty-six miles away in a twenty-two foot boat; however, their motor broke down and the boat drifted. The two men subsisted by catching fish with a harpoon made from an old pair of scissors and on drinking water collected in the bottom of the boat. After 120 days, one of the men succumbed. On the 155th day, eleven hundred miles away on a beach near Pago Pago, Samoa, the other man was found weighing only ninety-nine pounds. He had weighed 232 pounds when he first started off. What makes the story so unusual was the survivor's astonishment upon arriving in Tahiti by plane and being greeted by press and photographers. He did not consider this adventure unusual or noteworthy and could not believe that such a big thing was being made of it!

Pigs and chickens, *together with dogs and an occasional stowaway rat, were the animals carried on voyages as breeding stock for food production in their new homelands* (left).

Freshly caught fish *supplemented a diet that otherwise consisted largely of dried and preserved foods* (right).

Sustenance for a voyage *included a variety of fruits, nuts, roots and edibles from the sea, together with gourds filled with drinking water, supplemented by that which could be collected off the sails. These items* (below) *are identified in the accompanying key* (far right).



3
MATERIALS

Give of me your trunk, O Koa tree,
Of your strong and shining trunk, O Koa tree,
For a strong canoe to build me,
Chosen by the chief Kahuna
Chosen with sacrifices and prayers . . .

Koa

A magnificent and totally unexpected gift awaited discovery by the settlers reaching Hawai'i. The islands were blessed with extensive forests of what would come to be called *koa,* trees of extraordinary size that were found nowhere else in the world. These trees would provide wood of remarkable durability out of which the Hawaiian would shape his canoes. For some 1500 years the Hawaiian people lived in delicate balance with their environment, the trees they used being replaced by natural regeneration. Contact with the west shattered this fragile balance; in the span of a few decades *koa* began a radical decline that has continued even to the present day.

"Their huge trunks and limbs cover the ground so thickly that it is difficult to ride through the forest, if such it can be called," writes E.F. Rock in 1913 of a once beautiful *koa* forest in Kealakekua, South Kona. Rock, a botanist, goes on to note of this macabre forest scene that "90 per cent of the trees are now dead, and the remaining 10 per cent in a dying condition."

In 1779, a little over one hundred and thirty years before Rock's observations, Lt. Charles Clerke who was with Captain Cook tells of wandering through the *koa* forest above Kealakekua: "Some of our Explorers in the woods measured a tree 19 feet in the girth and rising very proportionably [sic] in its bulk to a great height, nor did this far, if at all, exceed in stateliness many of its neighbours; we never before met with this kind of wood."

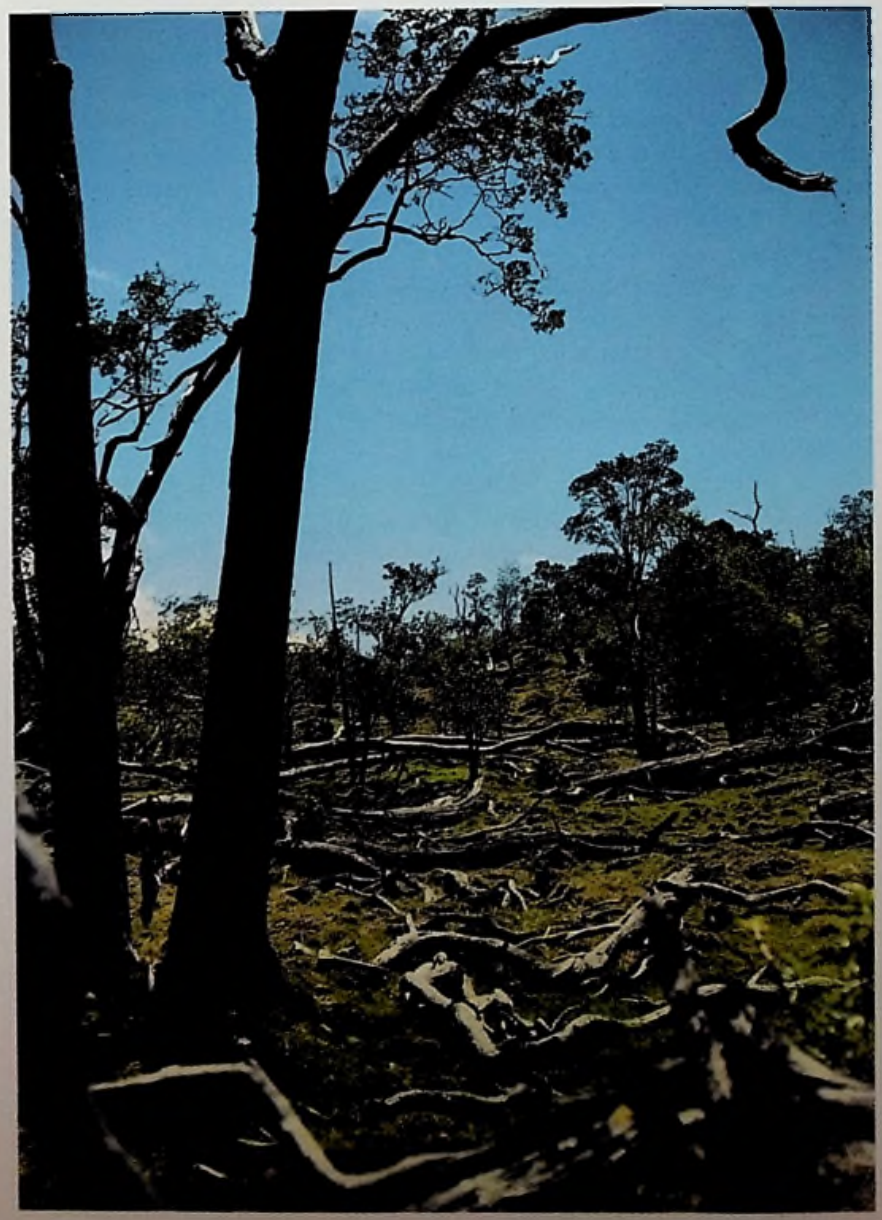
Similarly, Archibald Menzies in 1792 describes the same area: "The largest trees which compose this vast forest I now found to be a new species of mimosa [*koa*] . . . I measured two of them near our path one of which was seventeen feet and the other about eighteen feet in circumference, with straight trunks forty or fifty feet high . . . as we advanced, the wood was more crowded with these trees than lower down where both sides of the path had been thinned of them by the inhabitants."

In 1977 the author and a party visited the same area in South Kona that Rock, Clerke and Menzies had inspected. The scene suggested a primeval forest graveyard with some of the rotting hulks that Rock had seen years before still strewn about, since foresters estimate it takes fifty to seventy years for a fallen *koa* log to decompose. Punctuating the wasteland were the "standing dead", majestic *koa* trees that had died ignominiously in the glory of their years with, as Rock describes, "huge branches dangling on strings of bark, ready to drop from the dizzy heights, when stirred by the slightest gust of wind, crushing everything beneath them."

Acacia koa, once undisputed monarch of the forests of Hawai'i, probably evolved from seeds hitchhiking to Hawai'i in the bowels of some storm-blown bird or through some other capricious act of the winds and seas. In an environment that was comparatively free of competitors and predators, *koa* proliferated to where it was once—after *'ōhi'a*—the second most common forest tree in Hawai'i. It has been estimated that today there is standing probably not much more than ten percent of the amount of *koa* that existed at the time of Cook's arrival; presently non-native species make up the majority of the forests of Hawai'i. Today on Hawai'i there is perhaps one healthy *koa* tree per three acres on land that was once covered by *koa* forests—a far cry from the dense tracts of giant *koa* that once flourished in Kealakekua and many other districts. Fortunately some stands of *koa* have survived, but even these are threatened by a deadly array of enemies, led by man. *Koa* has become a stranger in its own land.

As harvest outstrips reforestation and regeneration, ***koa trees much over 100 years old are becoming increasingly scarce today. Ironically, most of the koa that is cut ultimately leaves the state.***

A dying koa forest, *resulting largely from damage caused by grazing cattle, was photographed by E. F. Rock around the turn of the century* (above right). *Even though the amount of koa has declined to an estimated 10% of its former acreage, the destruction continues* (below right).



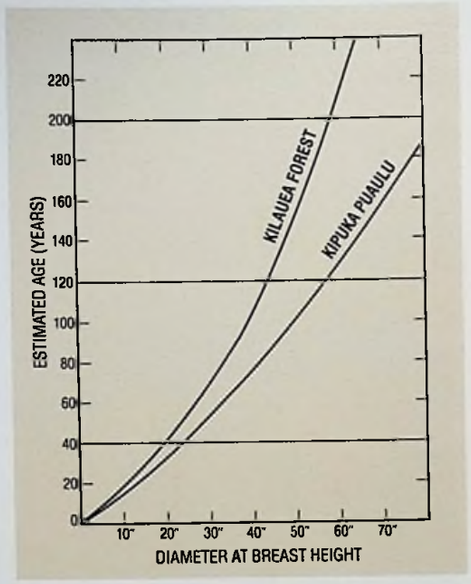
To the Hawaiian, the presence of *koa* was a blessing, a gift beyond words. Mammoth and powerful trunks gave being to a dynasty of canoes that, by the accounts of a great many early European explorers and visitors to Hawai'i, was without peer in the Pacific. What happened to this noble species?

"On the continents, species had evolved in conjunction, cooperation, and competition with each other." As they competed for territory and resources, only the best adapted survived. The fortunate ones, in this case *koa* seeds, that reached Hawai'i flourished. "On Hawaii they [arriving species] found large niches into which they could move and hold." A plant could take on all kinds of "improbable shapes and functions because the plants which on the continents would have blocked this kind of development were absent. . . Birds and insects, for instance became flightless, gave up or did not evolve defensive ploys such as mimicry or camouflage. Among the native plants there was only one poisonous species and exceedingly few with thorns, spines or even tough barks and hard shells. They had no need for them since there were no grazing animals to hold at bay, and nature never produces unnecessary weapons or practices evolutionary bravado."

When the day of reckoning arrived *koa* was painfully vulnerable, as were many other species. An eminent botanist notes soberly that "there have been more animal and plant species extinguished in the Hawaiian Islands than in the entirety of North America." Dieter Mueller-Dombois, noted University of Hawai'i botanist continues: "The question of whether or not the extinction of indigenous island biota is an inevitable process cannot be answered so easily as previously thought . . . we cannot dismiss the indigenous biota as being weak competitors. Instead our findings put a much greater burden on man."

Indeed the burden is on man, starting in 1792 in the form of a well-intentioned but ultimately devastating gift from Capt. James Vancouver—cattle and goats. Enjoying a predator-free environment, the goats and especially the cattle, multiplied prolifically. These voracious herbivores moved into *koa* belt areas where they found the sweet bark, juicy roots and especially the tender juvenile seedlings of *koa* irresistible. Once a tree, or most of its shallow root system, was girdled (the bark eaten around), the *koa* tree died. Those seedlings that the cattle—the main culprit—did not eat outright were often trampled, effectively preventing most natural *koa* regeneration.

And it was not as if *koa* did not have problems prior to contact (Cook's arrival), for "there are more endemic insect species attached to this *koa* complex than to any other genus in the Hawaiian islands." However, before contact there was a delicate balance between native birds and *koa*-infesting insects, the birds keeping the ever-present insect threat reasonably in check. But this fragile relationship was destroyed, as were so many others, by the radical disruption of the pre-contact ecosystem of Hawai'i. Many of the birds are gone and more introduced insects have joined in the siege on *koa*.



Growth curves *for koa trees at Kilauea forest and Kipuka Puaulu, two sites on the island of Hawai'i, demonstrate the influence of local soil, rainfall, and temperature conditions. From 100 to 200 years are required to produce a canoe-quality koa log.*

Other disruptions to the forest ecosystem of Hawai'i in the years after contact besides cattle, goat and sheep have been wild pigs, logging, ranch land clearing and fire. While pigs pre-dated the arrival of Cook, their population and dispersal were not a fraction of what they are today. Most wild pigs can take or leave a meal of young *koa* shoots, but their rooting activities play havoc with the young *koa* trees. Logging *koa*, and clearing *koa* forests for lumber and range land also have had a profound impact. In post-contact Hawai'i fires were more numerous and destructive, wiping out significant non-rainforest *koa* areas so thoroughly that natural replacement was not possible, as was the case with the less severe fire episodes in pre-contact Hawai'i.

N. B. Emerson writes of still another threat to *koa* as related to him in an interview with Mr. C. N. Spencer in 1892. Emerson notes that there was "a grove of very large *koa* trees in the upper part of Kahuku [on Hawai'i] about two miles north and east of the celebrated water hole named Pealu; but they were girdled and barked by collectors of tan bark, so that in 1887 only one of these forest giants was standing, and that not of the largest size. It too had been girdled and was dead. It was from this grove, Mr. Spencer thinks, that many trees for the *peleleu* fleet were taken." Rock notes similarly that "the bark of the *koa* was used by natives for tanning purposes."

For all the doomsaying, Mueller-Dombois has found that rainforest *koa*, though radically depleted, will today replace itself at about a one-to-one ratio if undisturbed. Many fallen *koa* trees observable today have died as a result of natural phenomena, having succumbed to old age or being toppled by severe storms. It must be remembered though that the present distribution of *koa* forests is so restricted that any recovery of its original terrain would require a major planting program. Currently some *koa* reforestation experimentation is being done at Keauhou Ranch on Hawai'i under the aegis of the Kamehameha Schools. Of existing Hawaiian forests, Mueller-Dombois notes "the management of these *koa* and *'ōhi'a* forest ecosystems will largely determine the future of biological conservation in Hawaii."

For a number of years botanists divided Hawaiian *koa* into several different species. Indeed, even to the untrained observer there are distinctly different characteristics among the *koa* varieties found on each of the major islands, not to mention the pronounced differences between stands on each island, and sometimes even within the same stand. As Mueller-Dombois notes, "There is a great probability that the upper and lower elevation *koa* also form different races." Its wide range of physical characteristics is a major function of its different habitats. Though not settled, botanists today have generally agreed that there are two species of *koa* in Hawai'i—*Acacia koa* and *Acacia koaia* (curly *koa*). Within these two species are a number of different forms, especially in the *Acacia koa* species, which is highly adaptive.

In fact, so adaptive is *Acacia koa* that it is found from sea level to as high as 7000 feet. It flourishes at elevations between 3000 and 6000 feet. Although *koa* grows in warm, relatively dry areas with as little as 25 inches of rainfall a year, it definitely grows best with a rainfall of between 75 and 200 inches a year. Generally the drier the habitat, the more beautiful but twisted the wood. *Koa* grows in a wide range of soils, and on occasion will even take root on a new lava flow. The reproductive mechanisms are only now being understood, with k*oa* in rainforests typically propagating from seeds and *koa* in seasonal forests propagating by sending out suckers. Seeds can lie dormant for many years and then, typically because of some favorable physical disturbance followed by exposure to light and heat, suddenly germinate.

Competition, soil, weather, and elevation play very significant roles in the physical type of *koa* tree a given area will produce. Three factors are thought to influence whether a tree will grow straight and tall before branching—genetic characteristics, condition of the terminal bud and exposure to light. *Acacia koa,* when growing in the open with light coming from all sides or at lower elevations, rarely reaches a trunk height more than 15 to 30 feet. *Acacia koa* that grows in thick stands in a rainforest habitat will often produce straight trunks of from 40 to 80 feet in height at higher elevations; trees in dense stands will tend to strive for sunlight, which is only available from above. The greatest incidence of straight and tall *koa* trees was found on the slopes of Haleakalā on Maui and the high mountains of Hawai'i. In comparison to many other similar species of trees, *koa* is unexpectedly fast growing, fostered by the year-round growing season in this tropical environment.

Koa sometimes reaches massive proportions. Tall, straight *koa* trees up to 20 feet in circumference were seen by a number of Europeans visiting Hawai'i in the late 1700's and early 1800's. One legend reputes a *koa* tree with a straight trunk as high as 120 feet, and Emerson notes ten men were required to encompass another mammoth *koa* tree from which a canoe was to be hewed. Though these dimensions are probably exaggerated, there undoubtedly were some quite large *koa* trees. Straight trunks in excess of 70 feet were not unheard of; and while never plentiful, one can still find today an occasional 50- to 60-foot straight-trunked *koa* tree. In 1977 a 62-foot log was felled in the Honomalino forest above Kona, from which a ten-man, 58-foot canoe has been made.

Of old, certain areas such as the mountains above Hilo and Kona and the slopes of Haleakalā produced such an abundance of high quality canoe logs that a very disproportionate amount of the total number of canoes throughout the islands came from these sites. At Keauhou Ranch on the island of Hawai'i there stands what is considered to be the largest *koa* tree in the world. Its trunk measures some 12 feet in diameter and 37½ feet in circumference. Though the trunk only rises about 30 feet before branching, its topmost branches tower 140 feet above the ground. The tree is probably four hundred to five hundred years old.

The first and only study on the age structure of *Acacia koa,* done recently by Mueller-Dombois, has brought to light some new facts. Studying two distinctly different geoclimatic zones in the Volcano area on the island of Hawai'i, he found that it was "possible to determine the average

age of a sample of several trees with similar diameters." In the accompanying graph it can be seen that *koa* grew faster in Kīpuka Puaulu where there was deeper soil, less rain, and a warmer climate than in the Kīlauea forest. Where there is less rain the nutrients in the soil are not as likely to leach out. The growth rate of *koa,* all environmental factors being equal, will also vary with the age of the tree, growing fastest when it's young.

According to the accompanying graph, it would take about 100 years in Kīpuka Puaulu and about 150 years in the Kīlauea forest to produce a canoe-quality *koa* log 4 feet in diameter and 40 to 60 feet high. For the same tree to reach roughly 5 feet in diameter, it would take approximately 135 years in Kīpuka Puaulu and 200 years in the Kīlauea forest area.

The higher slopes of Mauna Kea, Mauna Loa and Hualālai on Hawai'i and Haleakalā on Maui were once covered with dense forests of *koa,* totalling tens of thousands of acres. In 1813, early visitor John Whitman noted "Owhyhee [Hawai'i] and Mowee [Maui] furnish the best canoes." Other island areas had healthy but much smaller concentrations of *koa.* Kaua'i, in fact, appeared to have a genuine dearth of canoe-quality trees; it is recorded that "on Kaua'i *koa* rarely reached the size of Big Island *koa* and their trunks were usually short and twisted." It is interesting that, barring wartime (when large fleets were assembled at a given island), early European explorers rarely mention large congregations of canoes off Kaua'i, O'ahu, Moloka'i or Lāna'i. On the other hand there were numerous accounts of seeing large numbers of canoes off Maui and, especially, Hawai'i. Rev. Sereno Bishop observed in the 1830's that "Kona with its great *koa* forests inland abounded in canoes." By way of contrast, Rev. Samuel Whitney, a missionary working on Kaua'i, wrote in 1834 to Rev. Chamberlain in Honolulu inquiring about purchasing a whale boat to serve his far-flung flock as "canoes cannot be obtained here for love or money. . ."

The other species of *koa* found in the islands is *Acacia koaia (koai'e),* a rather small tree typically reaching a height of only 20 to 25 feet. The trunk tends to be gnarled and twisted with rough, corrugated bark, in contrast to the trunk of the *Acacia koa* which tends to be straight with relatively smooth bark. The *Acacia koaia* is found only in lowland dry areas on the leeward side of an island, usually alone; harder than *Acacia koa,* it was never used for canoe hulls but its curly, corkscrewed grain made it a favorite for fancy paddles.

Koa For Canoes

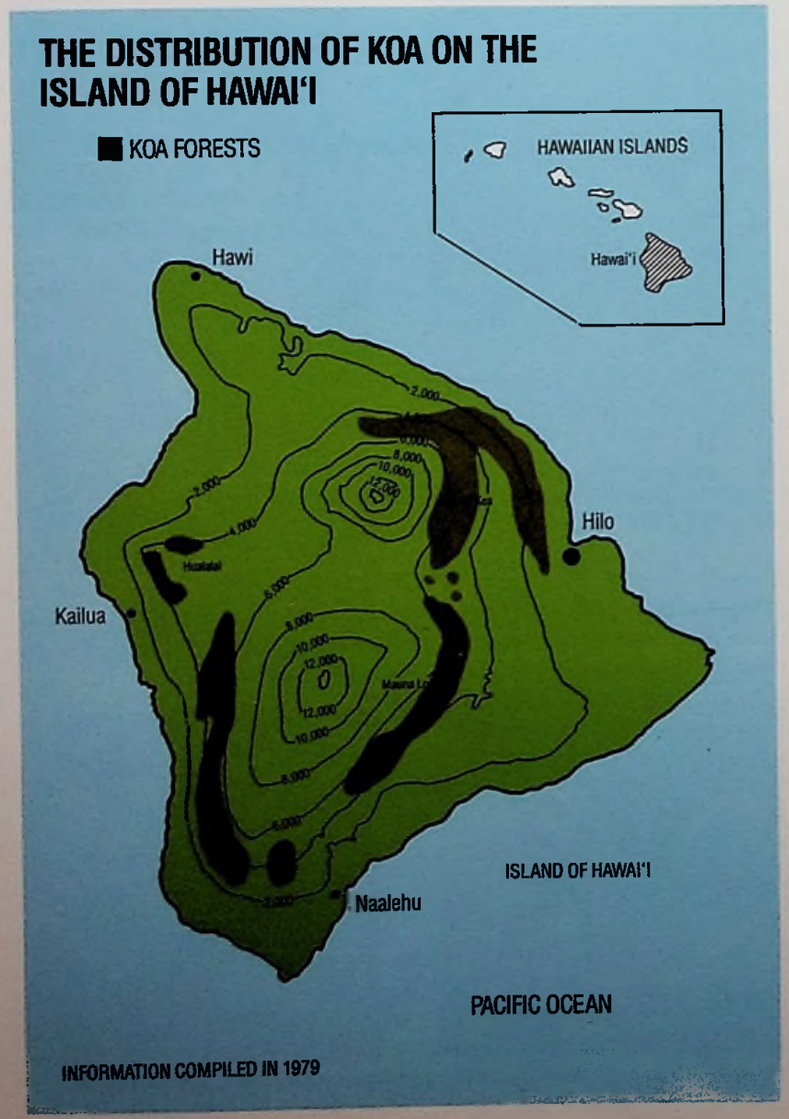
Early Hawaiians, and canoe builders in particular, possessed an especially detailed knowledge of differing physical characteristics of woods, primarily of *Acacia koa.* In the absence of modern-day botanical classification techniques, the canoe builder devised his own very sophisticated system for classifying *koa.* Through analysis of a tree's trunk shape and dimensions, bark, grain, and branching patterns, a canoe builder was able to identify each *koa* tree as being of a certain type.

Beyond the obvious gross physical characteristics of a *koa* tree, the ancient canoe builder was most concerned with the grain, for well he knew that each tree possessed distinct grain characteristics. While today's botanist will tell you that *Acacia koa* is *Acacia koa,* he will observe that there is, besides the more obvious differences in physical characteristics, a remarkable range in the density from one tree to the next, and from one stand to the next. The density of *koa* ranges from a low of about 30 pounds per cubic foot to a high of 80 pounds per cubic foot. In some cases there will even be a significant range of grain density within the same tree. It was apparently this maverick and obscure feature of *koa* wood that most plagued the canoe builder.

While the Hawaiian did not think in terms of pounds per cubic foot, he did develop a system of grain classification that was for all practical purposes comparable to a botanist's grain density scale. Low density *koa* (roughly 30 to 45 pounds per cubic foot) was to the canoe builder generally soft, lightweight, and yellowish. He called it *koa lāʻau maiʻa* (banana-colored *koa*) and valued it for its lightness as wood for paddles, but rarely used it for canoes. Another name for this type of *koa* wood was *koa ʻawapuhi,* literally, "ginger *koa,*" which was regarded as female by the Hawaiians. Mid-range density *koa* (40 to 60 pounds per cubic foot), reddish to brown, was overwhelmingly favored for making canoes, primarily because of its durability, and strength-to-weight relationship. *Koa* at the high end of the density range (60 to 80 pounds per cubic foot) was almost black in color and extremely heavy. The wood of this type of tree was called *koa ʻiʻo ʻōhiʻa* (hard *ʻōhiʻa*-like grain) and was usually avoided for canoes because the wood was heavy and hard to work. On the occasion when a canoe was made of this kind of *koa* it was said that it "will never lose its heaviness until it is smashed." This contrasts to the typical *koa* canoe that over the years loses weight due to water loss from the wood. Noting the tendency of *koa* to crack and check, canoe builder Z. P. K. Kalokuokamaile said that the canoe maker of old had "to be very careful for the grain of some trees lie [sic] all in the same direction."

This canoe-quality koa tree *in the Kona area* (left), *would yield a canoe of approximately 50 feet. Trees of this size and even larger were common at the time of Captain Cook's arrival. Lt. Clerke reported "Some of our Explorers in the woods measured a tree 19 feet in the girth and rising . . . to a great height, nor did this far, if at all, exceed in stateliness many of its neighbors. . ."*

The severely restricted distribution *of koa on the island of Hawaiʻi today is shown on the map* (below).



Further identification of a tree was made through its bark. Unfortunately, only two types are recorded. *Kaekae* was a whitish bark that generally covered a tall, handsome tree, indicating a straight grain of the *lāʻau maiʻa* variety. This type of tree, according to Kalokuokamaile, made "a very light canoe and floats well after it is built and put into the sea." *Maua* on the other hand, was a dark red bark that typically sheathed the tough, heavy, black-grained *ʻiʻo ʻōhiʻa,* of which "the grain of the wood twists forward and back. This is hard to make into a canoe."

Trunk shape and dimensions, and branching patterns provided the canoe builder with his most common means of identifying different types of *koa.* Following is a list of the terms still known that were used in identifying *koa waʻa* (*koa* for canoes):

Koa Terminology

koa hiʻu waʻa	growing straight up before branching; also *koa hiʻu awa*
koa huhui	growing straight up, with a cluster of branches at the top
koa huli pū	having wood of such good quality throughout that it was thought best to avoid cracking the log by exposing and drying out the roots, letting the tree fall over, rather than cutting it down
koa iho ʻole	crooked but nicely bent in an arc; could be easily shaped to give the hull a "banana" curve; considered the most desireable type
koa kamahele	having one branch larger and more serviceable than the trunk itself; also *koa lālā kamahele*
koa koʻamoku	large and rounded but not long; a canoe made from this type will have the same width from stern to prow
koa kolo	leaning or sprawling, but still fit for use
koa kolopū	growing straight up with no significant branching; of uniform diameter nearly the whole length of the trunk; waves will wash into a canoe made from this type
koa kū keʻele waʻa	straight but somewhat flattened on both sides
koa kūpalaha	having a broad, straight trunk, but rather flat on one side
koa kūpalina	generally usable but imperfect; bent, flattened, short, not well-proportioned
koa kupulāʻiki	same as *koa kupālaha*
koa lālā kamahele	same as *koa kamahele*
koa lau kane	(no data)
koa lau kani	strong; considered male; possibly same as *koa lau-kane*
koa lau nui	a large-leafed variety
koa noʻu	straight, thick, unblemished, not very tall; suitable for a wide, short canoe such as an *ʻōpelu* (heavy-duty fishing canoe)
koa poepoe	of good size but short and thick
koaiʻa	same as *koaiʻe*
koaiʻe	*Acacia koaia;* a dwarf *koa* with narrower leaves and pods, harder wood; used for fancy paddles
koaʻohā	same as *koaiʻe*

Koa *(Acacia koa)* Hull, Manu, Seats, Gunnels

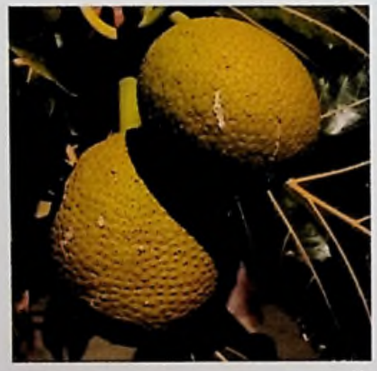
'Ōhi'a lehua *(Metrosideros collina)* 'Iako, Mast, Wac

Wiliwili *(Erythrina sandwicensis)* Ama, Hull

Hau *(Hibiscus tiliaceus)* 'Iako, Ama

'Ahakea *(Bobea eliator)* Manu, Gunnels

Kāwa'u *(Ilex anomala)* Manu, Gunnels



'Ulu *(Artocarpus incisus)* Hull, Manu, Gunnels, Seats

Component Woods Of The Hawaiian Canoe

Many indigenous and endemic woods were used in constructing a canoe. All had individual properties making them particularly suitable for different kinds of canoes and their component parts.

'Ōhi'a-hā *(Eugenia sandwicensis)* Hull, Gunnels

Kōlea *(Myrsine suttonia)* Manu, Gunnels

Naio *(Myoporum sandwicense)* Manu, Gunnels

Manono *(Gouldia)* Manu, Gunnels

Kukui *(Aleurites moluccana)* Hulls

Other Woods

Although *koa* was the distinctly preferred wood for making canoes, the ancient Hawaiian occasionally made his canoes from a number of other varieties of native woods. Emerson notes that "other useful woods of varying quality were also found in abundance, each of which had its office in canoe building and were sometimes used in making the body. Such were the *ahakea,* the *kukui,* the *ulu* or breadfruit, the *ohia-ha,* the *pua,* the *alana,* the *hau* (a hibiscus), the *wiliwili,* and the *niu* or cocoanut and many others." *'Ahakea, pua, 'ālana,* and *hau* along with *kāwa'u, kōlea, koai'e, naio, manono, kapena* and *alamea,* were used primarily for the component parts. Degener notes that though rare, "the trunk [of the coconut tree] was hollowed out and made into a canoe termed *loloniu,*" an observation confirmed by Handy and Emerson. According to Emerson the *alamea,* "though never abundant, in ancient times . . . grew to be a tree of magnificent proportions in the forests of Hawaii, especially in the Kona district . . . It is said to resemble the *Kauila* being harder and more resistant than the *koa;* hence probably the favor it found as a war canoe." *'Ōhi'a hā,* a native species of *Eugenia,* was apparently very little used for making canoes; when it was, the canoe was "quite heavy but very durable."

Fornander notes that besides *koa,* "three other kinds of wood were used in the olden time for building canoes, the *wiliwili, kukui* (candle-nut tree), and *ulu* (breadfruit tree). The *wiliwili* is yet being used. The *kukui* is not much seen at this time. The *ulu* is used for repairing a broken canoe . . . ." Handy comments that the early Hawaiian settlers found *kukui* "to be one of their most valuable assets, perhaps the chief of which lay in the fact that the trunks of large trees could be hollowed into superb canoe hulls."

Soft, light and easily worked, breadfruit, *kukui* and *wiliwili* were especially favored as play or training canoes particularly for young aspiring canoeists or women. The "baby" or training canoes rarely exceeded 20 feet in length and usually were in the 10 to 15 foot range. Of the light woods, breadfruit was apparently least used; not only was the breadfruit tree fairly rare and needed as a food source, the one variety available to the Hawaiians was usually unsuitable in girth and height for making canoes. Of *wiliwili,* Fornander notes that "it was also made into canoes, provided a tree large enough to be made into a canoe can be found; but it is not suitable for two or three people, for it might sink in the sea. But it must not be finished into a canoe while it is green; leave it for finishing till it has seasoned, then use it."

Emerson says of softwood *wiliwili* canoes that: "If not sufficiently durable and resistant to the powerful jaws of the shark, they were at least easily manipulated and very buoyant, and made a cheap and on the whole a very serviceable canoe for ordinary purposes." Degener, in his book *Flora Hawaiiensis,* noted that in the early part of this century canoes of *wiliwili* were not in "favor because of the belief that sharks preferred to follow this particular wood." The limited literature on canoes made from soft woods tends to support the ancient Hawaiian's concern for the greater vulnerability of light wood canoes to occasional shark attacks.

Wiliwili canoes are almost always referred to in the literature as near-shore, play or training canoes. I'i notes that as a young boy he "had learned a little about paddling a canoe made of *wiliwili* wood that his parents had provided for him."

There is one reference made by French sea captain La Perouse of canoes about his ship, off Maui in 1796: "These canoes had outriggers: each held from three to five men; the common size might be about twenty-four feet in length, only one foot in breadth, and very near the same in depth. We weighed one of them of these dimensions, which did not exceed fifty pounds weight." One can only suppose that a canoe of close to the 24-foot length La Perouse noted must have been of some extremely light wood such as *wiliwili,* breadfruit, or *kukui.* For a *koa* canoe of 24 feet—no matter how thin—to weigh only fifty pounds, as some have suggested, is inconceivable.

Wiliwili, by some accounts, was never very plentiful. Kalokuokamaile notes that "in the olden days . . . there were very few places in which this tree grew." This is somewhat at odds with botanist W. E. Hillebrand, who wrote that *wiliwili* was "much more common formerly than now." It was said by some that Ka'ū was the best place for *wiliwili.* Today *wiliwili* can be found flourishing in certain areas. The author has visited a grove of *wiliwili* above the Mākena area on Maui that comprises several hundred acres. Many of the trees are 3 to 4 feet in diameter with trunks often rising 15 to 20 feet high before branching. Other sizeable stands of *wiliwili* dating from precontact times can still be found in the Pu'uanahulu, Pu'uwa'awa'a and Kalapana areas of Hawai'i. Smaller populations are also found on Kaua'i behind Kekaha, in west O'ahu, south and west Moloka'i, Kaupō on Maui, Ka'ū on Hawai'i and on Kaho'olawe.

Emerson makes an intriguing reference to a certain *kaukauali'i* (minor chief) who, in the time of Kamehameha I, "constructed a vessel *(moku)* out of a single huge *wiliwili* tree. He named this craft after himself, *'Waipa'.* It was partly covered or decked over, but had no outrigger, being kept upright by ballast. It had a single mast and sailed with Kamehameha's fleet to Oahu." It is not unlikely that such a craft was built. After contact there were a number of Hawaiians experimenting with new types of craft. By way of reference, the largest *wiliwili* tree known, located on Pu'uwa'awa'a Ranch is, at breast height, almost thirteen feet in circumference, and fifty-five feet high.

Kenneth Emory, dean of Pacific anthropologists, records an informant who told him in 1937 of the Hawaiians training *wiliwili* trees to grow tall and straight before crowning by constantly trimming off side branches.

One unusual type of Hawaiian canoe was allegedly made from bulrushes—*wa'a naku.* Three independent sources speak of such a craft

The other variety of koa, Acacia koaia, produced a curly grained wood unsuitable for canoe construction but ideal for the production of fancy paddles.

Other Woods

Although *koa* was the distinctly preferred wood for making canoes, the ancient Hawaiian occasionally made his canoes from a number of other varieties of native woods. Emerson notes that "other useful woods of varying quality were also found in abundance, each of which had its office in canoe building and were sometimes used in making the body. Such were the *ahakea,* the *kukui,* the *ulu* or breadfruit, the *ohia-ha,* the *pua,* the *alana,* the *hau* (a hibiscus), the *wiliwili,* and the *niu* or cocoanut and many others." *'Ahakea, pua, 'ālana,* and *hau* along with *kāwa'u, kōlea, koai'e, naio, manono, kapena* and *alamea,* were used primarily for the component parts. Degener notes that though rare, "the trunk [of the coconut tree] was hollowed out and made into a canoe termed *loloniu,*" an observation confirmed by Handy and Emerson. According to Emerson the *alamea,* "though never abundant, in ancient times . . . grew to be a tree of magnificent proportions in the forests of Hawaii, especially in the Kona district . . . It is said to resemble the *Kauila* being harder and more resistant than the *koa;* hence probably the favor it found as a war canoe." *'Ōhi'a hā,* a native species of *Eugenia,* was apparently very little used for making canoes; when it was, the canoe was "quite heavy but very durable."

Fornander notes that besides *koa,* "three other kinds of wood were used in the olden time for building canoes, the *wiliwili, kukui* (candle-nut tree), and *ulu* (breadfruit tree). The *wiliwili* is yet being used. The *kukui* is not much seen at this time. The *ulu* is used for repairing a broken canoe . . . ." Handy comments that the early Hawaiian settlers found *kukui* "to be one of their most valuable assets, perhaps the chief of which lay in the fact that the trunks of large trees could be hollowed into superb canoe hulls."

Soft, light and easily worked, breadfruit, *kukui* and *wiliwili* were especially favored as play or training canoes particularly for young aspiring canoeists or women. The "baby" or training canoes rarely exceeded 20 feet in length and usually were in the 10 to 15 foot range. Of the light woods, breadfruit was apparently least used; not only was the breadfruit tree fairly rare and needed as a food source, the one variety available to the Hawaiians was usually unsuitable in girth and height for making canoes. Of *wiliwili,* Fornander notes that "it was also made into canoes, provided a tree large enough to be made into a canoe can be found; but it is not suitable for two or three people, for it might sink in the sea. But it must not be finished into a canoe while it is green; leave it for finishing till it has seasoned, then use it."

Emerson says of softwood *wiliwili* canoes that: "If not sufficiently durable and resistant to the powerful jaws of the shark, they were at least easily manipulated and very buoyant, and made a cheap and on the whole a very serviceable canoe for ordinary purposes." Degener, in his book *Flora Hawaiiensis,* noted that in the early part of this century canoes of *wiliwili* were not in "favor because of the belief that sharks preferred to follow this particular wood." The limited literature on canoes made from soft woods tends to support the ancient Hawaiian's concern for the greater vulnerability of light wood canoes to occasional shark attacks.

Wiliwili canoes are almost always referred to in the literature as near-shore, play or training canoes. I'i notes that as a young boy he "had learned a little about paddling a canoe made of *wiliwili* wood that his parents had provided for him."

There is one reference made by French sea captain La Perouse of canoes about his ship, off Maui in 1796: "These canoes had outriggers: each held from three to five men; the common size might be about twenty-four feet in length, only one foot in breadth, and very near the same in depth. We weighed one of them of these dimensions, which did not exceed fifty pounds weight." One can only suppose that a canoe of close to the 24-foot length La Perouse noted must have been of some extremely light wood such as *wiliwili,* breadfruit, or *kukui.* For a *koa* canoe of 24 feet—no matter how thin—to weigh only fifty pounds, as some have suggested, is inconceivable.

Wiliwili, by some accounts, was never very plentiful. Kalokuokamaile notes that "in the olden days . . . there were very few places in which this tree grew." This is somewhat at odds with botanist W. E. Hillebrand, who wrote that *wiliwili* was "much more common formerly than now." It was said by some that Ka'ū was the best place for *wiliwili.* Today *wiliwili* can be found flourishing in certain areas. The author has visited a grove of *wiliwili* above the Mākena area on Maui that comprises several hundred acres. Many of the trees are 3 to 4 feet in diameter with trunks often rising 15 to 20 feet high before branching. Other sizeable stands of *wiliwili* dating from precontact times can still be found in the Pu'uanahulu, Pu'uwa'awa'a and Kalapana areas of Hawai'i. Smaller populations are also found on Kaua'i behind Kekaha, in west O'ahu, south and west Moloka'i, Kaupō on Maui, Ka'ū on Hawai'i and on Kaho'olawe.

Emerson makes an intriguing reference to a certain *kaukauali'i* (minor chief) who, in the time of Kamehameha I, "constructed a vessel *(moku)* out of a single huge *wiliwili* tree. He named this craft after himself, *'Waipa'.* It was partly covered or decked over, but had no outrigger, being kept upright by ballast. It had a single mast and sailed with Kamehameha's fleet to Oahu." It is not unlikely that such a craft was built. After contact there were a number of Hawaiians experimenting with new types of craft. By way of reference, the largest *wiliwili* tree known, located on Pu'uwa'awa'a Ranch is, at breast height, almost thirteen feet in circumference, and fifty-five feet high.

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One unusual type of Hawaiian canoe was allegedly made from bulrushes—*wa'a naku.* Three independent sources speak of such a craft

The other variety *of koa, Acacia koaia, produced a curly grained wood unsuitable for canoe construction but ideal for the production of fancy paddles.*

Huge drift logs *carried by currents from forests of the Pacific Northwest to the shores of Hawai'i were as highly prized as koa for canoe construction.*

made of bulrushes. Emerson makes mention of a bulrush canoe in the story of Kila (son of Mo'ikeha), and in a footnote to this reference, comments that "the rushes, after being cut and slightly wilted in the sun, are made up into cigar-shaped bundles, tapering at each end, and tightly bound with cord or some substitute. I have often seen the tough stems of the *koali* vine *(convolvulus)*, which grows to a great length, used for this purpose. These primary bundles are bound firmly into two or three parts of equal size, and these, in turn, are lashed together, side by side, to form the canoe. When taste and skill are used the result is a craft that will do excellent service for months, on which it is possible to venture with safety quite out into the ocean."

Fornander, in his *Collections of Hawaiian Antiquities and Folklore*, tells of the sending of "Ulu, the king of Kau, in a canoe made of bulrushes." Fornander, however, thinks that ***naku*** (in the original Hawaiian reference), which also means "a search, a pursuit after" should, in the context of ***wa'a naku*** be rendered as "a search canoe," not a bulrush canoe.

Lastly, Rev. Henry Cheever, an Englishman who made a tour of the Hawaiian Islands in 1843, reports going to Hilo and in the vicinity of Coconut Island being able to "make your way through the bread fruit and ***hala*** trees to the borders of the lakes [Coconut Island area], and take a sail there, if you like, in a boat of bulrushes, such, very likely, as Moses was laid in by the Nile."

It is left to the reader to decide whether the so-called ***wa'a naku*** or bulrush canoe was a true native Hawaiian craft or a post-contact European-influenced oddity.

Drift Logs

The gods must surely have smiled on the Hawaiian people, giving them yet another special source of canoe logs: giant redwood, fir, pine and other kinds of tree trunks that drifted from the northwest coast of America to the shores of Hawai'i. W.T. Brigham, one-time curator of the Bishop Museum, notes that "many of the largest and most famous double canoes of the Hawaiians were hewn from logs of Oregon pine brought to the shores of Niihau and Kauai by the waves. I myself saw dozens of such logs in 1864, some of great size, some bored by Teredo, others covered with barnacles, along the shores of Niihau." Similarly James Hornell notes that, "in Hawaii giant logs of Oregon pine occasionally drifted ashore; these were greatly prized, for they were often so large as to serve as entire hulls without the need of raising the sides by means of planks sewn on; the difficulty was to obtain a pair of approximately equal size; sometimes a log was kept for years before this aim was achieved."

It was as if nature had compensated for the chronic canoe log shortage on Kaua'i and Ni'ihau, for that was where most of these drift logs landed. Captain George Vancouver notes that "the circumstance of fir timber being drifted on the northern sides of these islands is by no means uncommon, especially in Attowai [Kaua'i], where there then was a double canoe, of a middling size, made from two small-pine trees, that were driven on shore nearly at the same spot." The log belonged to whatever chief ruled over that stretch of coastline where it happened to be beached.

Menzies, Vancouver's surgeon and naturalist, while crossing the Kaua'i Channel later reported "the largest single canoe we had seen amongst these islands, being about sixty feet long and made of one piece of the trunk of a pine tree which had drifted on shore on the east end of the island of Kauai a few years back. She had sixteen men on her and was loaded on the outriggers with a large quantity of cloth, spears, two muskets, and other articles, which they were carrying up to Maui to Kaeo."

4
TOOLS

May my adz fly inside and outside of the canoes I hew
The Koa chips fly at a touch
Do not make the keenness of my adz go to its sides
But keep it always in front

The Adze

The Polynesian preferred the adze *(koʻi)* to all other implements. Harder than spring steel, the fine-grained Hawaiian basaltic stone adze was a wonderfully functional all-purpose tool. With it he sculpted his canoe and shaped his culture.

In Hawaiʻi, a canoe builder's tool kit of adzes was as indispensable to him as medical instruments are to today's surgeon. To read the accounts of many early European visitors to Hawaiʻi, the quality of work the canoe builder wrought with his adze was every bit as fine as the surgeon's. One of these observers, John Whitman, in 1813 said, "When we reflect upon the disadvantages under which they laboured before the introduction of iron, we cannot but admire the ingenuity which enabled them to construct such a vessel with no other tools than such as were made from shells and stones, and the skill and patience which could render such materials subservient to such important purposes."

Supplying the canoe builder with the tools of his trade was a separate class of adzemakers *(poʻe kā koʻi)* who were a highly specialized guild of stone craftsmen. Adzes were a primary object of barter between the canoe builder and adzemakers or whoever else might have obtained adzes through exchange.

Most Hawaiian stone adzes came from one of the quarries on Hawaiʻi, Kahoʻolawe, Molokaʻi, Oʻahu, or Kauaʻi. However, Ellis recounts in 1823 natives at the fishing village of Nīnole on Hawaiʻi telling him that their village "was a *wahi pana* (place famous) for supplying the stones employed in making small adzes and hatchets, before they were acquainted with the use of iron."

The most important of these quarries was on the southern flank of Mauna Kea. It was not only the largest in Hawaiʻi but the largest in the entire Pacific region, covering some 7½ square miles, at an elevation of between 11,000 and 12,400 feet. The site was at least twenty miles from the nearest permanent habitation. Although there were a few shelter caves, fuel and food were totally lacking. Water was available at nearby Lake Waiau, but containers and a tough two-mile hike were necessary. Warm clothing and bedding would have to have been brought, as even summer nights on Mauna Kea are bitterly cold. Anthropologists Patrick McCoy and Richard Gould, who have recently done extensive research on the Mauna Kea site, feel that between the harsh environment and formidable logistics, "any prehistoric expedition to the adze quarry must have involved a carefully planned visit of at least two or more weeks during the relatively short summer."

Kamakau states that the prehistoric Hawaiian adzemaker had identified four distinct kinds of rock—*hokele (hoʻokele)*, *ʻalā makahinu* (blue lava), *pahoa*, and *makaiʻa*—as types of basalt suitable for adze-making, none of which can be identified today. He also notes that when "compact water-worn basalt, *ʻala-ʻala lelekepue*, *ʻala piamakahina*, or *ʻala haumeku ʻolokele*, . . . were to be found the expert stoneworkers went there to examine the quality and the grain of the stones to see which would make good solid adzes."

The adze-making process consisted of three steps: quarrying, flaking and finally grinding and polishing. Quarrying adze material began with first identifying suitable basaltic material. Pieces of workable size were

A petroglyph *of a man with an adze* (right) *located in the Puakō area on the island of Hawaiʻi.*

Canoes today *are still carved with adzes, though the stone heads have been replaced by steel* (below).

Quarried basaltic material *from which adze preforms were shaped* (above) *the second step in the adze-making process.*

The Mauna Kea adze quarry, *the largest in the Pacific, encompasses 7½ square miles at an altitude of between 11,000 and 12,400 feet* (left).

broken off, usually with a large hammerstone. At times at the Mauna Kea quarry the basalt was mined. McCoy and Gould explain: "The ancient Hawaiians extracted the best available basalt by using levers and breaking up large slabs of rock that had already been cracked by thermal expansion and contraction." In some cases pits were cut as much as 15 feet into the bedrock.

The adzemaker would then take a smaller hammerstone *(haku kā ko'i)* and flake his piece of raw material, reducing it "to a basic preform, as close as possible to the intended shape and size of the finished adze." The adzemaker then transported his preformed adzes back to his permanent home where he would finish them. McCoy and Gould note that, "the quality of some preform rejects [at Mauna Kea] indicates that the adze craftsmen were very selective in what they took away." This makes eminent sense, for it was a difficult hike and one large adze preform might weigh as much as fifteen pounds.

Sometimes at the quarry site, but usually at home, the adzemaker would finish the adze by grinding and polishing the rough edges of the preform on a smooth, flat grindstone *(hoana)*. Introducing sand of different coarseness along with water was a common method of increasing the abrasive effect of a grindstone. The final adze would sometimes be mirror-smooth on all sides and always capable of taking a fine edge.

Successful quarrying and especially flaking required that the adzemaker be a sophisticated geologist. As much as the Hawaiian adzemaker knew of a stone's fault lines, flaking patterns, and imperfections, he still experienced a fairly high discard rate, as indicated by the numerous abandoned preforms strewn about the Mauna Kea quarry site. This was apparently due to a phenomenon called "end shock," whereby when a blow is directed at one side of the preform, a piece is dislodged from the opposite side. Often this happens when there are no detectable imperfections in the rock. Forty structures considered shrines in the Mauna Kea quarry complex suggest "evidence of ritual behavior intended to predict or influence the flaking qualities of basalt extracted from various parts of the quarry." Recent attempts at adze making have graphically demonstrated this problem.

Malo states that, "after splitting the rock and obtaining a long fragment, they [adzemakers] placed it in a liquor made from vegetable juices *(wai-laau)*, which was supposed to make it softer." *Wai lā'au* was apparently the juice of the *pala'e* fern mixed with green *kukui* nuts. This reputed practice, while interesting, has no known basis in science.

After an adze was completed it was lashed by its tang (projecting tongue) to an "L-shaped" haft (handle) with coconut sennit or *olonā*. *Hau* and *'olopua*, both readily available, were favored for the haft. At one end of the haft a heel or wooden tongue was cut to the desired angle. A protective cloth *(pale)* of *tapa, lauhala,* or banana leaf was customarily inserted between the wooden tongue of the haft and the tang of the adze to prevent slippage and protect the lashing from being cut by the sharp edges of the tang of the adze.

The canoe maker's adze kit was made up of a number of different adzes. Most were quadrangular, but some were triangular and trapezoidal. Sizes and weights ranged from ten- to twelve-pound, foot-long models for hewing *koa* trees, to dainty inch-long affairs that weighed no more than a few ounces.

A master canoe builder was incredibly skillful with his stone adzes. Besides having different shapes, sizes, and weights, adzes had different bevels and were hafted at different angles, affording the canoe builder a range of hewing options within one tool form that a contemporary wood carver requires from his entire tool kit. Kalokuokamaile writes that "you noticed the skill of the workers [canoe builders] by the long shavings removed by the adze. The shavings were not small or large but were all of one size."

To hew out interior portions of the canoe where the width was too narrow to allow the use of an ordinary adze, the Hawaiian canoe builder employed a special socketed or swivel-headed adze called both a *ko'i 'āwili* and *kūpā 'aike'e*. In fact this adze took its name from Kūpā'aike'e, the god who according to Hawaiian mythology invented it. So essential was this adze to the hollowing of a canoe that Kūpā'aike'e became one of the canoe maker's most important gods, and generally presided over the interior work of a canoe.

Representative collections of adzes (right) *and adze heads* (below) *illustrating the range of shapes, bevels, sizes and weights (from a few ounces to over 10 pounds) that the canoe builder had at his disposal.*

In some cases adzes were made out of conch *('olē)*or other types of shell and were, notes Kamakau, "used for grooving wood in the fitting together of the canoe." Young officer Thomas Manby, traveling with Captain Vancouver, observed canoe builders "at work with the native implements of the country consisting of stone and shell ingeniously fitted in small handles clearing the tree of its numerous branches." Another type of adze was made from the *alahe'e,* an extremely hard wood. It was said that such an adze was useful to the canoe maker when working with softwoods, particularly *wiliwili.*

There was also the iron adze *(ko'i meki)* that Malo notes "had reached Hawaii before the arrival of the foreigner, a jetsam iron which the chiefs declared sacred to the gods." Kamakau also claims that the Hawaiians had iron adzes prior to the arrival of Cook. Both are probably correct, in that the Hawaiians did have and know what iron was prior to contact. What little there was probably washed up on the shores of Hawai'i as part of the residue of some distant shipwreck.

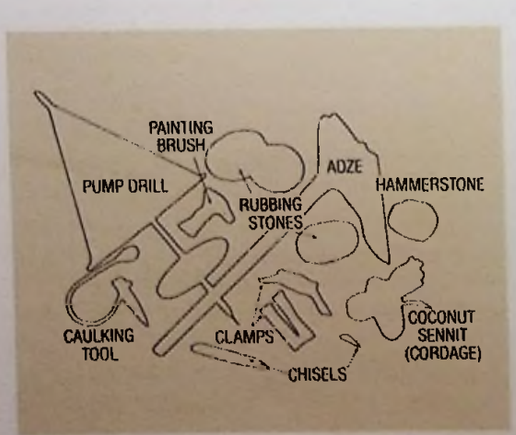
Russ Apple reports that in 1779, only one year after Cook arrived, "metal chisels and adzes replaced stone ones in Kona for carving canoes . . ." However, they retained the traditional adze configuration. Ellis notes that in the 1820's, "though they now use an axe in felling the trees, the adze is still their favourite tool, and many of them use no other." There are other accounts of the stone adze being used alongside the metal adze well into the nineteenth century.

Indeed, the stone adze was a very precise tool, much more so than the iron adze; and the canoe builder had an adze for every conceivable need. Brigham observed as late as the end of the 19th century that "I have seen them [stone adzes] used and sharpened, and I have been astonished at the dexterity of the man and the efficiency of the tool. In watching the shaping of a canoe I have seen the old canoe-maker use for the rough shaping and excavating an ordinary foreign steel adze, but for the finishing touches he dropped the foreign tool and returned to the adze of his ancestors, and the blunt looking stone cut off a delicate shaving from the very hard *koa* wood and never seemed to take too much wood as the foreign adze was apt to do."

To this day the adze, albeit with a metal blade, has remained one of the favorite, if not the favorite, tools of many Pacific island peoples. Perhaps no other people has aspired to and accomplished so much with such a tool.

Adzes Used in Canoe Building

ko'i 'āhuluhulu	planing adze
ko'i alahe'e	hardwood adze
ko'i 'auwaha	scoop adze
ko'i 'āwili	socketed adze
ko'i holu	broad, bent adze; used to shave off smooth in the direction of the grain
ko'i ho'oma	narrow and deep adze
ko'i kahela	chisel
ko'i kāhili	finishing adze
ko'i kāholo	planing adze
ko'i kalai	carving adze
ko'i kāpili	finishing adze
ko'i kīkoni	small finishing adze; used to shave off and smooth projections
ko'i kila	steel adze
ko'i kuehu	shaving adze
ko'i kūkulu	straight-edged adze; used to shave down canoe sides
ko'i kūpā	adze used for hollowing out canoe hull
ko'i kūpā 'ai ke'e	swivel-headed adze; used for hollowing out the narrow bow and stern sections, smoothing and polishing
ko'i lipi	sharp adze; used for hewing *koa* trees
ko'i meki	iron adze
ko'i milo	adze used on the outside of canoe
ko'i nunu	"greedy" adze; same as *ko'i kalai*
ko'i 'olē	conch shell adze
ko'i oma	small, oval adze; used for finishing
ko'i 'ōpaka	adze used on the outside of canoe; cuts smoothly
ko'i 'ōwili	gouge; twisting adze; same as *ko'i kūpā 'ai ke'e*
ko'i pāhoa	chisel; "dagger" adze
ko'i pāpale	(no data)
ko'i paukūkū	adze used to cut canoe log into sections
ko'i pele	adze used to hollow out bottom of canoe hull by cutting zig-zag trenches
ko'i wili	socketed adze



A canoe-builders basic tool kit, *made exclusively from natural materials—bone, shell, stone and wood—enabled him to achieve a quality of workmanship rivaling that of contemporaneous European craftsmen.* (identified at left).

Modern *canoe-making tools* (right) *includes metal adzes that retain the traditional forms together with more sophisticated power tools. These enable today's builder to produce a canoe in a fraction of the time that was required for construction using traditional implements, but their use does not necessarily result in a canoe of superior quality.*

The chainsaw *has largely replaced the adze in canoe building today* (far right).

Other Tools

Completing the canoe-builder's tool kit were chisels, hammers, clamps, drills and what appear to be caulking tools. Holes, says Kamakau, "were drilled with a shell called *makoloa,* and smaller holes for sewing the planks together with a *makilihoahoa* shell; another instrument for boring holes was fashioned from a dog's bone." Stone chisels *(pōhaku pao)* were usually made out of the same stone and in the same manner as adzes. In some instances they had wooden handles *(kau).* After contact, steel chisels *(kila pao)* came to replace those of stone. This chisel was the primary implement employed to make the narrow, rectangular lashing holes in the hull rim and in the component parts.

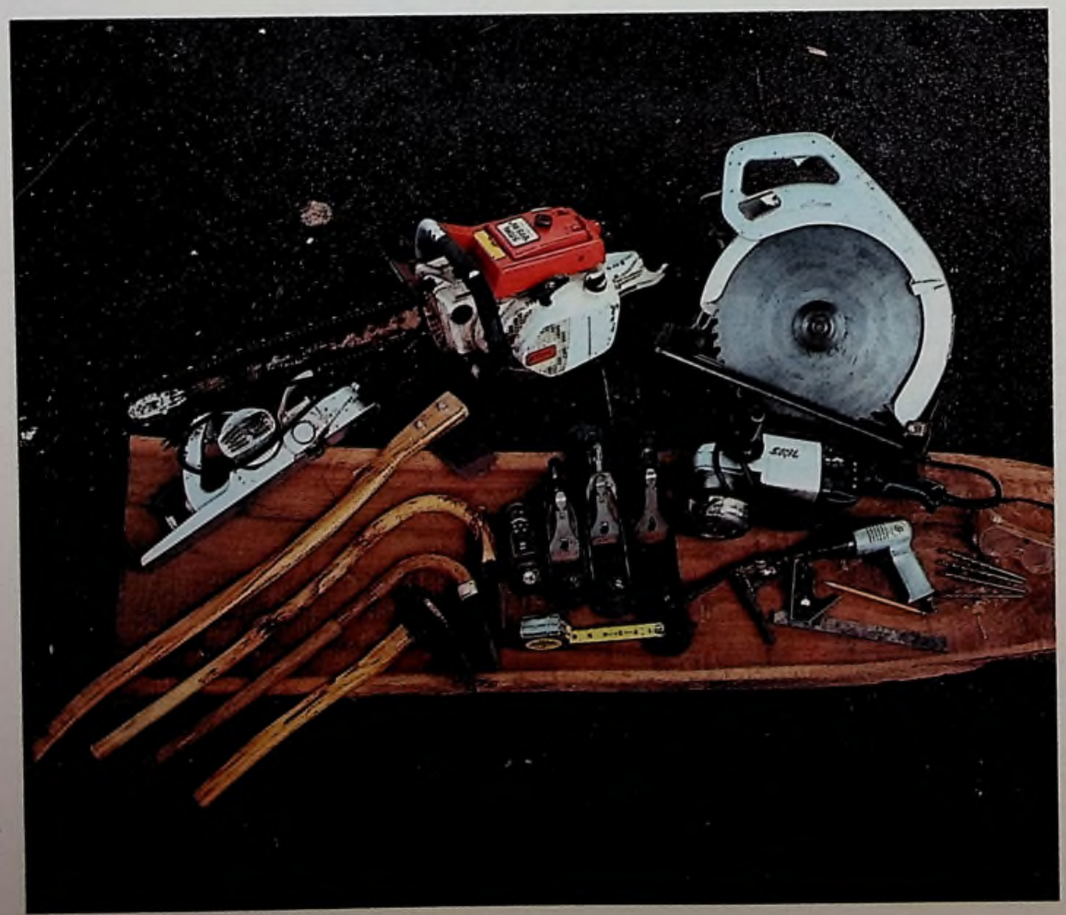
In making the lashing holes, the canoe builder used hammerstones *(pōhaku kāpili wa'a)* to tap the chisels. Most were everyday hammerstones used for other work besides canoe building. *'Ulu maika* stones (rolling discs) also did occasional duty as hammerstones as evidenced by the wear on their edges.

Wooden clamps *(pūki'i wa'a* or *kaumo'o)* were apparently used to bind down the gunnels and possibly the end pieces *(manu)* while they were being sewn to the canoe hull. Several different forms of clamps exist, varying from straight pieces of wood, to slightly curved pieces, to an S-shaped form. Specimens at the Bishop Museum are about three to six inches long each with one or two holes at one end. A length of typically 2-ply *olonā* somewhere between four and six feet long is passed through these holes uniting the two clamps.

A single rather unclear account of how clamps were employed comes from an anonymous Hawaiian informant writing in the late 1800's. He notes that "three small sticks were made, four inches long with holes in the center and through the holes of a stick a cord braided and knotted is threaded. This stick is called a *kaumoli.* When the *moo* are being made fast to the *kupe,* holes are made along the edge of the canoe properly spaced the way the *kahuna* wants them to be. Through the holes that have been bored, cords are put through and the wood parts permitted to hang. When the woods are fitted on then the *kaumoli* stick is laid on the *moo* and the *kupe.* Then the cords that are wound around the *kaumoli* is [sic] drawn tight . . . only with these tools can a single person work."

Buck reconstructs how he thinks clamps might have been used: "The clamp piece without the knotted end was run off the cord and the piece with the knot was placed vertically on the outside of the lashing holes with the short end downward . . . The cord was drawn taut so that the upper ends of the clamp pressed against the sides of the gunwale strake. The long cord could then pass over the top edge of the gunwale strake and make outer and inner turns around the clamp pieces to retain the gunwale strake. When the permanent lashings were made the clamp was released at that particular set of holes to free the hull perforations for the lashing. The other clamps kept the gunwale strake in position and were released as the permanent lashings reached them."

Caulking tools—straight pieces of wood with one end pointed and the other square, not unlike a tongue-depressor—could have been likely implements in the canoe-builder's tool kit. Buck does "not see how caulking could be used in the double scarf joins" though the author feels they had a potential role in the application of some sort of organic caulking compound to the outside lashing holes or other seams to keep water from coming into the canoe.



5
CANOE BUILDING

Swept with clouds of red dust was Ka'u by Laamaomao
Resounded the canoe-building house with the multitude of adzes
hewing the canoe.
Bottom upwards the canoe is turned; adzes hewd the ends,
Thunderously hewn . . .

The Gods

"The building of a canoe was an affair of religion." Virtually every known account of canoe building in pre-contact, and in many cases even post-contact Hawai'i, totally supports Malo's statement. It was not because canoe builders were religious zealots or that the canoe itself was considered sacred. Rather it was because so agonizingly many things could go so horrendously wrong from the time a canoe builder first set foot in the forests till the finished canoe entered the water. Canoe builder Koakanu noted tersely, "this occupation is a hazardous one, often resulting in death."

Only a shining *'aumakua,* or supportive god, could and would insure against the likes of a tree being found rotten after it had been laboriously felled, a log getting out of control and being smashed while being hauled to shore, or a canoe developing a crack the length of the hull just as it was to be completed. Well the canoe builder knew that in the process of selecting and felling a tree and then during the hewing, hauling, final finishing and launching of the canoe, myriad things could go wrong. Peter Puget wrote in 1794 that "I can believe what Taimotu [Keeaumoku] said that it was beyond our conception what an infinity of labour and trouble it must have taken from the felling of the tree to the completion of the canoe."

Consequently, virtually every step in canoe making, from determining whether undertaking such a project was propitious in the first place to final launching, was steeped in ritual or ceremony designed to appease the gods and solicit their aid in guarding against accidents and problems. Emory also notes that, "the ceremonies and their accompanying feasts provided interesting and enjoyable interludes in the work, and a spur to the completion of each stage." And it fell to the master canoe builder, the *kahuna kālai wa'a,* to be as knowledgeable and proficient in the performance of each of these different rituals and religious ceremonies as he was skilled as a craftsman, botanist, engineer and naval architect.

In many cases the various ceremonies differed from island to island, and from *kahuna* to *kahuna.* In the performance of some of these rituals and ceremonies, especially when a large canoe or a chief's canoe was concerned, the head *kahuna kālai wa'a* sometimes had the assistance of one or more other *kahuna,* not necessarily belonging to the canoe makers' guild. In virtually every instance the *kahuna kālai wa'a* had a canoe-related *'aumakua,* or personal deity, to whom he was totally devoted and solicitous of, and who, hopefully, reciprocated. While all *kahuna* in old Hawai'i were highly regarded, the *kahuna kālai wa'a,* in part because of the responsibility and importance of his job and his range and depth of skills, has been referred to as *primus inter pares,* first among equals.

The demands on and rewards for a canoe builder were great and the gods exacting, Kamakau calling the task "troublesome and wearisome work." An anonymous Hawaiian canoe builder of the 18th century notes that "Everyone may think that this work is like all others. It is very strict and if one sins, there is but one penalty, quick death. He will not be spared by the gods of canoe makers."

Within the canoe-building profession "the class of royal experts was different from the class of common experts." The best canoe builders were traditionally employed exclusively by the highest chief. Emerson claims that "Kamehameha I had two *kahuna kalai wa'a,* men of great skill named Kamaukoli and Kepaalani." He further notes that, "in building a canoe of great size, as for an *ali'i,* several *kahunas* might cooperate, in which case the one who superintended the whole work was called *'ka poo o ka waa'* . . . upon him lay the responsibility for the success of the whole undertaking." Lesser *ali'i* also had personal canoe builders if they could afford them. The builders of the commoners' canoes were not necessarily less skilled than the canoe builders of the chiefs; rather reputations established themselves, and just as today certain craftsmen, artisans, or artists are held in higher esteem than others, so it was of old.

It was said of canoe builders that they were "very much like the preachers. They do what is correct and proper and do not commit sins. If the *kahunas* have wives, they conduct themselves with propriety while the husbands go to the upland to make canoes. They do not commit sins because this work is very dangerous and the laws of the gods of canoe making must be well kept until the husbands return from the mountains."

Traditionally, "the religious ritual consisted of offerings and chanted prayers addressed to the tutelary deities of the craft." The gods associated with canoe building were numerous and their power and attributes often confusing and overlapping. In fact it is sometimes difficult to distinguish whether a particular patron god was a distinct personality, or the same as some other god with different attributes and functions ascribed to him. In Emerson's words, "with the Hawaiian the function made the god."

In most parts of Polynesia, Kāne was the principal god of canoe builders. However in Hawai'i, Kū in his various incarnations was the main god of the upper forest and canoe builders, with Kāne and Kanaloa addressed by the *kahuna kālai wa'a* on certain occasions. Today known primarily as the god of war, Kū was also known as the patron of the family and the nation. Kamakau listed Kū, patron of canoe builders, as appearing

A shrine *at the Mauna Kea quarry, one of 40 such structures designed to appease the gods and solicit their aid in adze-making. Virtually all stages of the canoe-making process were accompanied by similar attention to religious ceremony and the gods.*

in five different forms; Henriques listed ten, while Emerson reported eleven forms. Emerson notes that Laka as a "god of the wa'a is to be carefully distinguished from three other deities bearing the same name."

Lea (Lea [or Laea] Kawahine), the wife of Mokuhāli'i, one of the forms of Kū, was the female deity of the canoe. The small Hawaiian bird, the *'elepaio*, the incarnation of Lea, by its behavior and feeding habits assisted the canoe builder in determining which trees might be unsuitable because of the presence of insects and/or rot. Hinapuku'ai, goddess of food plants, also sometimes assumed the form of Lea as an *'elepaio*. Lea also was responsible for watching over the binding of the hauling ropes and the safe guidance of the rough-hewn log to shore, as apparently was the goddess Kapūoalaka'i or Kapū'āoalaka'i.

And the list of deities would not be complete, notes Emerson, "without mention of that countless host of gnomes, spirits, elves, fairies and spooks who peopled the Hawaiian wilderness ... In figure they were dwarfish and squat, in character mischievous." They were collectively called Kini-a-ke-akua, Mano-a-ke-akua, and Lehu-a-ke-akua. As often as not, this motley forest crew would harrass and cause trouble rather than assist the canoe builder.

Gods of the Canoe

Hina-ke-kā	goddess of canoe bailers
Hina-kū-wa'a	another name for Lea
Hina-puku-'ai	goddess of food plants; sister of Lea; took the form of an *'elepaio*
Ka-pū-'ā-o-alaka'i	another name for Ka-pū-o-alaka'i
Ka-pū-o-alaka'i	forest goddess; presided over the lines by which new canoes were guided as they were transported from mountains to sea; also Ka-pū-'ā-o-alaka'i
Kama-i-ka-huli-wa'a-pū	god who aided in floating, righting, and bailing out upset canoes
Kānealuka	god of canoe builders
Kū-'ālana-wao	Kū of the upland offering
Kū-holoholo-pali	Kū who steadies the canoe as it is carried down steep places
Kū-kalanawao	Kū who guides through the mountain wilderness
Kū-kanaloa	(no data)
Kū-ka-'ōhi'a-laka	Kū of the sacred *'ōhi'a;* also Laka
Kū-maha-ali'i	Kū who journeys in the canoe
Kū-mauna	Kū of the mountains
Kū-moku-hāli'i	Kū who bedecks the island; canoe builders' chief god; husband of Lea; also Mokuhāli'i
Kū-ohanawao	(no data)
Kū-'ōhi'a-Laka	another name for Laka
Kū-olonawao	Kū of the deep forest
Kū-pepeiao-loa	Kū of the long comb-cleats; god of the seat braces by which the canoe is carried
Kū-pepeiao-poko	Kū of the short comb-cleats; god of the seat braces by which the canoe is carried
Kū-pulapula	Kū with many offspring
Kū-pulupulu	Kū the chip-maker; god of the forest; also Kū-pulupulu-i-ka-nahele, Kulauka
Kulauka	another name for Kū-pulupulu
Laka	god of canoe builders; also Kū-'ōhi'a-laka
Lea	goddess of canoe builders; wife of Kū-moku-hāli'i; sister of Hina-puku-'ai; took the form of an *'elepaio;* also Hina-kū-wa'a, Laea, Lea-ka-wahine
Lea-ka-wahine	another name for Lea
Moku-hāli'i	another name for Kū-moku-hāli'i

The Search

An expedition was not mounted to the *koa* forests until the satisfactory performance of certain rituals, and upon the assurance that all omens were good. Fornander notes that if a *kahuna kālai wa'a* had a dream with "reference to death, then he could not go up to [the forest] to hew canoes. If he persisted then the result would be fatal." Koakanu, a Fornander informant, remarks that "when a man desires to go up to build a canoe he must first prepare a pig, red fish, black fish and various other things. And when these things are ready he comes home and courts dreams in his sleep. If they are good he will go up, but if they are unfavorable he will not." Amateur historian Edgar Henriques notes that as late as 1912 Kealakahi, a traditional canoe builder from Kona, "for three nights ... went to his family *heiau* to pray that his undertaking would be successful."

Presuming all auguries for building a new canoe were favorable, preparations would be made for a log-locating expedition to the inland forests. Provisions were gathered in amounts depending primarily on how long the canoe builder and his party (if he had one) anticipated staying in the

An 'elepaio *at its nest; these birds were closely observed, as their behavior was important in the identification of defects in canoe logs.*

forests. On some occasions a trip to the inland *koa* forests was made solely for the purpose of locating and marking a suitable tree; more commonly an expedition would remain in the mountains until the tree had been felled and rough hewed. Depending on the number of people in the party, the distance to the forests, and the searchers' luck, the log-locating party might be back the same day or be gone for a week.

Henriques, along on a log-locating expedition in 1912, recalls that Kealakahi and his assistant waited two days before they even sighted the *'elepaio*. "Then, for three days more they followed the bird from tree to tree, taking note of its actions and behavior . . . The *'elepaio* lit on many trees that it did not peck at, but the watchers always found some fault with the tree—the trunk might be too short, or twisted, or too large in diameter, or growing where it could not be felled properly. At last the *'elepaio* alighted on a beautiful, straight tree which the *Kahuna* declared was exactly the one he had in mind." Always the canoe builder knew long before he first went into the mountains what kind of canoe was being called for and carefully selected a tree that would best suit the order.

In this case Kealakahi and his assistant "hewed a deep groove in the trunk, near the ground," to alert any other canoe builders who might find and want the same tree that it had already been laid claim to. Kalokuokamaile notes that if "years later another person found the marked tree, he would not cut it . . . This was a rule observed from remote times down to the present."

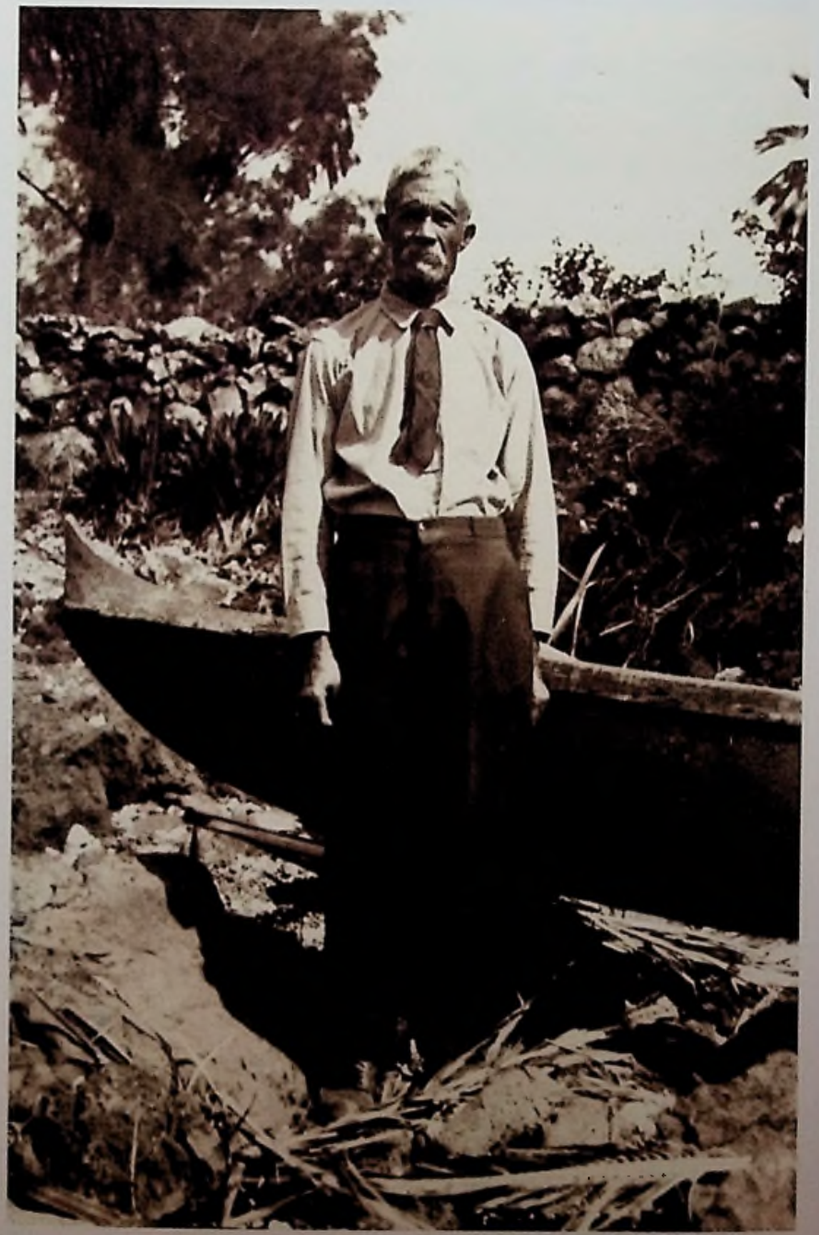
In most cases, though, when a party departed for the mountains to seek a log, they did not return until a log had been found, felled, and rough hewed. Whitman, writing in 1813, notes that a canoe builder "frequently remains for two or three months in the mountains busily employed fashioning and reducing it [the canoe log] to the proper thickness." But before one could go one had to, as Kalokuokamaile notes, "catch a quantity of fish to take up to the canoe making site. After much fish was caught then taro was cooked. One required much strength to carry up these luggages, such as adzes, sleeping *kapas, poi,* fish, calabashes, water bottles, and ropes." When a large party was up in the mountains it became necessary to periodically restock with provisions brought from shore. In no case, notes Koakanu, "should a woman go along," for if one did, "the canoes would be cracked."

Prime canoe-quality *koa* forests were usually found at the 4000- to 6000-foot elevation. Typically this meant *koa* trees were a minimum of five miles—and usually closer to ten to fifteen miles—from shore. It might be necessary to go as far as fifteen to twenty-five miles from shore as with forests behind Hilo, in the Volcano area, and in the once dense stands in the Kula, Olinda, and Makawao districts on Haleakalā, Maui. How far Hawaiians were going for canoe logs at the time of contact and in the years immediately ensuing can be gleaned from the accounts of early European explorers who made investigative trips into the islands' interior.

On Captain Cook's second visit to Hawai'i in 1779, members of his crew were probably the first westerners to see the inland forests of Hawai'i. Starting from Kealakekua, three members of a party trying to reach the snow on Mauna Loa noted independently that the *koa* forests from which the Hawaiians procured their canoe logs extended from six to roughly twenty miles inland. One of the crew members notes that in the "woods are some paths of the Natives and here and there a temporary house or hut, the use of which is this; when a man wants a Canoe he repairs to the wood and looks about him till he has found a tree fit for his purpose . . . he runs up a house for his present accommodation and goes to work upon his Canoe . . . our people who made excursions about the Country saw many of these Canoes in different states of forwardness." The writer at this point implied he was a minimum of five to six miles from shore.

Another member of the party remarks that at a point about thirteen miles from shore by his reckoning, "they pass'd many Canoes, half finished, and a hut also . . . [but] could find no water . . . [so] they proceeded on about 3 miles in this last Wood, coming to two huts . . . they stopped . . . having walked as they thought 20 miles this day." The next day, "they had got a very little way before the indian path ended, and which goes no farther than where they build their Canoes." This point is at least twenty miles from the shore.

Kawaikaumaiikamakaokaopua Kalokuokamaile *(nicknamed Z. P. K.), descendent of a long line of canoe makers, was still building canoes in the traditional manner during the early 1900's. He also provided invaluable written information on this ancient profession, as well as on other aspects of Hawaiian material culture.*



David Samwell, one of the members of the party, notes that they first encountered *koa* only four or five miles from the shore, but it was not until "after having followed the path four (or) five miles in this Forest, we came to a place where we found three Men building Canoes with temporary Sheds for their Residence." At this point Samwell would have been eight to ten miles from shore.

Menzies, while ascending Hualālai in 1794 notes that at a point a good ten to fifteen miles from shore, "we found a small hut that appeared to have been lately occupied by some of the natives, who had been thus far up the mountain falling [sic] trees and shaping them out in the rough for canoes, planks and other purposes." A little further up the mountain Menzies remarks that, "in many places we found the wood had been thinned by the natives having cut down the larger trees for various purposes"—mostly canoes.

In 1823, Ellis, who visited the lone village of Makaaka some eight miles from the South Kona shore, describes a post-contact canoe builder's set-up: "The house was large, and beneath one roof included their workshop, kitchen, and sleeping-room, without any intervening partitions . . . On one side two women were beating native cloth [the *kapu* against women at building sites having been dropped by this time], and the men were at work on a new canoe. In the same place were several larger ones, one upwards of sixty feet long, and between two or three feet deep, hollowed out of a single tree. The workmen told us they were making a pair of that size for Kaikioewa . . ."

Commander Charles Wilkes, with the United States Exploring Expedition, remarks that at Pānau, a settlement about ten miles southeast of Kīlauea crater, "we found a large clearing in the woods, and a village, consisting of three or four native houses. Here many canoes are built and transported to the sea, the trees in the vicinity being large and well adapted to this purpose." Ten miles southeast of Kīlauea puts this village a good fifteen to twenty miles from shore. This passage also implies, as do several others, that there were occasionally certain areas in or near the woods, where a number of canoes were either brought together to be cured or worked on. A number of other Europeans trekking through the mountain interiors of Hawai'i in the first fifty years or so after contact provided many accounts similar to those described.

As late as 1913, Rock wrote: "Occasionally one can find an unfinished log which, owing to its enormous weight, was abandoned by the natives, who were unable to remove it to the lowlands and beach."

The Tree

Upon finding what appeared to be a suitable tree, the presiding *kahuna,* according to Emerson, either retired to his *mua* (family *heiau* or shrine) or slept right at the base of the tree "to learn in dreams from his deity, or *aumakua,* as to the suitableness of the tree in question. If there appeared to him in his dream a man or a woman standing naked before him without *malo* or *pau,* screening himself or herself from shame with the hand, when he woke he would interpret the dream as meaning that the timber of the tree was *puha,* unsound, and he must look farther. But if there appeared to him a shapely man or woman decently girded and robed, he arose with the assurance that the tree was a good one." Kahoolilihala, a traditional canoe builder who built canoes till very recently in the Hilo area, says of chopping a tree, that "if anyplace look twist, no good. It's where the skin cover up a rotten branch that fell off. Hollow inside. Another way, hit the roots of the *koa* with the axe . . . If it sound hollow like a drum, *puka* inside. No good." Also of concern to the *kahuna* were *koa* trees that formed a crotch where they first branched, as water often collected there causing rot to set into the core.

A rough-hewn canoe *at the turn of the century prior to being hauled from the forest* (left) *to the shore for finishing.*

The neck of the canoe, *maku'u* (below), *was designed to facilitate attachment of hauling ropes. Roughed out canoes sometimes weighing many tons often had to be dragged distances of up to 20 miles.*

At the base of the tree to be felled an offering was made to the gods, including prayers, a small black pig *(pua'a hiwa),* coconut, red fish (preferably *kūmū*), and *'awa;* sometimes banana, sugar cane, and other items such as a red *malo* were included. On the following day the pig was cooked in an underground oven *(imu)* and eaten within the immediate vicinity of the tree. "In the case of a large canoe for some noted chief a human sacrifice was necessary to insure its safety and lucky voyages." Before the *kahuna kālai wa'a* commenced cutting down the tree he uttered a last prayer to his *'aumakua.* Fornander informant Kauwanaolu says that "if the canoe is for fishing purposes, a different petition is offered for the hewing of that canoe tree. If it is intended for sale, another prayer is used at its felling."

With all signs favorable, the *kahuna kālai wa'a* would make a final assessment of the *koa* tree's branch configuration as it related to where and how the tree would fall. Fornander says that if a tree had one branch near the top much larger than all the rest—the traveler's branch or *lālā*

kamahele—the *kahuna* would make "particular observation of because, on the side of that branch the tree would fall when cut." Emerson notes that "the best plan [was] to cut it halfway through on the same side as its main branch, after which the axemen would rest a while and refresh themselves until ready to deliver the finishing strokes on the opposite side with all possible precision and rapidity . . . [the *lālā kamahele*] . . . was to receive the shock of the fall and thus defend the tree."

In felling the tree, "the axe [adze] was not struck squarely against the tree, but with a glancing blow—*kikepa*. *Pao kapakahi* is another expression for the same thing, so as to sliver off a little at a time. In doing this the handle of the adze is held at right angles to the shaft of the tree, thus bringing the stone axe flat-wise to the tree." Traditionally the tree was felled by "making two transverse cuts into the trunk about three feet apart from each other." Long vertical-grain slivers of wood were then split off between the two scarfs. "The experts of the olden times said that the wood of the tree came off in fine pieces. The cutting was not like the cutting of the steel axes, in which the chips flew when cut."

With stone adzes very uniform and exact wedges of the intervening wood were removed and splitting minimized. Kalokuokamaile reports that a tree was usually "cut in on the side until the core was reached, the front of the tree was left untouched to hold it when the tree fell." Buck contends that "scarfs were continued around the tree on the same level." "Where one expert chopped, the other expert also chopped and thus they cut in pairs all around the trunk of the *koa* tree until it was felled." Emerson speaks of "*pahu pū,* a style of cutting in which the cut is made a good ways from the ground because the stump part is not wanted . . . [and] *pa'i a'a,* the style of felling a tree in which the *kahuna* began to cut from the surface of the ground."

An anonymous informant relates, as do other accounts, that in prehistoric Hawai'i, "This is the way a tree was cut for a canoe: They dug around the roots of the tree until the roots and tap root was exposed, they began to cut. This is how the cutting was done. There were as many cutters as there were roots, each one with a stone adz." Emerson mentions that *koa huli pū* was "so good from one end to the other that it was thought best" to cut it down with a style of felling *(hu'e lepo)* in which the "*kahuna* dug down and cut the roots and thus made the tree fall." Such a method, though probably more laborious, would have practically eliminated the possibility of the tree splitting and cracking as sometimes occurred when using the more conventional double scarf method of cutting.

Kalokuokamaile notes that the "place where the tree was cut should be even and not irregular . . . If the cuts were irregular, some up and down, the log would be ruined. You would find the end cracked. A crack, a foot in length, spoiled the wood to the extent of a fathom or more." He notes further that "when you saw that the tree was about to fall, go cut *hapuu* fern stalks to serve as a support for the tree, for that was one of the rules for cutting *koa* trees. It saved the wood from being spoiled and cracking as the weight was held up by the fern stalks beneath." Another account says: "Cut the core right out and leave the back uncut. Then the *kahuna* tells them to cut a section of *hapuu* fern trunk and put it into the open cut. He then tells them to cut into the place that was left uncut to keep it from falling. With two strokes of the adz the tree falls." Other sources corroborate this wise practice. Contemporary loggers and canoe builders know well of the tendency of *koa* to crack up the trunk from the point of the cut as it is falling.

The length of time it took to chop down a *koa* tree with stone adzes varied according to the size of the tree and the number of people assisting. Canoe builder Koakanu notes that, "It would take one man almost a week to fell a tree; if many hands at work it could be felled in two days. Nowadays we have iron axes, and because of their sharpness a tree can easily be cut down. A strong man can cut down a *koa* tree in half an hour." While probably an exaggeration, the fact remains that iron axes and adzes greatly reduced the time it took to build a canoe. An anonymous Hawaiian source notes further that in post-contact times "iron axes simply cut into the trunk. Everything else is done just as it was in ancient times." Malo notes similarly that with stone adzes "if there was but one *kahuna,* it would take many days to fell the tree; but if there were many *kahunas* they might fell it the same day." In some instances there was a division of labor. An anonymous observer noted "the experts who did the cutting were different (men), the adz grinders were different, and different ones attached them to the handles."

By some accounts, just before a tree was expected to fall *hāpu'u* fern stumps were layed out where it was anticipated the tree would fall. These spongy fern stumps apparently absorbed a lot of the shock as the tree hit the ground, hopefully preventing the crack-prone *koa* tree from splitting. Modern-day loggers often see a chainsaw-felled *koa* tree develop cracks in the trunk if it hits the ground particularly hard or in the wrong way.

When a nearly felled *koa* tree had made the cracking sound—*hāku'iku'i*—announcing its fall, all movement ceased and absolute quiet was required.

The 'Elepaio

As mentioned earlier, upon reaching the forest some canoe builders first looked for the *'elepaio,* and then observed its behavior as it alighted on different potentially usable *koa* trees. Ornithologist Andrew Berger notes that the *'elepaio* "occurs only on Kauai, Oahu and Hawaii," leaving the canoe builder on Maui and Moloka'i with only the less reliable Hawaiian Crow *('alalā),* which also assisted in the search for a suitable rot-free log. Fornander informant Kawenaolu remarks that "if they should hear the *alala* the idea of building the canoe [from that particular log] should be abandoned because it is evident to them that the tree is rotten inside."

More often a seemingly suitable tree was selected and cut down without the aid of the *'elepaio* or *'alalā.* A skilled canoe builder could usually tell by inspection if a tree had a high likelihood of being unusable or rotten. It was usually just after the tree had been felled that the *'elepaio* appeared and was closely observed. Fornander writes: "If the bird darted down and perched on the trunk of the tree and then ran along the trunk to the other end, the canoe-hewing priest would remark: 'The canoe is perfect.' The conduct of the bird in running directly from the base to the end was the sign which enabled the priest to pronounce it perfect. Where the bird traversed was the top opening of the canoe. Supposing that the opening of the canoe which the bird apparently intended was underneath, the bird would fly to a certain height, then circle over the tree. The priest would understand that it was urging the turning of the tree. But if the opening that the *'elepaio* intended to be was on the side, it would fly in that direction. On the other hand, if the bird came and stood on the trunk of the tree intended for a canoe, if it continued to remain there for some time, the canoe-hewing priest knew that a defect was at that point. If the bird again ran from the trunk and stood in another place, then another defect was at that locality, and thus the bird would indicate all the defects in the canoe, whether it be rottenness, hollow-cored, or knotted. In this way the canoe-hewing priest was made aware of the defects of the [tree for a] canoe."

The *'elepaio* was considered very reliable. Emerson notes that "wherever the bird pecked with his bill there would infallibly be found a point of decay that must be removed. If, however, there were but one such point, or

At the beach, *shaping of this rough-hewn canoe* (right) *would be completed, and the maku'u (neck) shown in the foreground reduced to a small projection (moamoa) extending beyond the manu. Water was sometimes allowed to stand in the canoe bottom to prevent cracking.*

This model *of an ancient double canoe* (below)*found in a cave at Kaumalapau, Lāna'i, suggests that canoe builders in old Hawai'i produced smaller versions as prototypes of larger canoes, or perhaps for purposes of training or recreation.*

if being many they were all included in such a plane as might be removed in excavating the hollow of the canoe, the log was still acceptable."

The *'elepaio* is by nature a very timid bird seldom coming near human beings except when a *koa* tree has been felled. At this time, notes Emerson, "it acted its part with great boldness and with utter disregard of the many people that might be standing about." Conceivably, any resident grubs and insects were brought to the surface of the log by the thunderous dislocation of the tree falling, offering up a banquet of bugs so irresistible that the stomach of the *'elepaio* temporarily reigned over its timidness.

Rough Hewing

After the tree had fallen the head *kahuna kālai wa'a* performed another ceremony which Malo describes: "The head *kahuna* mounted upon the trunk, ax in hand, facing the stump . . . Then in a loud voice he called out, 'Smite with the ax and hollow the canoe! Give me the *malo!*' Thereupon the *kahuna's* wife [the mention by Malo of the involvement of a woman at this or any stage of canoe-building, canoe-hauling excepted, is at variance with virtually all other reports] handed him his ceremonial *malo,* which was white; and having girded himself, he turned about and faced the head of the tree. Then having walked a few steps on the trunk of the tree he stood and called out in a loud voice, 'Strike with the ax and hollow it! Grant us a canoe.' Then he struck a blow with the ax on the tree and repeated the same words again; and so he kept on doing until he had reached the point where the head of the tree was to be cut off. At the place where the head of the tree was to be severed from the trunk he wreathed the tree with *'ie'ie (Freycinetia Scandens)* [sic]. Then having repeated a prayer appropriate to cutting off the top of the tree, and having again commanded silence and secured it, he proceeded to cut off the top of the tree. This done, the *kahuna* declared the ceremony performed, the tabu removed."

By other accounts, a number of craftsmen joined in cutting off the top of the log. Buck comments on the branched end that "when severed the *tapu* [tabu] which had invested the tree was automatically removed and all could share in the work." There were known variations on this ceremony, however the gist seems to have generally been the same. When the *ēulu,* or top of the tree, was severed from the trunk and the *kahuna* removed the ban of silence with the words, *"E ho'olele wale ke 'ahu,"* the last of the ceremonies connected with felling the tree were over and rough hewing began in earnest.

The next step usually involved removing any branches and debarking the tree, with the strips of bark used as roofing and siding material for the temporary mountain shelters *(kāmala)* of the canoe builder and his helpers. These shelters were usually lean-to or tent-shaped, with thick layers of fern as flooring.

Before commencing rough hewing, the head *kahuna kālai wa'a* would work out an exact blueprint in his mind of what the final canoe would look like. The shape and dimensions, localized rot, and any other quirks of the log unnoticed while the log was standing, as well as certain other physical characteristics, dictated to the canoe builder which part of the canoe was to be the top and which the bottom.

Rough hewing usually began with the rough shaping of the exterior of the hull, its mouth facing down (keel side up). The log was tapered at each end, giving the outer hull the first suggestion of its ultimate contours. The sides and keel were trimmed down to the point where the canoe had its exterior sides and bottom rough shaped. The log was then rolled over on its keel and the top side flattened.

If manpower was lacking or a log was particularly large, a long lever

A 60-foot koa log *from the forests at Honomalino, Hawai'i, was brought to Honolulu (*above left*) in 1978 to be made into a canoe for the Kamehameha Schools. Sophisticated chainsaw rigs (*left*) reduced the construction time to a fraction of that required when using traditional tools. Innovative canoe builders such as Wrighto Bowman (guiding chainsaw) and Sonny Bradley have developed and modified tools that have revolutionized canoe building. Slabbing the top of the log (*bottom left*), a step that took several days a few years ago, was completed in a matter of hours. After the sides and bottom of the log had been slabbed (*above*), the first stage of construction was complete.*

Straight cuts *were made in the top of the log with a circular saw* (facing page, bottom right) *and a chainsaw to facilitate removal of the wood. Adzes were used* (above) *extensively in all stages of the construction. The canoe interior was then hollowed out by using a chisel and hammer* (bottom). *A sledge hammer and wedge* (above right) *were also used in the removal of larger pieces of wood. Pepeiao or cleat projections were carved* (right) *after most of the interior wood had been removed. A varnish was applied* (bottom right) *to the hull for both protection and waterproofing, allowing the beautiful grain of the koa to be seen.*

stick with a rope attached at the top was employed when it was required to turn a log over. In some cases it was enough to simply angle the stick under the log and pull on the rope till the log turned. Leverage, however, was limited with this method sometimes necessitating that one "make a hole where the opening of the canoe should be and take the stick and insert it into the log and pull" on the rope tied to the end of the stick. By this latter method one man could turn over a log weighing several thousand pounds.

The head *kahuna kālai waʻa* would then determine where the side projections or comb cleats *(pepeiao)* for the seats, and U-shaped spreader *(wae)* would be located. These protrusions were an integral structural part of all ancient Hawaiian canoes and of many Hawaiian canoes made well into the twentieth century. However, a number of Hawaiian canoes made shortly after contact had screws, nails, or bolts to attach separate *pepeiao,* a much easier method than carving them as part of the hull.

To determine the exact location of the *pepeiao* and to calculate other dimensions, the *kahuna kālai waʻa* used the following anatomical units of measure: the distance between the fingertips of the outstretched arms *(anana);* the length from the fingertips of one hand to the elbow of the other arm when both arms are extended to the side *(muku);* the distance from the collarbone to the tip of the middle finger with the arm extended *(iwilei);* the span between the extended tips of the thumb and forefinger of the hand *(kīkoʻo)*; and half of a *kīkoʻo (poho).* His thumb and index finger also served as calipers. With these anatomical measuring tools, the Hawaiian canoe builder achieved exactness and tolerance comparable to what a craftsman of today does with sophisticated instruments.

The hollowing out of the canoe was directly overseen by the head *kahuna,* usually under the special patronage of the goddess Lea. A series of oblique cuts *(kūpele)* were made from stern to bow, "across the surface of the part to be hollowed out . . . [and with] this done the triangular pieces bounded by the cuts were removed by a wedge like use of the axes [adzes]." "When the center of the canoe was roughly hollowed, then the sides of the sections were cut downward." The *pepeiao* projections were blocked out, and the interior of the canoe roughed out to a stage ready for hauling to the ocean.

Kalokuokamaile differs from most informants, saying that the rough hewing starts with the canoe mouth up. After the canoe was hollowed out and some preliminary work done on the outside, "the thing that remained to be done was to turn the opening down in order to make the keel of the canoe and make the outside straight. Then it was turned up again and the inside re-cleaned." Different canoe builders by preference employed a slightly different sequence of steps in rough hewing a canoe. As far as is known, fire was never used in hollowing out a Hawaiian canoe, as it was in other Polynesian island groups.

Always a *makuʻu,* or neck, was hewn out at the stern, and occasionally at the bow. This neck, knobbed at the end, was absolutely essential, providing the point for attaching the hauling and restraining ropes. At this stage, canoes were either hauled to shore or left up in the mountains for curing and future retrieval. Menzies observes that rough hewn canoes, "after laying some time . . . to season, were dragged down in that state to the seaside to be finished."

At any given time, there were apparently quite a few rough-hewn canoes strewn about the forests. Clerke notes that "Our people who made excursions about the Country saw many of these Canoes in different states of forwardness . . . In this wood [Mauna Loa's southern flank] they pass'd many canoes, half finished." As people were rarely seen with these rough-hewn hulls, it is presumed that most were curing. Some might have been abandoned if they developed irreparable cracks or were damaged in hauling.

Water Tanks

Canoe builders and overland travelers often made use of these rough-hewn canoe hulls left in the mountains as interim water catchments. The earliest recorded instance of such a use came in 1779 when a party of very thirsty men from Cook's crew, while attempting to climb Mauna Loa, "at last found some rain water in the bottom of a Canoe, which although the colour of red wine, was to them a very agreeable sight." Some fifty years later, Commander Wilkes and his party from the U.S. Exploring Expedition traveling in the same general Volcano area found themselves in dire need of water. Wilkes "was informed that there was within about two miles, an old canoe which would be found full of water. On our arrival at it, we found that the natives, who had preceded us, after supplying themselves had emptied out the rest." When Wilkes and party caught up with his advance party of Hawaiians later in the day he found them "hawking water about the camp at half a dollar the quart," in the finest western entrepreneurial fashion. Many years later an informant of Emory related how in the early 1900's in the Paupala district of Kaʻū there was "a cave in which was stored a long canoe to catch the drip from the fern coated roof. This cave was also used for a sleeping place. This is a common method for collecting and storing water."

Hauling

Canoe hauling was at every stage a very laborious and dangerous undertaking. A canoe that was to be hauled to shore might be two to five or more inches thick on the sides and six or more inches thick on the bottom. Judging from the weight of rough-hewn canoes today, a forty to seventy foot rough-hewn log might have weighed anywhere from five to twenty thousand pounds. The amount of work involved in moving logs can be appreciated from reports by missionaries as they were building early churches. Rev. Elias Bond speaks in 1843 of watching the natives hauling a single *ʻōhiʻa* timber: "It took three of these . . . inch ropes, to draw the timber with. One stick of 50 or more feet in length and 15 or 16 inches square occupied 4 days of the severest labor in drawing with from 80 to 100 men attached. Four ropes of ¾ inch diameter were snapped at a single pull upon it." Rev. Titus Coan and Rev. John Paris, building churches on the island of Hawaiʻi, speak of it taking eighty to one hundred and fifty men, women and children to drag a single timber of *ʻōhiʻa* the six to fourteen mile distance from forest to church sites. While these accounts involve hauling *ʻōhiʻa,* they give an idea of the manpower needed to haul a huge, and often much heavier, roughed out *koa* canoe log.

Every effort was made to haul a rough-hewn canoe by the shortest and most practical route. While a route was sometimes precleared of certain obstacles, Kalokuokamaile notes, "it was useless to widen the path for perhaps only two canoes would ever pass that way and it was a waste of labor to improve and to widen it. Therefore it was made just large enough for men to draw the canoe."

Menzies observes in his trek inland that, "the wood continued close and impervious on every side, excepting by little tracks here and there, where cut down trees or canoes had been dragged into the path to take them down to the sea side." From this it seems that canoe logs were sometimes dragged from within the forest to a central path. Most accounts, however, indicate that a new path was forged each time a log was hauled to shore.

The hauling of a rough-hewn canoe log to shore was often a major event with sometimes an order for "every male inhabitant of one or more villages to repair to the woods and bring it down." Abner Wilcox, living in Hilo, complains in a letter to a missionary colleague in 1839 that "not unfrequently are [his students] called from their schools to go with the

others to the mountain for a canoe, a labor sometimes of several days." One of Fornander's Hawaiian informants relates similarly, "According to the size of the canoe so will be the number of men required; a small canoe requires fewer men. The day set for dragging the canoe is a day of much pomp . . . men, women, children, and sometimes chiefs [will go up]." Other accounts note that in the case of a chief's canoe or a particularly large or heavy canoe log, "a proclamation went to all the people . . . men, women, and children, too, brought pork, dog, fish, and *poi* to the uplands" where a feast was held prior to the hauling. Given the enormous investment required in time, people and resources—especially food for the haulers—only an *ali'i* or a large cooperative could afford a large canoe.

Because there were many obstacles and potential dangers to both haulers and canoe, the hauling process was not only preceded by an elaborate blessing ritual but monitored for the duration of the hauling by the head *kahuna* who walked about sixty feet to the rear of the canoe. Nobody could walk either with him or behind him, for those places were reserved for the canoe-building gods and goddesses who were there in spirit. The head *kahuna* also had the duty of inspiriting the haulers by continually chanting a *paha*—verses designed to ease their toil. As with many of the institutions related to canoes and canoe making, ancient/traditional methods of hauling were often observed well into the twentieth century. Emerson reported a Hawaiian's eyewitness account of hauling a canoe in historic times:

"The hauling to the shore of the *kaele* or the half-finished canoe of a king was a dread affair . . .

"The hauling of a large canoe christened *Hanakaulua* from the forests of Kapalilua—Ka-ohe-eha in South Kona . . . occurred in 1823 under the governorship of Kuakini—John Adams. There were 110 *kahunas* cooperating in this undertaking and all the able-bodied men in North and South Kona, Kau and Kohala were commanded to be present, under the penalty of having their houses and property destroyed by fire. The *kahuna poo* who superintended the whole business was named Kahula with Maikawai as a coadjutor. The business of hauling the *kaele* to the coast was distinct from that of carving and fashioning the canoe and was in charge of a different set of men.

"The cable *kaula ko* by which the log was hauled was an immense affair as thick as a man's thigh, made of *ilihau* obtained from Halawa on Molokai. This was attached to a huge *makuu* [neck] more than a fathom in length. In addition to the *kaula ko* there were four *kaula kailiili,* check ropes, two on each side about 8 fathoms long which were held by men, one at each rope, called *na kanaka kailiili,* whose duty it was to keep the snout of the log in the right course. At the forward end of the hauling rope were attached two short lines of a small size with a man holding each. There was a stick like a whiffle tree passing across from one of these ropes to the other firmly lashed in place and at the extreme forward end of these two ropes was a loup called a *kipuka* into which these men each thrust a shoulder. It was their duty to keep the hauling rope straight and taut; while doing this they continued to stand. They were called *na kanaka pu.* The great multitude of men who did the hauling were arranged along the *kaula ko* to right and left of the cable alternately each supporting and grasping the cable with but a single hand. These men were called *na kanaka ko waa.* During the preliminary services preceding the hauling, they remained sitting, and profound silence was observed while the head *kahuna kalaiwaa* performed the ceremony of *lolo ana u ke kaele ma ke kuahiwi,* consecrating the canoe in the mountains or wilderness.

"Everything being now ready, and each one being at his appointed station, perfect silence being observed, the head *kahuna kalaiwaa* chews a small portion of *awa* and having spit it into the hollow of his hand, anoints with it the *makuu* of the *kaele,* and then declares *'na noa ka aha, e lele aku la.'* One of the *kahunas* holding the check ropes, who is a *kilo,* silence still prevailing, (now) recites a *paha.*

"It must be remarked that during the recitation of the *paha* the profoundest silence and the strictest decorum must be rigorously observed. Any infraction of this *kapu* is punishable by death. Truly the hauling of a royal canoe from the wilderness to the shore was an awesome undertaking. My informant tells me that the hauling of this *kaele* to the *halau* on the

At the turn of the century, *hauling canoe logs was often accomplished with the aid of beasts of burden; the rough-hewn canoes shown here were being taken to Honaunau for finishing.*

shore occupied three months' time and that the undertaking was made famous by the tragic death of Pine, the *kahuna* who recited the *paha*. This accident occurred while going down a steep incline at the place since called, in commemoration of the event, *ka pali o Pine*. The huge log gave a lurch and passed over his body crushing him into a lifeless mass."

Lowering a canoe over a cliff *(pali)* was always a harrowing affair as an anonymous Hawaiian informant notes: "Be very careful about calling to the men who are letting it down by ropes tied to a tree, lest the rope slacken and the rope tied to the canoe will break. There were many canoes that were gone, lost in the upland of Keei I and Keei II where canoes were made. Some have never been recovered to this day and some have had their points rammed into the earth. Only a small part of the prows remained exposed, almost all had disappeared. Some people had guessed that that was how some canoes had vanished; big canoes belonging to the chief, Kamehameha.

"This rope that is tied to the tree, smokes at the base of the tree like a real smoke that rises from real fire."

The informant goes on to note that when the haulers come to a fairly even slope: "The *pale* [person who guides the canoe] says, 'Make ready to surf,' that is, everybody goes on to the canoe. If there is a low-hill, it does not matter if every one boards it but if it is a high hill it will not do for the unskilled to ride or he'll be hurt. Only the skilled can ride, because the speed of the canoe is faster than that of a horse or an automobile if there is a fine long slope. As the canoe speeds on, you are lucky if you can stay on for five fathoms. All the people will fall off except the *pale*. The *pale* in front can check the speed. The *pale* calls all the time till they reach home. If they come to a bad place full of *aa* (lava rocks), then some sticks are laid under it. These sticks are called *ipuwai*. This is to prevent the bottom of the canoe from being scratched by the rocks, till it becomes so badly scratched that the canoe is ruined."

An informant of Fornander's from Kona notes somewhat acerbically that "it is the man guiding who wrecks or saves the canoe . . . if it is a half-witted man who directs the canoe, or a man with little ability, this will surely occur: trouble will follow from the outset. I saw this happen continually at my birthplace."

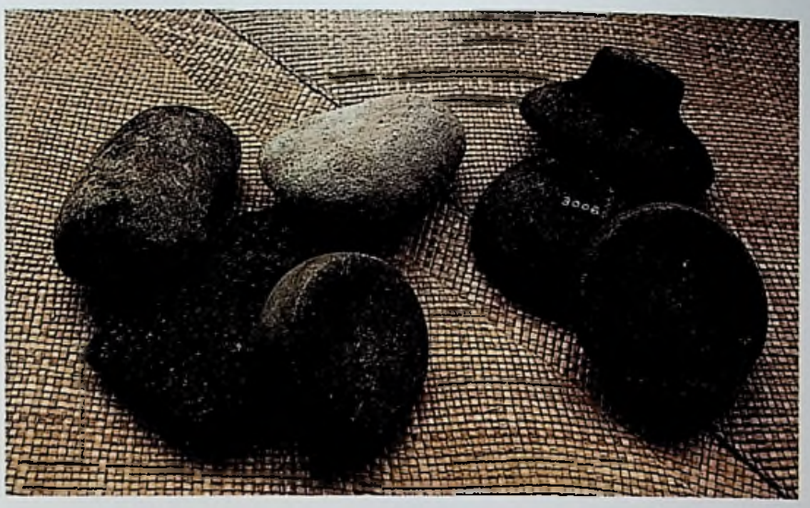
Finishing

Upon reaching the shore the unfinished canoe was carefully put in a covered canoe shed called a *hālau*. There canoes were mounted on wooden blocks called *'aki, lona,* or *paepae,* "generally of soft wood (*wiliwili, kukui,* or *hau*) carved to fit the bottom of the canoe." Typically a canoe building *hālau* was a long, thatched house or shed open at each end and with one end facing towards the sea. Here the canoe was allowed to cure. If the log was already sufficiently seasoned, work commenced immediately.

One account states that rough-hewn logs were sometimes submerged in a muddy swamp for curing. Usually the log was left to season in a shaded place "on logs to prevent it from warping" anywhere from several months to several years. This served to minimize the tendency of *koa* to split, check or crack. Even with adequate curing, many logs warped or cracked, especially as the canoe hull was thinned down to its final thickness.

When the finishing work was about to begin, "a piece of sennit cord was stretched from one side to the other of the door, it meant that no one could enter, it was very *kapu*. His [the canoe builder's] wife, children or friends were not permitted there." Only canoe builders and apprentice canoe builders were permitted in the canoe *hālau*.

Fornander claims "there are two methods of hewing the canoe for its



finishing: from the front and from the rear." With the rough hewn canoe log resting mouth up, the canoe builder usually began working on the exterior upper sides, shaving the rim of the canoe down to its final form. Then the lower exterior sides were shaved down as finely as possible with an adze. Next the hull was turned over, and shaped and faired *(ka'aoki)*. The bottom was rounded and the bow and stern sections were given their final curves. The pronounced neck of the stern where the hauling ropes were secured was mostly removed, always leaving a small projection *(moamoa)* extending just beyond the end of the stern *manu*.

The hull was then turned over again to rest on its bottom, and the "hollowing out of the interior *(kupele maloko)* completed." When the width of the hold toward the bow and stern became too narrow for the employment of ordinary adzes, the *kūpā 'ai ke'e* or *ko'i 'āwili* (socketed or swivel-headed adze) was used. These adzes "could be turned in a groove on the foot of the haft [handle]. Thus the edge of the adz could be turned to any angle to lie more nearly in the longitudinal axis of the haft and function like an ax. The inner sides [of the canoe] were trimmed fairly straight from the top down until they curved inward at the bilge."

After all the adzing had been done, stone and coral rubbers *(pōhaku 'ānai wa'a)* of varying roughness and density were used to smooth and polish the canoe, primarily its outer surface. J. S. Emerson, brother of N. B. Emerson, furnishes the only known list of the different types of canoe rubbers used. He listed six tabulated in the order in which they were used: (1) *puna,* common beach coral; (2) *pōhaku 'elekū,* lava crust with a coarse rubbing surface; (3) *'ana,* pumice; (4) *'ōahi,* dense, closed-grained, coral reefrock; (5) *ōla'i,* not described; and (6) *'ō'io,* closed-grained basalt; it was the last and finest stone used. N. B. Emerson adds *pōhuehue, kāwa'ewa'e* and *ou'a* as kinds of stone used in polishing canoes, but gives no description.

These tools, made of coral and stone of different grades of coarseness and fineness, took the place of today's rasps, planes, files, and sandpaper. E. H. Bryan mentions that the emory-textured leaf of the breadfruit tree served as a very fine sandpaper, used in the final stages of the finishing process. Almost any stone or piece of coral of desired size and coarseness would suffice for an abrasive. In some cases pieces of coral were picked up off the beach, used as long as they kept their roughness, and then discarded. Other rubbers, especially those of basalt, were carefully shaped into forms resembling a squashed *poi* pounder, a muffin, or a half of a yo-yo or tennis ball.

With these primitive rubbing and polishing tools the ancient Hawaiians achieved finishes on their canoes that prompted early European visi-

Canoe rubbers *of varying degrees of coarseness, made of coral and stone* (left), *served the purpose of rasps and sandpaper.*

Paint for the canoe hull, *paele, was prepared from a variety of plant materials* (right), *among them juice from 'akoko, 'uhaloa, banana flowers and buds, kukui bark, ti root, and charcoal from wiliwili wood, hala or cane leaves, or bulrush. Its preservative and waterproofing characteristics were remarkable.*

tors to Hawai'i to make comments such as: "Our cabinet-makers do not polish the most costly furniture better; and without planes or any of the tools employed by our workmen, those of Owhyhee [Hawai'i] are capable of competing with the best artisans of Europe."

After the hull was finished, water was sometimes put in the bottom until such time as the other parts of the canoe were ready to be attached. This was done because a finished thin-hulled canoe minus spreaders, seats, and gunnels had a marked tendency to warp and/or crack.

"After working and finishing the body of the canoe, then the parts were added to the stern and prow. That was the hardest work." Parts to be added were the gunnels, the bow and stern end pieces, the intermediate bow and stern covers, the seats, and the U-spreaders. Kalokuokamaile notes, "It was with great skill that one part was fitted to the other." After these parts were shaped and fitted, they were firmly lashed to the canoe body. Lastly, the *'iako* and *ama* were added.

Painting

According to Malo, the canoe hull was painted before the gunnels, bow and stern *manu,* and other parts were attached. However, an anonymous informant notes that "when the piecing of the canoe parts was done" then "the blacking (material) to rub onto the canoe . . . was rubbed all over." Apparently the stage at which the hull was to be painted was a matter of the individual canoe builder's preference.

Many recipes existed for the remarkably effective, wholly organic paint, termed *pā'ele.* Common to almost all recipes were juices from the buds and twigs of a type of *Euphorbia ('akoko),* the flower and buds of the banana *(ōpū mai'a),* and the red inner bark of the root of the *kukui* tree *(hili kukui).* The juice from the root of the *tī* was sometimes added, as was *'uhaloa (Waltheria americana),* a species of herb of unknown origin. The liquid obtained by pounding and grinding these ingredients together in a stone mortar and pestle was then mixed with finely powdered charcoal made from burnt *wiliwili* wood or pandanus *(hala)* leaves. If available, *"akaakai* (bulrush) and the *naku* (reed) were the very best material [for *pā'ele*] and burnt quickly when set on fire." The charcoal obtained from burning the dry *'ama'u* fern, cane leaves, and even burned limestone was also used. After the juices and charcoal were all mashed together, the liquid was strained through a mesh made from the *'ahu'awa* fiber.

"To make the paint colorfast and not run," Kalokuokamaile says, "*ti* root was brought, pounded well, the juice squeezed out and added to the *kukui* juice." He goes on to note that "when it was desired to make it shiny so that the images of people could be reflected in the sides of the canoes (which was done for the canoes of chiefs) hen's eggs and other herbs [were added] to keep the wood permanently shiny." Artist-draftsman Arago comments in 1819 that after a canoe "is painted black," it is "polished till it becomes very bright, by means of a yellow flower which is found all over the island."

N. B. Emerson says, "instead of the charcoal to give it a black color [there] is sometimes added some form of ochre or red earth called *'alaea* which gives it [the paint] a reddish color." When applied, a canoe became a *"waa 'ula o ke alii,"* red canoe of the King "to indicate a chief's distinction." Some accounts note, as Ellis does, that the canoe was "dressed with the oil of the *kukui* nut" after the *pā'ele* was daubed on. Though *kukui* oil would seem a natural, its qualities as a waterproofing or wood-preserving oil are less than impressive. It was apparently the ingredients in the paint itself that so effectively preserved and waterproofed the hulls of Hawaiian canoes.

The paint was either smeared on with the hand or applied with a brush made from a piece of "pandanus aerial root, one end of which was beaten," or with "the finer fibers of coconut husk *(pulu niu).*" The canoe hull was painted black, contrasting to the natural yellowish-colored gunnels. Once applied, *pā'ele* was the equal of most bottom or protective hull paints used today. Many Europeans who observed the preparation and application process expressed initial skepticism as to the paint's effectiveness. Nearly all who were around long enough to see the painted canoe sometime later became firm believers.

Consecration

The final consecration ceremony for a canoe was called *lolo 'ana ka wa'a i ka hālau,* literally "imparting brains to the canoe" or simply *lolo ka wa'a.* "There are many kinds of *lolo* ceremonies performed for canoes," notes an anonymous Hawaiian informant. While there were a number of variations on how these ceremonies were performed, everyone agreed that satisfactory performance of this ceremony "was absolutely essential to the safety and well being of the canoe and its owner." "The *lolo* ceremony is not merely a bestowing of good luck on the craft . . . [but] an inquiry of heaven as to the fate or luck in store for the canoe." When a canoe was being consecrated for a high chief, a human sacrifice was sometimes included to maximally assure the success of the canoe.

There were customarily three components common to almost all *lolo* ceremonies, their sequence depending on the preference of the presiding *kahuna.* Typically, a live pig was put inside the hull of the canoe. The pig's behavior reputedly portended the future of the canoe. However, a happy outcome was apparently ensured in that, "if the pig goes along and lies down at the prow of the canoe, it is well; but if the pig goes forward and leaps out of the canoe the *kahuna* will say, 'This is a very strong canoe. It will have no mishaps until it rots away.'"

Secondly, a big feast was an integral part of virtually all *lolo* ceremonies. "The pig symbolized the 'rooting' *('eku)* of the canoe into the open sea, and the dog the 'tearing apart' *(hae aku)* the billows of the ocean," comments Kamakau. After the food was distributed to those attending the ceremony, the head *kahuna* offered a prayer beseeching the various gods of the canoe to give the canoe a long, safe, and productive life. Malo notes, "when the *kahuna* had finished his prayer he asked of the owner of the canoe, 'How is this service, this service of ours?' Because if any one had made a disturbance or noise, or intruded upon the place, the ceremony had been marred and the owner of the canoe accordingly would then have to report the ceremony to be imperfect. And the priest would then warn the

owner of the canoe, saying, 'Don't you go in this canoe lest you meet with a fatal accident.'" If the ceremony was satisfactory the *kahuna* would say, "You will go in this canoe with safety, because the spell is good *(maikai ka lolo ana)*."

The third element was that at some point the canoe was put into the water, and the head *kahuna* instructed those who would try it for the first time to take it out, staying always within hearing distance so they could respond to his questions and directives. Apparently only positive answers to any questions put to the paddlers by the *kahuna* were indicated. If the canoe was for a *hōlona*—a "man who buys a canoe and does not know how to make one"—he would take the canoe out for the first time with those who might have assisted in construction in some way, to catch some fish. If the owner caught the first fish, and it was a red fish, the omens for the canoe were especially favorable. The fish were then brought back in and offered with *limu kala* (seaweed) and prayers.

Informant I records a particular consecration ceremony he witnessed in 1885 as conducted by *kahuna kālai wa'a* Kuluwaimakalani. "No woman was allowed to be present at the ceremony nor to partake of the feast. The offering consisted of the usual black pig, also cocoanuts (of the kind called *niu hiwa*), *awa* (of the kind called *hiwa*), bananas (*lele*) . . . The offerings were laid out at the bow of the canoe. The *kahuna* now offers prayer . . . After this the pig was killed by strangling him with a rope tied about his snout. It would not do to shed his blood. The oven was built near the bow of the *waa*. Care had to be taken that the pig be nicely cooked . . . not a crack must appear in its skin. . . 'Cracked the pig, the canoe breaks; faultless the pig, safe and sound the canoe.' The food was now eaten, all must be eaten, and the *awa* drunk. The scraps and debris are now placed in a *lauhala* basket and carried out to sea with them in the canoe, and as they ride in on a breaker the *kahuna* casts the basket overboard with the injunction that they are not to look back to see it."

Post-Contact Construction

In the chaos of "contact" many of the ancient Hawaiian skills, technologies and institutions that took precious centuries to develop vanished in a matter of a few years. While certain canoe-building traditions and activities continued even into the early twentieth century, most of the huge and complex body of knowledge surrounding canoe construction was lost forever in the lopsided clash of Hawaiian and western cultures. The canoe was a delicate continuum. Rituals, ceremonies, taboos and traditions were a canoe builder's irreplaceable blueprints. As these were forgotten, abandoned or devalued, the canoe disappeared.

Only ten years after Hawai'i had been impacted by western culture, Kamehameha planning his conquest of the islands, "entreated [of Captain Douglas] that a carpenter might be left at Owyhee [Hawai'i] to supervise the building of a western type brig for ferrying his troops and supplies." In 1794, Kamehameha successfully prevailed upon Captain Vancouver's carpenters to help him build the *Brittania,* the first western-style vessel built in Hawai'i by and for Hawaiians. Supercargo John Turnbull writes in 1803 that in that year, "Captain Vancouvre laid down the keel of Tamahama's first vessel, or rather craft; but so assiduously has he applied himself to effect his grand and favorite object, the establishment of a naval force, that at the period of our arrival he had upwards of twenty vessels of different sizes, from twenty-five to seventy tons; some of them were even copper bottomed . . . securing to him not only a decided superiority over the frail canoes of his neighbors but the means of transporting his warriors to distant ports." Naturalist George Langsdorff in 1804 notes similarly, that "the thing which more than any other occupies his [Kamehameha's] attention is ship-building . . . any sailor, who is at the same time a ship-carpenter, is particularly welcome; he is immediately presented with lands, and almost anything that he wants."

Symbolically, the legacy of the canoe had been broken. By the 1840's the Hawaiian "navy consisted of decked vessels . . . armed schooners of from twenty to a hundred tons, which, manned and commanded almost entirely by native seamen, are politically valuable in holding the remoter dependencies to their allegiance. . ."

While many Hawaiians were quick to adopt western forms of marine craft, some traditional canoe builders were slow to let go, continuing to build a modest number of old-style canoes through the 1800's and finally tapering off in the early 1900's. But it was not the same. Neither the canoe builder nor his profession were respected and revered as before the foreigner came. With pride in workmanship gone in many cases, the post-contact-built canoe generally deteriorated in quality. John Cobb, in a commissioners' report to the U.S. Commission of Fish and Fisheries, wrote in 1900 that, "the older ones [canoes] are very handsome in design and workmanship, the old-time native boat builders having been especially expert in their manufacture. The present generation has sadly deteriorated, however, and the canoes made now [late 1800's] by natives rarely show very much skill in design and workmanship."

In all but very few instances, metal tools quickly replaced the stone adze—cutting down tremendously on the time it took to hew a canoe, but at the expense of the fineness of hewing one achieved with the stone adze. Similarly, beginning in the 1800's nails, screws, bolts, pitch and other introduced materials quickly came to be used to repair cracks in the hull. Ship's author J. S. Jenkins writes pridefully of the Hawaiian canoe in 1838 that "the lashing of sennit, and the gum of the breadfruit, have given place to good spikes and pitch."

The *Nihoa,* built for Kamehameha V, and the elegant Herbert Dowsett canoe—both built in the mid-1800's and now preserved in the Bishop Museum—are illustrative of this western influence. Both finely crafted originally, they now display a pathetic patchwork of wire, nails, screws, bolts and, on the *Nihoa,* metal plate!

Fiberglass and resin *have largely replaced koa in canoe construction today, although recent years have seen a renewed interest in building canoes of koa. The first all-fiberglass canoe, a surfing design, was built in 1954.*

6
ACCESSORIES

Thick grew the forests: Koa and candlenut;
Thick grew the forests: hau, wiliwili.
Koa for paddles,
Hau for lashings,
Soft wiliwili for outrigger floats. . . .

A number of component parts and accessories, the Hawaiian names of which occasionally varied from district to district and island to island, were necessary to make a canoe operational. Gunnels, end pieces *(manu)*, U-shaped spreaders and seats were integral parts of all hulls. A bow hatch was typically present, though not always. By many accounts the most difficult part of canoe building was the shaping and fitting of these hull components, especially the gunnels and *manu*. Most writers feel as Emerson does that "the various parts added and attached to the *ka'ele,* [hull] to constitute it a *waa,* or canoe, are termed *na laau.*"

Kalokuokamaile recounts that "you had to seek a very straight tree and also to find how to get the canoe parts *(maka)* from the bottom of the tree. If it was a large tree and two of these parts could be gotten from a single tree, that was very lucky indeed for some of the tall and large trees did not have large roots below. The thing that was greatly desired was to get the parts that went on at the stern and prow of the canoe [*manu*] . . . No one went back to the beach until all the things that were wanted were found. They [the parts] were very heavy. One should not carve them too thin while in the mountains lest they do not fit when fitted on the shore. The wood was carried while it was undried."

The wood for *'iako* (booms) and *ama* (floats) was generally found nearer the beach and relatively easily procured. These *'iako* were essential to rigging both single and double canoes, *ama* to all single canoes. All parts, whether hull components or *'iako* and *ama,* were attached and bound with various vegetable fiber lashings.

A sail rig, though optional, was often an accessory to both single and double canoes. And though again optional, a platform was almost always constructed between the hulls of a double canoe.

Mat covers that served to keep water out of a canoe were typically employed on a channel crossing or when particularly rough water was expected. All canoes carried some form of a bailer, usually a section of gourd, and in many instances two or three wooden poles to aid in righting a swamped canoe. These poles and assorted fishing poles and spears would often be tied outboard to a rack lashed to the front *'iako.*

Gunnels *(Mo'o)*

Kalokuokamaile remarks that, "the customary way to treat the sticks to be used as side pieces on the rim of the canoe *(moo-waa)* was to soak it [sic] in sea water . . . for several weeks before taking them out to cutting [sic] into shape. The old people did this to prevent shrinkage when added to the canoe."

Gunnels were invariably made of a light-colored or yellowish wood, *'ahakea* apparently being the most favored. However, *hōlei, 'ōhi'a, kāwa'u ('aiea), kukui, kōlea, hō'awa, 'āla'a,* and other native woods were also used as available. On occasion the gunnel was made from a single piece of wood, though it was more common to join two or more lengths end to end.

The gunnels were fitted on each side to the rim *(nīao)* of the middle section of the canoe by a double scarf joint. Buck describes how the gunnel and canoe rim edge were formed: "The scarf joint was formed by recessing the lower edge of the strake plank [gunnel] on its inner side for about half its thickness and for a varying depth. The gunwale edge [*nīao*] was treated in a similar manner on the outer side so that the two edges fitted neatly together. However, the gunwale strake [gunnel] was thicker than the gunwale edge and its lower edge projected outward beyond the outer side of the hull."

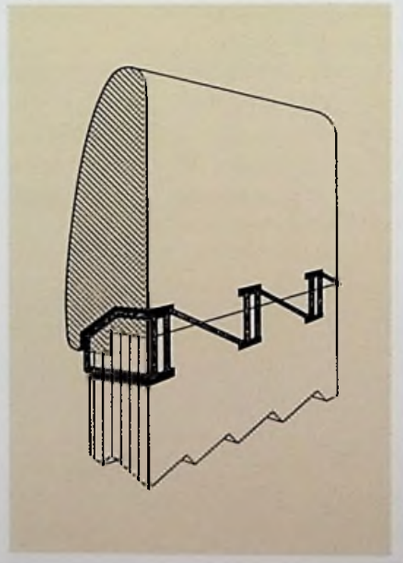
Haddon and Hornell go on to describe the very intricate method of sewing the gunnel to the canoe body. "The sennit braid used for lashing was passed from the interior through a hole bored transversely through the side of the underbody immediately below the upper margin; it was then continued through another hole bored obliquely upward and inward from a point on the lower edge of the washstrake above. Several turns having been made through the two holes, the braid was carried along on the inner side of the hull, from the upper hole in the pair just joined, to the lower hole in the adjoining pair."

These holes or lashing slits were apparently chiseled from the inner side slanting inward so that they were smaller on the outer side. There is sound reasoning behind this particular technique of using interiorly chiseled horizontal slits for lashing holes instead of round or otherwise-shaped holes. Flat weave coconut sennit, the favored cordage for sewing canoe components together, tightly filled the rectangular slits, because the sennit had the same rectangular shape in cross section as the slit. This served the all-important purpose of keeping the water from coming in.

The accompanying drawing and photograph illustrate this method of joining a gunnel to the hull or to another gunnel. Almost invisible from the outside, this form of lashing the gunnel to the canoe hull was unique to Hawai'i. In some cases, especially with hulls that were one of a pair for a double canoe, one or even two additional gunnels were sometimes fitted

Gunnels were lashed *to the hull in an ingenious manner seen only in Hawaiian canoes. The deteriorating hull* (right)*from which part of the gunnel has broken away reveals this lashing, almost completely concealed where the gunnel is intact. The diagram* (below left)*illustrates this technique, an important advantage of which was to keep water from entering the canoe.*

Manu, typically two-pieced in old Hawai'i, were lashed together as shown here (below right).



and sewn to the one below in the same fashion in which the first gunnel was lashed to the rim of the canoe hull. This was done to give the canoe the desired amount of freeboard, which might not have been enough with just one gunnel.

The thickness of a gunnel averaged one to one and a half inches, while its width varied considerably. Clerke remarked in 1779 on "a plank about a foot broad," and Haddon and Hornell say six to eight inches, while some portions found on Lāna'i in 1924 presumed to be from a pre-contact canoe are still narrower, averaging from one and half to two and a half inches wide. Gunnels in most modern canoes are generally four to six inches wide.

Shaping, fitting and lining up the gunnel was a very exacting job. According to Emerson, one way of obtaining a perfectly flush fit between the gunnel and canoe hull body was "to smear some thick coloring matter over the *nīao*[rim of the canoe] and then apply the rail [gunnel] and notice where the color had taken effect." If the color did not adhere uniformly, high or low spots were faired out. Once the gunnel was properly shaped, an informant of Pukui's states that "*ti* leaf stems were inserted into all the holes" supposedly to aid in the fitting and alignment of the gunnel to the canoe rim.

End Pieces *(Kupe, Manu)*

At the bow and stern of all canoes were finely carved end pieces or end covers. Captain Cook described these end pieces well: "The extremities of both head and stern is a little raised, and both are made sharp, something like a wedge but flatenes more abruptly, so that the two side boards join each other side by side for more than a foot." Except for a sometimes slightly higher and more pronounced end piece at the bow, the bow and stern end pieces were nearly identical in form.

In the case of end pieces there has arisen some confusion in terminology. Buck says, "end pieces were referred to generally as *na laau* and more specifically as *kupe*. The somewhat vague term of *laau* (wood) was rendered clearer by referring to the forward pieces as *laau ihu* and the aft pieces as *laau hope*." Most other sources agree with Buck's use of *kupe*. However, Emerson defines end pieces more as they are thought of today, noting "the term *manu* applied to each projection together with that portion of the rail that was of one piece with it, generally as far as to the outrigger." Still another name used for end pieces is *maka*. While *kupe* appears to have been the proper term for end pieces, *manu* has come into such common usage that it will be used hereafter.

Buck notes that these all-important end pieces "combined the functions of gunwale strakes [gunnels] and end covers." As elegantly carved and shaped as these end pieces were, they served first and foremost a utilitarian function in breaking, shedding and thus keeping out boarding

seas. The *manu* also provided critical forward buoyancy that, combined with its unique design, lifted the bow from the water when it was buried in rough seas or surf. That they were sometimes considered ornamental is not surprising given their graceful form and shapely *manu* (bird) projection. The *manu* was generally regarded as the elliptical- or spatulate-shaped ornamental extremity at the upper end of the bow and stern pieces. Emory says that *manu* "which may be the survival of a bird-shaped ornament . . . was the most conspicuous" difference between Hawaiian and other Polynesian canoes. A canoe called by Malo a *leleiwi* featured an unusually broad and allegedly very decorative *manu* projection as seen in the accompanying diagram.

If an end piece was constructed from a single piece of wood, which was apparently quite rare in pre-contact Hawai'i, it was specifically termed *kupe'ulu;* if of two pieces, each half was called a *kupe* as was the whole. As can be seen in the accompanying photographs, these end pieces were, if formed of two pieces, tightly sewed together in the style called *'aha 'ūmi'i*—the lacing or squeezing sennit. They were then lashed to the canoe hull in the same fashion as the gunnels. The stern cover ended a couple inches short of the very tip of the after end of the canoe, always leaving a projection called the *moamoa.* The *moamoa* is still a design feature of canoes being made today, and serves in securing ocean racing covers.

Judging from the end pieces in the Bishop Museum and observations of certain old models, many of the bow and stern end pieces on old canoes extended in the form of a gunnel along a good portion of the canoe hull, often as far as the *'iako* where holes are sometimes seen for the *'iako* lashings. Contemporary end pieces generally stop in front of the number one seat and behind the steersman. As imported milled lumber and sophisticated tools became available after contact, many of the end pieces on canoes made in the last 100 to 150 years have been of one-piece wood construction. And as with the gunnels, not too long after contact end pieces came to be screwed or nailed on in preference to the laborious sewing technique.

Median Bow Cover *(Kaupo'i)*

The *kaupo'i,* sometimes called *kuapo'i,* was a triangular hatch plank, or what Buck calls a "median bow cover." It afforded the bow and occasionally the stern extra protection against water entering the canoe. It filled the empty triangular space between the two converging pieces at the ends, and was sewn to the carefully rabbeted interior edge of the *manu.* It had a slightly convex aspect and/or a ridge down the middle which, with the addition of a breakwater *(pale kai)* at the base of the bow, kept out most incoming waves. The breakwater or weatherboard was either a wedge-shaped or vertical transverse piece of wood spanning the width of the hull, typically between four and eight inches high. It was extremely important in deflecting boarding seas.

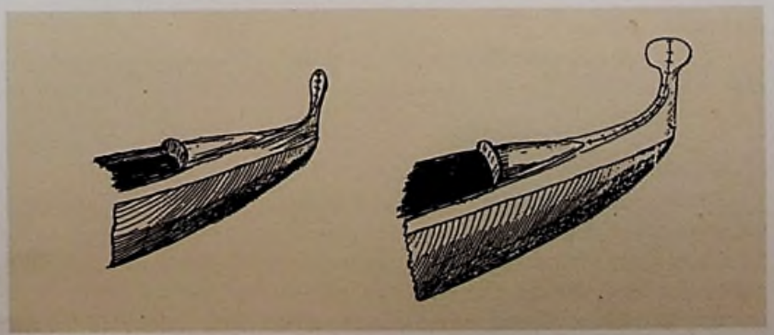
While most sources do not mention a *kaupo'i* for the stern, Emerson notes "in stormy weather, or when occasion required it, a similar hatch was used at the stern of the canoe." He called it the *kuapo'i o mua.* The *kaupo'i,* but not the *manu,* was invariably painted black in the same manner as the canoe hull and *ama.*

None of the older post-contact canoes that have survived incorporated this feature, nor do canoes of today, though various models and numerous references attest to its former common use. It appears to have been an optional item, employed if one was anticipating rough water. John Whitman writes in 1813, "When they are about to sail from one Island to another they use the most efficient means to secure the canoe from accidents. They cover them with a board fitted closely to the top and made secure by strong cords."

The median bow cover *or kaupo'i* (above), *painted black in the photograph, was a detachable piece that was sometimes sewed to the manu when boarding seas were anticipated.*

A canoe builder *in 1920 preparing to attach the manu to the hull* (left).

An illustration *taken from Malo's Hawaiian Antiquities* (below) *shows, on the canoe bow at right, the unusually wide and spatulate manu that defined a leleiwi canoe. An ordinary manu is seen at the left.*



U-spreaders *or wae of variable shape served primarily as points of attachment for the 'iako, and secondarily as braces to prevent twisting of the hull.*

Comb Cleats *(Pepeiao)*

Pepeiao, literally "ears," are found in pairs along the inside edges of the hull. Originally they were an integral part of the hull, being formed when the canoe was being rough hewn in the mountains. *Pepeiao* furnished points of attachment for both seats and U-spreaders. Each pair of *pepeiao* was called by a specific name according to its use and relative positioning. *Pepeiao mua* referred to the forward cleats; *pepeiao hope* referred to the aft cleats. *Pepeiao pa'i hua* referred to the pair of cleats located at the widest part of the canoe, as *pepeiao kainaliu* indicated those cleats usually just aft of the forward *'iako,* from where the bailer usually works.

Seats *(Noho'ana Wa'a)*

Canoe seats *(noho'ana wa'a)* generally made of *koa, kukui,* or breadfruit, were shaped snugly to the width of the hull and secured just above the *pepeiao.* Seats had different names according to their positioning. The steersman's seat was termed *pāpāki'i,* with the seat immediately in front of it called *pani,* meaning "steersman's substitute." The next seat was called *kāhihika'ale* meaning "where the waves or water laps into the canoe." The seat at the main *'iako* was termed *papakōnane,* or "checkerboard," and the bow seat, *kamani'ula.*

The seats also provided structural rigidity and served the vital function of cross braces, keeping the canoe hull from twisting and warping.

U-Spreaders *(Wae)*

Wae, generally referred to as canoe spreaders, served as purchase points for the *'iako*-to-hull lashings and secondarily as braces. They were generally of an elliptical U-shape, sometimes a V-shape, and on rarer occasions nearly straight. The root portion of the *'ōhi'a,* because of its strength and often natural curve, was the wood most often used for the *wae.* The piece of wood used was shaped as needed, notched and fitted snugly to the *pepeiao* flush with the inner side of the gunnel. The top of the *wae* was cut off level with the top of the gunnel. The *wae* rested on the *pepeiao* between two spaced holes that were used for lashing the two together. The *wae* was attached to the *pepeiao* by means of a lashing which passed through a cleat hole over the *wae,* through the cleat hole on the other side and repeating, crossing over the previous round.

Usually the vertical diameter of a *wae* was slightly greater than the horizontal diameter, serving to increase its load-bearing capacity. Haddon and Hornell note that "these spreaders [on a double canoe] gave support to the sides of the canoe, and it is probable that they represent true frames which have degenerated and now subserve a new purpose." Buck feels however that "there is no evidence to show that true frames were ever needed to strengthen the sides of a dug-out hull." Buck appears to be a bit off base and Haddon and Hornell rather on target. None of the gentlemen had any first-hand experience with the workings of a Hawaiian canoe, especially a large double canoe. Any substantive experience with any type of large Hawaiian canoe clearly points up the structural necessity for a fairly powerfully constructed *wae.* Incredible strain and bursts of torque are routinely transferred by *'iako* to the gunnels, *wae,* and, ultimately, the canoe hull. In this context the *wae* serves an important role as a slightly articulating frame indispensable for absorbing and distributing the loads that the gunnels and immediate hull area could never otherwise withstand.

In fact it is doubtful that even a small single canoe could have done without the assist of a strongly built *wae,* although Haddon and Hornell curiously note booms "lashed directly [no *wae*] as is customary in small canoes." No other mention or evidence is found of a boom being lashed to a canoe hull without the presence of a *wae,* although such a practice is not uncommon in the canoes of other Pacific island cultures.

Outrigger Booms *('Iako)*

Kalokuokamaile observed that in picking outrigger booms that would not create drag, "you had to select the sticks that arched well and not easily reached by the sea lest the canoe be slow in travelling. If it was not reached by the sea, the speed would be like that of the *mahimahi* fish." On an outrigger canoe there were two *'iako* that, for no explicable reason, always extended out on the port side of the canoe to join the *ama.* The short portion of the *'iako* that stuck out on the starboard side was called the *muku.* While on some occasions *'ahakea* and other native woods were used for the *'iako, hau* was overwhelmingly preferred.

Hau, found throughout much of Oceania and having light-weight, naturally curved limbs, furnished excellent *'iako* and sometimes even *ama.* Botanist Otto Degener reports that *hau* "was held in such high regard by the Hawaiians in former days that it was a grave offence for a commoner to cut any of its branches without first gaining permission from a chief to do so." As with *koa, hau* displayed various grove and regional characteristics of which the canoe builder was quite aware. *Hau* that grew in the hotter, more arid areas usually provided a stronger, more dense-grained wood than its wetland brother. Dry land *hau* was generally the favorite, and a famous grove still flourishes today in the area just behind Nāpo'opo'o, Hawai'i. To assure themselves of properly arched *'iako,* Hawaiians on some occasions allegedly trained young *hau* saplings to grow to the desired shapes. When the *hau* had lignified (matured) it would theoretically be the exact, desired shape for an *'iako.* Pukui and Elbert reported an *"imu hau hana*—oven in which *hau* wood was heated *(hana)* to be bent for a canoe outrigger."

In most cases the *'iako* was made from a naturally shaped branch of the *hau.* This might have been straight with a slight downward curve just

before it joined the *ama,* or straight for a short bit, curved upward slightly, and then curved downward again to attach to the *ama.* In some instances *'iako,* even with the abundance of naturally shaped *hau,* were apparently worked down from a large piece. Kalokuokamaile comments that "if there were no smaller trees to furnish sticks that arched well, then a larger tree could be divided in half for the two arched sticks." Buck notes, "the booms for larger canoes were adzed to four sides." Paris noted that some outrigger booms were "finished to an octagonal shaped cross section, polished, and curved at their ends to better hold the lashings."

Before working on a branch it was stripped of its bark and soaked in the ocean for one to two weeks. When dried out after this treatment the *'iako* would not rot or be attacked by insects. After the *'iako* piece had been soaked and dried, the part of it that lay on the gunnels and *wae* was usually flattened on the under surface. The portion of the *'iako* that spanned the hull of the canoe and around which many of the lashings were wrapped was called the *kua 'iako.* The outboard end of the *'iako (kapua'i)* was either left blunt, or shaped concavely on its underside so it fit snugly to the float. For better purchase of the lashings, a notch or knob *(manu o ka 'iako)* was sometimes incorporated at the end of the *'iako.*

On all outrigger canoes, notes Buck, "the aft boom was always closer to the stern end than the fore boom was to the bow end." The length of the booms, and thus how far out the *ama* was rigged from the canoe, varied according to the size and type of canoe and the expected ocean conditions. The farther out an *ama* was rigged the more stable the canoe, but the greater the drag. An average boom might measure five feet from the edge of the port gunnel to the *ama,* though the distance could range from no more than three to four feet on a small canoe to eight to twelve feet on a particularly large one.

Cross Booms *('Iako, Lapauila)*

The cross booms joining the hulls of a double canoe were of a somewhat different configuration than the *'iako* of an outrigger canoe. "The arched sticks of the outrigger *(iako)* were carefully selected from the bent trunk of an *ohia lehua* as they were the best of all arched sticks," noted I'i, an Hawaiian contributor to *Nupepa Kuokoa* in the late 1800's. He goes on to say that "some double canoes had three arched sticks *(iako)* of *ohia lehua* but if the canoes were long, four or five *ohia* were used—carefully selected and prepared, for these were the strongest." There are few woods

Two 'iako and a manu *of particular interest are shown* **(left).** *The upper cross boom of 'ōhi'a is from the double canoe of King Kamehameha I. Below this is an 'iako from a single canoe, having a small, crude face carved at one end. Both this 'iako and the manu below it were taken from caves on the island of Lāna'i, and are thought to be quite old, possibly of pre-contact origin. The manu and part of the gunnel are of a single piece, not unusual in canoes of pre-contact construction.*

This small fishing canoe **(below),** *photographed in 1913, displays a finely carved manu and an unusually straight ama.*

anywhere that are stronger than *ʻōhiʻa lehua,* and no structural or load-bearing configuration in nature stronger than an arched beam. *Hau* does not even begin to approach the strength of *ʻōhiʻa* and would be of marginal utility on a large double canoe, though Haddon and Hornell seem to think it sufficed. While four or five *ʻiako* would suffice for many large double canoes, occasionally even more were used. Paris' drawing in 1839 of a forty-seven-and-a-half-foot long double canoe showed six; one observer in 1793 saw eight.

Though arched *ʻiako* on double canoes were standard at the time of contact, according to Malo "*iakos* used in ancient times were straight sticks. This continued to be the case until the time of Keawe [last quarter of the 17th century] when one Kanuha [son of Keawe II] invented the curved *iako.*" This raised the decking well over the water, eliminating wave resistance and affording drier and more comfortable placement of people and baggage. A double canoe model brought back to the British Museum by Vancouver in the late 1700's is fitted with two perfectly straight booms which, as Haddon and Hornell note, is either "a late survival of the older method or an extemporization out of two outrigger hulls." In large part because of the difficulty in securing arched *ʻiako,* many *ʻiako* on double canoes described in the second half of the nineteenth century were straight pieces, as were *ʻiako* of virtually all double canoes in the twentieth century.

These *ʻiako* either laid on top of the gunnels if there was only one, or "in those with two strakes [gunnels] they passed through the upper one or partly through both and rested on the upper part of the lower." Wherever an *ʻiako* spanned the open part of the hull there would be located a *wae* for purposes of lashing the *ʻiako* and giving rigidity to the hull. The ends of the *ʻiako* projected a few inches beyond the outside gunnel and were often knobbed or notched for better purchase of shroud lines and occasional back stays.

Often the foremost and aftmost *ʻiako* rested on top of and were lashed to the respective end covers *(kupe).* Both end booms, note Haddon and Hornell, were "usually bowed slightly higher than the others, whereas the second from the fore end was stouter and wider than its fellows and carried the socket in which the mast was stepped."

The distance separating the two hulls was variable, depending on the size and intended use of the canoe, and, to a lesser extent, sea conditions. As a rule, wider spacing between two hulls afforded greater stability; however, speed was sacrificed and the tendency of the hulls to work against each other was increased.

Cook estimated that the hulls of a seventy-foot double canoe were lashed eight feet apart, while Supercargo Ebenezer Townsend two decades later notes a canoe of the same length with hulls only five feet apart. In 1843, there are reports of two different forty-five-foot double canoes, one with a one-and-a-half-foot spacing and the other a nine-foot spacing between canoes.

Float *(Ama)*

"When a man found the *wiliwili* for his floater, he cared for it as he would his own child," observed Kalokuokamaile. He goes on to note that "other woods were not desired in the olden days for the longitudinal stick *(ama)* of a canoe, only the *wiliwili* . . . [for] no matter how much the wind blew it never sunk but kept afloat just as the canoe kept afloat." Indeed, *wiliwili,* with its lightness and tremendous buoyancy, was overwhelmingly favored for making the *ama; hau* or drift timber was used if *wiliwili* was not available.

Although *wiliwili* is relatively plentiful in certain areas today, such was apparently not always the case. Judging from various sources, good quality *wiliwili* trees in old Hawaiʻi, if not scarce, were at least highly prized.

All *ama* made in pre-contact Hawaiʻi, it must be remembered, were reported to be of one piece, unlike today's generally composite models. Kamehameha V's thirty-five-foot-long canoe *Nihoa* in the Bishop Museum has an *ama* almost twenty feet long, being somewhat longer than a typical *ama* on a similar-sized canoe today. It can only be imagined how large an *ama* was needed for some of the 60- to 70-foot canoes reported, or for the 108-foot hulk seen rotting at South Point. Emory was told by an informant on Maui that "*wiliwili* trees were trimmed to grow straight to produce suitable timber for floats." With the need for tall, straight-trunked *wiliwili* and the tree's strong tendency to begin branching at a low height, such a practice would certainly have made sense.

According to Kamakau, *ama* were shaped with adzes made of the extremely hard *alahe'e* wood. This work, like that of sennit making, may have been done by a separate guild of craftsmen. An anonymous Hawaiian, writing sometime in the mid-1800's, said that in old Hawaiʻi, "different people hewed out the floats and these were much traded for in the olden days." Accounts of canoe building conspicuously omit *ama* making as one of the canoe maker's duties, which supports the belief that it was a separate craft.

Its curved shape and unique fore-end made the *ama,* like the canoe, a form peculiar to Hawaiʻi. Not unexpectedly, the design appears to be a highly evolved and ingenious answer to the rowdy and unpredictable waters of Hawaiʻi.

The form of the float was generally a simple convex curve from the rear tip to a point somewhere in front of the point of attachment of the forward boom to the float. This assured that both ends of the *ama* were above the surface of the water. The shaped fore-end of the *ama* was called the *lupe,* and for some unknown reason, left in its natural state and not painted with *pāʻele* like the rest of the float. Buck astutely notes that the fore-end of the float generally "had the sides cut away to form a thin vertical board" acting as a "cutwater to lessen water resistance when the fore-end was submerged." The sharp entry seen in the fore-end of *ama* in many old canoes seems very functional in its ability to cleave through

The cross boom *of the Moʻolele displays the arch typically seen in the ʻiako of Hawaiian double canoes.*

water, in many cases more functional than the blunt, rounded fore-end seen on most contemporary *ama*. Any rough-water canoeist can attest to how much time the front of the *ama* takes in trying to break its way into or out of a contrary sea.

The main carved body of the *ama* was generally either rounded or square with very rounded edges. Old models and photographs indicate that the portion of the *ama* from just behind the forward *'iako* to roughly halfway back to the aft *'iako* was thicker than the last half of the *ama*, a feature providing maximum buoyancy at its most critical point of water contact. The portion aft of the rear *'iako*, the *kanaka*, most often tapered to a sharp horizontal edge. On other craft it tapered to a small diameter, or was kept of fairly uniform diameter and abruptly terminated.

The curvature of the *ama* varied according to the sea conditions expected and the intended use of the canoe. In flatter waters little curvature was needed, while in rough waters a quite pronounced curvature was preferred. The latter *ama* was called an *ama kaka*. Wally Froiseth remembers being shown such an *ama* in Kona in 1950. He was told by the owner that it was only employed when very rough water or high seas were anticipated. The *ama* figured in an 1804 drawing by naturalist George Langsdorff, and in Admiral Edmond Paris' well-known drawing (1839) are markedly curved, as are many of those seen in old models. Paris made an insightful observation on how the curvature of the *ama* worked when he noted that the presence of a "rather pronounced curvature recognizes a sort of compensating principle in its action since on entering or leaving the water progressively it did not weight down or resist as suddenly as with a straight outrigger." Again, many rough-water canoeists have seen the remarkable way an *ama* disengages itself by degrees, always contacting the irregular surface or swell at some point along its curvature. This minimizes the tendency for an *ama* to break completely free of the water, which might possibly flip the canoe.

For some unknown reason the curve in many post-contact *ama* was absent. In many of the photographs of the 1800's and early 1900's there are seen *ama* with just the barest hint of curvature. Ironically, many of these *ama* pictured were rigged on canoes used for surfing, a situation for which a curved *ama* is tailor-made. In a number of the photographs the fore-end of the *ama* can be seen dangerously digging into the water—a situation easily avoided by using a well-curved *ama*.

In the late 1950's, with open ocean canoe racing becoming popular, there was a move back to the older form of *ama* with pronounced curvature. This design has essentially remained the norm to the present. Other seemingly sensible design features of old style *ama* have not been followed, such as the fine entry, the tapering exit and the greatest volume located just forward of center.

In 1924 Emory said of canoes he observed in west Hawai'i that "the *lupe* [fore-end] of the *ama* is nearer the canoe body in properly fixed canoes." This "toeing in" that Emory observed is still commonly seen

A canoe photographed in 1892 *displays an ama having pronounced curvature* **(above left)**, *probably reflecting the form of most pre-contact ama. A later photograph, ca. 1930's* **(left)**, *shows the traditional shape of the front end of the ama. Note that, in this instance, the 'iako-to-ama lashing passes through holes drilled in the ama. Modern ama, while somewhat variable in design, have nevertheless retained the traditional banana shape* **(above right)**. *The ama lashing on a racing canoe* **(above middle)** *illustrates the modern practice of attaching a lead weight to the 'iako when rough water is expected.*

today. It compensates for the drag the *ama* creates on the left side of the canoe and the resulting pull to the left. The amount the *ama* is toed in will vary for many reasons, the most important being the distance the *ama* is rigged from the canoe. The front of the *ama* is generally toed in an inch or two.

Although not seen in canoes today, a number of old *ama* had holes bored transversely through them at a point a couple of inches below where the *'iako* attaches so that the lashing could be passed through the holes instead of around the whole *ama*. Though this may not have been quite as strong, a certain amount of drag was eliminated by not having the lashings around the outside of the *ama*.

Lashing *('Aha, Aho)*

Slammed by forces reaching thousands of pounds per square inch, simple vegetable fiber lashings routinely absorbed and dissipated bursts of torque that could rip steel. The Polynesian understood only too well the importance of lashing to a canoe's survival. In Hawaiian waters, any form of rigid, non-flexible attachment would see a single or a double canoe slowly but methodically dismembered. Methods of lashing outrigger components to both single and double canoes were devised that were at once rigid and flexible. Soft, pliable and rugged vegetable fiber lashing, especially when wet, very firmly binds a canoe and its outrigger assembly or two hulls, while simultaneously allowing for reasonable lateral and see-saw movement.

The coconut tree, often called the tree of life and widely regarded as the single most utilitarian plant known to man, usually furnished the lashings on which the life of the canoe depended. *Olonā, hau,* and *'ie 'ie,* were also used in lashing a canoe, but apparently not as extensively as coconut sennit. Freycinet, visiting Hawai'i in 1793, spoke highly of sennit and its use, saying "nor can one help being amazed at the skill and intelligence demonstrated in joining various parts of these floating machines so solidly that they are almost indestructible under the pressure of sea water, even though it is only achieved by means of braided fiber lashings. The same type of sennit is used in fastening the float of the single canoes and in holding together the double canoes, and it also makes a mooring line of incredible strength." The sennit to which Freycinet refers was made of millions of individual coconut husk fibers, few more than four inches in length, tenaciously entwined to collectively provide a uniquely strong and pliant marine cordage. One of coconut sennit's many admirable qualities is that it is little affected by the ravages of sun and sea, unlike cotton, manila or other natural cordages. Coconut sennit, as with modern forms of natural and synthetic cordage, was of different qualities, thicknesses, plies and weaves, and of varying tensile strengths. Emerson even notes two different types of coconut from which sennit was made. One type was made from the fiber of the *lelo* coconut, and the other from the fiber of the *hiwa* coconut, "which is of a lighter color than the *niu lelo.*" Cordage for use in rigging a canoe was customarily a two- to five-strand flat weave of the highest grade. A three-strand flat weave was apparently most common.

The makers of cordage in pre-contact Hawai'i were a distinct group, usually women. Kalokuokamaile recalls that in "the time of the ancients, different people worked on sennit cords and very few people were trained in making sennit cords. It could only be obtained from them and no one ever regretted paying with a hog a fathom in length to the makers of sennit cords. Such cords were unobtainable without going to a worker of sennit." An unidentified Hawaiian writing in the late 1800's concurs with Kalokuokamaile, noting "the sennit braiders in the olden days were different people," and that "the braid used as cordages in canoes . . . was much traded for in the olden times."

Indeed, sennit was a primary unit of barter in pre-contact Hawai'i. Without it there would have been no canoe. The canoe builder, who used it extensively in sewing on parts and lashing the outrigger assembly or other hull, had to obtain it from a maker of sennit. Early European ship pursers quickly recognized the high quality of Hawaiian coconut sennit and other natural cordages and traded for it actively, using it to replace worn rigging on their boats. Langsdorff in 1804 went so far as to say of local cordage "that ships are supplied with them and they are considered as more durable for tackling than the European cordage."

Coarse flat-weave sennit gave excellent purchase on itself, with minimal slippage or loosening of the lashing, provided the canoe was rigged tightly the first time. Sennit tightened up considerably upon wetting. Beyond the primary benefit of connecting canoes and canoe parts by means of cordage, namely simultaneous rigidity and flexibility, such a method also provides a built-in "overload" and "backup" system. The first system was a "breakaway" feature purposely incorporated into the lashing. Lashing strengths were tailored according to the size and type of canoe, its anticipated use and expected sea and surf conditions. A lashing was made so that, when a certain threshold of resistance or force was encountered, the lashings would break before the *'iako, ama,* gunnels or *wae.* Knowing just what thickness and ply of cordage, type of lashing, and number of wraps to use constituted the art of canoe rigging.

Whitman writes that when a channel crossing was planned or rough water expected, "the outrigger is more carefully secured by double the usual quantity of line." Canoes were more strongly rigged for rough water, but only within the known structural limitations of the *'iako* and other parts. Whitman also makes the only known early mention of a bowline or "slingshot *(kaula kā'ili'ili).*" He wrote, "a strong piece of line is made fast to each end of the canoe and from thence to the eyammer [*ama*] to keep it steady." This is a line from the bow of the canoe to the point where the forward *'iako* attaches to the *ama* and/or a line from the stern to the point where the aft *'iako* joins the *ama*. Such a line is employed when expecting exceptionally heavy seas or high surf. "Slingshots" serve to keep the outrigger assembly from being wrenched backward or forward should the *ama* bury itself in a swell or wave. It is commonly employed today on surfing canoes and, occasionally, as part of a racing canoe's rig, particularly if rough water is expected.

The second system was integrated with the first and served essentially as a primitive backup "break checking" feature. Most lashings cinched down upon previous wraps at a number of different contact points by going over, through and/or around themselves. Should the lashings break at a certain place or places, the negative effect would be minimized in that the severed cordage would usually not separate beyond the two closest overlay points on either side of the break. As long as some of the lashings were still intact, as is most always the case when lashings break because of excessive force, a canoe would generally hold together long enough to either be tied supplementally, re-rigged at sea, or nursed back to shore.

'Aha, the term for sennit, also applies to the manner of lashing, binding or sewing. *'Aha* was employed in sewing the gunnels and *manu* to the rim of the canoe body, the bow and stern hatch to the respective *manu,* and the *wae* to the *pepeiao.* In the typical case of a composite or two-piece end cover, the halves were sewn together in a fashion called *'aha 'ūmi'i,* the lacing or squeezing *'aha.* Kamakau notes that the "'halves' *(puniu)* of the . . . *manu,* [were lashed] with sennit cord neatly braided in the *'o'io* pattern." The manner of sewing the end pieces and gunnels to the edge of the canoe's body and the bow hatch to the respective end pieces was called *kāholo.* The sewing of all these parts to the canoe, as discussed in an earlier section, was a tedious and exacting job. It had to be done with

great care and in a particular way.

ʻAha hoa waʻa or *ʻaha hauhoa waʻa* are the terms for weaving or binding an *ʻiako* to an *ama* or canoe, or for tying two hulls together. *Lanalana* or *nananana* traditionally referred to the lashings in general, but were used interchangeably as terms for ornamental plaited-knot lashings and the specific lashings of the *ʻiako* to the *ama*. Informant Mauliʻawa says that "the cloth wrapped about the *ama* to protect it from the lashing of the *ʻiako* is called *pale hauhana*." In the absence of such a wrap, tight lashings would bite deep into the soft *wiliwili*.

When tying the *ʻiako* to the *ama*, the lashings either passed around the *ama* and the end of the *ʻiako* (which was either upturned, notched or pegged), or two holes were bored in the *ama* and the lashing was passed through the holes several times and around the *ʻiako*. If lashings went through the *ama*, the end of the *ʻiako* was upturned, notched, pegged, or sometimes left plain, with the foot of the *ʻiako* cut and fitted to the top of the *ama*. It is unclear whether the practice of going through the *ama* was a pre- or post-contact development; such a method of lashing through the *ama* had real merit in that drag from lashing around the outside of the *ama* is virtually eliminated.

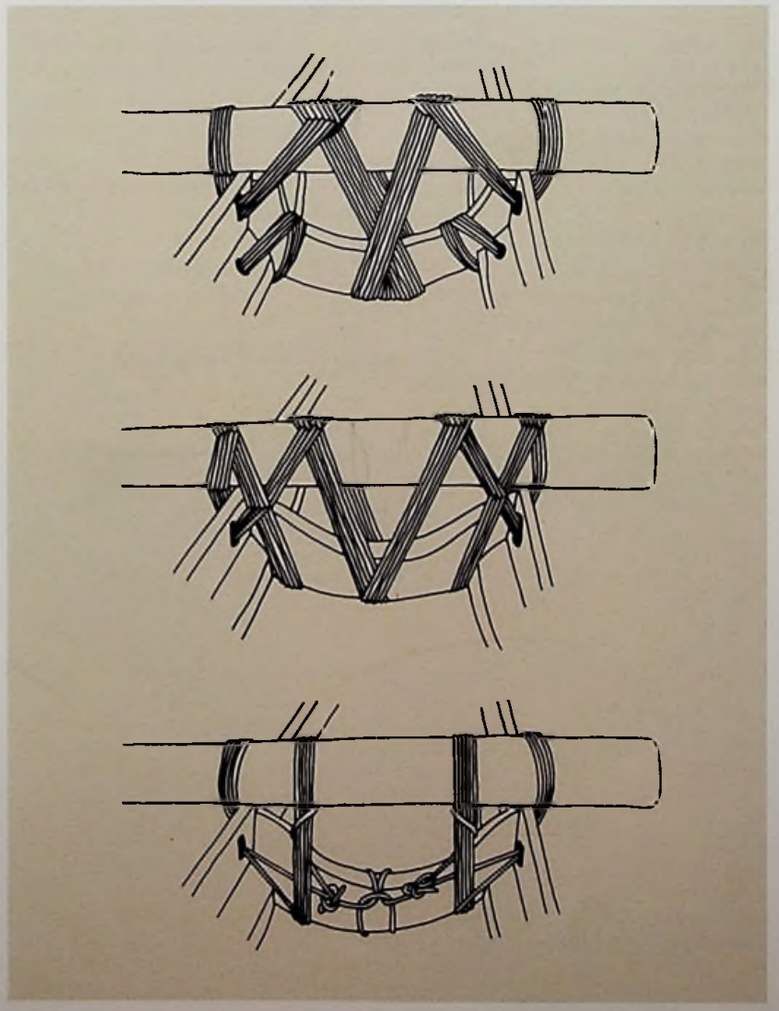
Indeed, lashings were regarded very critically. As with the canoe, the whole concept of lashing bespoke a very sophisticated understanding of naval architecture, physics and ocean dynamics. The most seaworthy well-built canoe in the world was worthless, and a potential coffin, if its lashings were not adequate for given seas. There were, at one time, many different types of lashings known, each tailored to a certain anticipated sea condition, or to the intended use of a certain canoe such as for fishing, surfing, ceremonies, or racing. Emerson notes that "they had many patterns . . . forty or more . . . of lashings called *aha*, some of them great elegance and beauty, each of which had its own name . . . some of them are very *kapu*." With the Hawaiian canoe comparatively devoid of ornamentation, lashings seem to have been one place where an aesthetic form could be integrated with no sacrifice to function.

The *pāʻū o Luʻukia* was apparently the best known, most decorative and highly regarded lashing employed. It derived its name from Luʻukia, "a famous beauty who, though wife to another man, so fascinated Moikeha, a king of Hawaii that he sailed with her to Tahiti. One of her would-be lovers hoping to win her favor by alienating her against Moikeha, cunningly slandered that prince to Luukia. He so far succeeded that he aroused in her an aversion to the young man. As a consequence, she sought to defend herself against further approaches of her royal lover by weaving about her loins some sort of woven corset or *paʻu*." The *pāʻū o Luʻukia* was thus a play on a very ornate and intricately woven chastity belt. The *pāʻū o Luʻukia* lashing was confined, as generally were fancy lashings, to the *ʻiako*-to-*ama* tie.

On some occasions, reddish-colored sennit was interwoven with a whiter *ʻieʻie, olonā,* or *hau* cordage. Emerson notes that "the best *aha* to bind the *ama* to the *iako* was of two stranded cord made of *olona* and coconut fiber twisted together. *Olona* had a tendency to shrink when wetted and give when dry, but when these two fibers were mixed it remained firm at all times." Emerson goes on to note that "an old Hawaiian named Paila informs me that about the year 1840 he thinks it was his good fortune to see at Olowalu, Maui, a fine large canoe, the *ama* and *ʻiako* of which were joined by this most beautiful of lashings. Red and white colors were combined and interwoven in such a way as to produce a most pleasing effect."

Malo notes that "when it came to making the lashings for the outrigger of the canoe, this was a function of the utmost solemnity. If the lashing was of the sort called *kumu-hele,* or *kumu-pou* it was even then tabu; but if it was of the kind called *kaholo,* or *Luukia* (full name *pa-u o Luukia*), these kinds, being reserved for the canoes of royalty, were regarded as being in the highest degree sacred, and to climb upon the canoe, or to intrude at the time when one of these lashings was being done, was to bring down on one the punishment of death." Emerson concurs, noting that "the more ornate and decorative of them [the lashings] were reserved for use in the canoe of an *alii,* and the time when the *kahuna* was engaged in doing one of these peculiar *ahas* was regarded as specially sacred—*kapu loa*—and it was death for any unauthorized person to approach the *halau* or canoe shed at such a time." Emerson also comments that "the operation of binding an *aha* often reached the dignity of a sacred rite. Hence *aha* means a religious ceremony, also an assembly of worship . . . "

Accompanying illustrations and photographs depict three of the more well-known methods of lashing an *ʻiako* to the canoe body. Virtually any *ʻiako*-to-hull lashing could have graced a single or double canoe. Worthy of note is a lashing variation observed by Paris, probably in 1839, on a large double canoe that belonged to King Kamehameha. Paris figures the *wae* fitted into "horizontal grooves worked in the strengthening projec-



ʻIako-to-hull lashings *of the three most common varieties. A remarkable feature of such lashings is that they simultaneously provide rigidity and flexibility.*

tions [*pepeiao*] left on each side." He does not show the U-spreader in any way lashed to the comb cleats *(pepeiao)*. The only lashing of the *'iako* to the U-spreader that Paris shows are "two massive connecting collar lashings," a lashing style much simpler than that known to have existed for either double or single canoes. While the lashing would have undoubtedly been done tightly and is clearly shown as being "massive," it would not appear to have been as effective as lashings that crisscrossed and went through the gunnel at some point and around the portion of the *'iako* immediately outside the gunnels. As Hornell says, "it is possibly one of the innovations tried out during the transition period when the native culture of the islands was being rapidly modified by increasing contact with the outside world."

Only a few different methods of lashing are employed today. Most canoes, whether racing, recreation, surfing or fishing, use one of the two *'iako*-to-hull lashings shown for rigging single outrigger canoes; these are called a "diamond" and "double diamond." The *'iako*-to-*ama* ties also show little variation, though some canoe clubs will occasionally incorporate a variant lashing.

Canoe Lashings

'aha a Ka-lani-manuia	(no data)
'aha a ka lino	tautly-braided lashing
'aha a Keawe-'ula-lani	(no data)
'aha a Pi'i-kea	(no data)
'aha Aliomaomao	(no data)
'aha 'awili	(no data)
'aha hauhoa wa'a	lashing to bind *'iako* to *ama* or to canoe; to tie two hulls together; also *'aha hoa wa'a*
'aha hehe 'ia wau	(no data); possibly *'aha heheia wa'a*
'aha hi'iau	(no data); also *'aha heiau*
'aha hoa ama	lashing to secure the *ama*
'aha hoa wa'a	same as *'aha hauhoa wa'a*
'aha holo	same as *'aha kāholo*
'aha holo a pa'a	lashing to bind gunnels and *manu* to canoe
'aha holo luahine	(no data)
'aha ka inoa o nawo	(no data)
'aha ka muku pele lua	(no data); possibly *'aha ka muku peleleu*
'aha kāhele honua	*ama* lashing; possibly *'aha ka'ahele honua*
'aha Kahiki 'ula	(no data)
'aha kāholo	lashing to bind end pieces and gunnels to canoe body, bow hatch to end pieces; used on royal canoes
'aha kaku	lashing to bind gunnels to canoe hull; a continuous suture
'aha kakua	(no data)
'aha kau	*ama* lashing
'aha kaukāhi ka'ahi	(no data)
'aha kaula 'ōhi'a	lashing to tie outrigger for rough water
'aha ki'ihei	(no data)
'aha kumu hele	*kapu* lashing used on outrigger of a chief's canoe
'aha kumu pou	same as *'aha kumu hele*
'aha lu'ukia	(no data); possibly *'aha o ka pa'u o Lu'ukia*
'aha manawa	(no data)
'aha na nuku 'eono	six-pronged lashing
'aha na nuku 'ewalu	eight-pronged lashing
'aha na pūkolu o Kāne	(no data)
'aha na peleleu	(no data)
'aha na piko 'ehā	*ama* lashing
'aha o ka pā'ū o Lu'ukia	very decorative and intricate lashing; sometimes made by interweaving a white cord of *wauke* bark with red coconut fiber sennit; reserved for royalty
'aha o Lu'ukia	four-pronged lashing; possibly *'aha o ka pā'ū o Lu'ukia*
'aha 'o'io	lashing to bind the halves of the *manu*
'aha ouaua 'apo kahi	double-wrap lashings from *pou* to *'iako* and *ama;* also *'aha oauaua 'apo kahi*
'aha ouaua 'apo lua	similar to *'aha ouaua 'apo kahi;* used when *pou* is longer; reaches higher up the *ama;* also *'aha oauaua 'apo lua*
'aha ouaua kai nui	lashing quickly and hastily extemporized
'aha pa'alia pa'a	(no data)
'aha pā'ū o Lu'ukia	same as *'aha o ka pā'ū o Lu'ukia*
'aha pāwehe	lashing used on Kaua'i
'aha pe'a	(no data)
'aha pepehi kanaka	(no data)
'aha peu	(no data)
'aha pueo	(no data)
'aha 'ula kapu	red, eight-strand sennit lashing; reserved for *ali'i*
'aha 'umi'i	lashing to bind the halves of the *manu*

Sails *(Pe'a)*

While drawings and descriptions made by early European visitors of the traditional Hawaiian sailing rig do exist, "details concerning the mast and the sail," notes Buck, "are scanty." Like so many other features of the Hawaiian canoe, the type of sail used in Hawai'i became specialized, a uniquely Hawaiian form of oceanic sprit sail called a "crab claw." This sail was found on double canoes, which were "always equipped to carry sail," and often on single canoes as well. Its origin is unknown, though it is generally assumed to have evolved from a more ancient form of sprit sail in the Marquesas and/or Tahiti. Reportedly, a more ancient triangular-shaped sail survived and was occasionally used alongside the "crab claw" sail.

The Hawaiian "crab claw" sail was three-sided, with its apex down near the bottom of the mast. Apparently a bolt rope was hemmed in the edges of the sail and laced or tied at intervals to the mast and spar *(paepae)*. The lower end of the spar, which "functioned as a boom sprit," was tied to the mast near its foot.

Emerson also claims that the "peak," or tip of the spar, "was kept in place by a stick called the *o,* the foot of which was crotched and rested in a loop of line attached somewhat below the middle of the mast."

The main sheet, *kaula paepae,* was attached somewhere near the middle of the spar, and was carried back to an aft *'iako* for securing and tendering. The rigging and sheets were typically made of *'ili hau,* a tough cordage made from the bark of the *hau.* The mast, called *pou* or *kia,* was generally made of *'ōhi'a lehua* and the carved spar of *hau.*

The rather slender spar curved upward, with a rope apparently leading from its upper end to the top of the mast down to the deck. Adjustment of this rope controlled the amount of "bag" in the sail, and if, as Haddon and Harnell note, the upper end of the spar was "bent in toward the masthead . . . This gave the free margin [leech] a deeply crescentic form," so clearly depicted in Webber's drawings.

Many accounts and drawings by early European visitors, as well as petroglyphs, figure a "pendant made of streamers of bark cloth *(tapa)* flying from the upper end of the boomsprit." In some cases feathers took the place of the *tapa* streamers, and on occasion also graced the top of the mast. There is also the suggestion, as seen in a petroglyph in Kaluapulani Gulch on Maui, that a sail sometimes had bunches of streamers attached at intervals along its spar edge.

The sail material was most often matting made of finely plaited one-eighth to one-quarter-inch-wide strips of *lauhala* (pandanus leaf). Malo notes that, "the young leaves, *mu-o,* made the best mats, and from them were made the sails for the canoes." The sail was made by sewing together about eight- to sixteen-inch-wide panels, called *'ie* with *olonā* or sennit. These panels were overlapped horizontally before being sewn up. Surprisingly, a *lauhala* mat sail is quite light, weighing less than a canvas sail of the

same size. Emerson also notes that "where a white effect was desired" in the sail, strips "of the white *lauhala, lauhala keokeo* which grows on Hawaii but not I believe on Oahu," were used. He goes on to say that, "the sail of the Hawaiian canoe in ancient times was made of different materials ... *hala,* the *loulu*-palm, the fine *makaloa*-rush of Niihau ... and other vegetable fibers that abounded in the islands."

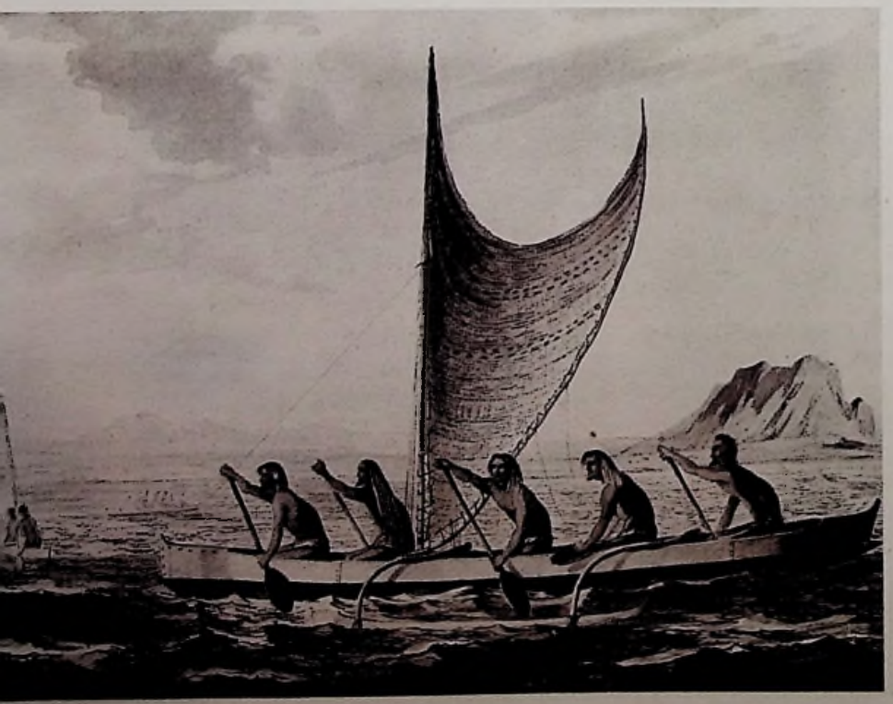
According to an informant, Koali'i, when the sail was "for a king, for a distinguished priest or for a war canoe, the sail was dignified with the name *la* or *pea la* ... and was a work of art. This name apparently ... [came] from an emblem also termed *la* that was woven in its centre ... [that] consisted of a circle with twelve rays of a red color pointing inward toward its centre, where was inscribed another smaller circle, the central part of which was white in color." This sail was distinguished from that of the commoner sail by being of "a special pattern, more finely wrought and highly decorated ... the leech and luff, and the other borders of the *la* were reenforced and at the same time decorated by interweaving fibres of *olona,* or cocoanut *aha* ... When finished the *la* was an article not only of great decorative value ... but also of exceeding strength and durability ... [to] be handed down as a precious heirloom from one generation to another." Kamakau also notes that the sail of an *ali'i* had distinguishing features. "The bottom of the mast *(kia),* and sail *(pe'a),* and the arched parts of the sail were decorated with red cording." Fornander and other writers note that on occasion the sail, pennant, and even hull, paddles, and cordage of a particularly high chief would be colored red, denoting his exalted status.

Emerson reports that the sails used on the islands of Hawai'i, Maui, Moloka'i, Lāna'i and O'ahu were the standard "crab claw" but that "the fashion of *La* that prevailed on Kauai ... appears to have been quite unique, different from anything found elsewhere ... [it] was heart-shaped in figure. It seems to have been used without a spar to spread it instead of which light poles of the tough elastic wood called *maile* were sewed to its border in place of a bolt-rope .. [it] was braided in a variegated pattern, called *pawehe,* red, black and white *makaloa.*" Though not seen by Emerson, this heart-shaped sail form was described to him by several independent Hawaiian informants. Fornander makes an isolated reference that might allude to this strangely shaped sail described by Emerson. He notes that on one of Kamehameha's first expeditions, "the kind of sails used was mats braided round and flat."

Saturday, January 3, 1789, just over a decade since Cook's arrival in Hawai'i, John Meares records from on board his ship, the *Iphigenia,* seeing a boat coming around Diamond Head into Waikīkī; in attempting its identification "the natives were deceived as well as the people in the ship; for they all imagined it to be the *North West America* [a brig], which had not been seen for some days, till the canoe came within a short distance. She had got jib, main-sail, and fore-sail as well as those of a schooner."

Acculturation had been shockingly swift. Two thousand years of an unbroken legacy of vegetable-fiber sail that had powered the most ambitious and successful ocean assault in man's history, erased in just over a decade! And it was no wonder, with early European visitors such as Vancouver in 1793 recounting how he and his crew members were waiting for Kamehameha "to come off in great state in one of his largest canoes, that we had rigged for him with a full suit of canvas sails, sloop fashion, to which I had added a union jack and a pendant." Vancouver goes on to note somewhat wryly that Kamehameha cruised for some time about the bay before he came alongside. "On his [Kamehameha's] arrival we found him highly delighted with his man of war, but he observed, that she would make a much better appearance with a few swivels [cannons] properly mounted."

The sailing double canoe Mo'olele, *a 42-foot koa-and-fiberglass replica of a traditional interisland sailing canoe, is capable of speeds of 15 knots* **(below right).** *The illustration of a sailing canoe off of Ni'ihau by Webber* **(below left),** *an artist with Capt. Cook, accurately depicts the rigging and design of the sails.*



Sails of western design *were quickly adopted by Hawaiians after contact. Not long after Cook's arrival, canoes were seen with gaff rigs similar to that pictured above on the "Alabama," photographed in Honolulu Harbor in 1906.*

Freycinet, in 1813, says of the canoes he observed that, "today they are rigged as cutters, that is to say they are fitted with a yard, boom and mainsail, and two jibs—a purely European installation." By 1800 the old "crab claw" design had been largely replaced by European spritsails. While not as numerous as in pre-contact Hawai'i, sailing canoes were not uncommon throughout the nineteenth century. Apparently there were a number of different rigs tried on canoes during the late 1700's and 1800's, though the sprit-sail or so-called gaff rig seemed to have predominated. A jib was very often added, particularly on a double canoe.

Although Freycinet noted that "all the canoe sails that we saw were made of canvas," plaited *lauhala* apparently held its own especially for the poorer people. In 1823, Ellis notes, "the sails they now use, are made of mats [*hala*]." In 1893 Keohoki'i states that "in 1869 Moe-honua had a canoe rigged with a *lauhala* sail *(pe'a lauhala)*. It was triangular with base down and the *paepae* or boom, at the lower border. It was on the canoe named *Ohule.*" Other isolated accounts report the use of *lauhala* mat for sail material well into the 1800's as well as an occasional fisherman who still used the traditional "crab claw" design.

By the later 1800's sailing canoes were seen less and less frequently, except in Hilo where both single- and double-hulled sailing canoes were used for fishing into the early 1900's. Once a year, on Regatta Day, sailing canoes could also generally be seen. In the 1930's sailing canoes became very popular as racing craft at Waikīkī, only to die out completely just before World War II.

Mast *(Pou, Kia)*

The methods of positioning, stepping and rigging the mast and sail were slightly different for a single canoe than for a double canoe; in neither case is it perfectly clear how these were done. The positioning of the mast on the single canoe was typically at the front *'iako,* stepped either on top of the *'iako* or in front of it on the hull bottom.

Placement of the mast in an outrigger canoe varied. Photographs from the 1880's to 1950's show it to be stepped in the stern about as often as in the bow. Whether the mast was ever placed in the stern of pre-contact canoes will probably never be known. However, many old-timers maintain that the mast was placed in the stern of the canoe, just in back of the aft boom. The reasoning is sound. The stern of a canoe is significantly larger in volume than the bow, giving the stern a much greater displacement. With the compression load of the sail rig driving the hull down into the water, the fuller and more buoyant stern would have been depressed much less than the finer bow. In rough water this was particularly important, for a heavy sea and a strong wind would have easily combined to depress the bow with its lower freeboard to the point where seas would readily pour in.

On the double canoe, most accounts place the mast midway between the two hulls, as Webber's drawings at the time of contact, and later others, illustrate. However, there are accounts that indicate, as does Malo, that the mast "was set up in the starboard canoe, designated as *ekea,* the other one being called *ama.*" Haddon and Hornell felt size was the determining factor in the location of the mast. "The conclusion most probable is that the mast was stepped in the starboard or weather hull in small double canoes without a *pola* [platform], where a notched heel would enable it to fit upon the second *iako,* whereas in larger vessels it was stepped in a socket or shoe [*ku kia*] upon the *pola* but immediately above the second *iako.*" The second *'iako* was traditionally thicker and stronger than any of the others to better withstand the considerable strain and compression load exerted by the mast and sail.

On a double canoe the mast was secured by a pair of shrouds on either side, tying to the *'iako* both fore and aft of where the mast was stepped, with the occasional addition of a back stay *(pū o hope; kaula hope).* Paris adds two fore stays attached to the outer end of a bowsprit, "probably an innovation inspired by European usage."

The mast for an outrigger canoe was secured similarly, with a shroud attaching on each side to the foreboom, a forestay to the bow of the canoe *(pū o mua; kaula ihu),* and occasionally a running back stay. Emerson states that the mast "was set in the forward part of the canoe. It passed through a hole in the *nohoana* [seat] or board placed just in front of the forward *iako* . . . and was then stepped in a block resting on the bottom of the canoe . . . It was held in place by shrouds called *kaula pu* which passed from the mast head and were attached to the forward *iako* on each side, also by a stay called a *kaula ihu* which was attached to the prow." Emerson's positioning of the mast agrees with Webber and others. Stepping in front of the foreboom also lowers the center of balance, affording greater stability as well as enabling the foreboom to be used for aft securing points, eliminating the need for a back stay.

Platform *(Pola)*

Lashed on top of the arched crossbooms of a double canoe was a narrow wooden platform, or *pola,* for which says informant David Kupihea, "*iliahi* was best; [but] *ohia, lama,* and *ahakea* were also good." It was constructed of "slight poles" laid lengthwise or a wide plank with a single stout pole on either side. In the latter case, I'i states that "the two poles of the platform were joined to either side of the slab and lashed fast with ropes from front to back . . . These poles were tied with ropes that were wound and looped to make it easy for one person to undo the platform and carry it ashore, or unship it in case of disaster."

Written sources, drawings and models are fairly equally divided on whether the platform was level or curved upward slightly at each end. As there is the tendency of the bow or stern, especially in rough seas, to be

lower in the water than the rest of the platform, the additional height at each end would have kept the *pola* drier. It is likely that there were both forms. The height of the platform above the canoe's gunnels varied considerably—Ellis notes it was "at least two feet," while Ebenezer Townsend states that the platform of a canoe carrying Kamehameha was "about four feet higher than the sides of the canoe." R. W. Andrews noted in 1843 that in addition to the *pola*, "a further frame work of poles and boards made a platform for the accommodation of warriors, non-combatants or freight as the case might be." This would seem to be the *pāpa'i hale* or *hale lanalana* that was sometimes built on the *pola* to further ensure the dryness and comfort of passengers, especially the privileged. Fornander notes that a "double canoe with its platform covered . . . was a sign that a chief was aboard." The chief's rank was indicated by further attaching to the platform a *pūlo'ulo'u*, a *kapa*-covered ball on a stick called a *pahu*.

If many of the early reports of the numbers of people, particularly warriors, seen on a *pola* are even remotely reliable, some platforms must have been fairly substantial affairs. Accounts by early voyagers indicate that the number of passengers that were carried on the platforms of various double canoes was sometimes quite large—from thirty to a hundred or more people.

Between the hulls *of a double canoe, a platform or pola was frequently lashed, resting upon the arched cross booms. Passengers (often warriors) and freight were carried on this structure, which was capable of bearing surprisingly heavy loads. Often a small thatched hut was built on the pola, serving as a shelter for the more privileged passengers.*

A rack called a haka *or kau mōkoi was sometimes lashed outboard on the forward 'iako of a fishing canoe to hold fishing spears and poles* (below).

Mat Cover *(Pā'ū)*

"When the lashings of the canoe were completed a covering of mat was made for the canoe (for the purpose of keeping out the water) which mat was called a *pa-u*." Emerson indicates that there were two types of covers, a *pa-u* for ordinary times when "only the waist of the craft where the baggage and freight were stowed, was covered" and a larger *pā-ū* which "covered the opening of the canoe from stem to stern" as protection in stormy weather. Apparently the first type was a solid piece of mat, covering only that portion of the canoe where freight might be stored. The second type of *pā-ū* was a cover in the sense that canoe covers are thought of today. Kaio'oni, a 19th century informant of Emerson, notes that "each of these three holes [the openings in front, behind, and between the *'iako* of an outrigger canoe] had its own mat with a hole for each man." Such a cover completely covered the opening of the canoe, leaving only enough of an opening at each seat so that the paddler's waist might fit through.

The *pa-u* were customarily *hala* (pandanus) mats woven to the desired specifications. Emerson, in his notes on Malo's *Hawaiian Antiquities*, gives the only known account of how they were secured to the canoe: "A number of holes, called *holo*, were made in the upper edge of the canoe. By means of small cords passed through these holes a line, called *alihi pa-u*, was lashed in place. Through the loops of this *alihi* was run a line that criss-crossed from one side to the other and held the *pa-u* in place. This last line was called a *haunu*." Mauli'awa, an informant of Emerson's, relates that these "mats turned up in front of and in back of the rower."

Emerson describes the form of mat cover apparently used to cover freight. Called "*'ahu uhi waa*, it had holes for which the modern sea term is earings. The *moo* and *iako* had holes into which a long rope [*kaula luahine*] running from bow to stern was lashed, and the *ahu* [cover] was lashed to this. The [*kaula 'ulili*] rope criss-crossed from one side of the canoe to the other, passing over the *ahu*."

Only two references are known that describe these *pa-u* in use. G. D. Gilman, while taking a trip down the Nāpali coast of Kaua'i in 1845, saw three canoes departing for Ni'ihau. He notes, "one of them was quite small, containing only three persons, a man and two women, who handled their paddles like professional rowers. The top of the canoe was covered with mats firmly secured, with openings left just large enough to admit their bodies, but at best it was a slight affair to stand the rough seas in the channel." Capt. Charles Barnard describes in 1815 a slightly different form of *pā-ū*. He observed that when readying "to cross the channel, they cover the canoe with mats, so that but little water can get in, leaving only a small hole to bail, and for the man who guides the canoe; the rest sit on top."

Fish Spear and Pole Racks *(Haka, Kau Mōkoi)*

A rack called a *haka* or *kau mōkoi* was sometimes lashed outboard on the forward *'iako* of a fishing canoe to hold fishing spears and poles. Sometimes a simple "Y"-shaped stick *('āmana)* was lashed to the *'iako* in the absence of a special rack. In either case the trailing ends of the spears and poles apparently rested freely on the back *'iako*. The *haka* was lashed to the *'iako* through holes made in either a solid or a two-footed base. As seen in the accompanying photograph, the form of the racks varied considerably, being sometimes ornately carved, and having from two to no more than five notches carved in their upper edge in which to lay the spears or poles. Human heads or figures were occasionally carved at the ends of these racks for decorative purposes.

Stone canoe anchors *usually weighed from 15 to 30 pounds. Line was attached either through holes occurring naturally or drilled, or was tied to a constricted neck or natural projection (*above*). An anchor bearing a phallic carving (*right*), although allegedly of pre-contact production, was possibly made in historic times.*

Bailers *(Kā Wa'a)*

Canoe bailers were called *kā wa'a,* or *kā liu.* Buck assumes they were "of the general Polynesian pattern, a wooden scoop with a median handle projecting forward from the back" though none are known to exist. Gourds were plentiful in Hawai'i and numerous references are found to their use as canoe bailers. As to why the Hawaiians would have abandoned the wooden bailer with a handle, Buck wrote: "It is . . . probable that the increased cultivation of the gourd offered more easily made substitutes and that the change in material involved the loss of the median handle."

Anchors *(Pōhaku Hekau)*

Stone canoe anchors or *pōhaku hekau* were in many cases stones with a natural hole or some other natural feature that permitted a line to be attached without slipping. Not uncommonly a hole would be drilled through, or a groove cut in a stone that did not afford a natural fastening point. Though Buck feels anchors were "not used much in fishing, as the fisherman kept his canoe in approximately the same place by using the paddle with his left hand while he held the fishing line with his right," there are many references to canoes being anchored while fishing, especially bottom fishing. Emerson also notes that a canoe anchor might also be let down in very deep water to act as a sea anchor.

Canoe Sheds *(Hālau Wa'a)*

"They are exceedingly careful in the preservation of their canoes and indeed it appears to be one [of] their principal Considerations, those of large Dimensions are always in houses, as are also the Smaller ones not immediately in use."

The sun was a canoe's worst enemy, aggravating the tendency for the *koa* to check or crack. It was desirable to keep a canoe constantly in use, which kept the wood moist enough to prevent most cracking. Additionally it was important to keep a canoe covered with pieces of loose thatch or in a canoe shed *(hālau wa'a).* Canoe sheds were generally of two types—a relatively permanent structure with stone walls, or a simple wooden pole structure without sides. Both had roofs of either *pili* grass or some woven thatch. The more temporary sideless structures have long since disappeared. As a rule only a chief had the luxury of a stone-wall canoe house for storing his usually somewhat larger and more finely made canoes. For the commoner, who took his canoe out almost every day except during prohibited times, the beach with a few loose palm fronds, old *lauhala* mats, or a very simple pole and thatch structure was his storage shed.

If during a combined sea and overland journey a canoe that was usually in the water almost daily had to be left out of the water for any length of time, it was well covered. When Menzies and his party left their canoes for a few days at Pākini, he wrote "the afternoon was spent in covering up our canoes upon the beach to preserve them from the sultry weather." On occasion, several inches of water were left in the bottom of the hull to further protect against cracking.

The dimensions of stone-wall canoe sheds varied tremendously, ranging from four to thirty feet wide and thirty to eighty feet long. Walls were anywhere from three to as much as nine feet thick at the base and from three to eight feet in height, with the side facing the ocean always left open. Handy describes a later enclosed form of canoe shed: "The roof and sides were thatched with pandanus leaf *(lau hala)* and the door was made of wood."

Larger canoe sheds apparently doubled as living, dining, or meeting structures. A number of early travelers, especially missionaries, mention a canoe shed as both a meeting and sleeping house. Dixon recounted in 1786 that "by the time I got on the beach, dinner was nearly ready, and a large house, which Abenoue had for stowing away his canoes, was appropriated for our reception." Ellis notes on his trip around Hawai'i in 1823, "the people of the village assembled in a large canoe-house, and Mr. Thurston preached . . ." This canoe shed located at Kā'iliki'i, near South Point, was one of several where canoes were commonly left in storage by travelers who were desirous of continuing on toward the volcano or Hilo. Sea conditions beyond this point absolutely prohibited any further travel by canoe on all but rare days. Consequently, noted Ellis, "Mauae and his companions having drawn it into an adjacent shed, took off the outrigger and left it, together with the mast, sails, and paddles, in the care of the man at whose house we had lodged."

Dr. Baldwin, traveling through the Kohala area of Hawai'i, mentions in 1832 "sleeping in a long canoe house at night, the occupants of which were exceedingly kind to us." Baldwin's statement implies that there was a family of Hawaiians for whom the canoe shed was a permanent abode. Rev. John Paris, while traveling in the Ka'alu'alu area of South Point in 1841, speaks of going "to the house of our leader which was prepared for our lodging for the night. *Hale hookipa* it was called, house of refreshing and rest. It was a large grass canoe house."

When a canoe was drawn up on the beach or stored in a canoe shed, it was customarily laid up on carved wooden cradles *(lona* or *'aki)* made of *wiliwili,* pandanus, or some other soft wood. The cradles not only pre-

vented any rot from occurring, but also acted as a form of support jig for the canoe which had a tendency to droop or flatten out if left unsupported on the ground for long periods of time.

A new form of canoe storage, like that still seen today in many Pacific islands, was introduced to Hawai'i in the late 1800's by transplanted Gilbertese islanders. This was a light framework structure of poles set in shallow water with the platform for storing the canoe several feet above the highest reaches of the tides and chop.

Canoe sheds *on Ni'ihau (*right*), photographed in the 1890's. Sheds took several forms, though most consisted of a pair of long rock walls 4 to 5 feet high covered by a peaked, thatched roof. Their principal function was to protect canoes from the sun, thus preventing cracking.*

Storage of canoes *on platforms* (below), *a technique borrowed from the Tahitians and other Pacific Islanders, is seen here in Honolulu Harbor, ca. 1890's.*

7
PADDLES

Sit up, those in front and behind
So as to keep the hands dry when paddling.
The burden of the hands is the paddle,
The opponent of the wave is the paddle.

Until very recently Hawaiian paddles, *hoe*, were thought to have been "characterized by a straight thick shaft and a short wide blade, ovate in shape." However, the recent discovery of a unique paddle in a cave in the North Kona area of Hawai'i has created some doubt as to the accuracy of this assumption. While this paddle's length is typical of other Hawaiian paddles, its blade shape and dimensions are unlike anything previously thought to exist in Hawai'i. It is definitely of pre-contact vintage, having been dated at between 1500 and 1650 A.D. It also has been identified as being made of *Acacia koa*, a wood found nowhere but in Hawai'i, ruling out the possibility that it might have been brought to Hawai'i from some other Pacific island group. The shape of its blade, as can be seen in the accompanying photograph, is akin to that of a narrow double-ended spade, and is symmetrical in all respects. It was found without associated tell-tale artifacts or cultural clues.

Because the Hawaiian people evidently did not have ceremonial or dance paddles as did some other Polynesian cultures, it is safe to assume the paddle was a utilitarian one. It could have been some paddle maker's special experimental design or even representative of some of the paddles in use in that area during that period. It is of a design, size, and weight that would have been appropriate for a woman or child. The paddle is quite light and would have been easy to pull through the water because the blade size and configuration offers relatively little resistance. Interestingly, a similar paddle was discovered by anthropologist Yosihiko Sinoto in a dig on Huahine, Society Islands, in 1975.

The long, thick shaft and short, wide blade featured on the typical Hawaiian paddle are seldom seen in the paddles of other island groups in Polynesia. The general Hawaiian paddle design probably evolved in response to the need for efficient propulsion of a relatively heavy canoe through rough water. A wide-bladed paddle that could get a good "bite" of water in a rough sea would have been favored over a longer, thinner-bladed paddle that, under the same sea conditions, simply couldn't provide enough blade surface area to effectively move a heavy Hawaiian canoe.

As with the Hawaiian canoe, the Hawaiian paddle displayed distinct and wide variations—within a defined design range—according to the individual paddle builder's style and preference, the limitations of the wood, and the paddle's intended use. Judging from the paddles that have survived, there was evidently no single preferred template for Hawaiian paddles. Paddles with a broad and round blade were called *hoe nanue (nenue)* after the fish of the same name. The *hoe kala* and *hoe oeoe* were paddle types with narrower, longer, and more pointed blades.

Paddles, as with canoes, were lacking in any ornamentation but were finely constructed. The personal relationship between the paddle and its maker and/or user sometimes extended to naming the paddle, particularly a steering paddle. The names of famous personages, especially navigators, were often part of a canoe paddle's name. According to Fornander, paddles were sometimes a "sign of authority."

Discovered in a cave *in the Kiholo area of the Big Island in 1979, this koa paddle* (left) *is unique. The distinctly elongate blade stands in marked contrast to the broad, oval blade shapes on paddles described by westerners at the time of contact. Radiocarbon dating has placed its age at between 300 and 450 years. No other artifacts were present at the discovery site* (above). *Note the pointed blade tip which was accidentally broken off.*

A paddle collected on Cook's voyage and now at the Louverian Museum in Germany is the only known example of a Hawaiian paddle at the time of contact. It is not unlike a number of other paddles in the Bishop Museum collection. Other early voyagers such as Captain George Dixon, who visited Hawai'i in 1787, wrote that "their paddles are about four or five feet long, and greatly resemble a baker's pail." David Samwell, traveling with Cook in 1779, describes the Hawaiian paddles as "broad, and made of light wood, in the shape of a spade." Ellis recounts in 1823 that "their paddles which are large and strong are generally four or five feet long, have an oval-shaped blade and round handle . . . their weight must make paddling very laborious." Some years later, in 1898, Lieutenant Lucien Young likewise observes that the "paddles were large and strong, with an oval-shaped blade and round handle."

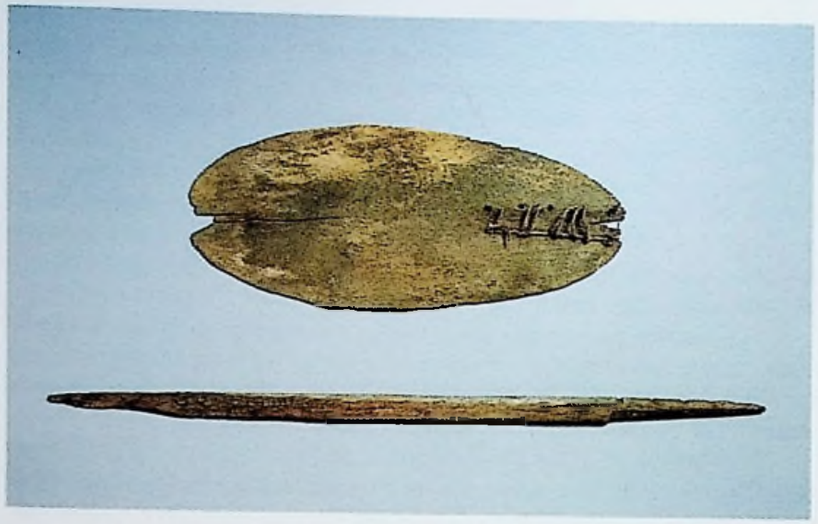
Adult-sized paddles in the Bishop Museum range in total length from 55 to 71 inches with an average of 62 inches. The lengths of the blades range from 19 to 26 inches with an average of 23 inches. The widest part of the blade ranges from 11 to 16 inches, with an average of 12 inches. The widest part of the blade on most paddles at the Bishop Museum is at approximately the middle or slightly above it; however, in some the greatest width of the blade is slightly below the middle. The average shaft length of Bishop Museum paddles is 39 inches, with the shaft diameter averaging a little over 1½ inches throughout its length. In some cases the shaft tapers slightly at the end. Most paddle shafts are round, but some are slightly elliptical. For children, smaller and lighter paddles were made. According to Buck, a typical one was 42½ inches in total length, 28½ inches in shaft length, one inch in shaft diameter, 14 inches in blade length, and 7½ inches in blade width.

A number of the paddles found in various collections have noticeably bowed shafts. This was possibly due to warping in some cases, but given the degree of bowing, and the almost invariable alignment of the bend with the blade, it seems probable that this was an intentional feature. On a few paddles the bow follows right through the blade, giving it a "scoop" effect. A curved handle and blade, even if not intentional, would have been functional. Such a paddle, when used for steering by "poking" (the face of the blade held against the hull), would have matched the contour of the hull, typically affording improved steering purchase by reducing slippage of the paddle on the hull.

"The upper part of the blade forms an angular shoulder with the shaft, then makes a wide curve toward the sides. In a few paddles the blade runs out in a straight line for a short distance before the lateral curve starts." The bottom part of the blade usually came to a soft point.

The thick shaft of the blade extended downwards into the blade area for at least one or two inches before it decreased in thickness and ultimately merged into the surface of the blade. Depending on its intended use, the "ridge" or midrib of a paddle faded out quickly near the top of the blade or, if extra strength or a steering capability was desired, continued tapering slightly halfway down the blade's length before blending into the flat blade surface. The more pronounced and larger the ridge, the stronger the paddle, though considerable weight was added. A paddle with a lengthened and somewhat raised ridge would, when "poking," give two distinct contact points with the hull—the leading edge of the blade angling in to the hull slightly and the ridge itself. This translated into better purchase than with a blade of uniform surface that would lie flat against the hull and could become dislodged more easily.

These Hawaiian paddles *from the Bishop Museum collection display a fairly wide range of designs that, with the exception of the third and fourth paddles from the right, are probably representative of those in use at the time of contact. The sole example of a large steering paddle is at the far left. These designs continued to be popular through the early 1900's. The two remaining paddles are examples of the many transitional forms that appeared following contact.*

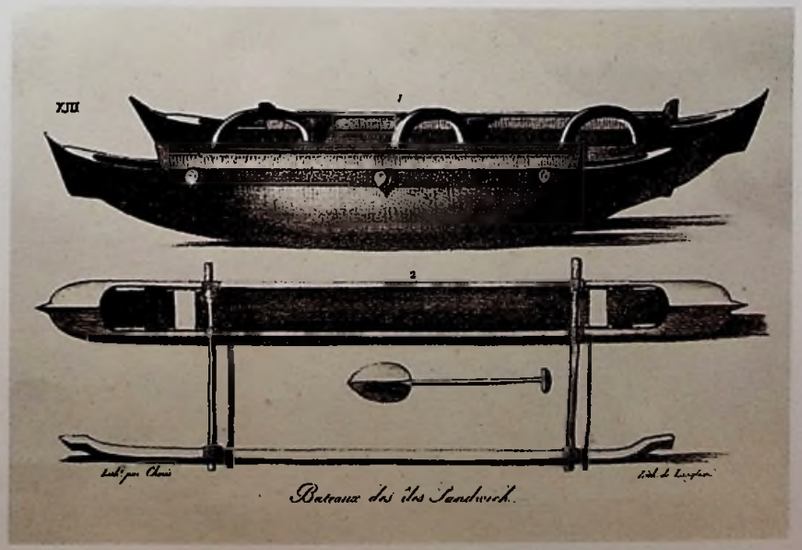


Another recent discovery, *the only two-piece paddle ever found in Hawai'i* (above left) *has shed new light on ancient Hawaiian paddle design. Found in a cave at Kawela, Moloka'i, without any other artifacts, this paddle appears to be "of mid to late eighteenth century" vintage. It was found with its koa shaft lashed to the blade (of a lighter wood) with coconut sennit.*

The great value *placed upon paddles is evidenced by the extremes to which owners went to keep them serviceable* (above). *The paddle on the left has been repaired by the addition of a heavy copper plate; the paddle on the right was salvaged by sewing on a broken portion of the blade with sennit.*

A T-shaped hand grip, *shown in an 1822 drawing by Choris* (below), *was apparently a feature of some pre-contact paddles, but it disappeared long ago.*

Today's paddles (left) *are primarily of Tahitian, semi-Tahitian, or so-called Hawaiian design. In 1978, visiting Californians reintroduced a paddle with a T-shaped handle (middle), a feature borrowed from paddles used for Olympic canoeing.*



The blades of most paddles in the Bishop Museum are slightly convex on both sides. However, Buck notes, "the blades of old paddles are flat on the back surface and slightly convex from side to side on the forward surface." Just which old paddles he means is not clear, though some of the paddles in the Bishop Museum definitely fit his description. It would appear, judging from some contemporary paddles, that the flat or back surface faced the rear of the canoe as the paddle was pulled through the water. Interestingly, this same blade configuration would appear again in highly evolved paddles introduced from the mainland in 1978. Although the hydrodynamic benefits of such a design are still only partially understood, it is possible that the early Hawaiians were already aware of this sophisticated design feature.

A number of the Hawaiian paddles at the Bishop Museum and in other collections have at the very tip ("on the forward surface," says Buck) a slightly raised projection or thickening about one quarter inch thick by one quarter to three-eighths inch high by one to three inches long. Anthropologist Ralph Linton remarks in 1923 that the projection is present on either side, though there is no other evidence of this ever being the case. Variously called an *io*, *'upe*, or sometimes *alelo (elelo)*, this protuberance was reputedly a standard feature on most Hawaiian paddles and is seen incorporated in paddles made as late as the early 1900's. No record exists explaining its function and no Hawaiian informant as far back as the turn of the century could remember ever hearing its purpose described. Haddon and Hornell say it "served no known useful purpose." The Hawaiian canoe and paddle tended to be functional in every respect, and one can reasonably assume that this raised thickening at the tip of the paddle was in some way utilitarian. Buck notes that, when found in paddles from other Pacific islands, the *io* was generally for strengthening the tip of the paddle for the occasions when it was used in lieu of a canoe pole. Emory goes so far as to say that in Hawai'i the *io* had the same purpose, that is "to protect the point in shoving," for on many occasions Hawaiian fishermen were known to have to push off of or over rocks, coral heads, or reefs. One old account states that in areas bounded by "reefs and shoal waters . . . fishermen and sailors along shore found it convenient to propel their canoes by polling [sic]. Ku, the son of Paka'a, is credited with introducing this practice."

Some have suggested that the *io* of Hawaiian paddles facilitated steering by somehow deflecting the water and locking the blade to the side of the canoe when poking. The most elementary hydrodynamic analysis refutes such a claim. If anything, the projection interferes with poking. Furthermore, the *io* was conspicuously absent on all steering-type paddles.

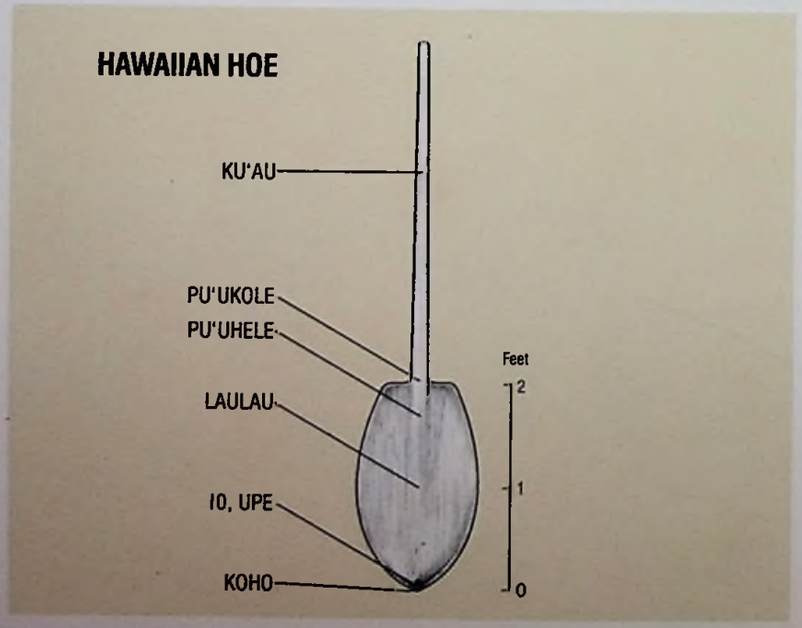
In Hawai'i the *io* more likely served to simply reinforce the relatively thin *koa* blade against splitting. With a single known exception, paddles were made until very recently from a single piece of wood, most often *koa*, which is prone to splitting and cracking. It was laborious and time consuming to make a one-piece paddle even with metal tools, much less stone implements. When *koa* or any wood is shaved as thin as in a paddle blade, there is a high probability that the blade will split near the bottom edge and especially at the tip, should it strike something even lightly.

Nearly all the paddles at the Bishop Museum that are cracked are made of *koa*, and all are cracked very near the tip. Illustrative of how highly valued even a cracked paddle was are the crude patching methods employed to extend the lifetime of a damaged paddle. In some instances cracks were crudely sewn together with heavy cordage. In other cases a heavy copper plate, cut to the shape of the paddle blade, was screwed on to the bottom portion of the blade, salvaging the paddle but adding probably two pounds to an already heavy paddle.

A small projection *(io or 'upe) visible at the tip of three of these paddles* (above) *was seen on many paddles of traditional design. While its function is uncertain, the io is believed to have reinforced the blade at its most vulnerable point, reducing its tendency to crack or split. The paddle second from the left belonged to King Kamehameha IV.*

Duke Kahanamoku, *renowned swimmer, surfer and paddler, holds a paddle* (below) *typical of those used on Waikīkī Beach during the 1930's. Its shape and dimensions are thought to be similar to those of paddles used by ancient Hawaiians.*

The only one of its kind *known to exist, this very old miniature paddle was found in a cave on the island of Hawai'i many years ago. While this may have been produced merely as a diversion or amusement, it might also have been made for a small child learning how to paddle. Training paddles of a similar size were sometimes seen in the other Pacific Island cultures.*



Each part of a paddle *had a specific name. Paddle dimensions and weight varied according to its intended use and user, and also depended upon the kind of wood employed. The huge investment in time and labor that a one-piece paddle represented made attention to durability an overriding concern.*

In November 1980, Bishop Museum archaeologists Marshall Weisler and Patrick Kirch discovered a previously unknown type of canoe paddle from a rock shelter at Kawela, Moloka'i. The *koa* shaft (32¼" long) and the blade (20" long; 8¾" wide), made of a lighter weight unidentified wood, are joined together by two-ply twist coconut sennit lashing; the lashing passes over the shaft and through ten small holes drilled through the blade at 1¼-inch intervals, five on either side of the shaft. The portion of the shaft that is lashed to the blade is contoured so that it lies snugly in a shallow depression made in the upper part of the blade; grooves cut across the upper surface of the shaft in line with the lashing holes further prevent the lashing from loosening.

Radiocarbon dates from seven nearby habitation sites, together with indications that a stone adze was used in its construction, suggest that "the paddle is probably of mid to late eighteenth century age." That no historic artifacts have been found associated with the sites or the paddle further suggest that the paddle, if not of pre-contact construction, was made soon after contact and was almost certainly uninfluenced by Europeans. This paddle's preservation, as with the one found in North Kona, can be attributed to the extremely arid climate at the two sites.

Steering paddles *(hoe uli),* larger and heavier than ordinary paddles, were employed for steering a particularly large single or double canoe. The only known steering paddle in the Bishop Museum is quite large, stretching seven feet and four inches in length, with a blade thirty-eight inches by sixteen inches, and a shaft measuring 2.7 by two inches. It is quite heavy and unwieldy and probably had been used only for poking. A "T" or crutch-shaped hand grip top is apparently an authentic feature of some pre-contact steering paddles. This variation is seen in a fine example at the British Museum and in a drawing by Choris in 1822.

There are only two references in the literature to any canoe steering device other than a paddle. Freycinet in 1813 observed the use of a rudder on a double canoe. In 1892 a Hawaiian informant told Emerson about seeing, as a young child, a *peleleu* canoe named *Ka'ai-honu* that "was rigged as a schooner, with cloth sails and a regular rudder." One can only surmise that the observed rudder arrangement was an idea borrowed from western craft and being experimented with as a transitional steering mode.

As with the canoe, the favored wood for making a paddle was *koa.* Emory notes that it was "*koa* which had a yellow wood and this *koa* wood was called *koa la'au mai'a* (banana colored *koa*); it was much lighter than the *koa la au ohi'a* used in the canoe body." *Koai'e* or curly *koa* was also greatly valued for canoe paddles. While heavier, its curly grain made an aesthetically attractive paddle. Of handsome, probably *koai'e,* paddles John Whitman writes in 1813 that, "the beauty and strength of the paddles made on Attooi [Kaua'i] render them a treasure to the natives of the other Islands, who esteem them as far more valuable than any made on their own." A few years later, in 1834, William C. Alexander says in a letter from Kaua'i written to a fellow missionary on O'ahu, "I also send you 10 *canoe paddles,* 5 each for Brethren Emerson and Smith. Will you dispose of paddles, if I buy them with books? Some of my people can pay for books in paddles more easily than in anything else. They bear a good price I believe in Honolulu."

Other woods such as *hau, 'ahakea, kāwa'u, naio,* and breadfruit were occasionally used for making paddles, but they never enjoyed the popularity of *koa.* By the middle 1800's some paddles were being made out of imported milled lumber—pine, redwood, fir or whatever was available. An article in the *Advertiser* of June 29, 1908, noted that " . . . pinewood paddles cost $1.50 each and *koa* wood paddles $2.50 . . ."

Excepting the individual maker's style, Hawaiian paddles showed little change from the time of contact until the late 1940's. Around that

In recent years, *some creative canoeists have embellished their paddles with airbrush paintings, colored resins or inlays.*

time George Downing, Wally Froiseth and others began experimenting with slightly different designs and dimensions. Surface area of blades and overall paddle weight were significantly lessened. Blade design changed from the traditional ovate shape, with the widest part of the blade generally at the middle and the tip pointed, to a more pear or egg-shaped model. Typically the blade width was narrowed, the bottom rounded and the widest part of the paddle moved down from the center of the blade. So-called "scoop" paddles were first experimented with at this time, generally having the same new blade shape. By 1950 industrial glues had been improved to the point where composite (two- or three-piece) paddles were practical. No longer did one have to start from rather large single pieces of lumber and make only one-piece paddles. Nevertheless it would not be until the late 1950s and early 1960s that composite paddles would come to be fully accepted.

During the mid-1950's George Downing, primarily in answer to a need for smaller, lighter paddles for the growing number of women and junior paddlers, designed a more symmetrical, elliptically shaped paddle with its widest part at the middle of the blade. The blade area was somewhat reduced over earlier paddles, as was the weight. For about two decades a generally elliptical to sometimes slightly egg- or pear-shaped paddle was considered the "Hawaiian" paddle. Exposure to the "Tahitian" teardrop-shaped paddle, beginning in 1975, temporarily displaced the so-called "Hawaiian" paddle of the '50s, '60s and early '70s, which really wasn't truly Hawaiian to begin with.

In 1978 Blazing Paddles, one of the canoe clubs from California participating in the Moloka'i–O'ahu race, introduced a type of paddle never before used with Hawaiian canoes. These paddles, which borrow heavily from highly evolved and sophisticated paddles for Olympic class canoes, have a shaft that is slightly angled to the blade and end in a crutched or T-shaped handle. The blade is somewhat pear-shaped and significantly narrower than any Hawaiian and most Tahitian blades. The blade is absolutely flat on the side facing the seated paddler and slightly convex on the other side. When setting the paddle in the water, the angle of offset is away from the paddler. A recent technical analysis of an offset shaft indicated that it will, all things being equal, move a craft faster than the same paddle with the more customary straight shaft-to-blade alignment. At this writing some Hawaiian clubs have begun experimenting with such a design, adopting it during the 1981 canoe racing season. The majority of paddles presently in use are either of Tahitian or semi-Tahitian design, although a wide range of other paddle forms are also represented.

As there are currently no paddle design restrictions imposed by the Hawaiian Canoe Racing Association (Hui Wa'a Surfing and Racing Association has certain dimensional limitations) it seems likely that paddles will continue to evolve into designs that range far afield from traditional designs. Whatever their shape, today's adult racing paddles weigh one-and-one-half to three pounds, one-half to one-fourth of what almost any Hawaiian adult paddle of the nineteenth and early twentieth centuries would have weighed.

8
DESIGN

What tree is best for the big canoe.
And the canoe shaped with the adze of Lono the God
Shaped by strong men and the Kahuna
Shaped so long and narrow . . .

"We can divide the Sandwich Island canoes into two types . . . the single and the double canoes. The former have an outrigger, while the latter do not, and are nothing more than two single canoes, held together by cross booms that leave a space between the two hulls . . . The length of the double canoes varies from thirty-five up to seventy-five feet, and the single canoe is between twelve to fifty feet long." Indeed, the hulls making up a double canoe, except for the extra *wae* and sets of *ʻiako* lashing holes, were no different from the hull of a single outrigger canoe.

What were the adaptations, the features that made the pre-contact Hawaiian canoe so different from most other Polynesian and Oceanic canoe forms? The question is best addressed by identifying primary design features common to all traditional Hawaiian canoes, together with the secondary design features that were not always present.

Primary Design Features

1) Pre-contact Hawaiian canoes had one-piece wooden hulls, as opposed to hulls built of planks. They were made primarily from *Acacia koa,* although other native woods and occasionally non-native driftlogs were also used.

2) Canoes were of two kinds—the outrigger canoe, consisting of a hull with two *ʻiako* lashed to a stabilizing *ama,* and the double canoe, consisting of two hulls joined by two or more *ʻiako.* There were no design differences between the hulls of a double or single canoe and they could be used interchangeably.

3) The hull bottom could always be characterized as being generally rounded or "U" shaped.

4) All hull curves in contact with the water, both longitudinal (length-wise) and transverse (cross-section) were convex. In cases of a hull with an extreme "calabash" shape, that is, when the lower part of the hull bulged out considerably and the upper part of the hull tucked in concavely, a very slight concave curve, *never part of the wetted surface area,* could sometimes be seen.

5) All canoe hulls had continuous rocker—convex fore and aft curvature of the bottom of the hull. In some cases the hull approached a nearly straight bottom.

6) The bow and stern portions as seen in the profile and plan views presented a narrow, tapered, and generally rounded entry and exit.

7) The hull in transverse section, especially at the ends of the canoe, was characterized by "slack," or gently rounded curves.

8) All canoes were deepest and widest to the rear of the midship section. A rare exception, according to Malo, is the *ihu-nui* (big-bowed canoe).

9) All canoes, whether rigged double or single, had these component parts: the seats, gunnels, *ʻiako, kaupoʻi, manu,* and *wae.* All these parts were of the forms described in Chapter 6, that are today considered traditional.

10) All rigging and lashing consisted of traditional coconut sennit or other vegetable fiber lashings.

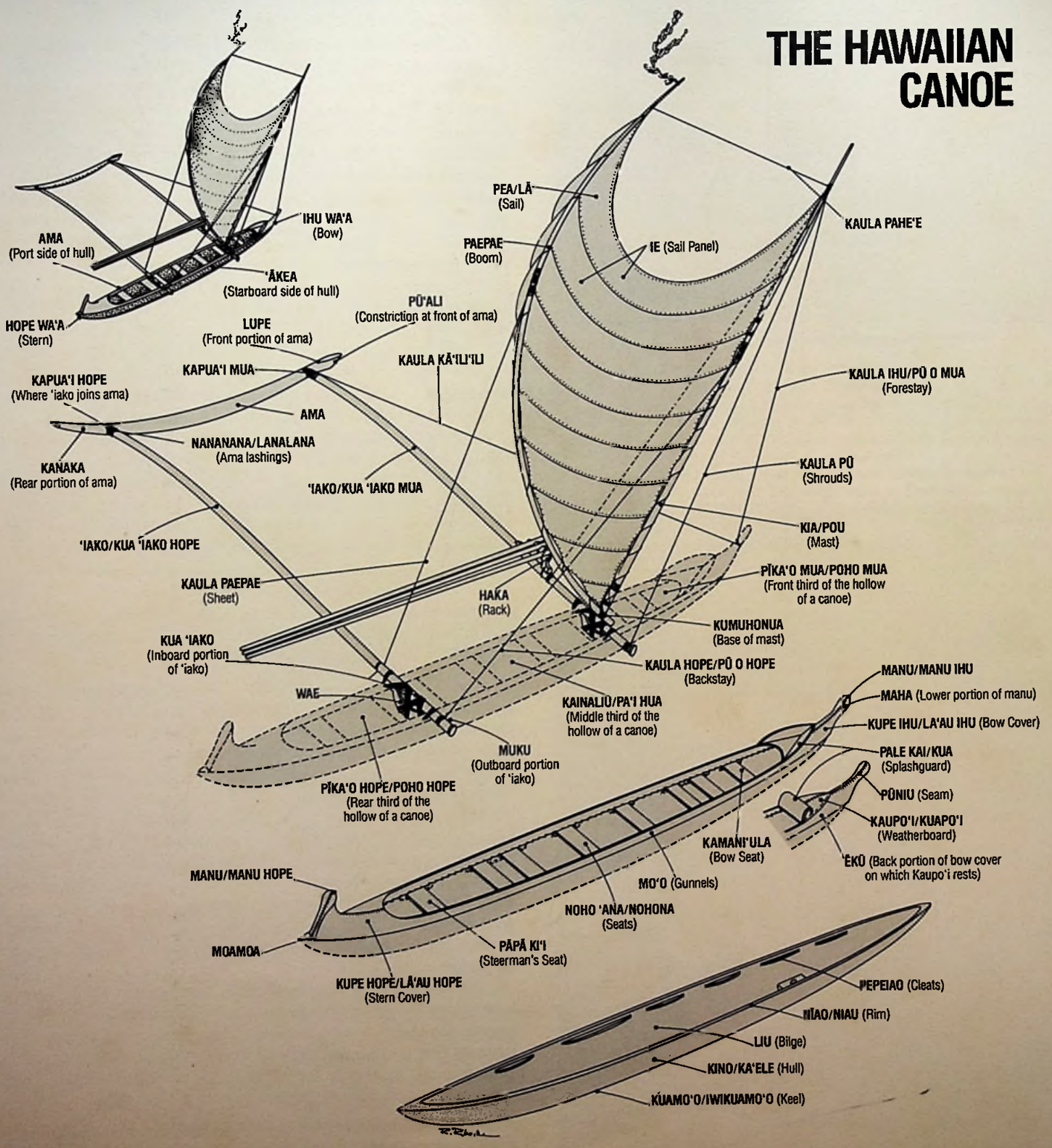
Secondary Design Features

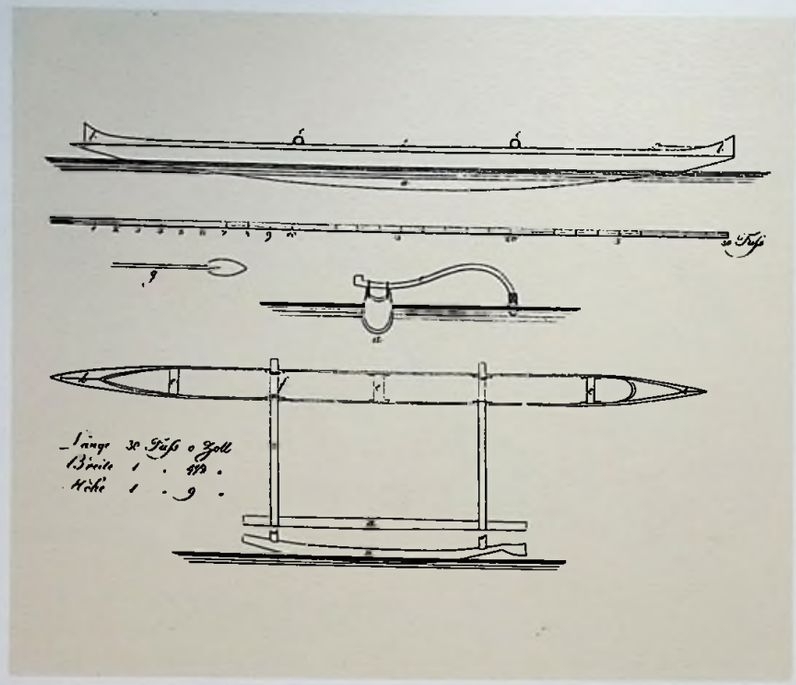
Secondary design features are those traditional features that may be found in some but not all canoes, producing a specialized canoe or one for specialized use. Such features still must fall within the range of what is regarded as being of traditional Hawaiian design.

1) A subtle keel or a medial ridge is sometimes found at the bow and stern and may have even run the whole length of the hull bottom as is seen in some old canoes. This subtle keel or medial ridge has erroneously been called a rounded or semi-"V", terms that are properly used to describe much more distinctly "V"-shaped hulls. When in evidence, the medial ridge is more like a slight ridge typically seen in the bow and less often in the stern. The medial ridge is so subtle as to almost immediately blend into the overwhelming roundedness of the hull. As far as is known, the medial ridge never went much beyond the very subtle forms seen in the accompanying diagrams of the Herbert Dowsett canoe and the canoe made of breadfruit wood, and in diagrams of the *ʻA* and the *Malia* seen in Chapter 14. Never did a medial ridge ever approach the degree of "V" entry or bottom seen in Tahitian and many other Pacific island canoes.

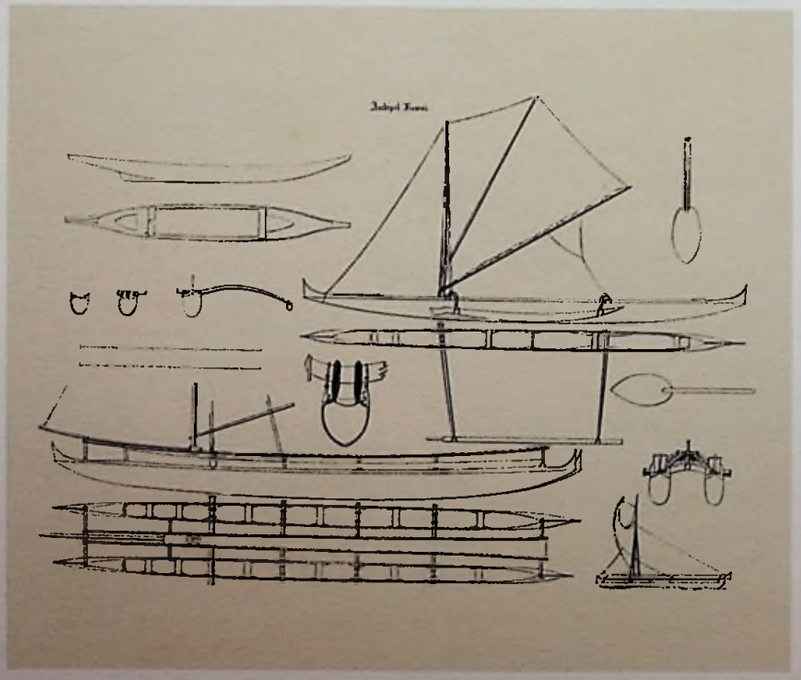
A bow and stern with a distinct medial ridge will assist the canoe's entry and exit more efficiently than a rounded hull by respectively cleaving or breaking the adhesion effect of the water to the hull. A medial ridge in a hull will also induce the canoe to "track" (rather than side slip or wander), in certain conditions a desirable feature for a paddling racing hull. However, such a feature will render the canoe less maneuverable and responsive than a round-bottomed hull, especially in large following seas. A canoe

THE HAWAIIAN CANOE





The earliest schematic drawing *of a single canoe* (above) *was done by Langsdorff in 1804. About 35 years later, Paris prepared well-known drawings of single and double canoes* (below). *Although both sets of drawings contain a few minor inaccuracies, they nevertheless provide useful information on early canoe design.*



with a true "V" bottom, as seen in the typical Tahitian canoe, would in wild Hawaiian waters have "tracked" itself into extinction, constantly broaching, flipping or causing a hull or outrigger to bury. When buffeted by contrary swells the Hawaiian canoe will at a critical point "give ground," momentarily integrating itself with the particular surface condition. A rounded-bottom Hawaiian hull will deftly contour, slide, and side slip its way through heavy seas. A "V" hull of any kind is definitely not a desirable feature for surfing hulls.

As seen in the accompanying drawings, two completely different types of canoes, the Dowsett two-man racing-type canoe and the capacious breadfruit fishing canoe, display two different ridge or keel configurations running the whole length of the hull bottom. The Dowsett canoe, reportedly about one hundred and twenty years old, displays a sharply rounded bottom coming off a deadrise, which is a flattening of the bottom curve in the lower portion of the hull. The breadfruit canoe, a very wide and chunky fishing canoe built in Waipi'o Valley about one hundred years ago, has a distinct ridge running the length of the hull bottom. In both canoes it would appear as though the ridge and the deadrise were transitional features, whims of the individual post-contact canoe builder. None of the numerous canoes used for burial purposes which are discussed in a later chapter reportedly display even a suggestion of a "V" or a medial ridge in any part of the hull. The earliest known schematic drawing of a typical Hawaiian canoe, by George Langsdorff in 1804, portrays a hull rounded in all aspects. Admiral Paris, in his drawings of an outrigger and double canoe, indicates the presence of a medial ridge in at least part of the double canoe hull; this was most likely a transitional feature.

All this is mentioned because it is not absolutely certain whether pre-contact canoes in fact had a subtle keel or medial ridge. It is not seen in any of the old canoe models, nor figured by any of the early European visitors in either their written descriptions or drawings. And there is good reason to believe that a subtle keel or medial ridge might have been the one design feature that distinguished the post-contact from pre-contact canoes. Visiting islanders from Tahiti and other Pacific island groups, where a "V" element in a canoe's hull was standard, might have added their influence as might have the European boat builders, who very soon after contact were working alongside the native Hawaiians, building various types of craft including the hybrid *peleleu* or war canoe.

2) The bow and stern sections varied markedly from canoe to canoe. Some of the lighter and faster canoes had relatively narrow and fine entries—the bow rocker tapering and curving up very gradually as seen in the drawings of the *Malia* and Herbert Dowsett canoes. This is in contrast to the typical fishing and cargo canoes, which were characterized by a much broader entry and exit section, and a much more abruptly curving rocker in the ends of the canoe. Much as with a distinct medial ridge, the finer the entry, the easier the canoe will break the water, and most importantly the less the resistance. Typical fishing canoes with very full and blunt bows, as shown in the two drawings, push a lot more water than their cousins having finer entries. However, the finer, smaller-bowed canoes have far less carrying capacity than the wide and full-bowed fishing canoes. For the most part, the narrower and sharper the entry, the faster the canoe.

Similarly, a narrower and gently tapering stern will release from the water more efficiently and create less drag than a full, abrupt stern. It was usually the canoes that were designed more for speed than high carrying capacity that got the daintier and finer 'ōkole (sterns). As a rule, canoes with deep and full bows and sterns had more wetted surface area, which added to the drag and resistance.

3) The sides of a canoe varied considerably, from an almost straight-sided drop from the gunnels that curved into an almost perfect "U"-bottom, to sides that were sometimes nearly concave just below the gunnels bulging out considerably—calabash style—at the lower part of the hull.

The incorporation of the calabash shape in a hull increased the carrying capacity of a canoe tremendously, making such vessels excellent for carrying heavy loads of men or freight. A canoe with a calabash hull would ride quite high in the water even when heavily loaded, due to its large-displacement hull design. A canoe of the same general dimensions but with straight sides and no calabash would, given the same load, ride much lower in the water. This translated into higher freeboard for the calabash-shaped hull even when loaded, an important feature in rough water.

The degree of calabash—how accentuated the bulge—and its location, whether near the bottom of the hull or higher up the sides, directly affected the canoe's handling, performance and carrying capacity, especially in different sea conditions.

4) Most Hawaiian canoes displayed an element of sheer—the fore and aft curve of the hull at the top edge of the gunnel. While in some instances sheer was absent, a reverse sheer was never found.

5) "Rocker" or "banana" similarly refer to the convex fore and aft curvature of the canoe hull bottom when viewed from the side. The degree of rocker in a hull varied markedly from canoe to canoe and played a large part in determining the performance and use of the canoe. In some canoes the rocker was a continuous convex curve from the tip of the bow to the tip tip of the stern, a classic "banana" shape.

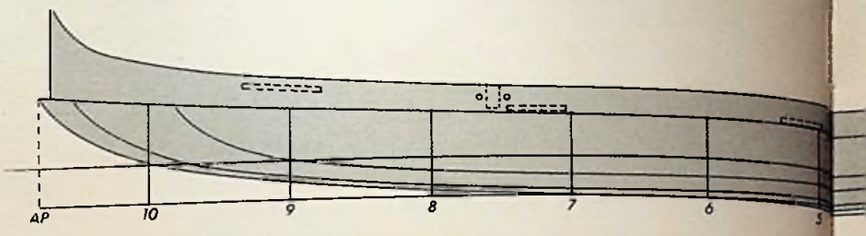
The more pronounced the rocker in the hull's bottom line, the more likely there was to be added sheer in that hull's gunnel. A heavily rockered canoe had high freeboard at the ends, making a very functional rough-water designed hull. As a general rule a canoe with pronounced rocker rode high and buoyantly over the waves, a favored design for handling in heavy seas and steep boarding swells. Such a canoe also usually made a good surfing hull, having much less of a tendency to "pearl dive"—bury its bow under water—than a relatively straight-bottomed canoe with minimal rocker.

Other Hawaiian canoes displayed minimal rocker with pronounced curvature only in the bow and stern sections, and with the mid-section of the hull bottom nearly straight. Few, if any, Hawaiian canoes had a perfectly flat bottom although some were fairly straight and had transverse curves so subtle as to appear flat. The stern, and less frequently the bow, on a canoe with little rocker usually graduated abruptly, resulting in a halved sausage look. Hardly streamlined in appearance, such hulls had high carrying capacity and were often seen in certain types of fishing canoes. The drawings seen in this chapter and in Chapter 14 illustrate the wide range of rocker seen in different types of Hawaiian canoes.

Beyond the gross design of a Hawaiian canoe, its various dimensions and how they related to each other determined canoe type and use. Two canoes of the same length might vary so greatly in depth and width and the relationship of these features that they were two radically different craft. One might be a light, sleek, narrow and low-freeboarded racing canoe and the other a heavy, deep, wide-hulled freight or rough-water canoe.

A canoe's speed, and to a lesser extent its performance, were functions of its weight. Light-weight canoes made fast paddling or sailing canoes. The type of wood used for the canoe hull, whether a heavy, medium or light-density *koa,* pine or *wiliwili,* had an obvious relationship to the canoe's weight. The next determinant of a canoe's weight, and thus quite often its intended use, was the thickness of the hull. Two canoes of the same general form and dimensions could vary considerably in weight if one were a thick, massive-hulled *'ōpelu*-type fishing canoe and the other a thin-hulled all-purpose canoe. *'Ōpelu*-type canoes were sometimes three to five inches thick on the bottom and two to three inches thick on the sides. This contrasts to the comparable-sized utility canoes which might

Two contemporaneous engravings *from the late 18th century, one* (above) *based upon drawings by Webber and the other* (below) *on sketches by Ellis, illustrate the transformation that such works underwent at the hands of European engravers. While Webber's field sketches were generally faithfully reproduced, those of Ellis were stylized almost beyond recognition.*

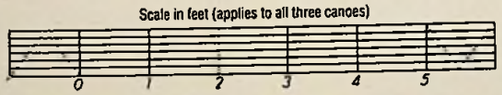


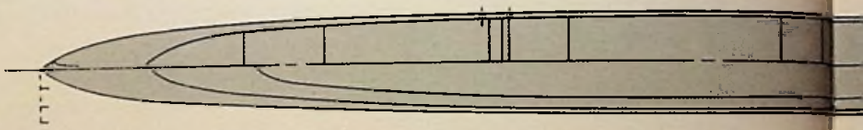
DOWSETT CANOE

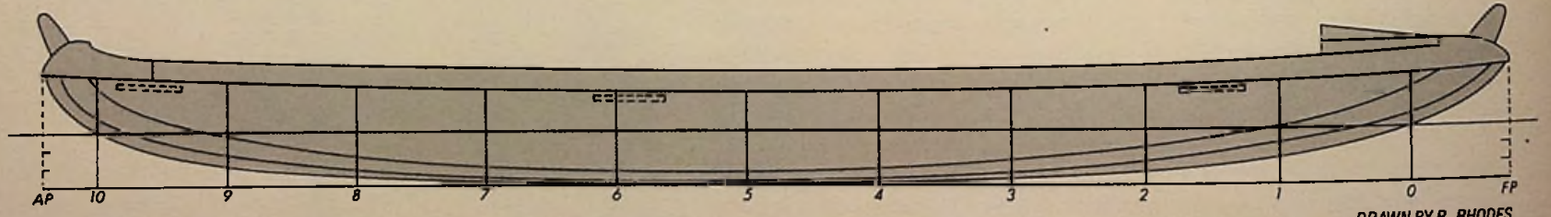
REPUTEDLY A TWO-MAN RACING CANOE
BUILT IN KONA, HAWAI'I CIRCA 1850

LOA 23'-7⅞"
LWL 19'-6"
BEAM 1'-4¾"
DRAFT 6½"

Scale in feet (applies to all three canoes)





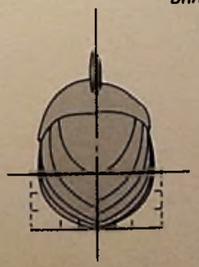


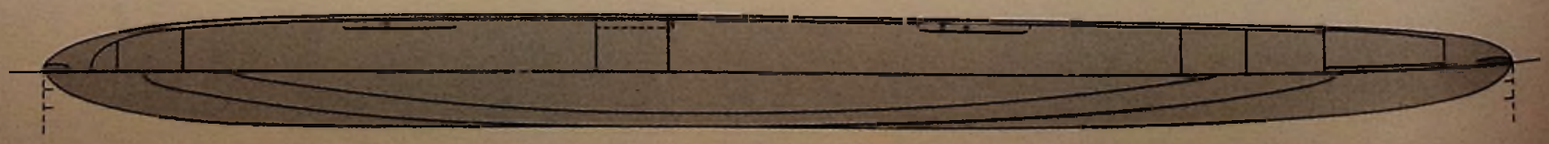
DRAWN BY R. RHODES

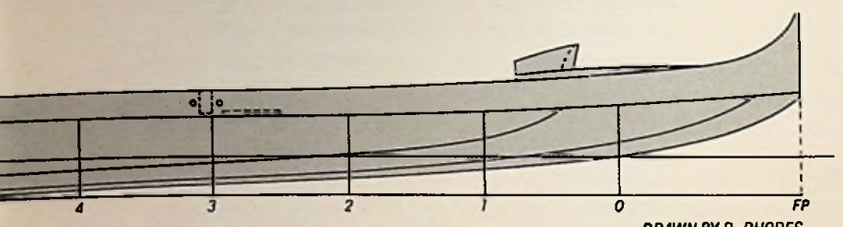
BREADFRUIT CANOE

BUILT IN 1890 IN WAIPI'O VALLEY, HAWAI'I
BY GREAT-GRANDFATHER OF
JAMES MAWAI OF MOLOKA'I

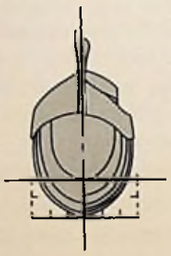
LOA 20'-10"
LWL 18'-7"
BEAM 1'-7"
DRAFT 9"

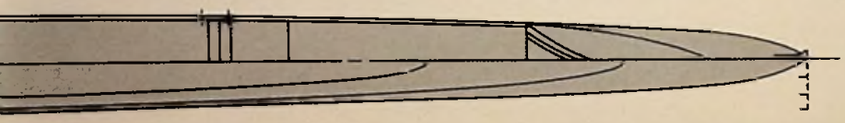


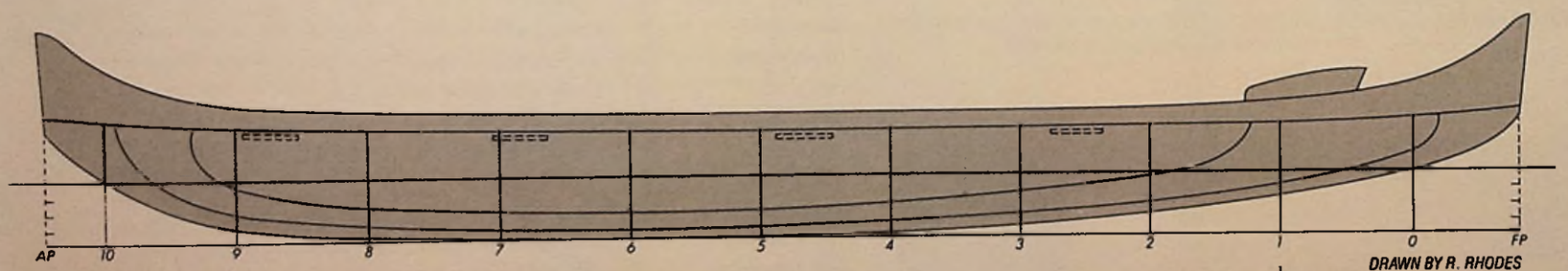




DRAWN BY R. RHODES





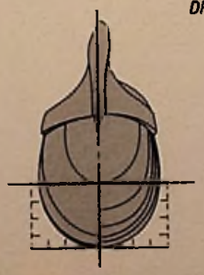


DRAWN BY R. RHODES

ʻŌPELU TYPE FISHING CANOE

ʻŌPELU CANOE IS A CONTEMPORARY GENERIC TERM
GIVEN TO 18'–25' LONG HEAVILY CONSTRUCTED,
DEEP AND WIDE KOA FISHING CANOES IN USE
DURING THE 19TH AND 20TH CENTURY

LOA 22'-5½"
LWL 19'-11"
BEAM 1'-10"
DRAFT 11⅜"



have been one to one-and-a-half inches on the bottom and one quarter to one inch on its sides. The weight differential for these two canoes could easily have exceeded several hundred pounds. The lightweight canoe was faster and more maneuverable, while the heavier canoe combined high carrying capacity with durability.

Endless tradeoffs and infinite combinations of characteristics—speed, carrying capacity, windward sailing ability, surfing ability, seakindliness, rough water capability, safety, light construction, durability—all were important, especially for certain functions in certain waters. Secondary design features generally determined the type of canoe, the range of its use and its activities. John Whitman, writing in 1813, remarks that "their canoes are of various lengths adapted to the purposes of war, fishing and playing in the surf."

Ultimately, the unruly and unmerciful sea dictated the primary design features common to all Hawaiian hulls that ensured survival in her capricious domain. Hawaiian canoes, for all their variability in secondary design features, displayed an amazing degree of homogeneity.

Each canoe was a special edition, a signature model. There were no molds, no templates and no sophisticated tools that made for production of duplicates, even if desired. Each builder had his own personal style and preferences, just as each log had its own distinct personality and quirks.

Canoe Forms

Hawaiian canoes were named according to their various forms and/or uses; a list of these names and when known, a description, follows.

Canoe Types

ʻakea	the starboard or outer hull of a double canoe
ama	the port hull of a double canoe; also *iama*
ʻauwaʻa hoʻāpipi	two single canoes hastily joined to do service as a double canoe; also *mau hoʻāpipi, waʻa hoʻāpipi*
ekea	same as *ʻākea*
iama	same as *ama*
ihu nui	canoe with a broad bow; made from the butt end of a log
hoʻomo	single or double *aku* fishing canoe
kāpili	fishing canoe
kaukāhi	canoe with one hull; outrigger canoe; also *waʻa kaukāhi*
kaulua	canoe with two or more or less equal hulls; also *waʻa kaulua*
kialoa	long, light and swift canoe; used for display and racing; also *kioloa*
kiapā	swift sailing canoe
kiapoho	canoe with a deep curving hull
kiapoko	short canoe with a rounded hull; nearshore fishing canoe
kioloa	long, narrow canoe; also *kialoa*
koʻokāhi, koʻolua, etc.	canoe holding or carrying one person, two persons, etc., up to eight persons *(koʻowalu)*
kūʻēʻē	double canoe with hulls of unequal length
kupeʻulu	old, worn-out canoe without sail or other conveniences; canoe with a large bow
lēʻiwi	canoe with a very flat *manu* or none at all
leleiwi	canoe with an unusually broad and decorative *manu*
loloniu	canoe made from coconut tree trunk; a rare type
malau	large canoe capable of carrying much freight; somewhat like a *peleleu*
manua	fishing canoe
mau hoʻāpipi	two canoes coupled together; also *waʻa hoʻāpipi*
mumuku	canoe with one end cut off and boarded up; canoe cut in two at the middle; possibly a burial canoe
ʻōpelu	present-day term for a short, thick-hulled, wide-bodied, heavy fishing canoe
panipani	fishing canoe
peleleu	extremely large (deep and wide), unique type of war canoe commissioned by Kamehameha I in the 1790's to aid him in his conquest of the Hawaiian Islands; very large canoe, sometimes a double canoe; fishing canoe of the largest size; short canoe
pou	short canoe, broad for its length, thick and blunt at the ends; used for baggage
pukahi	fishing canoe
pūkolu	canoe with three hulls; an experiment which failed
waʻa ʻākea	starboard hull of a double canoe; also *ʻākea, waʻa kea*
waʻa ʻaki	canoe with a rather sharp bow and stern
waʻa akua	sacred canoe for a specialized purpose (no other data)
waʻa ʻāpulu	old, worn-out canoe
waʻa ʻauhau	tribute or tax canoe; basket filled with food and set adrift during the *Makahiki* ceremonies; represented the canoe in which Lono returned to Tahiti
waʻa aukāhi	canoe whose wood is all of one color
waʻa hoʻāpipi	two single canoes hastily joined to do temporary service as a double canoe; also *ʻauwaʻa hoʻāpipi, mau hoʻāpipi*
waʻa honua	wide canoe
waʻa humu	sewn canoe; built up of planks sewn together with sennit
waʻa kae	slow canoe
waʻa kailike	canoe with little sheer
waʻa kaka	canoe with a good deal of sheer
waʻa kakaka	long, clean-built clipper canoe
waʻa kaua	war canoe; fleet of canoes about to enter into battle
waʻa kauhī	*aku* fishing canoe
waʻa kaukāhi	canoe with one hull; outrigger canoe; also *kaukāhi*
waʻa kaulua	canoe with two more or less equal hulls; also *kaulua*
waʻa kea	unpainted canoe set to sea after *kapu* were lifted during the *Makahiki;* another term for *waʻa ʻakea*
waʻa kome	bulrush canoe
waʻa kūpāhoa	long, thin canoe; clipper-built canoe; also *waʻa pāhoa*
waʻa lawaiʻa	narrow and deep fishing canoe with sides straight up-and-down
waʻa naku	bulrush canoe; possibly a search canoe
waʻa pā	canoe constructed of boards; rowboat
waʻa pāhoa	narrow and deep fishing canoe with sides straight up-and-down; longish canoe with straight sides of equal width all the way; also *waʻa kūpāhoa, waʻa lawaiʻa*
waʻa paulua	large or double canoe with three *ʻiako*
waʻa pū maiʻa	canoe with rather full and round in the waist, short at either end; good working canoe; canoe in which some of the sap-wood still remained
waʻa puhi	small canoe, slim and higher in the middle; used by chiefs in surfing
waʻa ʻula o ke aliʻi	canoe for display, to show kingly state; typically colored red; a chief's canoe with red sails

Ornamentation

Never were the canoes from any other Pacific island group given such consistently high marks for aesthetics, in spite of the fact that ornamentation on Hawaiian canoes was most conspicuous by its absence. Hull ornamentation, so common to most other canoes of Oceania, was absent largely because of the singularly unforgiving ocean environment of Hawai'i. Carving, inlay, or any nonessential ornamental design feature either structurally weakened a canoe or resulted in a canoe that was less rugged and break-proof than a simpler and cleaner craft. To survive the pummeling surf and raging channels of Hawai'i, every design feature, every component, every inch of the Hawaiian canoe had to be functional and rugged. Form, of necessity, followed function; structural integrity was tantamount to survival. Lines and curves were clean, flowing and simple.

While Hawaiians did view many lashing patterns as works of beauty, these were primarily functional and only secondarily decorative. The elliptical-shaped extremity at the upper ends of the bow and stern pieces, the *manu*, can also be considered as ornamental, but whether the ancient Hawaiians so viewed them is unknown. On occasion human figures or heads were carved into spear/pole racks or very rarely the knob portion at the outer end of the *'iako*.

A pair of canoe hulls *lie rotting at Miloli'i* (above) *on the island of Hawai'i. Regrettably, such was the fate shared by many of the once numerous canoes seen along Hawaiian shores.*

A three-board canoe *typical of the craft that began to replace koa canoes in the mid- to late 1800's, and that are still in use today* (below). *Their popularity stemmed from their low cost and ease of construction, though there were trade-offs in seaworthiness and performance.*

Post-Contact Design

What of the design of the post-contact canoe? Emory writes in 1939 that "except for the substitution of nails for the coconut-fibre braid . . . the Hawaiian canoe as it may be seen today at Waikiki differs very little from canoes seen by Captain Cook." Haddon and Hornell in 1935 state that "the outrigger canoes still in common use in the islands continue to be constructed on the same fundamental design as were those employed in vast numbers at the time of Cook's discovery of the islands." Indeed, except for occasional transitional or experimental models, primary canoe design changed little. Examples of this were the oversized single and double war canoes called *peleleu* commissioned by Kamehameha I in the 1790's for use in his planned conquest of the islands. Apparently there was no traditional precedent for these enormous canoes built with the aid of European carpenters in Kamehameha's employ. They were generally Hawaiian in terms of gross design features, though some were partially decked over and most far deeper and wider than anything built by precontact Hawaiians.

Another design departure was the three-board canoe, which first appeared in the middle to late 1800's. Though technically a canoe, it is such a radical departure from the traditional Hawaiian canoe form that it cannot be considered to be directly related to the Hawaiian canoe. The ease and cheapness of constructing these bastard craft was largely responsible for the decline of the traditional *koa* fishing canoe.

Outside of the European-influenced *peleleu* and three-board canoes, those built after contact were the largely traditional fishing or small, general utility craft. By the 1930's construction of traditional *koa* fishing canoes had all but died out. Coincident with this decline was an unprecedented surge of interest in building canoes expressly for racing. A group of canoe builders from South Kona ushered in a new era in the design of the Hawaiian canoe, streamlining the traditional fishing canoe. From that time on canoes were built primarily, if not exclusively, for racing.

Incredibly, through two centuries of foreign design and technological influence, the design persisted—persisted because there was no other known sea craft having a form that, for Hawaiian waters, was as well adapted and versatile as the traditionally designed Hawaiian canoe.

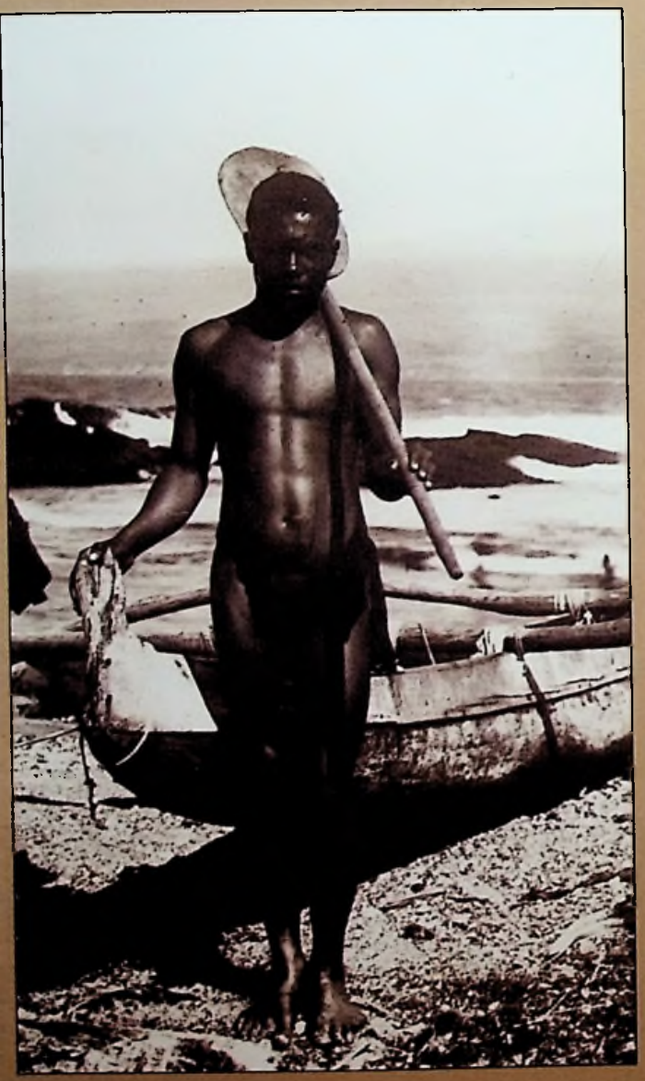
Fisherman at Hilo Bay (below), *ca. 1890.*
Children (right) *playing with canoe.*
Fishing canoes (far right) *at Waikīkī Beach, ca. 1910.*

Waikīkī Beach, ca. 1890 (above).
The Outrigger Canoe Club (left), *ca. 1910.*

Canoes and canoe shed (below), *ca. 1890.*
Canoe at Hōnaunau, Kona (right), *ca. 1925.*
Hawaiian family (bottom) *posing with canoe, ca. 1900.*

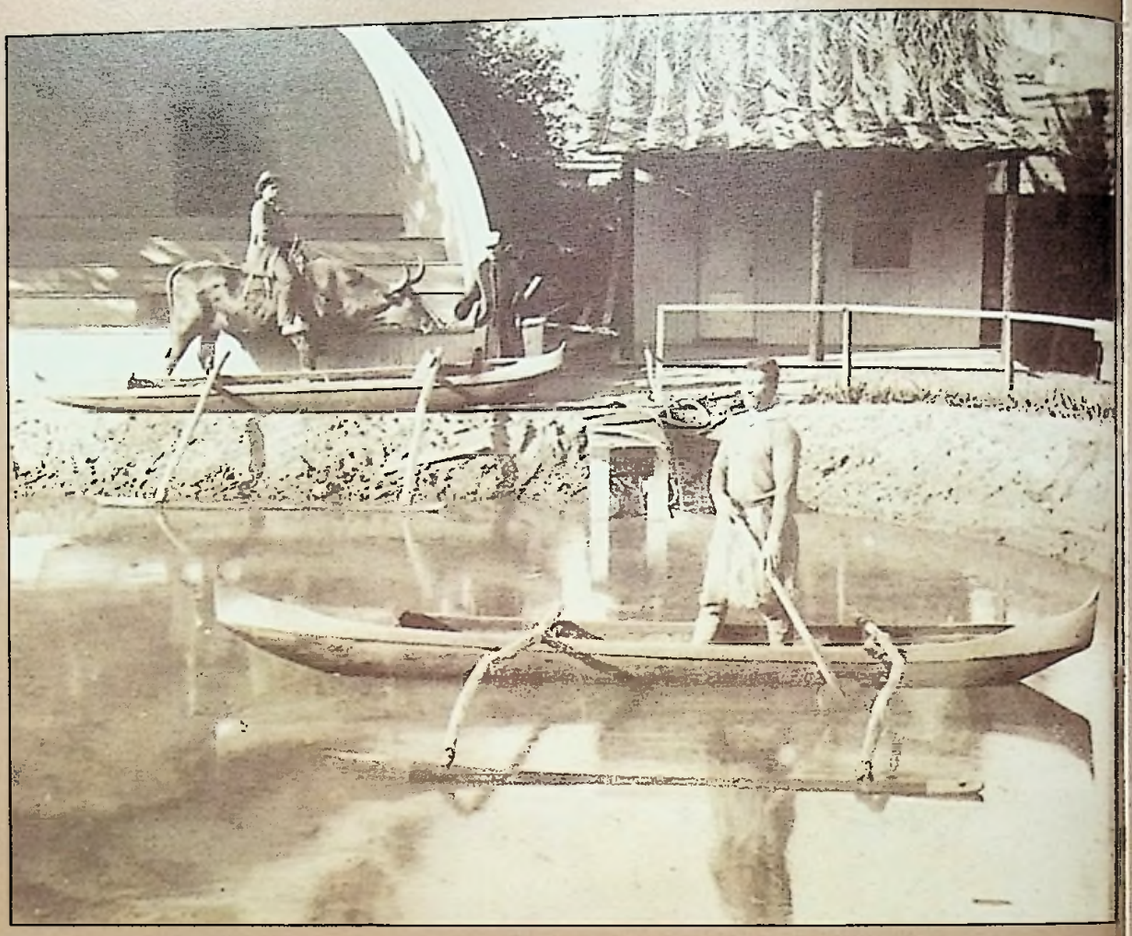
Kauhele with Mr. Hawks (left) *at Hilo, ca. 1890.*
Fishing canoes at Waipi'o Valley, Hawai'i (below), *ca. 1890.*
Canoes at Hilo Bay (bottom), *ca. 1890.*

Canoe shed (right), *Waipi'o Valley, ca. 1890.*
Canoes stored on a ramp (below) *at Ki'ikoa Landing, Kalapana, Hawai'i, 1924.*
Preparing to launch canoe (bottom left).
Fishing canoes, probably Waikīkī (bottom right), *ca. 1885.*



Kaua'i fishermen (top) *prepare to market the day's catch, ca. 1900.*
Fisherman and his canoe (left) *Hilo, ca. 1895.*
Posing with canoe (above) *rigged with sail and mat cover, ca. 1885.*

Wharf at Kailua, Kona, early 1900s (below).
Scene at Waikīkī Lagoon (right).
Warships in Honolulu Harbor (far right) *their crews standing on the yard-arms, fire cannons in a salute to King Kalākaua, ca. 1880s.*

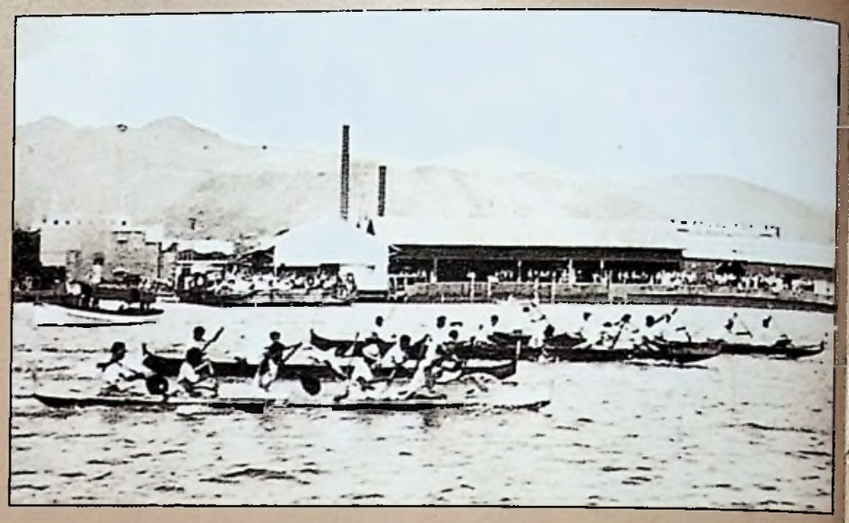


Canoes landing at Keauhou, Hawai'i as part of the Kamehameha III pageant, ca. 1915 **(bottom left).**

Float from parade **(bottom middle)** *during Kalākaua's Jubilee Celebration at 'Iolani Palace, November 1886.*

Double canoe **(bottom right)** *that brought Queen Lili'uokalani ashore in Hilo, Hawai'i, during her tour of the islands shortly after becoming Queen in 1891.*

Canoe race in Honolulu Harbor (right), *ca. 1900–1910.*
Canoe surfing at Waikīkī (below left), *ca. 1900.*
Beachgoers at Waikīkī (below right), *ca. 1915.*
Waikīkī Beach (bottom), *ca. 1930.*



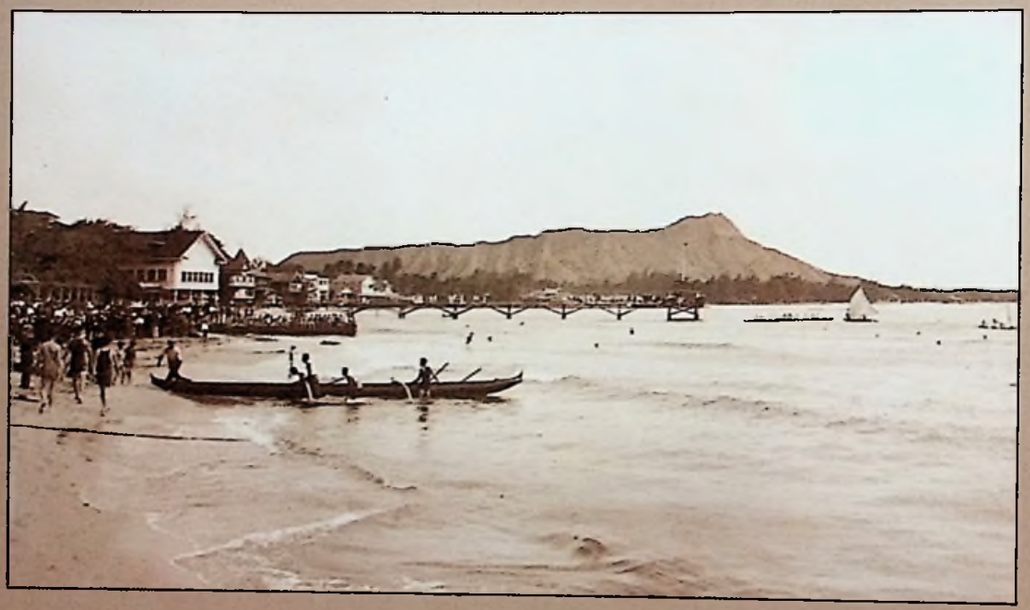
Early beachboys at Waikīkī (far left top).

Canoe paddlers (far left middle), *ca. 1916.*

Duke Kahanamoku and Tom Blake (left) *both exceptional watermen, ca. 1935.*

Duke Kahanamoku (below) *steers the famous surfing canoe Ka Moʻi with his brothers at Waikīkī in 1953.*

Canoe sailing and paddling races at Waikīkī (below), *ca. 1912.*
Women canoe paddlers at Waikīkī (bottom).
A page from the Honolulu Star Bulletin sports section (right), *June 30, 1934.*



EIGHT HONOLULU STAR-BULLETIN,

WAHINES AND KANES FLASH

Training for the canoe regatta off the Moana park waterfront July 4, is in full swing. No. 1, a crowd of paddlers and supporters watching the work. Senior wahines of the Outrigger club are in No. 2. From left—Lily Forrest, Andy Lane, Belle Kellogg, Mildred Hooper, Olga Clark and Barbara Schleif. Molly Akana, in No. 3, proves that paddling makes for beauty, and Frances Matson, No. 4, proves she knows her paddle, which she wields for Outriggers.

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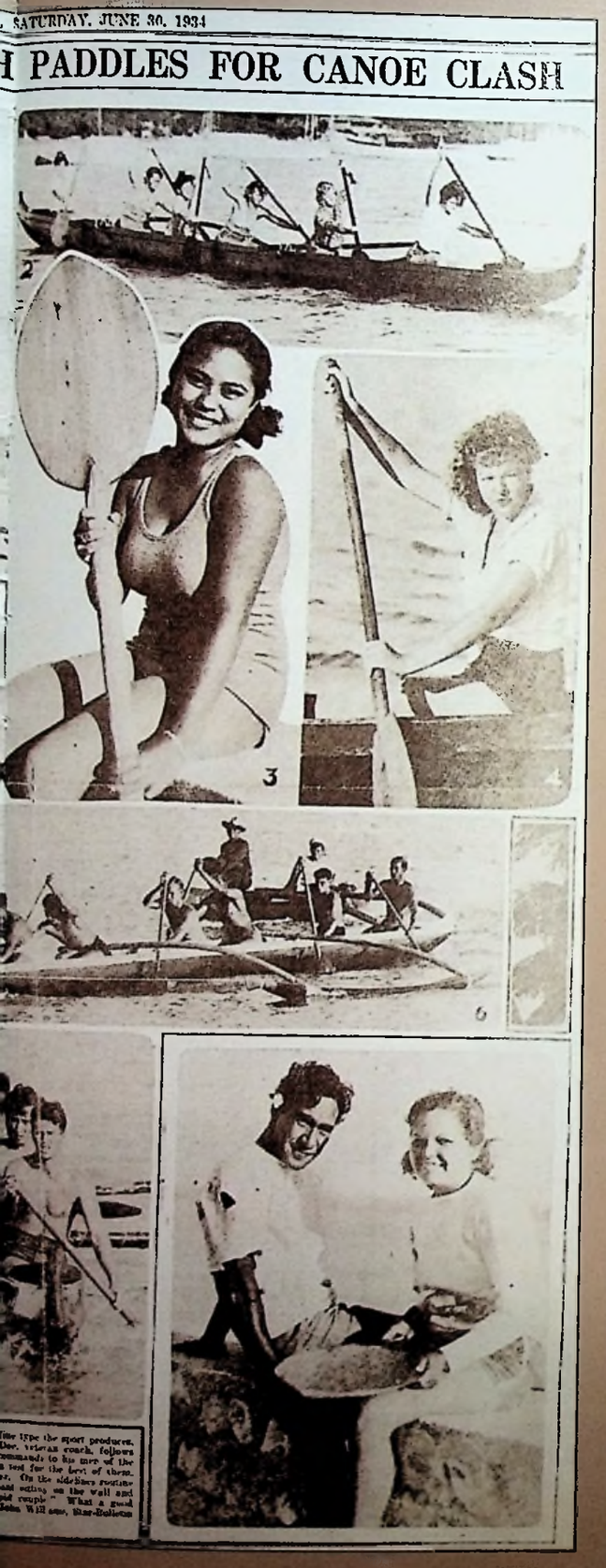
Here we are among the men. "Stepinout" Regis, of Queen's Surfriders, in No. 5 is a
In No. 6 Melvin Pasa, in the bow, is setting a cracker pace for the Hui Nalu crew. John
with advice in an outboard canoe. No. 7 shows Willie Wantle, coach, handing out
Queen's Surfriders crews. A sprint paddle of a mile along the long waterfront is a
In No. 8 Sunny Long leads in Queen's Surfriders crew, may be pleased the day's work is
is forgotten by some of them. Melvin Pasa and Lurline Lemon, for example, find it
minding their own joint business. So much so that housemates describe them as "the
time Cupid must have of all his work is as good looking as this!—Captions and pictures by
staff photographer.



, SATURDAY, JUNE 30, 1934

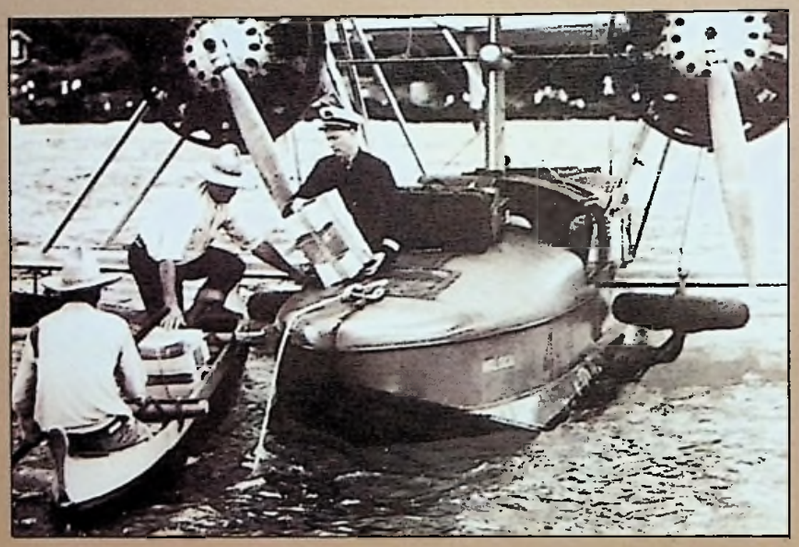
H PADDLES FOR CANOE CLASH

Canoe races at Waikiki Beach (below), *ca. 1912.*
Outrigger Canoe Club (bottom), *ca. 1930.*

Although the canoe was gaining popularity with the "smart set" as a pleasure craft, it remained a vital link with modern modes of transportation as seen in this delivery of newspapers to Kailua, Kona in 1929 (below).

Legendary Waikīkī beachboy Sally Hale and Bing Crosby catching a wave (right).

Canoe surfing at Waikīkī (bottom), *ca. 1930.*



Shirley Temple sits on a Hawaiian version of "The Good Ship Lollipop" as she entertains at Waikīkī in 1937 (top left).
Jack London and wife Charmion at Waikīkī in 1915 (top right).
Mary Pickford with husband Charles "Buddy" Rogers (left), *ca. 1935.*
Prince of Wales at Waikīkī (above), *ca. 1920.*

9
CANOEING SKILLS

Watch for the coral and stones of the reefs,
The waves and the billows of the ocean.
Steer the canoe over the depths of the sea.
Let the canoe travel over the waves of the sea,
Till it becomes worn, moss grown and aged.

Paddling Speed

"They row very fast with their broad paddles and easily keep up with the ship when going moderately." Europeans wrote in amazement of the speed and endurance Hawaiians demonstrated when paddling a canoe. They found that "these canoes are so well calculated for speed that we have seen the natives work them along, with their short paddle, at the rate of eleven or twelve miles an hour, and fairly run them under water," and that "one man will sometimes paddle a single canoe faster than a good boat's crew could row a whale-boat." Early Hawaiians claimed that a single canoe could be paddled as fast as ten miles per hour.

Such a speed is quite impressive when one considers that the fastest contemporary canoes with their well-trained crews can only reach eight to nine miles per hour. But such speeds of old would have been obtainable when one considers that those earlier "hulls were primarily designed to accommodate a maximum number of paddlers." Where a typical forty-foot racing canoe of today has accommodations for only six paddlers, a similar-sized canoe two hundred years ago would have seated up to double that number. It being quite likely that several additional paddlers would be able to increase markedly a canoe's speed, one could expect large double canoes with as many as fifteen to twenty paddlers in each hull to attain the eleven or twelve miles an hour reported.

While sails were definitely in evidence, "the usual and favorite mode of propulsion was by means of paddles." Freycinet "had the impression that the islanders used these sails only with tail wind or on the quarter. Instead of tacking, they prefer to paddle." In many instances canoes were paddled while under sail, as can be seen in the drawings of Webber and other early post-contact artists. Especially when traveling to or returning from battle, or as part of a chief's retinue, the ancient Hawaiian took great pride in the power, precision, and grace of his paddling and often seemed to quite enjoy the activity.

Vancouver observed "eleven large canoes put off from the shore with great order, and formed two equal sides of an obtuse triangle. The largest canoe being in the angular point, was rowed by eighteen paddles on each side; in this was his Owhyhean majesty, dressed in a printed linen gown, that Captain Cook had given to Terreoboo; and the most elegant feathered cloak I had yet seen . . . His canoe was advanced a little forward in the procession, to the action of which the other ten strictly attended, keeping the most exact and regular time with their paddles, and inclining to the right or left agreeably to the directions of the king, who conducted the whole business with a degree of adroitness and uniformity, that manifested a knowledge of such movements and maneuvre far beyond what could reasonably have been expected . . . he rowed up along the starboard side of the ship; and though the canoe was going at a very great rate, she was in an instant stopped . . . with his majesty immediately opposite the gangway."

Captain Cook, however, reported slightly different behavior as the King came out to greet them. "He [the chief] came off in a double canoe, and like the King of the Friendly islands, paid no regard to those [small canoes] who happened to lay in his way, but ran against or over them without endeavouring in the least to avoide them; nor could they get out of his way as the people in them were obliged to lay down till he had passed."

Paddling great distances was for many, especially fishermen, an almost daily activity. When one did not go on foot one went by canoe. Virtually all interisland communication was by canoe; Reverend William Richards writes: "The kings had a class of men whom they called runners who went with great rapidity to carry their messages . . . They also had a select class of men to row canoes on express."

Early European visitors were continually amazed that when paddling down an exceptionally rough and exposed coastline, Hawaiian canoeists generally preferred to hug the coastline, often just feet from wave-lashed cliffs. But there was method in this seeming danger, for under such conditions there is typically a backwash zone of less wind and chop paralleling the shore that makes paddling easier.

Besides the constant coastal travel, channel crossings were frequent, half the time upwind and upswell. Vancouver reported how a fast canoe left Kaua'i at sunset and counted on reaching O'ahu early in the morning of the second day after. By comparison a decked rowboat covered the same general course more than forty years later in nine days. Rev. John Paris recounts how in 1843, "six athletic paddlers took our frail ship [canoe] along with Hawaiian speed. All night, and a long night it was, we were skimming along over the waves, and the next day until some time in the afternoon," almost twenty hours of non-stop paddling. Another trip in 1849 took "half a day and the live long night upon the sea in a little open canoe. It was a tedious night with but little wind and the three natives had to paddle almost all the time when so sleepy that they could scarcely keep open their eyes, and one of them was every now and then nodding into the water and against the sides of the canoe so amusingly as to provoke me to laughter though it sometimes provoked his nose to bleed."

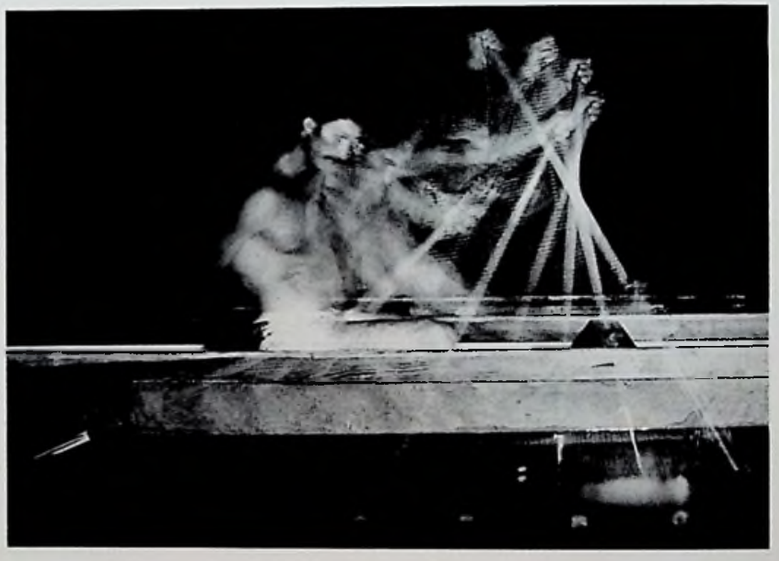
Paddling Techniques

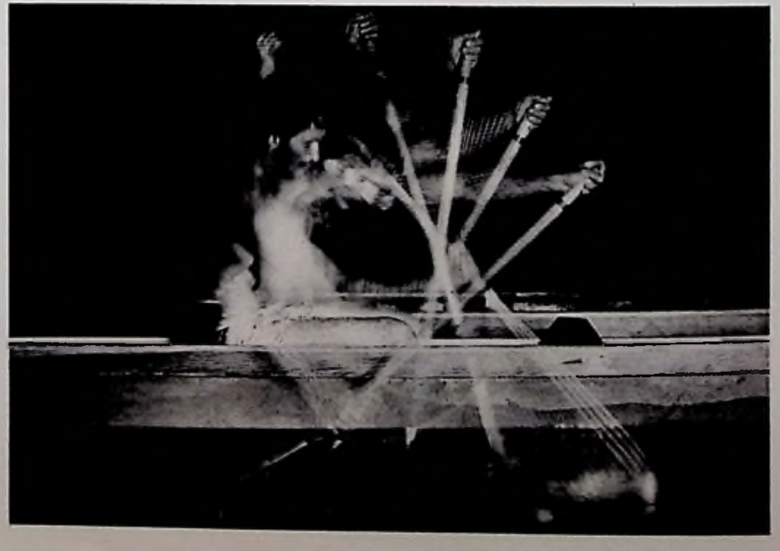
Early missionary Hiram Bingham provides the most complete description of the mechanics of paddling. He observed "nine or ten athletic men in each of the coupled canoes, making regular, rapid and effective strokes . . . Each raising his head erect, and lifting one hand high to throw the paddle blade forward beside the canoe, the rowers, dipping their paddles and bowing simultaneously and earnestly, swept their paddles back with naked muscular arms, making the brine boil, and giving great speed to their novel and serviceable sea-craft."

The act of paddling a canoe apparently was identical for both single and double canoes, though the order was different. With single canoes, a paddler always paddled on the opposite side of the person seated in front, while with a double canoe it was somewhat different, as Freycinet describes: " 'The sailors took turns paddling on the inside and the outside of each canoe, but on contrary sides, so that when one group paddled on the inside those on the other hull paddled on the outside. To announce the change in paddling, one of the men who was at the bow would strike three successive blows against the side with his paddle, and at the third blow the prescribed maneuver was executed with precision.' "

Precision was no doubt necessitated by virtue of the very closely spaced seats in many canoes. It was not unusual for early Hawaiian canoes to have the seats spaced at not much more than half the distance found on contemporary racing canoes. It was observed in 1793 that the largest of Ke'eaumoku's canoes measured sixty feet and carried forty-six paddlers, twenty-three to a hull. Allowing a conservative five feet for the stern and bow sections, there is left little more than two feet distance between each seat. This compares to a standard spacing on contemporary canoes of approximately four feet. Webber's drawings, done in 1779, indicate that especially on double canoes, paddling room was often very tight. Though there would not appear to be enough room to paddle on the inside of the hulls of a double canoe with a platform, it was adequately raised and narrow so as not to interfere.

George Hewett, a surgeon traveling with Vancouver, made rough notes that "(their ma)anner of Padling/(was) very pretty when/(th)ey go regular/(th)ree or 4 strokes/(ar)e taken on one/(s)ide and then all the/(p)addles are laid/(a)cross [changed over] the Canoe at/(t)he same Instant/(w)ith their Blades/(to)ward [on] the side they/are padling them raised/(an)d thrown [extended] the other [hand]/way and taken up [gripping the paddle high] and/(a)ll enter the Water/(to)gether on the other (si)de." Hewett's notes, though not perfectly clear, suggest that on some occasions only a very few strokes were taken on a side before switching over. The number of strokes taken on a side apparently varied widely according to the speed of the stroke, the ability of the paddlers, the distance to be covered, and the condition of the sea. Changes were probably signalled by someone in the bow of the canoe, though some reports indicate that the steersman called the change.





The Hawaiian stroke ***employed by paddlers of the Waikiki Surf Club*** **(above)** ***is seen from start to finish*** **(middle).** ***The position of the arms, degree of bend of the body and length of the stroke are in contrast to the Tahitian stroke*** **(below).**

I'i makes an interesting observation on a technique for resting while in the process of paddling long distances. "If the paddles remained quiet for about the time it took to paddle twice after the rattling or noise [to change sides] was made with the blade of [the] paddle, then the paddles came down in unison from front to back of the canoe . . . This was done so as not to wear out the paddlers." It was also apparently a practice to alleviate the tedium and fatigue of paddling long distances by singing and chanting.

Indications are that, especially when paddling great distances, paddlers took far fewer strokes per minute than today's average of forty to sixty strokes per minute in a long-distance race. R.W. Andrews recounts that while on a canoe trip from Lahaina, Maui to Kalua'aha, Moloka'i in 1843, "the rate of paddling in a seaway was about sixteen strokes a minute," twelve strokes on a side. The early Hawaiians' more moderately paced tempo appears to have been in the vicinity of fifteen to thirty strokes per minute with occasional faster stroke counts. It must also be remembered that while pre-contact paddlers would have been in good physical condition, the weight of their paddles, as much as five times the weight of a contemporary paddle, would have imposed a limit on the number of strokes per minute that even the strongest paddler could have sustained.

"Rules for canoe paddling were customarily observed in ancient times, and Kamehameha had been trained until he was skilled at it," reported I'i. Indeed, often beginning at a very early age, most young children and virtually all males and most females of chiefly birth were rigorously instructed in how to paddle, steer, refloat, and generally handle a canoe. I'i reports of a young chief: "it was his mother who taught him how to paddle, and he became adept at it."

Part of the instruction was to be made aware of when it was prohibited to be out in a canoe. During the annual *Makahiki* season, canoe use was forbidden on punishment of death, as was the case on other occasions that a chief or high priest might have set aside. Frequently early European visitors were unable to provision when a *kapu* on canoe use was in effect. Menzies recounts a visit to his ship by a lone canoe, and his "no small mortification that there was a general taboo laid on them [canoes] all over the island, by which they durst not bring any [foodstuffs] off. He [a canoe crew man] said that they themselves came off to the ship by stealth, and if it was known to the king he would put them to death for transgressing the taboo. They all seemed under great anxiety." Anxiety was quite understandable as indicated by an event which Menzies witnessed several days later: "The bay had been tabooed some days on account of a large shoal of fish that appeared on the coast, at which time this unfortunate man was seen going across the entrance of it in a small canoe. He was immediately pursued, and when brought on shore, they first broke the bones of his arms and legs, and afterwards put an end to his miserable existence by stabbing his body with their *pahoas* [daggers]."

In many cases young people were taught and given practice in specially made miniature training canoes, typically made of light weight *wiliwili, kukui,* or *'ulu,* and, to a lesser extent, *koa.* Even canoes made of bulrushes were reportedly used. Notes Emerson of young Kila: "It is easy to imagine what enthusiasm and ardor he [Kila] must have put into the construction and launching of his first canoe of bulrushes . . . But it could not have been long that he remained content with this clumsy structure. His ambition must have sought early satisfaction in the possession of a genuine canoe dug out of a *koa* tree . . ."

Training canoes would range in size from a very modest three or four feet to ten to twelve feet and rarely weigh more than fifty pounds. As the novice paddler gained experience, he was often taught how to steer, sail, and surf a canoe on waves.

For the experienced paddler, I'i notes, "there were many ways of paddling a canoe, some differing from others." What distinguished these styles has generally been forgotten, though some terms and vague descriptions are found. Emerson gives:

akahoe	to paddle carefully, silently
'awola	to pull or paddle steadily, in time, and vigorously
haukawewe	to strike the paddle at the end of the stroke against the side of the canoe, for joy or exultation, or to alarm an enemy
panapana	to paddle here and there irregularly; also *pānānā*
pukipuki	to spatter the water in paddling a canoe

The late John D. Kaupiko, one of the fathers of modern day canoeing, knew and taught several different styles of paddling by their Hawaiian names:

kahi mālie	a long and easy stroke
mā'oki'oki	a short, choppy, three-quarter stroke often used in the wind
'ōpelu	a long and easy type of stroke borrowed from paddling fishing canoes

Steering and Navigating

While virtually every Hawaiian had some experience at paddling a canoe, only a few became master steersmen and/or navigators. Far greater responsibility was upon the steersman, who had to be able to steer unerringly on unpredictable waves, handle virtually any ocean condition, and know, when under sail, how to compensate instantly for any combination of sudden wind shifts, gusts, and swells. Steering was done with a standard-shaped paddle that was often oversized, especially for a big canoe. Freycinet made the only reference to steering other than with a paddle: "Ordinarily, a man located at the stern of each canoe steers it with a large paddle; sometimes, though, we saw a rudder fixed in the center of the space that separates them [the two hulls]." Such an arrangement though, appears to have been a steering method introduced after contact.

While one or more islands were often visible in the course of interisland travel, weather conditions, darkness, or distances frequently obscured landmarks and made navigation necessary. Although there is little information about interisland navigational methods, it is known that they resembled the non-instrument techniques used elsewhere in the Pacific with some local modifications. Stars, planets, swell direction and character, currents, winds, and birds were the major elements involved.

Those who displayed prowess in paddling, navigating, steering, surfing, and general handling of a canoe were accorded special status in the community and often materially rewarded. Unusually strong paddlers and those who particularly distinguished themselves in their knowledge and all around management of a canoe in rough, open ocean conditions were often conscripted by a chief to serve in his employ. I'i notes of Kepaalani that "when his canoe left the harbor of Kailua to go to Kawaihae [about forty miles], he paddled without pausing to rest until he reached shore. Because of this ability he became a favorite of the king, and it was thus that he received the whole of Puuwaawaa and the fish ponds Paaiea in Makaula and Kaulana in Kekaha." Of Paka'a, Kamakau says "he was a strong paddler. Because of his skill in navigation he became director of Keawenui-a-Umi's sea travels. He was the captain who was in charge of his voyages, having charge of the canoes that went out to the ocean and other canoes of the chief."

Despite the influences of *Western culture, as reflected by these sailing rigs* (above), *many Hawaiians managed to retain their canoeing skills. Under Prince Kuhio's encouragement, canoe sailing had regained its popularity by the turn of the century.*

Flying an ama, these adventuresome canoe crews (right *and* below) *carefully position themselves to avoid capsizing–hoping to avoid the complicated problem of righting a sailing canoe.*

Women Paddlers

"One day an old woman being on board of our vessel while her little canoe was rocking at some distance on the waves, when she wished to return ashore, made no more ado than to leap overboard, and swim to it; but arriving at the wrong end for entering without danger of capsizing, she instantly dived under, re-appeared on the other side, sprang into the vessel, and paddled away with the agility of a young rower and the skill of an old one," observed visiting missionaries Daniel Tyerman and George Bennett in 1832. Later, on their same trip, they recounted "Kamamalu, the favorite queen of Rihoriho . . . paddling towards our vessel, in a canoe . . . was presently on deck . . . After taking leave of us her majesty jumped into the sea again, swam to her little boat into which she flung herself with inimitable dexterity (the most skillful of our seamen would have overset a canoe with attempting thus to board it), seized a paddle, and quickly reached the shore."

Though women did not spend nearly as much time in canoes as men, a number of reports by early visitors to Hawai'i indicate that many were accomplished canoeists in their own right. Kotzebue reports in 1816, "several canoes filled with girls, rowed up to us" and in 1819, Arago records, "a great number of canoes, soon surrounded the corvette, a still greater number came towards us from all parts of the coast; some were steered by women . . ." Other reports tell of mothers teaching their young sons the rudiments of canoe paddling and when necessary assisting men with paddling duties. I'i states that Ka'ahumanu, favorite wife of Kamehameha, was even "taught canoe surfing, in which . . . [she was] most skilled."

However, noted Campbell in 1810, "the women are subject to many restrictions from which men are exempted. They are not allowed to attend the Morai upon taboo days, nor at these times are they permitted to go out in a canoe." A number of years earlier Menzies noted similarly that "the taboo which had been laid on about ten days before, would expire on the following day, when we might expect to be abundantly supplied with refreshments . . . Several canoes were afterwards suffered to come alongside, but the women were so strictly tabooed that none of them durst yet venture to come off . . . but to evade this part of the restriction, they swam off to the ship in great numbers, and the sailors had the humanity and gallantry to take them in as they came along side . . ." Women were also generally prohibited from accompanying a fisherman in his canoe or warriors off to battle.

Sailing

The ancient Hawaiian knew the limitations of his sail, using it primarily when sailing down wind. Because of the extreme roundness of the Hawaiian hull, the ability of the Hawaiian canoe to go to windward *(ho'opāhu'a)* was quite limited. Experiments done by Finney in 1966, with the reconstructed forty-foot double-hulled Hawaiian canoe *Nalahia,* indicate that 75° off the wind might be all one could realistically expect. The strategic placement of paddles as leeboards would conceivably have cut down on the tremendous leeway a Hawaiian-design canoe makes going to windward, but there is no known evidence of such a practice.

Emerson states that "in sailing against the wind canoemen would study the tides and currents and if worse came to worse, would drop the sail and take to the paddles. The sail with its ropes and rigging would be rolled up and laid across the *iako*." Emerson informant Peter Kaahale recounted in 1892 that "in going a long voyage the paddlemen sat in their places and worked their paddles even when the canoe was under sail." Indeed, according to a number of early accounts, Hawaiians often paddled while under sail, especially when trying to make some point less than

ninety degrees off the wind. There was great efficiency in this power combination, in that with light winds or on a windward course the directionally imparted paddle power created a "vector" effect, whereby the sail worked more efficiently (the canoe making minimal leeway) with the sustained steady speed afforded the boat by paddling. The ultimate effect of using both modes of power was in many instances synergistic—greater than the sum of the speeds of each mode.

Paris commented on sailing canoes he observed: "They glide over the water with great speed." Ellis notes that though Hawaiian canoes were typically not as large as their cousins to the south, they "would probably paddle or sail faster than any of them." In fact, retracing one hundred and fifty years later Ellis' round-the-island tour of Hawai'i, the author along with others rigged a traditionally shaped twenty-eight foot Hawaiian outrigger canoe with a sail of the type used by Ellis' original party. On certain legs of the trip with a brisk wind, we estimated that the canoe, fully loaded, was traveling as fast as fifteen knots. Judging by several early accounts the Hawaiian sailing canoe off the wind was quite swift. Finney's *Nalahia,* which is extremely heavy, has achieved similar speeds using the ancient sail design.

After the arrival of westerners, sailing canoes did regular duty as sea taxis. Chester Lyman reports in the 1840's that "I hired a canoe and two men for a dollar to take me to Kealakekua about 25 miles distant." He goes on to note that, "as is always the case with Sandwich Island canoes, one man was stationed on the stick [*'iako*] . . . to counterbalance the action of the wind on the sail and prevent the canoe's oversetting."

While canoe sailing was done at any time, numerous accounts of canoe sailing trips during the 1800's indicate that Hawaiians favored sailing during the night, especially if the trip was a lengthy one. Missionary William Alexander notes in 1838 the sentiments of his Hawaiian crew about to transport him to another station: "We went to Waioli in a double canoe at night, as the ocean was calmer." Missionary Mark Ives wrote in 1842 that "when sailing towards Kau, the trade winds always blow directly against us, bearing the waves mountain high. Their violence is somewhat slacked early in the morning by the influence of the land breeze. We therefore find that our best means of getting to Kau from this place, is to

Strong winds and rough seas *molded the ancient Hawaiian canoe into a ruggedly efficient craft of extraordinary seaworthiness and undeniable beauty* (above left).

The modern catamaran is a direct descendent of the Polynesian double-hulled canoe. Pictured (above) *is one of the fastest of these craft, having sailed from Hawai'i to Tahiti in only 11 days.*

leave in the afternoon and sail during the night." Judging from the many accounts, the steersman had no trouble finding his way and the hindered vision was more than made up for by the reduced wind and calmer seas that evening usually brought.

Sea, Swell and Wind

"These are the 'gods' of death . . . the billows raised by the wind," wrote John Kaelemakule, a contributor to the newspaper *Hoku o Hawaii*. Kamakau stated that "a storm that brought wind was dreaded." It was the combination of wind and swell that was the most feared by the ancient Hawaiian, who was well aware of the deadly moods of his beloved ocean host. There are innumerable terms in the Hawaiian language describing every conceivable sea, swell, and wind condition in relation to a canoe.

To minimize calamities at sea, the Hawaiian canoeist, noted Kamakau, learned "how to tell when the sea would be calm, when there would be a tempest in the ocean, and when there would be great billows. He observed the stars, the rainbow colors at the edges of the stars, the way they twinkled, their red glowing, the dimming of the stars in a storm, the reddish rim on the clouds, the way in which they move, the lowering of the sky, the heavy cloudiness, the gales, the blowing of the *hoʻolua* wind, the *aʻe* wind from below, the whirlwind, and the towering billows of the ocean."

"The [little] swell that 'grows' *(kupu)* [occurs] close to the *ama*, or float, of a canoe and keeps curling is called an *ʻale kuloko*, a 'local' swell, or *ʻale huʻe*, a 'flowing' swell. The one that curls under the forward outrigger boom, *kua ʻiako mua*, is called the *ʻale huʻe i mua*, the flowing swell in front; and the one that curls at the rear *ʻiako* is called the *ʻale huʻe i hope*, the flowing swell in back. The swell that curls in front of the canoe is the *ʻale poʻi i ka ihu*, the swell curling at the 'nose'; the double curl *(poʻi palua)* at the middle of the canoe is called the *ʻale kawa* or *ʻale kapo* or *ʻale pani*, and the swell that curls 'outside' *(mawaho)* [behind] the canoe is called the *ʻale ʻuha*."

Kaelemakule also listed types of waves or swells ("billows") that held particular danger for the canoeists:

ʻale ʻaki — "a billow with a sharp crest almost ready to break over. When the canoesman saw this wave of destruction, he sets his canoe in a position so that the billow will push it shoreward. If successful, in setting the canoe it goes shoreward but if he fails, it perishes. The billows bites down onto the canoe from prow to stern and sinks it. That is why the seamen call this billow the biting billow."

ʻale kualoloa — "a long, rolling billow and much feared by seafarers. The canoesman should be very careful with this billow. When he sees it rising on the windward side very near to him then he changes the course of the canoe with back to it. By thus changing it the canoe speeds along till it leaves the billow behind it."

ʻale kūpipi — "Maui's fast moving billows, that is, the so-called *kupipi* billows that follow immediately behind each other, billows much dreaded by sea farers and having no escape from the many billows your canoe capsizes and is swamped."

ʻale nui — "a billow that rises with its whole big body and then bursts. When this billow catches a canoe at sea, it is death."

ʻale olowalu — "a billow that follows immediately after each other. One billow is right behind the next one. If a canoe at sea meets these *olowalu* billows, there is no escaping from death. The reason why there is no escape is that there are 4 or 5 billows all together in an *olowalu* and if it misses the first billow, it is destroyed by the second. When all of the *olowalu* has passed, there is no canoe."

Refloating a Canoe

Iʻi writes, "Many have perished because of ignorance and because they did not know how to set [right] canoes that had met with an accident." In such circumstances there were, however, "rules for refloating a canoe that had overturned at sea, thereby saving it and its occupants from destruction."

Early visitors to Hawaiʻi marveled at the canoemanship and resiliency of Hawaiian canoeists. La Perouse, sailing off Maui, recounts that of "one hundred and fifty canoes which put off from the shore with hogs and vegetables . . . almost all . . . boarded one or the other of the Frigates; but our velocity was so great that they filled with water along side and the islanders were under the necessity of quitting the rope which we had thrown out to them, and swim away. They first hastened after their hogs, which they brought back in their arms, lifted them on their shoulders onto their boats, out of which they emptied the water, and cheerfully entering them, again, endeavoured by every exertion to recover the position they had lost near our frigates, and which had been instantly occupied by others that also met with the same accident. Of these canoes, forty at least were overset . . ."

In another account, after a canoe being towed had been swamped, "both the men had much trouble to right it, and to bale out the water, as the high waves continually dashed over it. As all this was done swimming, the reader may form some notion of their expertness in this art. They were at last seated, but they had no oars having lost them when the boat upset. An European would not have known how to help himself; they were, however, not at all embarrassed, for they found their safety in their strength, and rowed with their hands, briskly forward." Still another account told how when a canoe was swamped "they immediately took hold of [the outrigger], and forcing it under water and back again, with an expertness which you cannot conceive of, they completely turned the water out of her."

Indeed, though almost every early European visitor to Hawaiʻi reported as did Commander Wilkes that "their good management of them [canoes] was proverbial," there were nevertheless many occasions where the ocean took its toll in canoes and sometimes even lives. Assisting the canoeists on these occasions were Kamaikahuliwaʻapū, Kamaikahulipū, and Kamaikahuliwaʻa, "different names of the god who aided in floating and righting and bailing out upset canoes. Jurisdiction extended over all the islands."

To minimize loss of life and canoe, "*ke kamaihulipu*, the art of righting upset canoes" was rigorously taught "to the fishermen and . . . the canoesmen of the ancient chiefs of Hawaii. No chief ever sailed the sea carelessly," reported Kaelemakule "without taking with him some men that were experts in righting a canoe in case they met with an accident at sea." Nineteenth century fisherman A. D. Kahaulelio noted that canoeists from the Hāmākua area were particularly skilled in refloating canoes, a reputation not surprising given the perennially rough nature of those waters.

Iʻi writes that even extensive training could not help against the "two things that made it impossible to right a capsized canoe: the breaking off of the booms and the smashing of the canoe. When either of these things happened, the occupants were doomed." Barring either of these scenarios, there were devised a number of quite sophisticated methods of righting and bailing out a capsized and/or swamped canoe. Instruction in these methods usually began at an early age, with the teacher sometimes using miniature canoe models of *wiliwili* to illustrate the different steps and techniques. When the pupils fully understood the often complicated and difficult righting and refloating procedures they would begin practicing in

small conventional canoes.

Standard reflotation equipment on all canoes was a gourd bailer, and, in all but the rarest instances, several lengths of rope. So critical was the gourd bailer to a canoe's survival that it was deified as Hina-(i)-ke-kā, goddess of canoe bailers; deification was a common practice when life depended on a certain condition, circumstance, or in this case a piece of equipment. On occasion, blocks *(lona)* of some light wood were also taken along to serve as flotation devices in refloating a swamped canoe. Usually two or more "*hau* sticks" and a section of netting were also stowed in the event they were needed in helping respectively to right and empty the water from the swamped hull or to jury-rig a detached *ama* and *'iako,* respectively.

If the *'iako* had somehow become detached from the *ama,* the procedure to remedy the situation, noted Kaelemakule, was to pass a piece of "netting under the floater and up over the foot of the boom to hold it securely in place. Then wind it around the boom again fasten it firmly on the boom tying with the pieces of rope several fathoms long . . . Make the boom fast to the floater that slipped off and that netting will hold fast until land is reached."

One anonymous Hawaiian source gives the Hawaiian names and detailed descriptions for twenty-seven different methods of righting and refloating single canoes, double canoes, and canoes with sail. Different methods were reported by various other sources. Each righting and refloating method was specifically devised for the particular kind and size of canoe, the number of people on board, and the type of sea.

Emerson notes that one of the basic ways of refloating a single canoe was to first right it and then turn the "head to the wind. When a big wave came two or three men would mount on the stern, and one perhaps on the *kanaka* [rear] of the *ama.* When the wave lifted up the bow the water would rush out astern. As soon as they saw a wave coming amidship they would jump off and let the bow plunge down the slope of the wave, and this would nearly clear the canoe of water. Then a man would jump in and bail it out as fast as possible. The *ama* would always be to windward."

I'i describes another basic refloating technique. "When a single canoe overturned, its supplies and equipment were gathered together and taken care of by one man while the others righted the canoe. To do this, one man stood where the float of the outrigger joined the forward boom and another, where it joined the rear boom. They held fast to the ropes attached to the free ends of the booms and forced the float downward. Then they climbed the booms and, watching the movement of the billows, turned the canoe, thereby spilling out half or a third of the water. When they let go of the booms and the canoe, it floated. Then the rest of the water was removed with the bailer."

I'i also describes one of the methods for refloating a swamped double canoe: "The men stood on the sunken canoe and hauled on ropes attached to the *muku* (outer ends of the booms) of the other canoe, overturning the two together. With both canoes upside down, like a canoe capsized naturally, all the men swam about in the sea as they would if a canoe were upset. They all clung to the bottoms of the canoes and tied ropes to the boom end of the one indicated by the instructor. Then they pulled together on that canoe while standing on the *muku* of the other. The canoe with the ropes attached turned over, emptying itself of sea water. Then the men climbed onto the empty canoe and tied the ends of the two or three rollers *(lona)* carried as equipment [flotation] to the *muku* and to other places on the booms of the swamped canoe and tied these ropes to the *pola* platform between the canoes. Then the ropes were drawn around at the rear of these *lona* to the empty canoe. Ropes were attached from both ends of these *lona* and knotted to resemble a fishnet. On this were placed baggage and

Heavy seas, with waves reaching an estimated 20 feet, turned the 1966 Moloka'i-O'ahu canoe race into a sheer struggle for survival (above). *One of several canoes that were capsized or disabled that year, the Malia is shown* (below) *immediately after having flipped over. Five of the paddlers are still underwater scrambling to free themselves from their seats.*

Human error and structural failure *combined to produce the first swamping of the Hokule'a, which occurred in the Kaua'i channel in 1976. While the Hokule'a was saved from this and subsequent near disasters by rescue craft, Hawaiians of old were not always so fortunate, sometimes losing their canoes, not to mention their lives.*

equipment, as well as persons suffering from cold and cramps . . . the men sit with their paddles from front to back in the hollow body of the drained canoe. Two men sat in the canoe containing water, one in front and one in back, hence it seems that the swamped canoe was also afloat. The instructor called out, 'Go forward five dips of the paddle.' Then he counted, 'one, two, three, four, five.' As he began to count the canoe started forward. The man at the back of the swamped canoe stood dipping the water out with his paddle while the water spilled out from the stern, owing to the movement of the canoe. Then the instructor called again, 'Paddle back five dips with the stroke that makes the canoe go backward.' This caused the rest of the water to spill out at the prow, until there was none left."

Many methods of refloating both single and double canoes involved the use of two or more lengths of *hau* wood called *lā'au huli pū,* that were temporarily bound in any one of a number of different fashions to the outrigger assembly and/or hull(s) of the canoe, to afford leverage in righting and then emptying the canoe of water, especially in rough seas. "The *hau* sticks were used with the pieces of rope," notes Kaelemakule, rigged in the appropriately indicated method for refloating a swamped canoe. So clever was the employment of these poles and ropes that with them one man could refloat a fair-sized single canoe and even a smaller double canoe.

In any kind of rough water most canoes took on enough water so as to require almost continual bailing. Any of the paddlers and often the steersman might have bailing chores, or, as Peter Puget noted in 1793, larger canoes had "boys in her bottom routinely bailing."

An interesting practice not unlike that occasionally engaged in by modern mariners who pour oil on a stormy sea to calm it, is related by Emerson. "Mauli-'awa tells me that the ancient Hawaiians were in the habit of quieting the sea in a storm by throwing upon it grated *kukui*-nut. When the ocean was *kuakea,* foamy and violent, it would still the ocean. They did this not only on entering a haven in a storm, but far out to sea in a storm. The *kukui*-nuts roasted and pounded up were carried in a *hokeo.*" The actual extent of such a practice is totally unknown, though the principle has some basis in fact.

Canoe Mishaps

For all the righting and bailing strategies, some canoes perished with all hands, especially if caught in a severe storm or sudden wind. Probably the most famous canoe disaster occurred between O'ahu and Kaua'i. Kamehameha I's fleet, enroute to attack Kaua'i in 1796, was caught in a very sudden and severe storm that decimated his fleet. Earlier Captain Cook described canoes that were in trouble off Kawaihae. They were apparently victims of the notorious *Mumuku* winds which come up very suddenly, turning what was seconds earlier a relatively placid ocean into a potentially very lethal maelstrom. Cook comments of one canoe that, "Mr. Bligh attempt'd to save their Canoe, but it blew too Strong; they were very grateful for this attention of ours." Several hours later Cook related that "from the suddenness of the bad weather humanity made us hoist in one of the Canoes, and besides those who belong to her." The next day miles offshore from Kawaihae, Cook reported still another rescue incident: "We saw a canoe paddling towards us, and which we rightly concluded had been driven off shore, from the last boist'rous Weather; they got hold of a rope, and one of the Indians on board [Cook's boat] observing them to be weak got into their Canoe; they were so very much exhausted and fatigued, that they could not without help get up the ships side. There was an elderly man, one of Middle age, and a child of about 4 years of age; This little boy they had lash'd under the thwarts." Author Emma Doyle reported that the *Mumuku* "was formerly so strong that the natives always lashed canoes to the rocks, stakes, or trees at Kawaihae."

On other occasions, canoes and occupants were not so fortunate. Mr. Bishop, a well-known missionary, gives a graphic account of less than commendable seamanship on an abortive canoe trip he and a colleague took down the Kona Coast in 1828, where "soon after doubling a point of land [Kaunā Point?] at a place called the Wili, the trades suddenly met us, and the swell from the south coming into collision with the current from the north, threw the sea over our canoe, and filled it. The natives in a fright emptied their calabashes of *poi* into the sea, and by great exertion succeeded in bailing out the water. We then rowed towards the nearest landing place . . . Mr. Ruggles and I . . . jumped into the surf, and waded ashore, leaving the natives with all the baggage to proceed with the canoe a mile farther to a better landing. We had scarcely commenced our journey on foot, when looking back we did not perceive the canoe. We ran to the beach. Calabashes and other light baggage were floating on the waves. Presently the heads of the natives and the prow of the canoe became visible, as they emerged from the sea that swept over them. The shore was high and rocky, and the canoe was driven upon the rocks and soon went to pieces. The natives, in all about ten, were watching a favorable opportunity to escape to the shore . . . To their expertness in swimming . . . they owed their safe escape from danger. But the canoe, valued at $150, was

lost, together with great part of our baggage." Other canoes were even less fortunate at this watery graveyard called the Wili, for Bishop goes on to remark that, "we have since been told that ours is the first instance, in which a canoe has reached the shore after being filled at the Wili." In other instances canoes were carried "into the ocean beyond all possible aid."

On a corresponding note, Tyerman and Bennet recount how "a very young man who had been banished by the king, for some family offense, to Maui, was going from that island to Ranai [Lāna'i] when the canoe was upset. The sharks which are always on the watch after such vessels, instantly seized and devoured two of his companions. He himself escaped with great difficulty; as also did a young woman in a very singular manner. When thrown in the water, she forthwith began to swim, with all her strength and speed towards the shore. This she reached in safety, though accompanied all the way by two sharks, one on each side of her, as though the three were engaged in a sea-race, which she happily won in this respect, that neither of the monsters attempted to devour her."

A few years after the Wili incident another missionary and his son were, as their colleague and teacher Edward Johnson related, almost lost in a canoe accident between Maui and Moloka'i. "It was about 7 in the morning when their canoe was upset, and so split, that it could not be floated . . . the natives in the canoe paddled towards Molokai . . . [but] the waves broke over them . . . and the canoe was sometimes a foot under water . . . [they] must all have perished had not a boat come to them, having providentially discovered their white sheet tied to a pole."

Other references in the post-contact literature relate similar or worse canoe disasters, indicating that pre-contact canoeists were, as Reverend Bingham notes of post-contact canoeists, "sometimes overtasked, chilled, or exhausted, or driven off by storms and lost." The ocean reigned supreme. Judging by the number of chants and prayers that entreated the gods for safe passage, the early Hawaiian knew that for all his determination, skill, and resourcefulness, he was still at the mercy of a capricious and sometimes savage sea. Reverend Lyons observed in 1846 a canoe of Hawaiians grimly determined to leave Waipi'o Valley for Waimanu, on a day when the ocean had other ideas. "They took to their canoe and made a long and fruitless attempt to get her put into the sea. They finally gave up and returned over the numerous *pali's* . . ."

Canoes were periodically endangered by *tsunamis* for which there was little warning. After the deadly November 7, 1837 *tsunami* at Hilo "not a canoe was left on the shore to assist in this work [rescue of those swept to sea]." An unnamed observer surveying the damage after the 1868 tidal wave in the South Point area observed that " 'the sea had been inland in some places, a hundred and fifty yards, and the whole coast was lined with house timbers, lumber, broken canoes, dead animals that had drifted ashore.' " Such occurrences also serve to explain in part the fate of the multitudinous canoes observed in early post-contact Hawai'i.

One little-remembered canoe trip that nearly ended in disaster involved a Hawaiian outrigger canoe that in 1939 traveled from Hawai'i to Samoa. Three intrepid sailor/adventurers, Capt. Alvin Woodbury II, Don Hall, and Al Eastman took a traditional 32-foot *koa* surfing canoe, raised the gunnels slightly, installed a mainsail and jib, and substituted for a conventional *ama* a hollow one made of metal. In this *ama* they stored gasoline for an outboard engine that they would never use. On April 19, 1939 the canoe departed for Samoa from South Point via Fanning Island. However, after unsuccessfully searching for Fanning for several days, they set a final course for Samoa. For the last 20 days of their trip they were without food, save two small fish that they caught. On May 23, 1939 they arrived 34 days later at a cove near the little village of Aoloau, Samoa, hungry and tired but otherwise no worse for wear.

Post-Contact Canoe Transportation

With the increasing number of western vessels plying Hawaiian waters during the 1800's, interisland canoe travel all but ceased. By the mid-1800's a canoe crossing a major channel was a newsworthy item, as the standard form of transportation for freight and people was by large vessels. An article in the January 22, 1853 edition of the *Polynesian* reported the manifest for the schooner *Pau:* "On her trip up she took to Hawaii 270 passengers, and brought back 190, 20 turkeys, 30 pigs, 75 chickens, 30 dogs(!), 1 pair oxen, 1 mule, 14 cords wool, 11 canoes etc. altogether making decidedly a jam for a schooner of 100 tons burden."

A canoe trip to Samoa *from Hawai'i by 3 intrepid sailors in 1939 nearly ended in disaster. The 32-foot koa hull was specially outfitted for the voyage. A navigational problem caused them to miss a scheduled stop at Fanning Island, forcing them to spend nearly 3 weeks without food.*

10
CANOE LADDERS

My heart beats high at your venture—
To buffet the raging sea!
Wild heave the waves 'neath the cliff-wall.
To be whelmed by Ocean's might . . .

"We landed before his house at a small gap between rugged precipices against which the surges dashed and broke with such violence and agitation and with such horrific appearance, that even the idea of attempting chilled us with the utmost dread. We however quietly submitted ourselves to their guidance, and were highly pleased to see the extraordinary dexterity with which they managed this landing. Having placed their canoe in readiness before the gap, they watched attentively for a particular surge which they knew would spend itself or be overcome in the recoil of preceding surges before it could reach the rocks, and with this surge they dashed in, landed us upon a rock from which we scrambled up the precipice, in an instant about 50 or 60 of the natives at the word of command shouldered the canoe with everything in her and clambering up the rugged steep, lodged her safely in a large canoe house upon the brink of the precipice, to our utmost astonishment."

Menzies, writing in 1794, was the only known non-Hawaiian to ever have landed in a canoe in such a manner. He was describing a canoe ladder, or *paepae wa'a,* an amazing contrivance for launching and landing a canoe on a beachless cliff-bound coast. Although there are reports of a canoe ladder being used along the Hana coast of Maui and the Hāmākua coast of Hawai'i, this type of ladder seems to have developed along the Puna shoreline of Hawai'i, where the shore is an almost continuous seacliff ranging from heights of twenty to eighty feet. Interrupted only by jagged lava outcroppings and an occasional patch of sand, these cliffs are relentlessly clawed by wind and waves. The waters off this shore are rich in marine life and the neighboring lands are fertile, for the most part, making the area a desirable place in which to live.

In that the bulk of the protein in the Hawaiian diet came from offshore marine resources, ready access by canoe to fishing grounds was an absolute necessity for prolonged habitation. At some point the ancient Hawaiian solved the problem of launching and landing his canoes from a cliff-bound coastline by devising the ingenious canoe ladder. No other

One of the last canoe ladders *lies abandoned and in disrepair at Kahauale'a in the Puna District of the island of Hawai'i in 1931. It was later repaired and used again in the late 1930's and early 1940's. Today nothing remains, but a nearby homesteader can still remember using the ramp as a young man.*

Hamming it up *for the camera, three Hawaiian youths pose at the Kahauale'a canoe ladder for a pre-1900 photograph* (left). *The paddlers landing at Kahauale'a on a calm day in 1909* (above) *by all accounts would have preferred to have a few swells to make the task easier.*

culture has ever been known to overcome the problem of providing boat launching and landing capabilities from a wave-lashed cliff-bound shore.

William Ellis, as part of a group of the first Europeans to travel around the island of Hawai'i, provides the first substantive account of a canoe ladder and its use. "After travelling a mile and a half along the shore, we came to Kehena, a populous village; the people seemed, from the number of their canoes, nets, etc. to be much engaged in fishing. Their contrivance for launching and landing their canoes, was curious and singular . . .

"In one place, where there were a few low rocks about thirty feet from the shore, they had erected a kind of ladder. Two long poles, one tied to the end of the other, reached from these rocks to the top of the cliffs. Two other poles, tied together in the same manner, were fixed parallel to the first two, and about four or five feet distant from them. Strong sticks, eight or ten feet long, were laid across these at right angles, and about two or three inches apart, which being fastened to the long poles with *ie*, (the tough fibrous roots of a climbing sort of plant, which they find in the woods) formed the steps of this ingenious and useful ladder.

"The canoes of the place were light and small, seldom carrying more than one man in each. A number were just landing, as we arrived at the place. Two men went down, and stood close to the water's edge, on the leeward or southern side of the rock.

"The canoes were paddled up one at a time. The person in each, then watching a convenient opportunity, rowed swiftly to shore, when the rolling billow carried the canoe upon the rock, and it was seized by two men who stood there to receive it. At the same instant that it was grasped on each side by the man on the rock, the one in the canoe, who steered it, jumped into the sea, swam to the shore, and assisted them in carrying it up the ladder to the top of the cliff, where they placed it upon curiously carved stools, made of the wood of the erythrina [*wiliwili*], and returned to the rock to await the arrival of another canoe. In this way five or six were brought up while we stood looking at them."

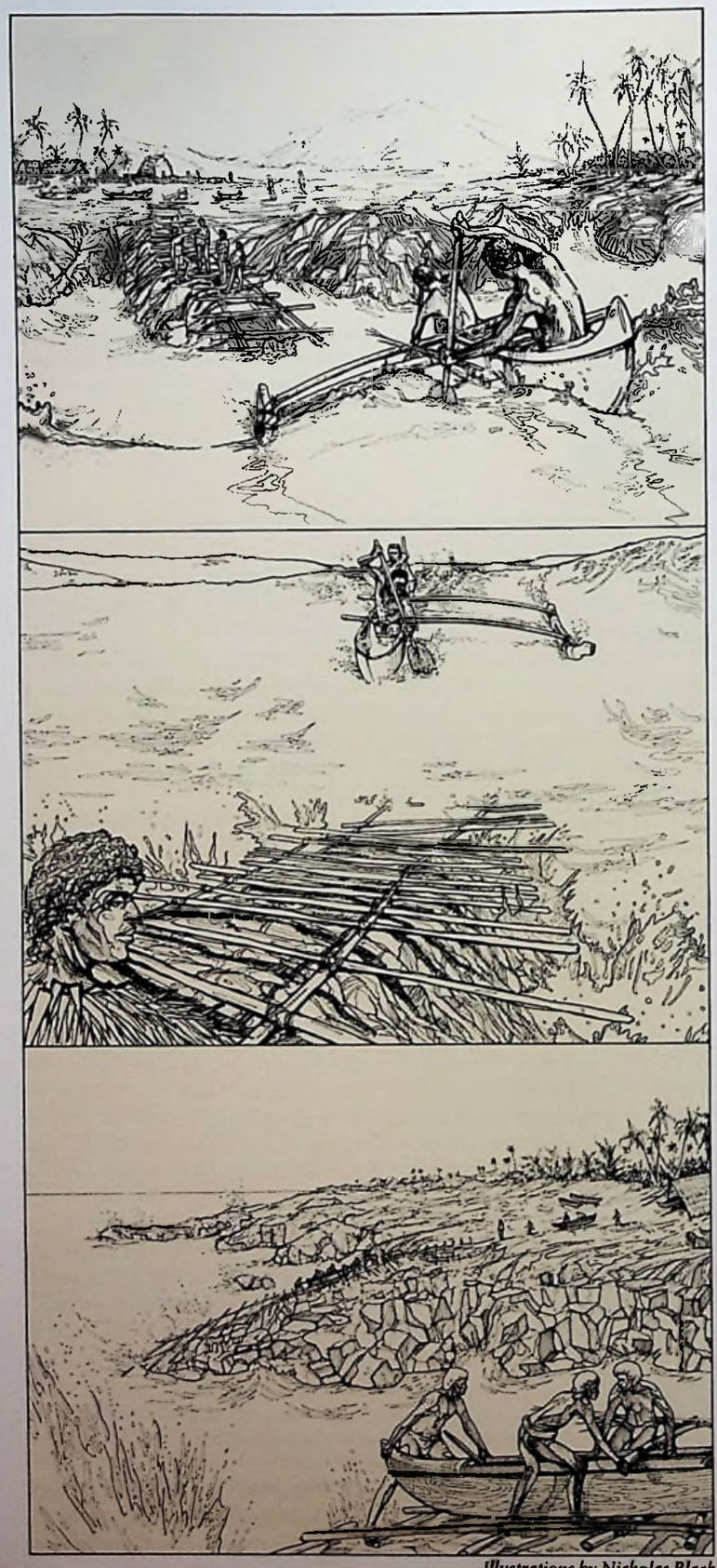
The only other known description of a canoe ladder in use is given by Mr. T. G. Thrum, who witnessed in 1909 canoes being landed on a canoe ladder at Kahauale'a, a few miles from the one Ellis observed at Kehena. Thrum comments that the canoes being landed "are much larger than those used at Kehena in 1823, requiring more men for their handling in a fishing cruise, and consequently calling for a larger cooperative force in landing. No less hazardous is the operation of launching at such stations, whether in the comparatively smooth spell . . . or in heavy weather. Both occasions call for decisive action on the part of the crew upon the given signal of the watcher for the propitious wave of a height that shall carry them off as it recedes, without a precipitous drop from the rude ways, or, land them well up on the skids on returning.

"At their launching the canoe is brought down to the incline, and the canoeists, standing on either side, at the auspicious moment slide it down to meet the incoming wave and leap into their craft as it takes the water, the momentum of the operation aiming to carry them a sufficient distance to permit them to seize their paddles to continue headway, and prevent a return wave dashing them against the rocks."

As can be seen in the accompanying photographs and illustrations, a canoe ladder was essentially a series of joined ladder- or ramp-like segments. Local topographic features determined the number of ladder sections needed to reach from the water to the storage area at the top of the cliff. A typical section might have been ten to thirty feet long, depending on the distance to the next rock feature suitable for securing it. The sections were from eight to twelve feet wide with cross members spaced a few inches to several feet apart. While other woods were occasionally used to construct a canoe ladder, *'ōhi'a*, because of its strength, durability and availability, was most favored. All members of the canoe ladder were held together by a lashing of plant fiber. The ladder itself was then secured by tying it to small holes bored through the underlying rock. The last section of ladder extended from the seaward edge of rocks into the water, free-floating with the swells. At the end of the day, when all the canoes were in, the free-floating section of the ramp would be untied and removed.

Choosing a site for a ladder was critical. There had to be an outcropping low enough to the water, usually about four to eight feet above sea level, to enable the free-floating portion of the ladder to rise with a swell. This would allow an incoming canoe to make it up the free-floating section past the "hinge" point and onto the next section of the ladder. The site was typically a promontory, never a recessed cave or inlet. The ocean and the configuration of the rock at the point of entry of the canoe ladder had to allow its appropriate rising and falling. A gentle slope was also required, or rocks that were somewhat tiered, to avoid a prohibitive incline for the ladder sections.

Still living in the Kalapana area are two men, John Hauanio and Kaipo Roberts, who remember well their experiences launching and landing a canoe (usually a twenty-five foot three-man affair) at a canoe ladder.



Illustrations by Nicholas Black

"Having placed their canoe in readiness ... (sequence at left) *they watched attentively for a particular surge which they knew would spend itself ... before it could reach the rocks, and with this surge they dashed in ...*" *Men waiting on the rocks grabbed the canoe to keep it from sliding backwards and then, together with the paddlers, carried it up the ladder to level ground.*

In 1909 at Pelekunu, *on the north shore of Moloka'i* (right), *a canoe hangs precariously as it is launched by hoist into rough water. This was the only means of gaining access to the fertile valley from the sea.*

They accompanied such noted Kalapana steersmen and fishermen as Kini Aki, William Peleiholani, Jack Hamili, and John Hauanio, Sr. Both men used the ramp at Kahauale'a, located almost in front of Kaipo Roberts' *kuleana* (homestead). It so happens that this was the same ramp that A. E. Hudson photographed in 1931, then in a state of abandonment. Later this ramp was fixed and used again for a time in the 1930's and early 1940's. Roberts recalls that this particular ramp was made up of five sections totaling about one hundred and twenty-five feet in length. A visit to the site in 1979 with Mr. Roberts revealed only the numerous hand-bored holes in the rocks to which the earlier ladders had been lashed, and a canoe shed directly behind the ladder. Inspection of canoe ladder sites at Poupou and Kamoamoa at the same time also revealed the strategically placed lashing holes, and at Kamoamoa there was also a canoe shed directly behind the ladder.

Both Hauanio and Roberts say that a moderate to heavy sea was necessary for effectively utilizing a canoe ramp. If the sea was too flat, the last free-floating portion of the canoe ladder hung limp, dropping almost vertically into the ocean. If seas were too heavy it became impractical even to tie on the free-floating section, much less safely launch and land a canoe. A favored swell size would have been in the four- to ten-foot range.

Again, both informants note the extreme skill of the canoe captains who would know precisely when to launch a canoe sliding down the back side of a wave or, more critically, how to land a canoe, catching the right swell just feet from the rocks and hitting the canoe ladder at dead center. Ideally the steersman tried to get the canoe as high up the ladder as possible. Sometimes the paddlers would jump out of the canoe at the last second, leaving the steersman alone to take the canoe up and onto the ladder.

Neither Roberts nor Hauanio see how, as in Ellis' account, the steersman could afford to jump out at the last second. In their experience the steersman always stayed in, guiding the canoe onto the ramp. Always present to assist a canoe landing on a canoe ramp were the *hāpai wa'a,* or helpers, who kept the canoe from sliding off or back down the ladder. They in turn were always given part of the catch. In the late 1930's and early 1940's, with help hard to come by, the users of Kahauale'a ramp constructed a modern block and tackle arrangement to assist in pulling up the canoe. World War II brought a final end to this remarkable practice.

11
SURFING

The spray of surfing rises
Surf riding sea of the island.
Sea of the striking of the big wave
The foam of the waves of Hiki-au
Sea of surfing at noontime

Ancient Canoe Surfing

In stone-hewn dugout canoes they rocketed down the faces of exploding liquid mountains. Canoe surfing *(pākākā nalu)*—in all the world, only the ancient Hawaiian, with his rugged canoe, tamed the wild surf that was the demise of so many lesser men, so many lesser craft.

Hawai'i, having relatively few protective reefs, lies naked in the path of mammoth wave trains that seasonally roll out of the north and south Pacific, sweeping down her channels and battering her coastlines. The islands are situated geographically such that distantly generated swells are often near peak strength at intercept. To this is added the fact that much of the near-shore submarine topography of Hawai'i is contoured and sloped so that wave size is maximized. Finally, the proximity of the massive weather system known as the "Pacific High" and blustery winter *kona* storms virtually ensures that tumultuous seas and strong wind will be the norm. Of regularly navigated channels, those in Hawai'i have been classed as among the roughest in the world, and her surf, sometimes in excess of fifty feet, is legendary.

Guarding most other Pacific Islands are necklaces of trillions of microscopic reef-building coral polyps. These delicate alliances of living and dead organisms routinely neutralize the ocean's most furious assaults. Scant feet from the pounding surf begin the placid lagoon waters that lie within these natural breakwaters. Canoeing here is safe and marine life generally plentiful. One need venture outside the reef only rarely, and then only when conditions permit. In the few other Pacific Island groups besides Hawai'i where barrier reefs are absent or minimal, the sea conditions are generally less severe.

No other culture is known to have had its survival linked to the surfing ability of its indigenous craft. The Hawaiian canoe had to be able to regularly gain access to life-sustaining deep water marine protein sources. So it was that in Hawai'i a relentless siege by surf, with wave forces of up to thousands of pounds per square inch, exercised a classic shaping effect on both the canoe and the culture.

Canoe surfing, as a learned and practiced skill and ultimately as a highly sophisticated sport, was the sole preserve of the ancient Hawaiian. Neither before nor since has any people developed canoe or boat surfing skills even remotely comparable to those held by the early Hawaiian. No other ancient culture has ever taken its indigenous craft and surfed them purely for the recreational value.

On isolated occasions other Pacific Islanders were known to have surfed waves in their canoes, but such instances were very rare and then usually unavoidable or unplanned. Some African and Mid-Eastern cultures also reportedly surfed small waves on occasion with their various craft, but only as they unwittingly picked up a wave returning to the beach.

In ancient Hawai'i those who excelled in surfing a canoe were accorded the highest prestige. While many commoners became proficient canoeists, it was the custom for the chiefs to be accomplished in such sports as boxing, sledding, sham fighting, canoe and board surfing. I'i explains that "there are many ways to show skill in canoe surfing. The king [Kamehameha] was especially noted for it, and so was his pupil, Gideon Laanui. They were often seen together gliding on the surf outside of Haleumiumiiole at Kawaihae and at Kapuni, outside of Kiikiiakoi. They would allow waves to go by until they saw one they wished to glide on, then ride it to the spot where they chose to land. There are ways of selecting waves which will go all the way to shore, and the king and his pupil were unusually skillful at this. Such things were actually taught." Indeed, Kaahumanu "was also taught canoe surfing, in which ... [she was] most skilled." Kamakau mentions that "Umi excelled in surfing with a canoe or a surfboard," and Ellis remarks of canoe surfing that "when the king or queen, or any high chiefs, are playing, none of the common people are allowed to approach these places, lest they should spoil their sport."

Ever imaginative, the ancient Hawaiian combined board and canoe surfing to come up with, as I'i writes, "what was called *lele wa'a,* or canoe leaping, in which the surfer leaped off the canoe with his board and rode the crest of a wave ashore. The canoe slid back of the wave because of the force of the shove given it with the feet ... This was a difficult feat and one not often seen, but for Kaahumanu and the king it was easy." Kamehameha apparently was so enamored of this unusual pastime that "he was frequently seen leaping from a canoe on this surf [Kaliliki]." Whether the canoe would have always been pushed back over the wave is somewhat doubtful, but the author and friends have attempted this activity in recent times and found it quite possible.

Early visitors to Hawai'i were invariably impressed by the Hawaiians' ability to handle canoes in rough surf. Dixon in 1787 made the following comment: "When we got near the beach, the surf ran so high, that we brought our boat to an anchor two cables length from it; but our good friend Abbenoue had taken care to provide against this inconvenience, and got a number of his people ready with canoes to land us, which they did as safely and with as much expedition as a London Waterman could do at Tower Stairs." Ellis, traveling down the Kona coast in 1823, writes where

Early tourists *found the ancient sport of canoe surfing as thrilling as did the Hawaiians of old, and it soon became a popular and fashionable pastime* (left).

Old timers, *many of whom were institutions in Waikiki, pose beside the famous canoe "Princess" in 1953* (below). *Left to right are: Louis Kahanamoku, John Ernstberg, Jimmy Alama, Earl King, Willie Whittle, Ah Kin Yee, David Kahanamoku, Charley Amalu, Duke Kahanamoku, Randolph Crossley, John D. Kaupiko, Sam Kahanamoku, Ainsley McKenzie, William Kahanamoku, Joe Akana, Gay Harris, Edric Cooke, Francis Bowers, Dad Center, Sally Hale, John Hollinger.*

his friends in a canoe "landed in a very high surf. To a spectator on the shore their small canoe would have seemed every moment ready to be buried in the waves; yet, by the dexterity of the natives, they were safely landed with no other inconvenience than a slight wetting from the spray of the surf."

Nevertheless, there are numerous accounts by travelers of being unceremoniously dumped and nearly drowned on aborted canoe entries through the surf. Missionaries, especially, complained endlessly of ignominious and sometimes near fatal (to their perception) canoe landing episodes through surf. A journal entry of Lorenzo Lyons in March of 1849 reads: "In attempting to land at Waipio, the surf rolled over our canoe with tremendous force and threw us all into the ocean. I began immediately to sink. While struggling for life I felt a hand grasp me and I was borne above the dashing waves. But in a moment the canoe was turned over by the welling and raging billows, and I found myself beneath it in a most dismal situation. I was separated from my deliverer, but he soon grasped me again." Corney relates how he "embarked in a canoe with Toowyheene (Kuwahine), wife to Keymatoo (Keeaumoku) . . . who steered the canoe, and when we came to the reef of the harbor wanted to try her skill in dashing through the surf, which ran very high . . . but she at length let the canoe broach . . . by which we were all upset and all thrown out."

All indications are that the early Hawaiians were well aware of the possibility of these accidents, and that they were always well trained for such eventualities. Righting and bailing a canoe swamped in surf were basic skills. Excellent watermen and canoeists, Hawaiians knew that there were certain surf conditions that invited disaster. A number of the early European explorers to Hawai'i commented that on days when the surf was particularly large and boisterous, few if any canoes would venture out. This was in contrast to calmer days when European vessels were usually deluged by canoes. Several accounts describe occasions when the surf came up so substantially in the short time that canoes were visiting or trading with a ship that the canoeists asked permission to spend the night tied up to the visitor's vessel until the surf abated. Captain Cook notes, too, that "it was very common for women with infants at the breast to come off in Canoes to look at the Ships, and when the surf was so high they could not land them in the Canoes they used to leap over board with the child in their arms and make their way ashore through a surf that looked dreadfull."

Surfing Canoe Design

The simple need to survive the required daily exits and entries through surf-cordoned coastlines dictated for the first Hawaiians a substantial rethinking of canoe design, and the simultaneous development of rough water canoe-handling skills. Being able to successfully steer and control a canoe fully loaded with passengers, fish or supplies as it raced in on a wave was of incalculable importance. Survival just a few feet off shore, let alone in the channels, demanded uncommon seamanship and an extraordinary craft with design and structural features unlike anything previously known in Polynesia.

The early Hawaiian canoe, primarily in adaptation to local sea conditions, eventually took on certain classic design features—rounded one-piece hull, full stern *('ōkole)*, simplified and rugged outrigger assembly, pronounced splash guard and rocker—that are still observable today, if for no other reason than in rough water and surf nothing else works as well. Although almost any traditional Hawaiian canoe could be surfed, there were most decidedly canoes that had dimensions and subtle design features that made them recognizably superior for surfing and general rough water handling.

As far back as 1789, Portlock noted that a single canoe was much safer in surf than a double canoe. Double canoes did surf, but the practice was apparently limited to occasions when there was no alternative available. The author has on several occasions surfed a double canoe, including the *Hōkūle'a* on a wave conservatively estimated at twelve feet, but never by choice.

Canoes twenty to thirty-five feet in length, with high sides and generous rocker, are generally best for surfing. Once on a wave, they tend to hold a straight course owing to the furrowing effect that comes with a certain minimum hull length; this tendency to run true also facilitates steering. Shorter-hulled canoes, while surfable, tend to broach or skitter, especially when caught in white water; this is because of the roundness of the Hawaiian hull, coupled with a shortened pivot point.

By the early 20th century, ***many koa canoes had been retired from fishing and were being used as surfing canoes on Waikiki Beach.***

Canoes longer than forty feet have been surfed, though there are certain drawbacks. A long canoe, especially one with a fine entry, will sometimes "pearl dive" while dropping in on a wave owing to its typically narrow, low-lift bow and its inability to get down the face of the wave before the wave breaks or before the steersman has control. Often a steersman in this situation will find himself several feet above the water, especially on a short-faced, fast-breaking wave. A canoe of less than thirty feet rarely experiences such difficulties.

If a wave tends to double up, such as is common at the inside breaks at Waikīkī, a longer canoe will sometimes find itself straddling two waves; this often results in a swamping, or, at the least, great difficulty in steering. Even momentary loss of control on an especially large or long canoe is usually disastrous. There is almost no chance of recovering control of a large canoe gone astray, especially on a large wave or in the white water. A smaller, lighter canoe can often be brought back under control, especially with the help of a second steersman, by applying extreme corrective force with the steering paddles.

The second steersman, required only in surfing situations, is the paddler who sits directly in front of the steersman and serves as a back-up in case the first steersman is unable to control the canoe by himself. Often the second steersman's seat is located just in front of the rear *'iako,* allowing him to brace his paddle at the juncture of the *'iako* and hull, giving him as much or more control than the first steersman.

There are several design features that mark a superior surfing canoe. A high freeboard, associated with a pronounced rocker and/or tall gunnels, and a generous splashguard forward and sometimes even a small one aft go a long way toward keeping out boarding seas and maverick waves. A pronounced degree of upturn or rocker in the bow, as well as a full bow entry section that provides critical forward buoyancy minimize "pearl diving." A canoe with a wide and deep stern generally handles better on waves than a canoe having a stern of smaller dimensions. A larger stern not only rides deeper in the wave because of its weight, allowing for maximum steering blade purchase, but presents a large surface area aft. This contributes to a canoe's surfing capacity, both when initially picking up a wave and, most importantly, once tucked into the wave itself.

While a paddle of almost any size could be used to steer a canoe in surf, an oversized, heavily built paddle was almost always preferred. The force and torque acting on a steering paddle while in use are enormous, causing weak or undersized paddles to disintegrate. Generally, the larger and heavier the canoe the sturdier the steering paddle must be.

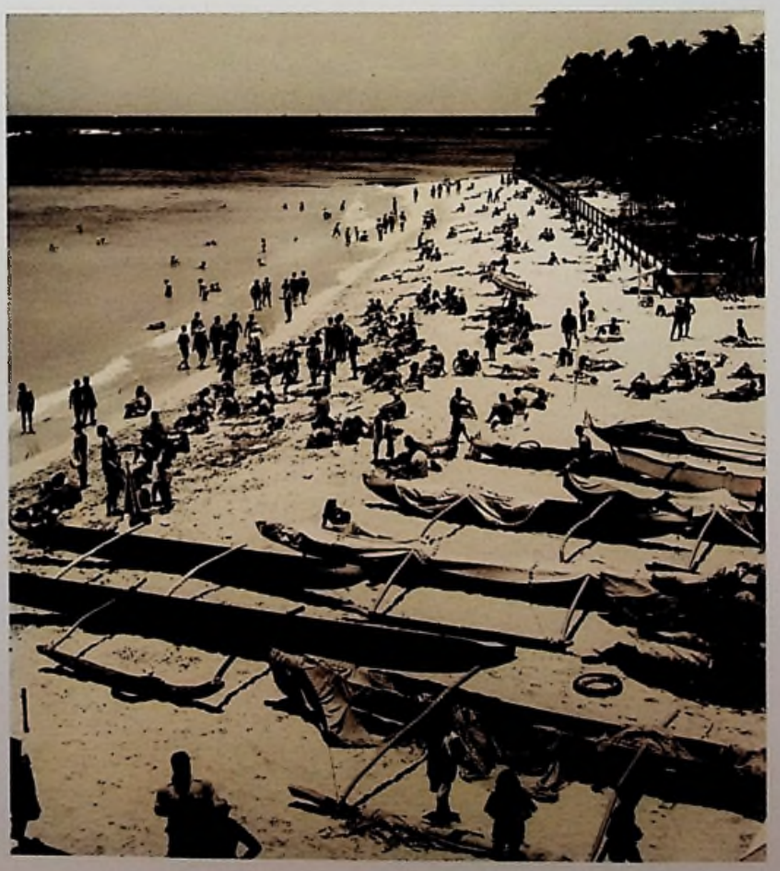
The aforementioned features apply equally to a canoe's surfing ability under rough, open ocean conditions. Whether under paddle, sail, or both, Hawaiian canoes occasionally pick up open ocean swells and surf them just as on a wave at a coastal break.

Modern Canoe Surfing

Like other ancient Hawaiian traditions, canoe surfing almost disappeared with the arrival of the missionaries. Well meaning, they set about systematically eliminating all of the Hawaiians' heathen practices. A dim view was taken of traditional Hawaiian sports, which the missionaries thought frivolous, dissipating, and inconsistent with God's plan. Water sports, especially, created too many opportunities for scantily clad members of the opposite sex to intermingle. Even more intolerable were the situations where "the ability of the participants [in canoe surfing] became something on which to gamble." John Cook, writing in the 1840's, comments that "when I first came to Honolulu, there were very few games played by the Hawaiians. The missionaries had frowned upon surf swimming and other ancient Hawaiian amusements and nothing had taken their place."

Legendary beachboy *Sally Hale shares a wave with a passenger* (below).

Koa surfing canoes, *replaced today by fiberglass imitations, crowd the beach fronting the Outrigger Canoe Club in 1946* (bottom); *the club was founded in 1908 "for the purpose of preserving surfing on boards and in Hawaiian canoes."*



Famous surfing areas once bustling with bodies, boards, bets and canoes were abandoned to salty memories and sunbleached ghosts. Barring isolated reports of occasional canoe and board surfing activity at Hilo and Lahaina, most of the nineteenth century was a low water period for these traditional Hawaiian sports. Wilkes even notes in 1844 that, "although their good management of them [the canoes] was proverbial, particularly in the surf ... of late, and since they have possessed foreign vessels, they have lost much of their skill." Wilkes makes the interesting observation that loss of traditional skills was as much because of acculturation as it was of the missionaries' attitude.

Near the turn of the century the 'Merry Monarch,' King Kalākaua, began encouraging and promoting a return to sporting activities, especially water sports. While more emphasis was put on "barge racing" than other water sports, canoe surfing activity also increased, especially at Waikiki. In 1907 the *Advertiser* first reported formal "surf steering contests between canoes," an event held periodically through the early 1900's.

In 1908 Alexander Hume Ford, a most enigmatic young man worrying that the last visible traces of Hawaiian culture would be soon lost forever, founded at Waikiki the Outrigger Canoe Club "for the purpose of preserving surfing on boards and in Hawaiian canoes." In 1911 a group of friendly rivals, mostly Hawaiian, formed the Hui Nalu Canoe Club, also for the purpose of promoting traditional Hawaiian water sports. The formation of these two organizations ushered in a renaissance of traditional Hawaiian water sports.

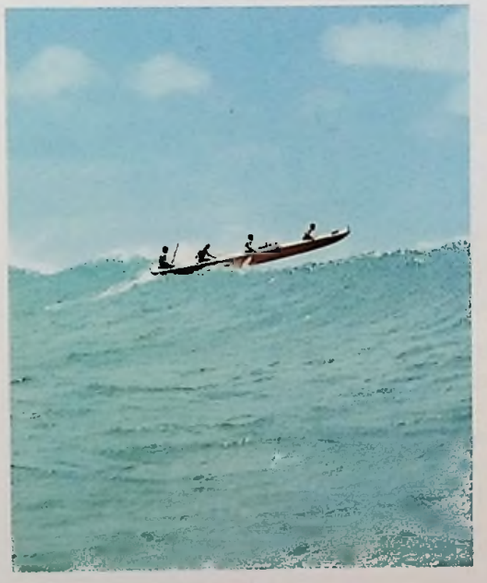
Board surfing would ultimately spread throughout the world—our most spectacular gift to the world of sports. The venerable and unique practice of canoe surfing, while remaining confined largely to the waters off Waikīkī, has continued to this day, owing somewhat ironically to its perennial popularity with tourists. Canoe surfing steersmen from Waikīkī are probably as skilled today as their ancestors. Legendary steersmen such as Steamboat Mokuahi, Sr., Blue Makua, Sr., Alex Apo, Blackout Whaley, and Mud Werner can still be seen gracing the waves.

The Outrigger Canoe Club was the home for most of these men and canoes until the large beachfront hotels started their own beach services in the 1960's. Until the 1960's *koa* canoes, most of them converted fishing canoes and a few specially made for surfing, could be seen up and down Waikīkī Beach. By 1964, however, the classic *koa* surfing canoes had all but disappeared, as victims of age, wear, negligence, breakage, and replacement—replacement by a fiberglass imposter.

Actually fiberglass and resin were first employed by George Downing in the early 1950's to patch and hold together creaky old *koa* canoes. This was, however, unsuccessful because the oiliness of the *koa* prevented successful lamination of the glass. The first all-fiberglass surfing canoe was built by Toots Minvielle and appeared in 1954. Performance was comparable to *koa* surfing canoes. Fiberglass canoes had their greatest advantages in ease and economy of construction, durability and minimal maintenance needs.

Big Waves

Probably the earliest attempt at surfing big waves is the account personally witnessed and related by John Kelly in the 1930's. "One idea that got kicked around time and again was that of riding a Castle wave in a canoe. It had never been done and arguments generally ran against it: Castle waves were too big, too fast, too steep. But a few diehards contended it could be done. Now, here they were, stroking into the take-off site in the *Princess* (a famous outrigger canoe) to prove their point ... suddenly from the steersman, the shouted command, 'Let's go!' and the six big men plunged their paddles into the deep, straining with all their might. Bodies and paddles flashed in unison in the afternoon sun. The canoe



Castle surf *offers a timeless challenge to the canoe surfer* (above *and* below), *both in the size of the waves and in the potential for long rides. Paddling out can be as exciting as surfing in. Momentarily suspended at the top of a wave* (left), *this canoe struck the water with such force that a large hole was blown in the bottom of the hull.*

In the aftermath *of a wipeout, an empty 30-foot canoe stands on end on the face of a Castles wave* (right). *Paddlers caught inside by an unexpected wave* (far right) *waste no time pondering the miscalculation and make a hasty exit. Shooting the "Bowl" at Makaha* (below) *required that the ama be specially rigged on the right side.*

picked up speed as the great wave mounted behind raising the stern higher and higher. A rooster tail took shape in her foaming wake; the outrigger began to sing.

"As the wave arose beneath the canoe and her angle of inclination became more critical, things began to look serious. The men were still bent over their paddles trying to achieve a speed as close as possible to that of the wave. In theory, this would have enabled them to shoot out ahead and to steer to the edge of the wave, away from the inevitable white water.

"But the crest was beginning to tower. The steersman, now glancing apprehensively at the frothing crest of the monstrous wave at his back, suddenly lost his nerve and screamed ... 'Hold back!' He must have forgotten that the rest of the waves of the set were already nearly breaking farther out to sea. With this command, the crew leaned back mightily on their paddles in a desperate effort to stop the canoe. But it was too late; with her forward speed checked, the canoe began to rise back up the slope, up, up, up, until she was nearly perpendicular.

"At that moment of ultimate truth, the crew mutinied. Scrambling and falling over one another, they bailed out on both sides. The steersman looked in horror down the abyss, threw aside his paddle and leaped from his precarious perch out into space ... Beneath the curving crest of the mountainous wave, the canoe was poised, straight up and down, the surrounding space filled with paddles and flying beachboys.

"Then it happened; the canoe faltered an instant, then, responding to the force of gravity, began her death plunge. The wave folded over with a clap of thunder. The *Princess* and her crew vanished beneath a blanket of writhing foam spreading across the surface of the sea.

"In a few minutes, Castle Surf was strewn with wreckage far into the reef. Outrigger, paddles, the canoe hull, survivors, coconut hats, bailing scoops and whatnot floated all over the scene. Thus came to a tragic end a historic challenge to the sea—riding a big Castle wave in a canoe. Never again has the attempt been made."

More recently, the author and friends George Downing, Fred Hemmings, Tom Conner, Jimmy Pflueger and others have on a number of occasions successfully surfed Castles at ten to twenty feet.

The author has also surfed both Mākaha and Waimea at fifteen to twenty feet in a one-man canoe, and while a number of waves were made, it was the wipe-outs that were always the most spectacular and memorable. On one occasion at Mākaha, while waiting at the "Point," I saw the classic down line swell activity indicating that an exceptionally large set was coming. Furious paddling was necessary to get the canoe over the first wave. However, the second wave at over twenty feet was simply too thick and too critical to get over. There is a vivid recollection of climbing up the face of a mountain of water and, when at its very lip, being hurled upside down and backwards "over the falls."

Another incident occurred while filming a canoe surfing segment for *National Geographic* at Waimea Bay. Again alone, and after successfully surfing several waves in the fifteen-foot range, I took off on a wave of about twenty feet. Conditions had become less than ideal. The offshore wind had come up to about twenty miles per hour, and the tide had dropped, causing the waves to "pitch-out" especially at the take-off spot. A combination of a heavy bow, because of a mounted camera, and a late take-off caused the canoe to cartwheel down the face of the wave with me stuffed in the hull "coffin style." The canoe was destroyed, the author almost.

12
FISHING

Arise in the night
Bestir yourself,—Leave the pebbles
Fetch the bait containers,
The collection of fish hooks,
The flexible nets
And bind them to the top of the outrigger poles,
Then paddle for the deep sea!

"While we were entering the bay which they called Kirekakooa [Kealakekua] after the town Kirekakooa we were surrounded by so great a number of canoes that Cook ordered two officers into each top to number them with as much exactness as they could, and as they both exceeded 3000 in their amounts I shall with safety say there were 2500 . . ." John Ledyard, like other early European explorers, was impressed with the large number of canoes in Hawaiian waters. Typically, reports described the numbers of canoes seen in terms such as "vast," "innumerable," or "prodigious." Even forty years after Cook arrived, the number of canoes at Kealakekua was apparently still quite impressive, Arago noting that the number of "canoes was immense; we see more of them here in a paltry village, than you would find in all the Mariannes."

How many canoes were there at the time of contact? Up to three thousand were seen at Kealakekua Bay alone, and there is no indication that canoes had followed Cook's boat as he sailed around South Point and up the coast into Kealakekua. Even if every canoe from the entire Kona district had come to meet him at Kealakekua, which is highly unlikely, it still left all the canoes from the five other districts on Hawai'i—Kohala, Hāmākua, Hilo, Puna and Ka'ū. Each district had a population thought to be only slightly smaller than that of the Kona district, and in the case of Hāmākua, Hilo, Puna and Ka'ū, comparable access to canoe-quality *koa*. Kohala had the least *koa* available, but Commander William French living at Kawaihae in the early 1800's commented to a visitor of the great activity at this coastal village and how the beach "was lined with canoes for miles in length." While waters off these other districts were not typically as accommodating as those of Kona, inhabitants would still have had need of comparable access to offshore marine resources.

Relative to the size of its population, the Hawaiian Islands probably had the largest fleet of canoes in the entire Pacific basin. Archaeologist Robert Hommon feels that the ratio of canoes to people "was probably in the 1:20 to 1:30 range." With estimates of the contact population ranging from a low of 175,000 to a high of 225,000, the canoes would have numbered somewhere between six and twelve thousand. The high figure is consistent with many reports by early Europeans of the great numbers of canoes in Hawaiian waters. That there was once an enormous number of canoes in Hawai'i is indisputable. But why were so many canoes needed?

Owing to its isolation the marine life of Hawai'i is less diverse than that of other Pacific islands. Marine life is also limited by the lack of nutrients, which are available in other areas in greater quantities because of more extensive reef habitats and more favorable ocean currents and upwellings. As a result, the production of marine food resources near the shores of Hawai'i have always been limited and liable to depletion.

Terrestrial sources of protein including chickens, pigs and dogs as well as native birds were chronically in short supply. As sophisticated as the Hawaiians were in their agricultural practices, fish pond technology, and food drying and preserving methods, continual and ample access to open ocean food sources was vital.

Canoes alone provided this critical access to life-sustaining protein. Writer Lucien Young noted in 1892 that "the importance attached to the supply of fish [for] food caused canoe making to be one of their greatest industries." Hommon notes, "most if not all the outrigger (single) canoes reported by Western visitors were normally used for fishing . . . [and] in peace-time most, if not all of the chiefs' double canoes as well were used for fishing." The relatively large Hawaiian population at the time of contact could very likely have been sustained only by numerous fishing canoes, so indispensable for food gathering.

Characteristics of Fishing Canoes

The all-important fishing canoes of Hawai'i came in many different shapes and sizes. Though most canoes could be temporarily adapted to almost any type of fishing activity, there were certain fairly specialized forms of fishing canoes. These brought together design, dimensional and weight features that best suited both the kind of fishing to be engaged in and the anticipated marine environment.

Fishing canoes were classified by usage and physical characteristics. Emerson says the "*wa'a pahoa (wa'a lawai'a)* was a fishing canoe narrow and deep with sides straight up and down." A *poki'i* was the "name of the canoe of the owner of the net used in *malolo* or *iheihe* fishing." A. D. Kahaulelio, writing in the newspaper *Nupepa Kuokoa* in 1902, says that the type of double and single canoes employed for *aku* fishing were called *ho'omo*. He also mentions *pukahi,* and *kiapoko,* as specialized types of fishing canoes, though descriptions are not furnished. Kamakau mentions "single canoes called *panipani* . . . [where] *iao* are kept. A *panipani* canoe was manned by three or four—or perhaps five—men, and carried only one or two fishing poles, as did the *kapili* canoe."

If large quantities of heavy fishing nets were to be employed, as many as sixty canoes might be used. Corney witnessed "not fewer than 6,000 people" assisting or watching as fish were driven into nets that yielded a

Capes of leaves *served as foul-weather gear, keeping fishermen warm and dry* (top left).

Fishing nets, *laid almost exclusively with canoes, are off loaded on the beach* (top right). *That koa fishing canoes were still relatively plentiful can be seen in the background of this photograph taken in the early 1900's. Canoes at Waiākea River, Hilo, are prepared for the day's fishing ca. 1890* (right). *Note that their average length was only 15–20 feet. Wicker fish traps were once commonly set from canoes* (above). *This plank-built canoe is interesting for its additional gunnel strake placed on top of the 'iako.*

"catch [of] 50 or 60 canoe-loads." These canoes might range in size from a wisp of a canoe in which the head fisherman darted about directing the operation, to enormous forty- to sixty-foot double or single canoes.

Writing about a type of net fishing in which a chum stick called *melomelo* was used, Kamakau says: "The head fisherman was in a light swift canoe, a *kialoa*, with one or two men." Because it was faster and less noticeable than a longer canoe and could be easily and quietly managed, "the *kialoa* canoe went first to the site of the fishing ground." In fact a surprising number of fishing canoes were quite small, many being twelve- to eighteen-foot one-man affairs. In 1779 Cook noted that the typical outrigger canoe length was twenty-four feet, while his surgeon Samwell observed most canoes were between fifteen and twenty-four feet. The majority of these were fishing canoes. Numerous other accounts by early visitors and missionaries state that most were single canoes, typically between fifteen and twenty-five feet long, with longer and larger canoes always in evidence but nowhere near as numerous.

Canoe builder Kahoolilihala notes that when he and his father were actively building canoes in the Hilo area during the late 1800's and early 1900's, they "generally built small 12-foot, two-man fishing canoes for use along the cliff-bound Hamakua Coast. Bigger canoes were impractical there." Small canoes were not only much less costly and easier to obtain, but were often more practical than larger canoes that required several men and, in certain conditions, could be more difficult to manage and more prone to swamping.

Analysis of typical twelve- to eighteen-foot one-man fishing canoes shows that they weighed from thirty to one hundred and fifty pounds, though they rarely exceeded one hundred pounds. Hulls were an inch thick at most, usually one-fourth to one-half inch depending on the type of wood and which part of the hull was measured. Most were very narrow and quite shallow, though some were deeper and heavily rockered, espe-

Rigged for aku fishing, *this turn-of-the-century double-hulled canoe is traditional in most respects. A fish box is lashed between the hulls. The smaller canoe alongside is of an interesting hybrid design, having a plank-built hull together with otherwise traditional components.*

cially for rough water use. While La Perouse once weighed a twenty-five-foot three-man canoe, one-foot deep and one foot wide, of only fifty pounds, a thicker-hulled canoe of the same length but near double the width and depth might weigh three to four hundred pounds or even more.

This latter type of short, capacious and heavily built fishing canoe is today generally referred to by the generic term, *ʻōpelu* canoe. An *ʻōpelu* canoe could be of any size but has generally come to be identified with the once common broad, deep and strongly built twenty- to twenty-five-foot fishing canoe. Besides its typically large volume, the most noticeable feature of this type of canoe was the thickness of its hull. It is not at all unusual even today to find the hull of an *ʻōpelu* canoe three to four inches thick on the bottom, thinning to one to two inches on the sides. According to canoe builder George Perry, some *ʻōpelu* canoes have the right half of their hull bottoms additionally thickened to compensate for the increased wear on that half of the hull bottom as it was dragged up or down the beach. Many larger fishing canoes were also massively constructed, assuring much greater durability and longevity than a more lightly constructed canoe. A thick-hulled fifty-foot fishing canoe weighed from six to twelve hundred pounds. Hull speed was sacrificed with such long and heavy canoes, though stability and especially carrying capacity were increased substantially.

Many fishing canoes were equipped with sails, which were used to get to and from the fishing grounds or for trolling. More often, though, one had to paddle one's own canoe for long distances almost daily. H. Waterhouse recounts in 1899 a bottom-fishing trip he took in a "low and narrow" three-man fishing canoe, "about twenty-five feet in length" that took two paddlers "an hour hard paddling . . . [one] kneeling down on his bare knees" to reach the fishing spot.

Strategies

Once at the fishing grounds the fisherman, frequently alone, often sculled *(hapuna* or *koali)* his canoe. This minimized movement and water disturbance that might have frightened the fish. Similarly, if a lone fisherman was fishing with one hand and had need to keep moving at the same time, "his left hand sculled *(koali)* the paddle inside the *ama*." Judging by the number of references, a lone fisherman was quite skilled at sculling indefinitely with one hand while fishing with the other hand, or even his feet. If the fisherman had need to see underwater, "he chewed *kukui* nut meat which he spewed upon the water." *Kukui* nut oil was, Kamakau went on to note, "his magnifying glass."

There is, however, an excellent fishing ground where no canoeing skills sufficed to keep a canoe in place. This location, at the very tip of South Point (Ka Lae) on the island of Hawai'i, has roughly eighty man-made "canoe holes," which may represent a unique response of fishermen to the combination of currents, swells, and depth of the ocean. These holes are spread along a hundred yards or so of coastline, with the majority clustered in a fifty-foot stretch. Most holes are of an hourglass form with the diameter at the narrowest point one to three or four inches and invariably uniformly smoothed. Typically, they are bored through a small outcropping or run at a forty-five degree angle through the edge of a jutting ledge. The majority of the holes are located right at the water's edge, though some are almost constantly under water and others as far inshore as forty to sixty feet from the mean high water line.

Informant Mrs. Emma Kauhane of Kaʻū said in 1948 that as a young girl she talked to Hawaiians living in the area who told her that "'Kamehameha with the help of his men made them.'" Hawaii's third Governor, Walter F. Frear, though he did not remember where he got his information, stated that the holes "dated from very ancient times." Kamakau notes that these were "holes which ships putting in at this place can tie up to and which are called 'The water dug by Kamehameha' *(Ka wai kuʻi a Kamehameha)*."

"Canoe holes" *were bored through the lava at South Point, Hawai'i, for tethering canoes. Line tied to these holes was paid out until the canoe drifted into position over the exceptionally rich ahi (yellowfin tuna) fishing ground, where the water was too deep for use of an anchor.*

It has been suggested by Kamakau that these holes were concentrated in this area so that a number of canoes could tie up and their occupants collectively engage in a search for a supposed nearby submarine source of fresh water. The explanation seems rather unlikely, as pre-contact Hawaiians knew well the areas where fresh water flowed out underwater. They were aware of a submarine source of fresh water just to the southeast of South Point; nor would they have bored the multiple small holes as part of an effort to tap the water on land. Furthermore, there was potable water available at Waiʻahukini, just minutes away by foot or canoe, and at "Ka-wai-a-ka-pala-hemo, a great deep pit in the basalt not far from South Point."

Aku, *skipjack tuna* (above), *were caught from canoes by trolling or by chumming with nehu or 'iao. Fishing implements such as nets, lines and traps were fashioned from plant materials, and hooks from wood, bone and shell* (right).

Much more likely is the explanation first put forth by one-time Kona minister Albert Baker in 1948. He notes of the area: "The ocean is rough to the east of the Point. It is calm near the shore on the west. These holes towards Kona a bit from the end of the Point were to tie canoes where the wind would swing them off to the junction of rough and calm water, for the best possible fishing."

It is a fact that the area directly off the tip of South Point provides some of the best fishing in the islands during certain times of the year. This is due to a confluence of ocean currents running several hundred yards off the tip of South Point that generates a localized sweep of water extremely rich in nutrients and thus marine life. These waters are a famous *'ahi ko'a* (yellow fin tuna) ground, where huge schools come to feed seasonally.

'Ahi were much prized by the Hawaiians, making this very narrow band of water, maybe a hundred yards from the canoe holes, a very important fishing ground. However, the ocean bottom only a hundred yards off shore was several hundred feet deep and the current fierce, absolutely prohibiting anchoring, even today. Fortuitously, a tethering point was available nearby at South Point's rocky tip, if one could devise some means of attachment. "Canoe holes" were the answer. Also working in the canoe fisherman's favor were the localized wind and sea conditions. Under typical trade wind conditions, if a line was tied to a canoe hole and paid out, the canoe would swing itself right into the sheer line of rough and calm water, with luck in the midst of the *'ahi ko'a*.

It has been suggested that "it is also possible that these holes were used to tie up canoes, not primarily for the purpose of fishing, but merely while the canoes were not being used." While this could have been the case, it seems unlikely for several reasons. Ka'alu'alu, a small nearby bay with a beach, was comparatively sheltered and offered unlimited canoe storage space; there was a canoe landing right at the tip of South Point; prolonged exposure to the elements and the constant washing about of the canoe would have shortened its lifespan considerably; and lastly, during a good part of the year surf and contrary storms turn the South Point area into one of the deadliest in the islands.

When fishing for *ulua* (jack crevalle), Kahaulelio notes "the canoe was rowed with the oars making it move noiselessly about." Fornander notes though that for certain types of *ulua*, "the canoe is paddled along, at the same time making a noise by striking the paddles against the canoe. The *ulua* hears it and follows the canoe, then the line and hook is payed out and the *ulua* is caught."

Trolling for *aku* (bonito), by comparison, required several fishermen either in a double canoe or a fairly fast single canoe. Corney described the trolling method of catching *aku, mahimahi* (dolphin), *ono* (wahoo) and other fish with similar feeding habits. "A canoe that pulls seven paddles goes to sea with two good fishermen, (besides the paddlers), each with a stout bamboo, about 20 feet long, a strong line made from the oorana [*olonā*], and about the size of a log-line, is affixed; the line is about three-quarters of the length of the pole, and has a pearl hook made fast to it. The canoe is then paddled very swiftly with the hooks towing on the surface of the water, one at each side, the fishermen holding the rod steady against their thigh, and the lower end resting in the bottom of the canoe; they steady the pole with one hand, and, with the other keep throwing water on the hook, and when their prey gets hooked, by lifting the pole upright the fish swings in, and is caught under the left arm and secured. In this manner they will take 40 or 50 in the course of a few hours." Kahaulelio noted that trolling "was very easy where it was windy because the sails of the canoe helped to carry it over the billows but in calm places one had to paddle till he was out of breath." Maintaining trolling speed was so demanding, Kahaulelio noted, that sometimes "the paddlers lost their tempers. All this could not be helped for that was the way it was done."

Another way of fishing, especially for *aku,* was to use a double canoe with a *malau* or baitwell. "The *malau* was two fathoms in length, eighteen inches, or half a yard high. It was wood below, with fine meshed mats on the sides and head boards in front and in back tied on securely." On occasion a *malau* was rigged under the *'iako* of a single canoe, but usually was slung between the two hulls of a double canoe. *'Iao* (silversides), *nehu* (anchovy), or sometimes small mullet were put into these *malau* or allowed "to swim about freely in the canoe in order to keep them healthy and alive all day long." When *aku* were sighted the bait fish were cast into the water in order to try and initiate a feeding frenzy. *Aku* would bite at a barbless hook as readily as at one of the small fish.

Kahaulelio notes that when fishing with a *malau* from a double canoe, "the single canoes did not come close. If they did, their fishing paraphernalia would be taken away from them for that was the law of *malau* fishing in ancient times. In these times [mid- to late 1800's] it would be disregarded and the sea behind would be white with canoes as the waves of Hai with foam. The *iao* fish bait was dipped up in a dipper and tossed out. Then the fishermen on both canoes began to fish, some on the right and the others on the left. The fish were like plovers caught in a snare for in one fishing, hundreds were caught." Kahaulelio said that his father and many others had given up fishing with a *malau* about 1848, "because it involved too much work in taking the *malau* filled with *iao* fish bait, from five to seven miles out, rowing a double canoe all the while." Though fishing activity declined significantly in the 1800's, double canoes, some even with a *malau,* were used, albeit with sail, up through the turn of the century, especially in the Hilo area.

Fornander described the strategy used in catching another variety of fish, the *mālolo* or flying fish. About thirty canoes would set out together. A net especially made to catch flying fish was part of the equipment. "Sometimes one canoe carries the net; sometimes five, and so on. The net canoe leads with six men aboard; the paddle-men are called 'flying-fish paddlers.' Their canoes are paddled uniformly when encompassing (the fish) without one slacking backward; when near the net the canoes are backed, then the net is drawn in. There are two canoes allotted for receiving the fish, a younger canoe and an elder canoe. The younger canoe is the one belonging to the net owner; the elder canoe is that belonging to the paddle men."

One of the most unusual forms of fishing was for a particular species of allegedly very fierce shark, the *niuhi*. Author Emma Nakuina reports that this is a rare shark, which in the night "can be seen a long way off by the bright greenish light of its eyeballs. These sharks will attack the largest of double canoes." Two Hawaiian informants of Margaret Titcomb similarly reported that "if a glow in the water is seen at night it is wisest to stop fishing and go home for the fishing is spoiled by the presence of this shark and it is dangerous to be near as the shark may attack the canoe."

Nakuina describes how this ferocious shark was supposed to have been caught. "The common kind of shark was formerly caught in vast quantities, and the liver, with a little of the flesh, was wrapped in *ti* leaves and baked under ground. Then from fifty to a hundred of the largest single and double canoes, loaded with baked meat and large quantities of the pounded roots of *awa* mixed with a little water, and contained in large gourds, set out to catch the *niuhi*.

"The fleet would sail many miles out to sea in the direction in which the *niuhi* was known frequently to appear. Arrived at a comparatively shallow place, the canoe containing the head fisherman and the priest and sorcerer, who was supposed to be indispensable, would cast another [sic], meat and baked liver would be thrown overboard, a few bundles at a time to attract sharks. After a few days the grease and scent of cooked meats would spread through the water many miles in radius. The *niuhi* would almost always make its appearance after the third or fourth day, when bundles of the baked meats were thrown as fast as it could swallow them. After a while it would get comparatively tame and would come up to one or other of the canoes to be fed. Bundles of the liver with the pounded *awa* would be given to it, when it would become not only satiated but also stupefied with *awa*, and a noose was then slipped over its head, and the fleet raised anchor and set sail for home, the shark following a willing prisoner, the people of the nearest canoes taking care to feed it on the same mixture from time to time.

"It was led right into shallow water till it was stranded and then killed. Every part of its bones and skin was supposed to confer unflinching bravery on the possessor. The actual captor, that is, the one who slipped the noose over the *niuhi's* head would also, ever after, be always victorious."

All fishing, but especially canoe fishing, was attended with many rituals and observations. Important among these were the seasonal restrictions on fishing for certain species. Kamakau reports that "during the months that the *hau* branch was posted, it was tabu for canoes to go out fishing." Offending fishermen paid with their lives. Well into the 1800's fishermen caught fishing during tabu times, in an area off-limits or taking prohibited species were subject, by order of the King, to heavy fines.

When getting ready for fishing, Kahaulelio notes, "some fishermen observed the strictest *kapu(s)* . . . in the preparing of the canoe." Fishermen traditionally made an offering at a fishing shrine, *kū'ula,* before and/or after a canoe fishing expedition, to keep *Kū'ula kai,* the god of fishing, and their own personal *'aumākua* happy. The first fish caught was usually part of this offering.

Dreams even entered the picture. Dreaming about certain fish was a good omen while "if one dreamt of a canoe during the night, he went home empty handed."

If many fish were caught, it was the custom in many areas of Hawai'i to strike a paddle against the side of the hull to notify fellow villagers that fishing had been successful. Menzies observed that "when the fishing canoes came into the bay in the evening, we had an opportunity of observing their manner of traffic with one another, as the whole village and people even from other villages flocked about them and a brisk market was kept up till they disposed of all their fish for small nails and bits of iron, and sometimes we observed that they drove very hard bargains."

Three-board canoe fleets *by the 1940's had largely replaced the koa fishing canoes that had once lined the shores of such fishing villages as Miloli'i* (above) *on the island of Hawai'i. Fishermen leave Miloli'i to fish for opelu in the traditional manner* (below) *in a canoe having some not-so-traditional features–steel pipe for 'iako, chain plates and screws for rigging, and a 40-horse outboard.*

13
WAR

You must have a large canoe
A small canoe, a long canoe
And a short canoe
Before you come and make war on Kaua'i

Peleleu

"There were also a number of large double war canoes building under thatched houses, said to be for the invasion of Attoi (Kauai), which had been several years since they were begun; the largest one seventy feet in length, six feet in depth and each canoe about two feet wide, lashed together about five feet apart. . . The sides of the canoes tumble in like a ship of war." Such were the observations of Ebenezer Townsend who in August of 1798 visited a navy yard at Kealakekua, one of several on the island. The canoes he saw were *peleleu,* "monstrosities, not belonging fully to the Hawaiian on whose soil they were made, nor to the white men who, no doubt, lent a hand and had a voice in their making and planning."

Peleleu was the name given to very deep, wide and unusually large war canoes that Kamehameha I had begun building in 1796 for his conquest of Kaua'i. Kamehameha reportedly had hundreds of canoe builders working on his war fleet, which consisted primarily of traditionally designed canoes as well as a few *peleleu* and European-style vessels.

The canoe name *peleleu* did not appear to be known until applied to this new type of oversized war canoe. Kamakau reports that the "*peleleu* canoes were large single canoes lashed together a little apart like a double canoe, but with a covered platform at the stern to make them more seaworthy, and equipped with mast *(kia),* mainsail *pe'a ihu)* and jib *(kiakahi)* like a sloop. (Kamehameha's two *peleleu* canoes were said to have been called *Ka-'aha* and *Ka-ihu*)." *Peleleu* were indeed rigged with some form of European-type sail, typically a schooner rig with or without jib. Emerson reports that at least one *peleleu* had a "regular rudder" as part of its steering arrangement. Malo says *peleleu* "were excellent craft and carried a great deal of freight. The after part of these crafts were similar in construction to an ordinary vessel (i.e. was decked over)."

Emerson interviewed a number of Hawaiian informants during the late 1800's who had either seen or ridden in a *peleleu* canoe in their younger years. From these various, mostly firsthand accounts, it is possible to reconstruct a reasonably accurate picture of the *peleleu* canoe.

By all accounts the enormous *koa* trees required for canoes as capacious as the *peleleu* grew in the forests of Hilo, Ka'ū, and South Kona. One informant noted that "Hilo had the largest *koa* trees, next to them in size were those of Kau."

The exterior design features and lines of the *peleleu* were basically Hawaiian; parts of the interior of the canoe and the superstructure appear to have displayed some quasi-western features. As Malo mentions, more of the opening of the canoe was decked over than usual, ostensibly for increased seaworthiness. For a double *peleleu* a substantial platform, often covered, was built and a form of false bottom *('ūlili wāwae)* was added. Their sides were unusually thick.

It has been assumed that most *peleleu* were double canoes, though accounts indicate the opposite. According to several of Emerson's informants, most were rigged as single canoes. Single or double, they all had extraordinary carrying capacity. "So great was the size of these canoes," notes Emerson, "and such their depth from the gunwale down, that flooring ['ūlili] had to be made on which the paddlemen might stand, or rest their feet while sitting on the usual paddlers seats. This flooring rested on a row of brackets *(pepeiao)* similar to those by which the seats themselves were supported."

Reports of the number of warriors various *peleleu* could carry range from fifty to one hundred and sixty. One account of a single *peleleu* eighty-eight feet long, mentions seating for eighty paddlers. While this might seem to be a large number of paddlers to accommodate, sitting two abreast with about one and one half feet between each seat would allow such a number of paddlers. Given the consistency of many of the reports, it is safe to assume that some double canoes carried well over one hundred warriors both paddling and on the platform.

There seems to be some misunderstanding among late nineteenth century observers as to what a *peleleu* canoe actually was and which canoes were *peleleu.* Fornander says Kamehameha built nine hundred and sixty *peleleu* in twelve years prior to his gaining supreme power on the island of Hawai'i in 1791. Kamakau states that eight hundred *peleleu* were constructed as the fleet for the second attempt to conquer Kaua'i. Kuykendall calls this number "hardly credible" and Emerson comments that the *peleleu* were "probably less than twenty and likely much fewer." All sources except for Fornander agree that the *peleleu* were built for Kamehameha I, beginning in 1796 and ending in 1801 when the fleet sailed. The great numbers of *peleleu* reported by Kamakau, Fornander and others may have been due to a misconception of what defined this particular type of canoe, or to their lack of understanding of the difficulties in constructing them. By all accounts *peleleu* were of such grandiose proportions that *koa* tree size alone would have severely restricted the number that could have been built. Furthermore, the time and resources needed to haul such enormous logs down from the forest and to construct canoes of this size were simply not sufficient in the short five-year period available to have permitted construction of hundreds of them.

Though Kamehameha's post-1800 fleet might indeed have been quite large, it is extremely unlikely that all were *peleleu* as some have asserted. More likely they failed to differentiate between the majority of his fleet, made up of conventional single and double canoes, and the extraordinarily large *peleleu,* apparently never built before or since. What seems to have happened is that, with the conspicuous addition of a few awesome and unique *peleleu* to Kamehameha's regular canoe navy, his fleet thereafter came to be loosely called the "*peleleu* fleet"—after its most notable members. This would account for the fact that among all the Hawaiian and western observers of the nineteenth century, very little mention is made of these unique behemoths, while many references are found to the everyday Hawaiian canoe.

Following are the known *peleleu* with brief descriptive data drawn from Emerson and his informants.

Peleleu Canoes

Ha-ulu-pe'e-lau — single *peleleu*; "It was made at Hilo and brought to Kawaihae. It was nine fathoms long, with one mast, and two men to a seat . . . informant heard that it went to Maui, but never to Oahu, and was broken up in 1828." (Kekukahiko, informant)

Hina-ka-pe-au — double *peleleu*; made at Hilo. (Pupule, informant)

Ka-'aha — single *peleleu*; originally a double canoe; hewn from *koa* at Piihonua, Hilo: "It was seventy-two feet long, and wide enough to accommodate three men on a seat; sufficient depth to hide a standing man; graceful; last seen at Kailua [Kona] 1853, 1854." (Po Kamaka, informant)

Ka-'ai-honu — double *peleleu*: "Sixty feet long, wide enough for two on a seat; the space between the two canoes was about twelve feet; [reportedly] 'made by foreigners'; it had two masts and a bowsprit, and was rigged as a schooner with cloth sails and a regular rudder. A portion of the space aft of the rear *iako* was decked over and had a house on it. In front of this was a *pola.* The rigging was by Olo-hana, father of John Young. It was broken up in the time of Kamehameha II at Kealakekua." (Manu-kahana-'ai-'ole and Pupule, informants)

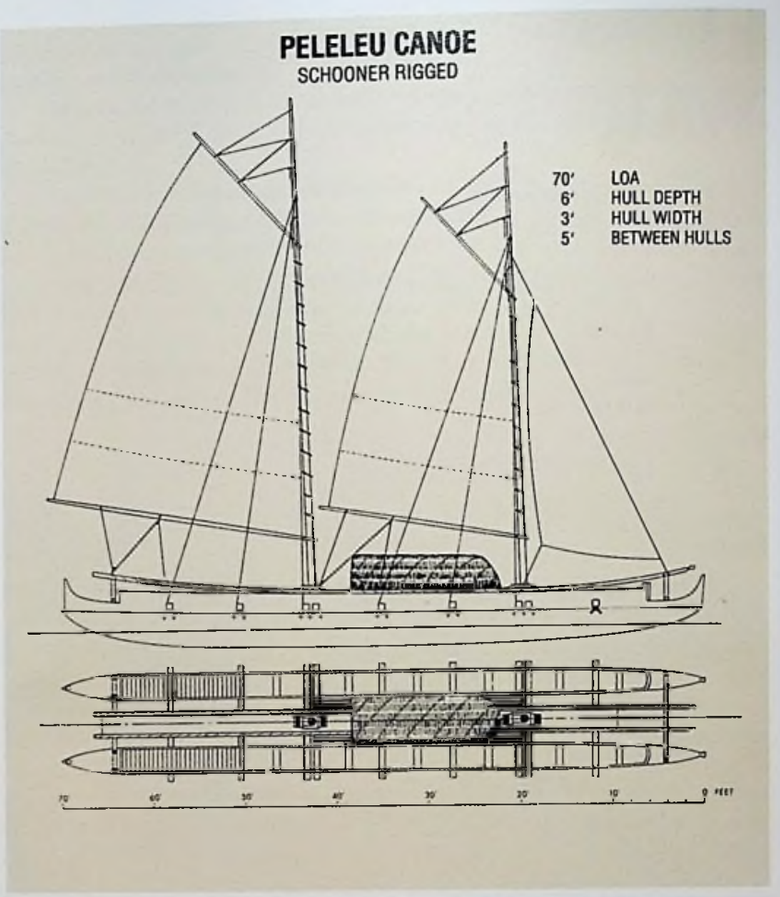
Ka-'eno-Kane — *pūkolu* (three-hulled) *peleleu*; schooner-rigged (Pupule, informant)

Ka-ihu-mau — single *peleleu*: "The length of the canoe is about sixty feet; depth about four or four and a half feet; width about the same. It is of *koa* from forests of Hilo. The *kuapo'i* is of *koa*; the *manu* and *moo* are of *ahakea.* The *iako* is of *hau,* the *ama* is of *wiliwili.* It was with Kamehameha on his voyages and went as far as Oahu." (Ka'aihulu, informant)

Ka-ihu-pekekue — single *peleleu*: "in 1854 or thereabouts I saw at Kailua, Kona, a peleleu hewn from the forests of Ka'u, one hundred and eight feet long. [Emerson thinks it might have been only sixty feet long.] It was about four feet wide, and about eighteen *kikoo* (handspan) in depth. Two men could sit abreast with room to spare, and there was accommodation for eighty paddlers. *Poupou* style (broad and dumpy), this canoe had a *kuapo'i* at both bow and stern. There was flooring called *ulili* for the feet of the men to rest upon. The lashing of the *ama* was the *pau o Luukia* [style]." (I and Po Kamaka, informants)

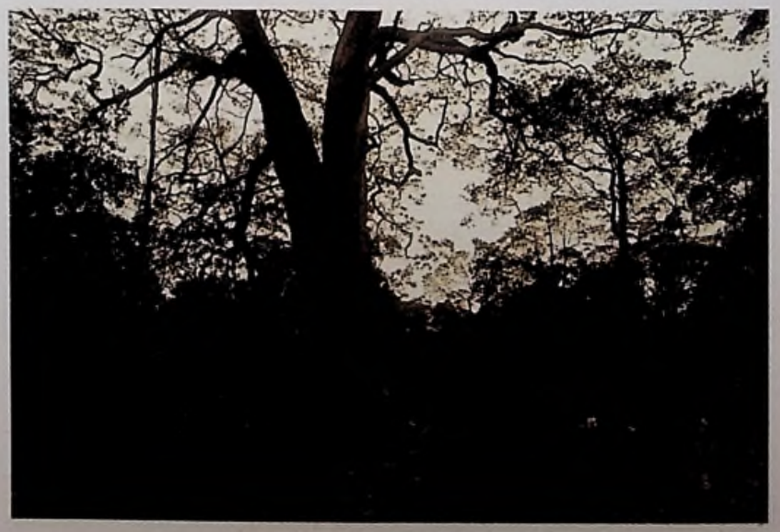
Pueo — double *peleleu*: "Seventy-two feet long; two men on a seat; had a very high *manu* and a big *moamoa.*" (Po Kamaka, informant)

Waipa — single *peleleu*; made from a huge *wiliwili*; named after the builder, a minor chief: "It was partly covered or decked over, but had no outrigger being kept upright by ballast. It had a single mast and sailed with Kamehameha's [I] fleet to Oahu." (Po Kamaka, informant)



Peleleu, *enormous war canoes unknown before the 1790's were often 5 to 6 feet deep and 3 to 4 feet wide* (above). *Many were rigged with sails of western design, and some were even equipped with a rudder.*

The world's largest koa tree (below), *though not the tallest, measures 12 feet in diameter and 37½ feet in circumference at breast height. It stands at Keauhou Ranch near Kilauea Volcano, Hawai'i, and is estimated to be 500 years old. Trees of this size were reportedly the source of hulls for the peleleu built for Kamehameha I at the close of the 18th century.*



In the 1870's Fornander reported seeing what undoubtedly was once a *peleleu* canoe. "Of the enormous size of the double canoes that were fashioned out of a single tree, some idea may be formed from a specimen still existing—at least it was a few years ago when the author visited the locality near the south point of Hawaii. It was said to have been one of a double canoe belonging to *Kamehameha I,* and it measured one hundred and eight feet in length. Its mate had decayed and disappeared and this giant relic of ancient ship building was also hastening to decay."

Kamakau, Emerson and I'i report that a particularly skilled and innovative Hawaiian boat builder constructed a vessel out of a single huge *wiliwili* tree in the manner of a European craft as his contribution to Kamehameha's war fleet of *peleleu.* Another enterprising canoe builder reportedly lashed three canoe hulls together to form what was called a *pūkolu.* It was not particularly successful, though it did apparently manage to negotiate the trip to O'ahu with the other *peleleu.*

For all the grand expectations, the career of the *peleleu* was short and less than illustrious. Moving slowly, "the fleet of *Peleleu* arrived at Kawaihae in 1801, at Lahaina in 1802, at Oahu in 1803." A cholera epidemic struck in 1804, wiping out many of Kamehameha's men. "The fleet never sailed. The expedition was called off, the dead were buried, and along the shore at Waikiki the war canoes were left to rot in the sun." Whether any of these rotting canoes were *peleleu* is not recorded, but of those that survived for a few decades, none were ever known to have been tested in battle.

A mock invasion, ***recreating the landing from Waikiki to Waialae of the war fleet of Kamehameha in 1795, was staged a little over a century later on Waikiki Beach.***

As is so often the case with war technology, the *peleleu* were obsolete almost before they were finished. *Peleleu* were too unwieldy and labor intensive to be practical for everyday use. As Emerson notes, "with the incoming of foreign methods of ship and boat building the old *peleleu,* with the enormous labor of hollowing it and of hauling it from the woods to the shore was abandoned and gradually allowed to fall into decay, or broken up to serve as material for numerous other purposes. Their sides which were of unusual thickness were sometimes fashioned into paddles, doors . . ." The last of these discarded hulks were seen as late as the 1870's.

Prior to and during the time of *peleleu* war canoes, virtually any conventional double or single canoe from 18 feet up to 70 feet that could be temporarily pressed into naval duty as a troop transport vessel served as a so-called "war canoe." Double canoes, as Hommon notes, though "less numerous than the outrigger canoes . . . were the most important vessels in inter-island warfare." Most chiefs kept a fleet of double canoes that in peace-time were used for fishing or other everyday chores, but which were acquired with the knowledge that they were indispensable to interisland warfare and could be used for local coastal troop movement. In 1793, an observer at Kealakekua reported being "shown one of his [Keeaumoku's] large war canoes, reckoned among the finest though not the longest, on the Island. It was like all the large canoes—double, neatly and handsomely finished, and did infinite credit to the workmen. Each separate canoe measured about sixty-five feet in length all one solid piece, form'd out of a tree. It had eight beams . . . was intended to carry fifty paddlers, twenty-five on each side, and I imagine between thirty and forty men on the platform."

Indeed, a major indication of the power and political influence of a chief was the number of double canoes in his possession or at his command, and the number of warriors he could conscript to fill them. Some of the more powerful chiefs, especially on Hawai'i, had a number of double canoes, typically sixty to seventy feet long. Double canoes had many times the space and carrying capacity of all but the largest single canoes, making them very practical troop transports. Fornander recounts that, "it is credibly reported by some of the old natives, whose grandparents lived at the time and saw it, that the principal war-canoe, or admiral's ship, of *Peleioholani*—the famous warrior-king of Oahu, who died about eight years before the arrival of Captain Cook—was a double canoe . . . its name was *'Kaneaaiai'* and that on *Peleioholani's* expeditions it carried on board from one hundred and twenty to one hundred and forty men, besides provisions . . ."

Fleets and Battles

Except for very rare naval engagements, a "war canoe" was a naval vessel only to the extent that it provided transportation for warriors who did their fighting on land. And with the endless designs of the chiefs to subjugate the people of neighboring islands, interisland military expeditions were sizeable and according to Fornander, "not at all uncommon in those days [pre-contact], and undertaken as much for the purpose of keeping his warriors and fleet in practice and acquiring renown for himself as with a view of obtaining territorial additions." At one point Kamehameha was even contemplating the subjugation of Tahiti with his large army and fleet of canoes and brigs.

Fleet size and numbers of warriors were on occasion quite large. Fornander relates accounts, obviously exaggerated, of pre-contact fleets. On one occasion, Huaa, the king of Puna, and Kulukulua, king of Hilo, agreed to wage war on O'ahu. "As soon as they decided upon doing this they began to prepare about eight thousand canoes, and also got together a

very large body of men who were armed with all kinds of weapons, both large and small." On another occasion Fornander states that when Keawenui-a-'Umi set out to make war on Maui, "the canoes on this expedition were so many that [they] covered the ocean from Hawaii to Maui and the people used them as a road to cross over on. It is said in Hawaiian history that the number of canoes used in this expedition was the greatest known." On yet another occasion, Fornander recounts, "on this journey of Kamalalawalu's with his Maui men to Hawaii to fight, there were very many canoes. (It is said that the Alenuihaha channel was so covered from Maui to Kohala and Kawaihae that the waves and the sea were invisible.) When they landed at Kawaihae, the seashores were blockaded by the canoes . . . [between points] whose extent approximated thirty miles." Fornander notes of the last two accounts that, "allowing for exaggeration in both cases, it indicates the largeness of war fleets in those days."

A more realistic assessment of the numbers of canoes and men that were probably involved in eighteenth century war fleets of Hawaiian kings is seen in the following exercise from Hommon. "According to Rickman, . . . Kalaniopu'u arrived in Kealakekua Bay on 25, January, 1779 with 150 double canoes. The average range of all eight accounts given by eyewitnesses of the crew-size or capacity of double canoes (ignoring Bell's probable over-estimate of an 80- to 90-man capacity) is 35 to 39. If this range accurately reflects the average of a fully-loaded war-canoe, then Kalaniopu'u's contingent, returning from Maui, would have consisted of 5,250 to 5,850 men . . . Kalaniopu'u's mission on Maui in 1778–1779 seems to have been raiding rather than conquest. It is reasonable to suggest that, in a full-scale invasion of Maui, Kalaniopu'u's army could have matched that of Kamehameha some 17 years later since Samwell . . . notes an additional 150 double canoes, many 'with 30 or 40 men,' were in Kealakekua Bay nine days before Kalaniopu'u's arrival. The capacity of all 300 double canoes would have been between 10,500 and 11,700. In addition, there were 650 to 2,850 outrigger canoes in Kealakekua Bay when Cook arrived, and many, if not most of them were probably capable of negotiating the 'Alenuihaha Channel with a small group of warriors."

In 1791 the combined forces of the fleet of the kings of Maui (Kahekili) and Kaua'i (Kaeokulani) were said by American Captain Joseph Ingraham to number 20,000. This is the largest number of men ever attributed to a fleet by a westerner. The number of canoes was estimated at six hundred to seven hundred, the same number of canoes with which Kamehameha was reported to have threatened the schooner *Grace* a few months earlier.

The most famous armada was Kamehameha's "most formidable army of at least 10,000 warriors, with a fleet divided into four divisions, each consisting of three hundred canoes for the purpose of subjecting Waohoo and the intermediate Isles, Mowe, Ranai and Morotoi." Another description has the fleet with "1500 war canoes, about 10,000 men, 5,000 prime muskets . . . together with many swivels and cannons," while a second-hand account by a captain stopping by Kealakekua has the warriors numbered at 16,000. Kamakau indicates the immensity of this fleet when he describes the distances—a few miles in both cases—that it covered on the conquered shorelines. "In February, 1795, Kamehameha's fleet of war canoes landed at Lahaina, covering the sands along the coast from Launiupoko to Mala . . . at Waikiki . . . it covered the beaches from Wai'alae to Waikiki."

This fleet carried the soldiers of the most successful military campaign in Hawaiian history but its glory soon came to an end, as Kamakau remarks on the 1796 attempt to cross the Kaua'i Channel. "Towards midnight they put out to sea, intending to land at daylight in Puna harbor on Kauai, but in the midst of the Ka'ie'ie'waho channel the advance canoes

These masked paddlers, *depicted by Webber in 1779, display what may have been the ceremonial attire of some Hawaiian warriors. The early field sketch* (above) *was accurate in most details of construction, in contrast to the finished engraving* (below) *in which the number of paddlers was reduced and the proportions of the canoe altered.*

encountered the strong wind called *Kulepe* and were capsized. The canoes that went to their assistance were swamped, and all might have been wrecked on the coast of Kauai or carried out to sea by the current and lost had they not been near enough to Wai'anae to gain shelter." This fleet's successor, the ill-fated "*peleleu* fleet," is curiously unrecorded in first-hand accounts. Charles De Varigny reported in the 1850's that this fleet had 27 schooners armed with cannon and artillery, more than 500 war canoes and a gunboat carrying 20 cannon.

While canoes played an extremely important role in most military actions, naval battles seem to have been quite rare and generally impromptu, with only a few having been described in the traditional and early post-contact literature. Instead, notes Hommon, "most of the decisive battles were fought on land," due to the fact that "elaborate battle

etiquette" would have been impossible for the combatants to observe at sea. He notes additionally that "the territory held by an occupying army would have been more clearly delineated on the land than in the ocean . . . [and] that once the terrestrial territory had been annexed (or successfully defended), the adjacent portion of the ocean would have been included automatically in the acquisition." Furthermore, fighting on the ocean created a double jeopardy battle field. The ocean could be as much an enemy as one's opponents. Warriors might win the naval battle but lose the war to the sea. A victor whose canoes were badly damaged could be in a position not much better than that of the vanquished, with return to shore as difficult for the winner as for the loser. The ocean, great equalizer that it was, decreased the edge that a demonstrably more powerful warrior or army would have on land, while adding additional escape risks for the weaker party.

Ellis comments that "sometimes they engaged in fleets amounting to upwards of one hundred canoes on each side," though only three accounts of battles at sea are known. Fornander tells of one between Kekaulike of Maui and Alapa'inui of Hawai'i. "When his forces and fleet were ready, Kekaulike sailed for the Kona coast of Hawaii, where he harried and burned the coast villages. Alapai'inui was then in Kona, and, assembling a fleet of war canoes, he overtook Kekaulike at sea, fought a naval engagement, beat him, and drove him off."

Kamakau relates another incident at sea where Keawe-'opala vanquished some disgruntled chiefs "who were deprived of their lands murmured against him and put up a fight against him, among them some of his own relatives such as Ke'e-au-moku, Keawe-poepoe, and Ku-mai-ku; but because of the number of his supporters the battle went against them. This fight was called Kai-omo and Moku-kohekohe because the coast was so well defended that there was no place to land, and the battle had to be carried on at sea."

The most well-known naval battle, called Kepūwaha'ula'ula, was fought in 1791 offshore of Waipi'o Valley between Kamehameha's fleet and the combined fleets of Kahekili of O'ahu and Ka'eo of Kaua'i. Kuykendall relates how "embarking their warriors on a fleet of canoes, the two chieftains crossed over from Maui to the northern coast of Hawaii and committed serious depredations before Kamehameha could interpose to stop them. Realizing the seriousness of this invasion, animated as it was by a not unjustified desire for revenge and conquest, Kamehameha collected a large fleet, well manned, including double canoes armed with cannons, and the sloop, *Fair American;* he is said to have placed John Young and Isaac Davis in command of his artillery. The leeward kings also had cannons, and foreigners to handle them and when the two fleets came together not far from Waipio, Hawaii, the battle was long and sanguinary. It is celebrated in Hawaiian annals by the name Kepuwahaulaula ("red-mouthed gun"). Kamehameha was victorious."

The acquisition and installation of cannons on board double canoes was a most natural progression for the strategically minded chiefs. In the spring of 1789, only eleven years after contact, Kamehameha entreated Captain Douglas to give him a quantity of arms, ammunition and a swivel (cannon), for his canoe, noting that Portlock, Dixon and others had done the same for his enemies, Kahekili and Ka'eo. Accordingly, Captain Douglas "immediately ordered the carpenter on shore, to form a stage on one of the largest double canoes, to receive the swivel. In the afternoon of the following day (Thursday, March 3, 1789) the carpenter having finished the canoe, she was brought alongside the *Iphigenia* when the gun was mounted; but it was with great difficulty that the King could prevail on his people to keep their paddles in their hands while he discharged the piece."

Canoe Breakers *(Pōhaku Ku'i Wa'a)*

Prior to the use of cannons the most powerful weapons used during naval battles reportedly were stone canoe breakers. Those observed in the Bishop Museum and in private collections weigh between eleven and twenty-three pounds, "and all were of a relatively uniform rectangular and more often elliptical shape with a well-made and deep groove, completely encircling the middle of the long width." Unlike various anchors, the canoe breakers were all well formed from heavy and dense-grained basalt, no coincidence given their intended use.

They were apparently employed by tightly binding a rope around the middle and then hurling the stone at the enemies' canoe in an attempt to break the hull or outrigger assembly and, ultimately, to immobilize or sink the canoe. Bringham comments that canoe breakers were "swung in the powerful grasp of the Hawaiian chief much like the 'morning stars' of mediaeval warfare." Should the repeated hurling and retrieval of the canoe breaker do its intended damage, the combatants in the incapacitated canoe would be forced into the water or at least into a highly disadvantageous position.

Pukui and Elbert in their *Hawaiian Dictionary* list another unusual type of canoe breaker for which no other information is available—"*pohaku wāwāhi wa'a,* stone hammer used under water to break enemy canoe hulls in war."

Canoe breakers *of dense-grained basalt were grooved for attachment of a rope. During naval battles these breakers were said to be hurled at an enemy's canoe, retrieved, and thrown again.*

14
RACING CANOES

Ka-ena speeds along
A single canoe in the calm
The four hundred rays that dart from
The back of the sun sink down
In the sea of Lehua

Kaunakakai, Moloka'i, October 1976—the ocean is calm. A sleek, halfbreed canoe explodes from the starting line, easily outstrips the closest competition and handily wins the Moloka'i-O'ahu Canoe Race. The impact of this victory continues to be felt. Made and paddled by Tahitians, the canoe was experimental, a marriage of Tahitian and Hawaiian design elements. It appeared to be faster than any existing "traditional" Hawaiian racing canoe, at least under the relatively flatwater conditions on that day. The following year, in response to this victory, specifications defining a "Hawaiian canoe" were established to ensure that in future races, no canoe would have an unfair advantage.

Kialoa

Since this race in 1976, the criteria for defining a traditional Hawaiian racing canoe have been in question. These criteria are likely to be the subject of continued debate, for no racing canoes of ancient Hawai'i have survived. At best, drawings, references, and models collected by early European visitors only hint at what the racing canoe called *kialoa* or *kioloa* might have looked like. European descriptions were almost exclusively of ordinary outrigger canoes or of double canoes belonging to chiefs. Models that survive are notoriously inaccurate and confusing. There are no existing canoe hulls known to be of the *kialoa* class.

It seems unlikely that a *kialoa* would have been very different in design from an everyday Hawaiian canoe—even lee waters were often too rough for a *kialoa* to have been anything but a basically Hawaiian canoe. Although certain secondary design features, dimensional and weight factors, and especially fine construction could have distinguished it somewhat, all that can responsibly be done to define a *kialoa* is to reconstruct primary design criteria applicable to all Hawaiian canoes and then superimpose the very few known references to *kialoa,* which essentially deal with secondary design criteria.

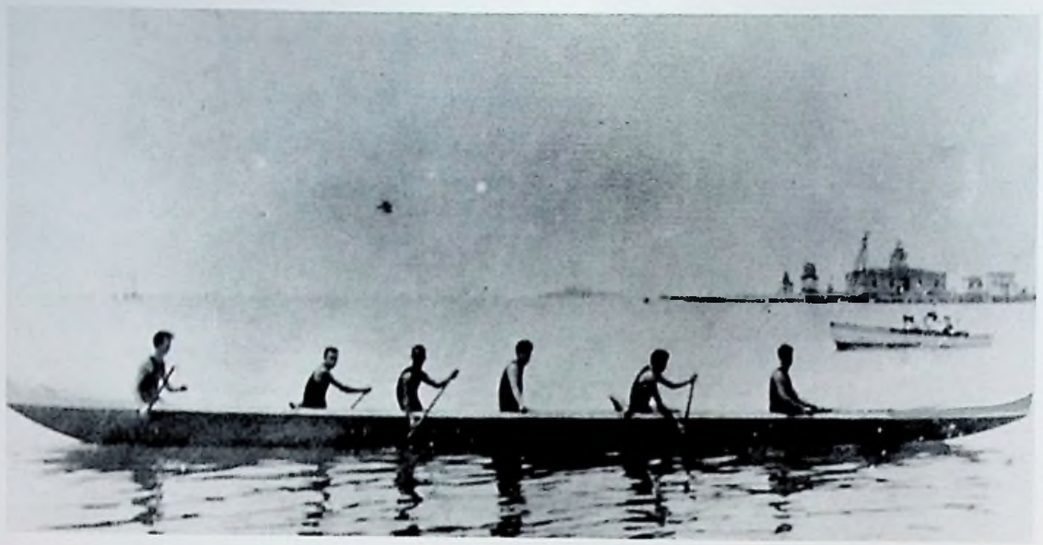
All the known specific references to or descriptions of the *kialoa* that could be located are given below:

> "a small, long beautiful canoe; a very small canoe in which only one man can sail; a very small handsome canoe" (Andrews: 1865)
>
> "small, narrow long beautiful canoe; a canoe for only one or two men; *he wa'a wiliwili* [a canoe of *wiliwili*], a canoe suitable for pleasure, fishing, racing, etc., sailing in still water" (Emerson: 1890's)
>
> "a light, swift canoe . . . with one or two men . . . first to the site of the fishing ground; a sailing canoe" (Kamakau: 1891)
>
> "a sharp and narrow canoe made expressly for racing" (Malo: 1903)
>
> "long canoe . . . sides not very high . . . used as a racer with sails . . . the sea did not dash over the floater" (Kalokuokamaile: 1922)
>
> "a long beautiful canoe" (Judd: 1927)
>
> "well-fitted for the use of one fisherman and for racing" (Degener: 1945)
>
> "long narrow racing canoe" (Buck: 1957)
>
> "long, light and swift canoe used for display and racing" (Pukui/Elbert: 1971)

Though *kialoa* and *kioloa* are considered interchangeable terms, Andrews makes a confusing distinction between the two, implying that they are two different types of canoes. Buck and Pukui-Elbert simply paraphrase Malo, shedding no new light on features special to a *kialoa.* Degener also draws on Malo, but expands his definition to suggest a *kialoa* was, besides a racing canoe, suited to and used as a one-man fishing canoe. Kamakau implies that *kialoa* was simply the name for a type of canoe that was light and swift, no matter what the use. The rest of the definitions speak for themselves. It is interesting to note that the *kialoa* was not always referred to as a racing canoe; if so defined, it was sometimes a sailing racing canoe, with no inference that it was a paddling racing canoe.

The upshot is that there is not even agreement on the definition of a *kialoa,* much less certainty as to a racing canoe's distinguishing or secondary characteristics. *Kialoa* by most accounts were one, two or at the most three-person canoes, although larger models were not unheard of. Malo says that "if the canoe was of the kind called *kioloa* (a sharp and narrow canoe, made expressly for racing) there might be but one man to paddle it, but if it was a large canoe, there might be two, three or a large number of paddlers, according to the size of the canoe." In all likelihood, *kialoa*-type canoes were long, low, thin-hulled, light, sleek and racy-looking, as most references imply. While such a definition is probably generally correct, one should note that this commonly accepted definition is almost always drawn entirely from Malo, a historian of uneven accuracy in such matters.

Most accounts suggest that the *kialoa* was as much for display as for racing. If this was the case, it is likely that only chiefs would have owned *kialoa,* for only a chief with his considerable resources could have afforded the luxury of a canoe that served only an aesthetic or recreational purpose.



The 'A, *built in 1902 for Prince Kuhio, was probably the first canoe built in historic times for racing. Regarded as the fastest canoe in the islands, it was used by a Kona paddling crew to win a famous series of races against a haole team between 1906 and 1910. It is shown here* (left) *in 1910 with the haole crew, who claimed that it was the 'A that enabled the Kona team to win and requested a rematch using their opponents' canoe. The haoles were again soundly defeated.*

The Malia, built in the early 1930's expressly for racing, is considered by many today to represent the prototype of the modern Hawaiian racing canoe (below).

There is, however, another possibility. A number of accounts by early European visitors indicate that at least some, if not many, everyday fishing and general utility canoes were of the *kialoa* description. Small canoes reported in burial caves further suggest that many of the one- to three-man everyday fishing or transport canoes in a Hawaiian community might have been far thinner-hulled, lighter, narrower, lower and finer than generally assumed. In other words, *kialoa* might well have been the generic term for any light, narrow, sleek and fast one- or two-man fishing or general utility canoe, a definition Kamakau would agree with.

Design

There is controvery surrounding several secondary design features that today are being ascribed to a *kialoa*. These include the degree of narrowness of the hull, amount of rocker, the straightness of the sides, flatness of the bottom, presence of a subtle keel or medial ridge in the hull, degree of fineness of the entry and exit, and the dimensional interrelationship of these features. In support of some fairly narrow (twelve-to-fifteen inch) hulls are a number of references to such widths by early Europeans. Contemporary racing canoes appear to have significantly less rocker and calabash and sometimes flatter bottoms than seen in old hulls, models and drawings. A subtle keel found in some old Hawaiian canoe hulls at the bow, sometimes the stern, and very occasionally seen running the whole length of the hull, is a secondary design feature that has come to be associated, rightly or wrongly, with a *kialoa*-type canoe. Similarly, a fine and narrow entry, as compared to the full, soft-rounded entry customarily associated with Hawaiian canoes, has come to be considered by many as a stock feature on a "traditional" *kialoa*.

A canoe with a subtle keel or medial ridge will anteriorly cleave and posteriorly break the water more easily, offering less resistance than the more typically Hawaiian rounded and fuller bow and stern. This generally results in a faster canoe, for, up to a point, the more pronounced the keel and the finer the entry, the faster a canoe should go. However, it will not perform quite as well in the turns as a round bottomed hull, as a hull with even a slight keel will have a greater tendency to track. Related questions are: how pronounced was the keel or medial ridge, for how much of the hull's length did it run, and was it of traditional or transitional (foreign) design?

Several six-man Hawaiian racing canoes in use today, built thirty or more years ago, display a medial ridge, usually incorporated in the first few feet of bow and sometimes the last few feet of stern. A quite distinct medial ridge is seen in the relatively short Dowsett and breadfruit canoes, which were described in Chapter 8. Both are manifestly Hawaiian as far as all primary design characteristics go, yet they are as different in appearance as night and day, with the exception of the medial ridge element in their hulls. Both hulls could be representative of pre-contact canoes, or more likely, examples of transitional canoe designs. Intriguingly, the canoe at the Bishop Museum, as seen in the diagram in Chapter 8, was said by owner Herbert Dowsett to have been an authentic and traditional Hawaiian two-man racing canoe. In that it is generally agreed upon that canoe hull design changed very little after contact until well into the 1900's, it could be argued that a varying degree of keel or medial ridge could have been one of several holdover secondary design features of a true *kialoa*.

It should be pointed out, though, that among the many small, light, and narrow canoe hulls used for burial canoes, most of which are apparently of pre-contact vintage, there is no reported evidence of any form of keel or medial ridge, however subtle. Likewise, the vast majority of other old Hawaiian canoes that have survived show no sign of a keel or medial ridge, nor an unusually fine or narrow entry.

It is clear that the *kialoa* canoes, reputedly so highly valued and coveted for their aesthetic value, would have performed admirably as racing canoes. A narrow, low-freeboarded canoe, with a thin, lightweight hull, would have made a fast canoe, well-suited for racing whether by paddle or sail.

Ellis says of canoes he observed in 1823 that they "appear eminently calculated for swiftness, being long, narrow, generally light, and drawing but little water . . . all the canoes of these islands are remarkably strong and neatly made."

As mentioned earlier, La Perouse weighed a rigged canoe at Mākena, Maui, that was some twenty-four feet long, twelve inches wide and about twelve inches deep, and found it to be no more than fifty pounds. Such a canoe must have been quite streamlined and very fast paddling. Other accounts by early European observers support the contention that there were canoes built expressly for speed.

Historic Racing Canoes

The canoes used for racing during the latter half of the nineteenth century and the first third of the twentieth century were ordinary fishing canoes, some of which also did surfing and transportation duty. Most were deep, wide, and heavy; many were stubby, usually in the twenty-five to thirty-five foot range, with a very pronounced rocker. Canoes considered best for racing during the late 1800's and early 1900's such as the *Hanakeoki,* the *Princess,* the *Kaimalino,* and the *Nihoa* are, by today's standards, of quite generous proportions. Some of the other canoes used for racing during that period were the *Leleaanae, Lihihilauakea, Ohuli, Malolo, Hokulele, Kala,* and *Puakauwahi.*

Many of the old guard canoes, such as the *Miss Veedol,* the *Honaunau,* Toots Minvielle's unnamed canoe, and the more recently (1930's) built *Ka Mōʻī,* were used in regattas and early Molokaʻi-Oʻahu canoe races as recently as the 1950's. Some of these canoes were not much more than 30 feet long and some weighed as much as seven hundred pounds. No one ever questioned whether an enormous surfing canoe like the *Ka Mōʻī,* or stocky little thirty foot all-purpose canoes like Toots' and the *Miss Veedol* would perform admirably as racing canoes. All did.

Early Hawaiian "racing canoes," if one can call them that, apparently came in a very wide range of shapes, sizes, and weights. It should be remembered too that in most instances canoe racing, from pre-contact times till as recently as the 1950's, was done in whatever canoe was available. This almost always meant common fishing or utility canoes, in which there was an enormous range in dimensions, secondary design features, weight and hull speeds. There is every indication that the ancient Hawaiian canoeist was very clear on the performance and thus racing merits of one canoe over another.

Lines drawings *of canoes* (pages 126–131) *illustrate some representative hull designs that have been used for Hawaiian canoe racing. From the earliest years of canoe racing until as late as the 1950's, surfing and fishing canoes like the Ka Moʻi and the Honaunau were used for racing. The ʻA was reportedly the earliest canoe built with racing in mind; the Malia, which remains a prototype for contemporary racing canoes, was among the first canoes built exclusively for the sport. A typical 6-man Tahitian lagoon racing canoe and a hypothetical Hawaiian canoe drawn to the optimum limits of the HCRA specifications are included for purposes of comparison.*

Charles Mokuohai, *one of the early builders of modern racing canoes, used metal adzes extensively to shape hulls during the 1940's and '50's.*

Probably the first six-man racing canoe built in historic times was the famous *A (A'a)*, finished in Kona in 1902 by Henry Weeks. Prince Kūhiō had commissioned Weeks to build the fastest racing canoe in the islands. It performed admirably, capturing for its Hawaiian crews a legendary series of races in 1906, 1907, 1908, and 1910. As can be seen in the drawing, the *A*, at six hundred and twenty pounds, was progressive for its day. Barring its weight, relatively high freeboard and generous rocker, it is not all that different from a contemporary Hawaiian *koa* racing canoe. The builder knew that while it had to be fast for paddling, it also had to be serviceable for fishing, sailing and surfing, in which it saw most of its use.

The first Hawaiian canoes constructed exclusively for racing were probably those built in South Kona beginning in the 1930's by a most unlikely and cosmopolitan group of Hawaiian, Japanese and Portuguese ancestry. James Yamasaki, Kyuhei Takimoto and Antone Grace starting in the 1930's, and later Charles Mokuohai, Frank Henriques and others, are for the most part responsible for the general form and design of most modern Hawaiian racing canoes. By most accounts this diverse collection of canoe builders settled somewhat arbitrarily on certain design, dimensional and weight features that they felt would make a sensible and fast six-man racing canoe. Not surprisingly this new generation of racing canoes—of which the *Malia, Kakina,* and *Leilani* were products—began displaying certain secondary design and dimensional features that today are taken for granted in a Hawaiian canoe built solely for paddling speed.

These canoe builders from Kona reportedly started by taking the lines and general characteristics of contemporary fishing canoes. They lengthened, lowered, narrowed and lightened the hulls. In further refining the hulls, they reduced much of the thickness, calabash, pronounced stern, and rocker that appropriately characterized most of the larger fishing canoes then in use. They gave a finer entry and exit to the bow and stern, respectively, and in some cases even incorporated a slight medial ridge, typically in the bow section. The result was essentially a streamlined six-man fishing canoe.

Most of the Hawaiian racing canoes built between 1940 and 1977 that are considered by many as authentically Hawaiian are, in fact, descendants of or influenced by the relatively modern dynasty of hybrid canoes conceived in the 1930's in Kona. While quite Hawaiian in design, it must be remembered that most of the Hawaiian racing canoes built from the 1930's until 1977, and in most cases still being built today, are strongly linked to the somewhat arbitrary canoe racing prototype developed in Kona. For the most part, pre-1930's canoes had few of the characteristics that are seen in racing canoes built after that time.

After almost forty years of unquestioning reproduction of the *Malia*-type Kona canoe, local Hawaiian canoeists, subsequent to exposure to Tahitian-type canoes, began experimenting in 1977 with some new designs. With few guidelines as to what defines a Hawaiian canoe, it has been difficult to say when certain racing canoes built in Hawai'i today depart from what is, or would have been, considered Hawaiian.

And therein lies the problem. At what point does too fine an entry or exit, too pronounced a keel, too narrow or flat-bottomed a hull, or too little rocker, mean a canoe is not of Hawaiian design? Did prehistoric Hawaiian canoes have the design elements that certain people today claim were present? Did the pre-contact Hawaiian ever strive to make the ultimate in a fast canoe? If so, would he have stayed well within primary and secondary Hawaiian canoe design criteria, as established today in building this fast canoe? Regretfully, the answers to these and other related questions do not exist.

There appears to be no question that a six-man canoe of unrestricted design at the required four hundred-pound minimum can be built that is faster than the fastest so-called "Hawaiian design" racing canoe, as defined in the rules of today's racing associations. And there is absolutely no question that one can build a standard "Hawaiian design" racing canoe far faster than any in existence simply by decreasing its weight from the current four hundred-pound minimum. Whether a faster four hundred-pound racing canoe of "Hawaiian design" can be built than already exists is more difficult to answer.

Canoes racing in the events sponsored by the various Hawaiian canoe racing associations must meet a number of established standards. Currently two less-than-satisfactory approaches are used by the various associations to establish standards: 1) design criteria based on measurements of existing Hawaiian racing canoes built before a certain date; and 2) design criteria based on traditional concepts of Hawaiian racing canoe design. In one racing association these criteria have been changed three times in four years, reflecting the problems associated with defining what constitutes a Hawaiian-design racing canoe. What can be done? There are no simple solutions. One association, in response to all the pressure and interest in building and racing faster canoes, has recently created an "open" division. Canoes in such a division have no hull design restrictions, but still have to be built within prescribed weight and length limits.

15
CANOE RACING

Then paddle fiercely!
Fly through the seas!
Plunge your paddles!

"There is always one wager, our bones. If we beat you, you forfeit your life to us, and if you should beat us, why we forfeit ours." This quote by Fornander is one of the very few references to canoe racing *(heihei wa'a)* in pre-contact Hawai'i. A competitor might wager his land, all of his possessions, his wife or even his life on the outcome of a canoe race. The most descriptive account of canoe racing in old Hawai'i comes from Malo: "The ancient Hawaiians were very fond of betting on a canoe-race. When they wished to indulge this passion, people selected a strong crew of men to pull their racing canoes. Each man then put up his bet on that crew which was in his opinion composed of the strongest canoe-paddlers, and, the betting being over, they started out for the race ... The racing canoes paddled far out to sea—some, however, staid close in to the land (to act as judges, or merely perhaps as spectators), and then they pulled for the land, and if they touched the beach at the same time it was a dead heat; but if a canoe reached the shore first it was the victor, and great would be the exultation of the men who won, and the sorrow of those who lost their property."

Another reference to canoe racing in ancient Hawai'i comes from Stewart Culin's 1899 publication, *Hawaiian Games*. "Two or more canoes race, usually out to sea, the course being a mile or a mile and a half out and around a flag buoy and return. The canoes are propelled with *kapa* sails." Though his account purportedly described pre-contact canoe racing, Culin appears to have mixed in a rather European feature—a flag buoy. His statement that the sails were of *kapa* is also questionable; *kapa* sails were reportedly only rarely employed, with *hala* being the traditional materials for sails. Westervelt also makes reference to the fact that, in pre-contact Hawai'i, a canoe race often involved use of a sail.

The inaccuracies in Culin's account are illustrative of the problems in evaluating any of the accounts of ancient canoe racing. Both Fornander and Malo, while serious scholars, made errors in some of their reporting, sometimes accepting informants' data without question. This is not to say that their accounts do not give an idea of the canoe racing scene in ancient Hawai'i. But it should be kept in mind that there is little hard data about canoe racing in pre-contact Hawai'i. Little of the format, frequency and popularity of canoe racing is known, though with the Hawaiians' love of games, and especially water sports, it undoubtedly took place.

From the sparse accounts available, some inferences regarding canoe racing in pre-contact Hawai'i can be made. Wagering on the outcome of a canoe race was an integral part of the sport, and for that matter, of just about all Hawaiian sports. I'i implies that canoe racing was an ancient sport when he says, "gambling was common in footracing, canoe racing, surfing, boxing, hand wrestling (*uma*), pulling with the fingers, wrestling, dragging a person, sliding, playing *puhene, puhenehene,* and *konane.*" Fornander even notes that with a canoe race "many people took the opportunity of offering wagers and accepting the same by the backers of either side." Canoe racing apparently was big business, complete with bookies. Racing for fun, without any betting, apparently was a rare occurrence. Notes I'i, "Betting became a pitfall for those who did not know the scheme secretly followed by the experienced bettors."

In ancient Hawai'i excelling at canoe racing was reputedly very important. Chiefs had champion paddlers who represented them in canoe races against would-be challengers, and there was always much incentive to win, for champion paddlers were customarily accorded special status and recognition in their districts.

Competing canoes were quite often of decidedly different dimensions and manned by an unequal number of paddlers. Fornander, especially, indicates that it was not uncommon to pit a single outrigger against a double canoe or a lone paddler in one outrigger against any number in another. He quotes a paddler from the crew of a chief named Kakuhihewa: "We were made bold to make a request for a canoe race with the king of Hawaii because we saw we have sixteen rowers [in their double canoe] while the king of Hawaii has but two." The double canoe with sixteen paddlers lost the race. While unthinkable within the context of present-day canoe racing, races in dissimilar-sized canoes with different numbers of paddlers were still taking place as late as the early 1900's.

Though there might well have been occasions when a number of canoes took part in a canoe race, it appears most races of old involved only two canoes. Races apparently could be either impromptu or pre-planned, usually from some point at sea to land, or on occasion from land out to sea and back to the same or some other point of land. It would also appear, the *kialoa* notwithstanding, that most canoe racing was done in everyday utility or fishing canoes that did occasional double duty as racing canoes.

Whatever form canoe racing took in ancient Hawai'i, it almost certainly never approximated a typical long-distance race or regatta scenario of today. Today's canoe racing formats represent a western institution overlayed on a very ancient pastime—canoe paddling. Beyond the act of paddling, ancient and modern canoe racing bear almost no resemblance to each other.

The Myrtle Boat Club, *formed in 1883, was the first of a number of boat clubs* **(above)** *that grew out of the increasing interest in barge racing, an activity that was to overshadow canoe racing for decades.*

Barges *were light, scull-type craft* **(left and below)** *that were propelled with oars by crews of from two to 14 persons. Their popularity was by no means restricted to westerners, with crews often composed of Hawaiians and even including members of the Royal Family.*

Honolulu Star-Bulletin

HILO PICKED TO WIN SENIOR BARGE RACE WEDNESDAY

"Wildcat" Deluna Is Awarded Decision Over Don Garcia

KIM WAI LEADS BAT SWINGERS IN MAJOR SET

THE MYRTLES SENIOR BARGE CREW

SPANIARD MAKES POOR SHOWING IN TIRESOME MAUL WITH FILIPINO

PEARL HARBOR RING NOTES

RED AND GOLD CREW GETS AN EDGE JULY 4

DRAGONS ON TOP AS FIELDERS IN BASEBALL RACE

SENIOR CREW OF HEALANI CLUB

PIRATES DIVIDE WITH MORAN MEN

LOS ANGELES IS ANXIOUS TO GET BOXE-JOHNNY GO

JUNIOR CREW OF THE MYRTLES

THE HEALANI'S JUNIOR CREW

The front page *of the sports section* (above) *of the Honolulu Star Bulletin for June 30, 1923, illustrates the immense popularity that barge racing once enjoyed, often dominating the sports headlines.*

Under King Kalākaua's reign, *water sports became tremendously popular in Hawai'i. Boat clubs, such as the Honolulu Yacht and Boat Club whose members are seen in this 1915 photograph* (below), *fielded crews for a wide variety of boating events in addition to barge racing.*

For canoe racing and many other traditional Hawaiian sports, the arrival of Captain Cook signaled the beginning of a long period of decline. Acculturation was shockingly swift. The venerable and vital canoe was often abandoned in favor of less practical, slower, and maladapted western-designed craft. In the process, canoe racing seems to have been one of the first traditional sports to nearly vanish as a result of the tumultuous invasion of European culture. What little enthusiasm for canoe racing that survived was effectively smothered by zealous missionaries to whom the gambling element, so much a part of a canoe race, was utterly sinful.

Early Regattas

In the classic colonial scenario, traditional activities and features of the local culture came to be viewed as crude, unsophisticated, and primitive, to be replaced by the more "progressive" ways of the uninvited guests. For the greater part of the nineteenth century and the first third of the twentieth century, canoe racing was displaced from its own waters. During this time, canoe races were little more than token events alongside barge, gig and other western racing craft.

Beginning in the early to middle 1800's "the captains of the whalers that harbored in Honolulu bay, appointed one day of the year when they manned their gigs and raced each other." With this start, "Honolulu began to organize and develop boating clubs. From all around the Pacific and even from Europe every kind of water racing craft was imported. Shells were secured from Oxford and Cambridge. Germany, America, China, and Australia contributed craft for water racing, and the sport grew until Kalakaua came to the throne."

The first recorded regatta date is thought to be May 20, 1859, when boat races were held in honor of the first birthday of the Prince of Hawai'i, son of Kamehameha IV and Queen Emma. After this regatta, but prior to Kalākaua's accession to the throne, "aquatic events were held at irregular intervals as holidays occasionally presented opportunities for holding races." In 1872 it was reported that "the regatta in the harbor drew a very large assemblage of people together, aquatic sports being always popular with the islanders."

In 1875, King Kalākaua, who was deeply interested in water sports, set aside his birthday, November 16th, as the date for an annual regatta. One report stated that "It was during the King's reign that aquatics came to the fore as a public sport. The King's patronage was the great impetus . . . The King's anniversary regattas were gotten up on a large scale. They included races for sailing craft, large and small; canoe races, both paddling and sailing; tugs-of-war; swimming races; diving contests; tub races; as well as many rowing races for boats of various classes from two-oared shore-boats to fourteen-oared cutters, including whale-boats and other ship's boats."

Also included were two-, six-, eight-, ten-, and fourteen-man barges, with both fixed or sliding seats, Canadian canoes, Japanese sampans, sea wrens and, "even tiny skipjacks that carry but a man apiece and look like children's toy barges." Most of these craft, of which Kalākaua owned a "fleet of various kinds," were built overseas—in the United States, Scotland, England, Australia, and even China. Later, excellent versions made of *koa* were built locally.

Even royalty got into the act. "At the 1879 regatta, which was held at Pearl Harbor, in an eight-oared race the crew coxswained by Princess Kekaulike defeated a crew coxswained by Princess Poomaikalani, and in another race boats were steered by Princess (afterwards Queen) Liliuokalani and by the King himself." Kalākaua's racing crews, invariably composed of Hawaiians, "were observed to spend more of their time in barges

than canoes." For a time, canoe paddling and sailing races, though typically among the regatta day events, were overshadowed by the greater interest in racing western-style boats.

Furnishing the crews for these colorful regatta events were a host of "chop suey" clubs that began coming into existence during Kalākaua's reign: the Myrtles in 1883; the Honolulus, the Kapiolanis and the Eclipse Club in 1884; the Knickerbockers in 1885; and the Healanis in 1890.

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In 1896 Representative A.G.M. Robertson, feeling, as a newspaper put it, that "there is not enough life and enterprising activity among young men in sporting matters as a general thing in Honolulu," secured passage of a bill in the Legislature that established the 3rd Saturday in September officially as 'Regatta Day.' Boat racing quickly regained popularity, fostered by the creation of the Hawaiian Rowing Association that same year. This was the first organization to promote and conduct boat racing of any kind in Hawai'i—in this case barges and other western-style craft. The year 1896 also saw the introduction of "shells" to Hawai'i. These were raced in Pearl Harbor quite regularly until 1906, when interest fell off due to the "heavy expense attached to the training of crews away from the city."

In the early 1900's two women's clubs, the Honolulu Girls and the Kunalus, began entering the rowing competition, making Hawai'i "one of the very few places in the United States where girl crews compete in the same type of boat that the men crews use."

In 1916 a crew from Hilo became the first from a neighbor island location to enter the rowing competition. In 1917 Hilo began sponsoring annual 4th of July regattas in its home harbor. In 1926 Kaua'i fielded its first crew. During the early 1900's regatta events mostly comprised various barge and gig races, generally six-man in senior, junior, intermediate, freshman, "kid," and novice divisions.

A typical course distance for a senior six-man barge race was about three and a half miles around a buoy, with times averaging twenty-two to twenty-five minutes, slightly faster than what six-man racing canoes do today. By way of an interesting speed comparison, it was said of the Japanese fishermen who raced in their sampans "that a single powerful Japanese can send a fair sized sampan skimming over the water at a rate that sometimes six strong man-o'-warsmen with their oars and a good gig can not equal."

In 1930 it was reported that "the fortunes of rowing in Hawaii have been as changeable as the fortunes of the islands themselves and this year finds an alarming element of competition from other sports, football particularly, which is tending to squeeze Regatta Day from its throne." Rowing did survive, albeit in a much-reduced form. Barring the war year of 1918, Regatta Day was held every year at Honolulu Harbor, moving in 1937 to the Ala Wai Canal for the first time. However, the tides of change and the onset of World War II finally proved too much. These once immensely popular yet always incongruous rowing races and other European aquatic events were held for the last time in Hawai'i in 1941. Only the Healani Club competed in barges amongst themselves after the war until 1949, when even they finally gave up.

What of the canoe paddling and sailing races over the last one hundred and twenty years? Actually very little is known of canoe racing prior to the early 1900's. From 1875 until 1933, the first year canoes had their own regatta, canoe events as part of Regatta Day were usually confined to a senior men's six-paddle race and a sailing canoe race. Sometimes a women's event was added. And though the canoe events on Regatta Day were not considered as prestigious as the various races in barges, gigs and similar craft, there was at least great interest among many Hawaiians.

In 1949 Regatta Day, which had been regularly observed in one form or another since 1896, was undone by the Territorial Legislature—wiped off the books. That the events in these colorful catchall regattas of the late 1800's and early 1900's were western-oriented is indisputable; however, it was these same regattas that kept canoe racing and sailing alive in an era that saw many other facets of Hawaiian culture disappear.

Sail Racing

Virtually unknown today, canoe sailing races once shared equal billing with canoe paddling races and were traditionally heavily wagered events. Of an 1896 regatta it was reported that "every native who could scare up a piece of rag as large as a handkerchief for a sail, entered his canoe in the sailing canoe race which was won by the canoe *Keiki* with the canoe *I* next." The next year it was reported that the "wind was poor for sailing and all but two of the crews paddled. The judges didn't like their activities, and the prizes were given to the two that 'came over the line sailing.' "

In almost all cases the same canoes that were used earlier the same day in the paddling race were later rigged for the sailing race. Famous paddling canoes, such as the *Princess* and the *Ka Mō'i,* which are still around today, once saw much action as sailing canoes. Usually the mast was stepped in the stern of the canoe. The sail rig in the 1800's was traditionally a form of gaff rig with the marconi and other often radical, if not peculiar, rigs beginning to make their appearances in the 1900's. Leeboards were usually not allowed, though most canoes had a 'hiking platform' extending from the starboard side. There were no restrictions as to the size or type of canoe, form of sail rig or number of crew members. First to cross the finish line won.

The 1930's saw several mini-regattas scheduled exclusively around canoe sailing races that were usually sponsored by wealthy patrons such as Doris Duke, Robert Shingle, Pualani Topping, and sometimes the Outrigger Canoe Club. Everybody who was anybody on the beach at Waikīkī participated in these extremely colorful and exciting sailing canoe races. In a typical 1935 race, "each canoe carried a guest (called 'commodore') of the Royal Hawaiian Hotel and the crews were (in order of finish); *Pua Ali'i:* commodore Tom Bragg, Duke Kahanamoku, Walter MacFarlane, J.D. Kaupiko, Jr., Bill Hollinger; *Center's-sailer* or *Lehua:* commodore Bob Topping, Sally Hale, Chick Daniels, Panama Dave; *Princess:* commodore Stanley, Dad Center, Miss Shields, Tommy Mullahey, Cedric Cook; *U'r Tellin' Me:* commodore Jack Briscoe, J.D. Kaupiko, Billy Mertens, Splash Lyons."

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Doris Duke, *tobacco heiress and patron of sailing-canoe races, waits with her crew* **(above right)** *for the start of a race in Waikiki in the 1930's. "Hiking boards" were lashed to the 'iako to enable crew members to shift their weight according to the tack.*

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The popularity of canoe sailing *races at Waikīkī* **(right)** *peaked during the 1930's gradually dying out altogether in the 1950's.*

Canoe races of the early 1900's, *while always competitive, were far more informal and less structured than races of today. Canoes in this race in Honolulu Harbor in 1928 not only differed markedly in weight and dimensions, but even had crews of different sizes.*

Pre-Modern Racing

Competing in a pre-1933 regatta canoe paddling event would be anywhere from two to ten entries. Canoes varied dramatically in size, weight and dimensions, and while most races were six-man events and later some four-man, it was not at all uncommon to race canoes manned with unequal numbers of paddlers.

Competing canoes were usually manned by friends of the owners of the canoe, often a "throw together" crew or an informal group from a particular locale, such as Waikīkī, Kaka'ako, Kalihi or Kona.

Until the turn of the century almost all canoe racing, both sailing and paddling, was confined to people of Hawaiian blood. Many Hawaiians also paddled barges, whale boats and other western craft. It was not until the year 1900 that *haoles* started paddling Hawaiian canoes. Beginners luck seemed to have been with them as they won the six-paddle event in Arthur M. Brown's canoe, *Alabama*. A newspaper reported that the group of Hawaiians paddling the *Kaka'ako* seemed "to have been under the spell of a *Kahuna* during the race."

The year 1906 is the earliest from which there is any substantial information on a canoe race. It was in that year's regatta that Prince Kuhio first sent down to Honolulu from Kona the *A*, or *A'a*, "claimed to have been the most perfectly built and fastest racing canoe in Hawaii." It was the start of an intense rivalry. The *A'a* with its all-Hawaiian crew narrowly beat another group of Hawaiians in the *Alabama* and a group of highly touted *haoles* in the *Hanakeoki*. In 1907, "the *haole* crew determined to wrest the territorial championship from the Kona crew. Ten thousand spectators lined Honolulu Harbor. The *A'a* [Kona crew] won by six lengths from the *Alabama* [*haole* crew] with the Kamehameha Aquatic Club's entry a poor third." In 1908, the *A'a*, with its Hawaiian crew, again won; in 1909, Prince Kuhio's crew did not make it to Honolulu, and in 1910 the vaunted Kona crew, captained by Manuia Manupau, came to Honolulu for the last time, again beating the *haoles*. The *haoles* felt, as Herbert Dowsett put it, "that it was the superiority of the *A'a* that beat them." So the Konans offered to trade canoes with the *haoles* and promptly beat them by an even wider margin than they had before. The next day the *Advertiser* wrote that "the *haoles* had no 'howl' coming yesterday . . . after it was all over they had to admit that the Hawaiians were too strong for them." Prince Kuhio was heard to kid the *haoles* after the race, "that they could take his canoe *A* down to Hawaii and race flying-fish until they worked up some speed." Thus ended one of the most legendary rivalries in the history of canoe racing. After this race in 1910, Prince Kuhio retired the *A'a* from racing, taking it back to Kona where he used it for sailing, surfing and fishing, a history typical of most 'racing canoes' of pre-modern times. In 1923 the *A'a* was given to the Bishop Museum, where it is displayed today as part of the Kapi'olani-Kalaniana'ole Collection.

Besides Regatta Day, there were events held sporadically at Waikīkī Beach in the early 1900's such as a Water Carnival in 1903 and 1905 and an aquatic regatta in 1907, "to be limited to Hawaiian aquatic sports: canoe racing, surf riding and surf steering contests between canoes."

With the formation of the Outrigger Canoe Club in 1908, recreational canoeing and canoe racing were given a shot in the arm. Founded for the purpose of fostering canoeing and surfing activities, the Outrigger began sponsoring periodic regattas almost from the day of its inception. While these regattas at Waikīkī had more canoeing events than any previous competitions including Regatta Day, the billing was still shared with surfing, paddleboarding, swimming and other events. In most years the Outrigger sponsored a 'Hawaiian Sports' regatta on Kamehameha Day and on the 4th of July.

Hui Nalu, also founded in 1908 primarily to encourage swimming competition, was by 1910 fielding canoe teams to compete with the Outrigger. Kamehameha Aquatic Club, which practiced from Kakakanalani Island in Kalihi Harbor, and later the Queen's Surfing Club also competed irregularly for a number of years with Hui Nalu and the Outrigger during the early 1900's.

John D. Kaupiko, one of the founding fathers of Hui Nalu and a legendary canoe paddling coach, noted that in the old days, "if we won we'd get some pineapples or maybe a chicken or a pig for a prize. That's

Manuia Manupau, *personal steersman* (above left) *of Prince Kuhio, captained the Prince's famous racing canoe, 'A, in a legendary series of canoe races. Manupau and his Hawaiian crew from Kona traveled to O'ahu, where they soundly defeated Honolulu's finest paddlers in 1907, 1908 and 1910.*

Fund-raising for canoe clubs *was probably never more imaginative than when, in 1914, the Hui Nalu Follies* (above right) *were created. They staged an elaborate performance to defray the costs of sending members of the Club's swimming team to the Pacific Coast Championships.*

how racing started." It apparently was not always that way, for another source states "in the olden days, it was the custom for winners of outrigger canoe races to receive cash prizes." Early Outrigger Canoe Club members were reportedly among the first to refuse cash in favor of medals, cups or other non-monetary awards.

Canoeing had expanded by the 1920's to include two-, four-, and six-person events, with women competing in only slightly fewer divisions than the men. When held at Waikīkī, canoe sailing and, less often, canoe surfing were also part of the day's competition.

But it would not be until July 22, 1933, at Nāpo'opo'o, Hawai'i that there would be a regatta solely devoted to canoe racing. Instrumental in organizing this regatta and those that followed were Duke Kahanamoku, Charles Amalu, Dad Center, John D. Kaupiko, Sr., David Kahanamoku, Commander Bailey, USCG, Paul Fagan, George I'i Brown, Dr. Albert Wall and Lorrin P. Thurston. Events were the men's junior and senior six- and four-paddle, boys sixteen and eighteen six-paddle, women's six-paddle, men's consolation six-paddle, and senior men's two-paddle. Clubs competing in this first all-canoe regatta and listed in order of overall finish were: 1) Outrigger Canoe Club; 2) Miloli'i; 3) Hui Nalu; 4) Queen's Surfers; 5) Hōnaunau; 6) Ho'okena; 7) Hilo; and 8) Kona.

The next year another canoe regatta was held at Nāpo'opo'o with some "20,000 startled spectators viewing the Kailua (Kona) outrigger paddlers decisively defeat all comers." And in 1935, "Julian Yates' persistent coaching of Hōnaunau's great collection of canoe crews" paid off, with Hōnaunau winning six of eight races. A new club of all-Japanese paddlers was a popular but hardly competitive addition to the 1935 regatta.

The last race of this series was moved to Honolulu Harbor and held on June 11, 1936, the *Advertiser* noting that "the Hawaiian Jubilee's greatest celebration of Kamehameha Day in the islands' history, reached its colorful climax in a brilliant and unique water pageant on the Ala Wai." Three additional clubs—from Kaua'i, from the University of Hawaii and Healani—participated in this final canoe regatta of the 1930's. Hōnaunau, under Yates' zealous coaching, again won the regatta with the most team points.

In response to this interest in canoe racing, the Hawaiian Canoe Paddling Association was formed at Lau Yee Chai in Waikīkī on June 4, 1936, specifically to foster and conduct canoe racing activities. In spite of this move, however, canoe racing entered an immediate and somewhat inexplicable period of decline after the 1936 canoe regatta. One reason according to an old timer "was that the Kona crews were 'too strong for the outside island crews.'"

From 1937 to 1943 there was only very limited and informal canoe racing competition. On July 4, 1943, the Outrigger Canoe Club held the first annual Walter T. MacFarlane Regatta at Waikīkī. Once again interest in canoe racing had been revived. One of the highlights of O'ahu's current racing schedule, the MacFarlane Regatta has become the oldest ongoing canoe racing event in Hawai'i.

But interest in canoeing was still limited, owing in part to the wartime situation. Competition at these early 4th of July races was limited to Hui Nalu, the Queen's Surfers, the Outrigger and an occasional 'throw together' crew. Interest in canoe racing began to pick up considerably in 1946, when a group of informally competing paddlers formed the Waikīkī Surf Club. Competition was still limited to the 4th of July and a newly added Kamehameha Day Regatta, with an occasional unscheduled event thrown in.

Modern Racing

At both their scheduled and unscheduled canoe races in the late 1940's, "various clubs competed against one another without benefit of a single written rule. Chaos and bitterness was often the result." In answer to this situation, and in response to the fear that interest in canoe racing might again ebb, the Hawaii Canoe Racing and Surfing Association

Canoes raced parallel to the beach *during the early years of the Walter T. MacFarlane Regatta* (above). *Of interest is the use of surfing canoes temporarily pressed into service for racing.*

A lavish array *of silver trophies* (below) *awaits the winners of the July 4th MacFarlane Regatta in 1946 at Waikīkī. First held in 1943, this is the oldest continuing canoe racing event.*

(HCRSA) was formed in 1950. Bill Capp, one of the founders of the HCRSA, recalls "it was apparent that it would be necessary to establish some kind of an association if canoe paddling was to be perpetuated in the islands." Capp drafted an initial constitution and a set of bylaws, and in May of 1950, three members from each canoe club met and elected Sam Fuller, President, Anthony Shim, Vice-President, Pat Olds, Treasurer, Rudy Choy, Secretary, and Sam Poepoe, Auditor.

Memories were fresh with the problems that attended many of the canoe races. Competition was intense. "I remember people hitting their paddles over other canoes and tipping over other boats," recalls Wally Froiseth of racing in the late 1940's. Prior to the HCRSA the few rules that had been tacitly agreed to often went unobserved, and HCRSA's new Board of Directors quickly set about addressing the problem of race rules.

In 1954 a standard minimum canoe weight of four hundred pounds was set, in response to complaints that racing canoes weighing between two hundred and fifty and three hundred pounds held an unfair advantage. The four-hundred-pound figure was arrived at by weighing the six-man *koa* racing canoes then active and settling on a round figure that most closely represented the cluster of canoe weights. It should be remembered that some of the canoes used in racing in the early 1950's were close to thirty-five feet long, for which a four-hundred-pound weight is quite reasonable. But four hundred pounds spread out over a forty-foot racing canoe means relatively thin hulls, probably much thinner than that of a pre-contact canoe of that length. Canoe builder George Perry feels that a slightly heavier minimum would eliminate a lot of the cracking and damage seen in contemporary racing canoes. Many of the problems that plagued canoe racing twenty-five to thirty years ago are still very much with us today.

In response to new problems, growing pains, and general disagreement, the bylaws and many of the race rules of the HCRSA were substantially rewritten in 1952, and have been continually modified ever since. While often accused of being too inflexible and narrow minded, an excellent case can nevertheless be made for the invaluable and vital role the HCRSA has played in the often stormy evolution of modern day Hawaiian canoe racing.

In the 1950's and 1960's the popularity of canoe racing grew slowly but steadily. The early 1970's saw an unprecedented surge of interest in canoe paddling, together with a certain amount of disaffection with some of the HCRA's (the "S" for surfing was dropped in the late 1950's) politics and what were felt by some to be overly restrictive rules and policies. In response the Hui Wa'a Surfing and Racing Association was formed in 1973. Its charter and bylaws were deliberately designed to be more liberal than the HCRA rules and requirements. Notably absent from the Hui Wa'a rules was the HCRA requirement that each competing club use a *koa* racing canoe in regattas. This HCRA requirement has much merit in that such a policy helps to perpetuate the *koa* racing canoe tradition; however, many new clubs simply found it impossible to obtain a log, much less come up with the money needed to purchase or construct such a canoe.

This is not to say that Hui Wa'a is not just as interested as the HCRA in perpetuating racing in traditional *koa* racing canoes; their decision to permit fiberglass canoes was rather a compromise to bring into canoeing many new paddlers and clubs that otherwise would have been excluded. Fortunately for Hui Wa'a, things have changed somewhat from those early days without *koa* canoes. Currently, a group of clubs are in the process of building a number of one-piece *koa* canoes. The logs were obtained from the Big Island in a cooperative effort. Some clubs are building their own canoes, others have retained expert builder Wright Bowman, Jr. to assist. Almost all the canoes are being built to what are generally considered

"traditional" Hawaiian design standards.

Reflecting the increased interest in canoe racing, Hui Wa'a, which started with only six clubs in 1973, had close to twenty in 1981. The HCRA started the 1970's with less than a dozen members, and now has over three times that many. As of 1981, there were about three dozen clubs on O'ahu, ten on Hawai'i, seven on Maui, four on Kaua'i, and three on Moloka'i, for a total of close to sixty clubs statewide, some more active than others.

In 1979, the HCRA went through a major restructuring, whereby the neighbor islands, which by then had grown to have more clubs collectively than O'ahu, received more representation. Each major neighbor island had its own island association running its competitions, and O'ahu was run by the HCRA. With the restructuring, O'ahu formed its own organization so that now the HCRA is solely responsible for establishing general regulations, but holds only one competition a year—the HCRA State Championships.

When the HCRA first formed in 1950, there were an estimated three hundred people directly involved in canoe racing. By 1960, there were some one thousand people participating, a number that grew to about fifteen hundred in 1970. In 1980 there were believed to be about five thousand people actively engaged in canoe paddling, either in regattas or long distance racing.

The number of regattas has grown from one or two a year for most of the first half of the twentieth century to a total of some three dozen a year statewide as canoeing moves into the 1980's. On almost any given weekend during June and July there will be at least two and sometimes three or four regattas going on somewhere in the state. Long distance races have become very popular in the last decade, increasing in number from a handful to over forty, including double hull, age group, and relay races.

At this writing there only are three "surf" regattas a year, all of which are held at Waikīkī Beach. These differ from the ordinary flat water summer regattas in that waves often must be negotiated either coming in, going out, or both. On a day with large surf there is much excitement; many waves are caught, but not without some spectacular "wipeouts" and swampings. A number of beautiful *koa* racing canoes have been heavily damaged over the years owing to the inexperience of the steersman, the capriciousness of the surf, or a combination of the two.

For lack of participants there were far fewer events in an early 1950's regatta than one of today. Typically there were senior four- and six-man, junior four- and six-man, freshman, novice, boys-under-seventeen and boys-under-thirteen divisions. Women paddled in the novice through senior events. In the late 1950's the four-man junior and senior events were dropped and boys under twelve and under fifteen were added. Until the late 1960's these twelve events remained the standard ones for regattas. By 1979, HCRA Championships had grown to twenty-seven events, including some "B" division races, mixed male and female races, masters' events, and a four-man once again. The participation of women has increased from a third of the events to almost half.

For the first few years after Hui Wa'a began in 1973, there was no regatta competition between the two associations. However, in 1976 such a competition started, and now the "State of Hawaii Championships" are expected to be a regular climax to the regatta season. HCRA, larger and older, has dominated these regattas, although Hui Wa'a crews have won a number of races over the years. Similarly, neighbor island clubs have in the last few years progressed to the point where they are very much in the running, especially Kai 'Ōpua from Kona and Hanalei from Kaua'i.

With all of the interest in canoe paddling during the last decade, a number of the local high schools, both public and private, began fielding crews and competing on a semi-regular basis in 1974. The first formal high school regatta was held in 1976. High-school paddling has been spearheaded by the Nā 'Ōpio Canoe Clubs Association headed by their coordinator Gardner Brown. Their season runs from January to March, and is flourishing, with about twenty schools and nine hundred paddlers competing statewide, primarily on O'ahu. At this writing, however, the State Department of Education does not include the sport in the curriculum.

Canoes paddlers and spectators *crowd Waikīkī Beach for an always popular "surf" regatta. During such regattas canoes paddle both out and in through the surf, resulting, especially when the waves are large, in some spectacular "wipeouts." Because of the long history of damage to koa canoes in these regattas, fiberglass models are now permitted, though some clubs will still race with their koa canoes.*

Canoe racing scenes *in Hawai'i* (left to right, from top): *the start of a regatta event at Nāwiliwili, Kaua'i; crew members rig a canoe; a prerace prayer and huddle; paddlers rejoice after winning their regatta event; punching through a wave at Waikīkī; crews turning on flags during 1981 State Championships at Lahaina; a race begins at the July 4th MacFarlane Regatta, 1981; youthful paddler after a race; carrying a canoe up the beach after a race; Honolulu Harbor regatta event; flower leis and head bands await paddlers at the end of a race.*

The Moloka'i-O'ahu Race

1939 was the first year that it was proposed that there be a canoe race from Moloka'i to O'ahu across the treacherous Ka'iwi, or Moloka'i Channel, a distance to Waikiki of roughly forty miles. "It can't be done! Crazy! Insane! Exceedingly dangerous! Too far! Impractical!" Such were the reactions to A. E. "Toots" Minvielle's call for an inter-island canoe race. Not even his own Outrigger Canoe Club supported him. From 1939 until 1952, Toots kept pushing the idea, undaunted. Finally in 1952 he managed to convince three crews to enter the first Moloka'i-O'ahu Canoe Race: The Waikiki Surf Club, the Hawaiian Surf Club, and Kukui o Lanikaula Canoe Club, a loose-knit group from Moloka'i. He also talked the Aloha Week Committee into helping sponsor the race, and Francis I'i Brown into putting up five hundred dollars for the winning crew.

But some people, in particular friends of the Moloka'i crew, still felt that this was a crazy idea and not worth the risk for five hundred dollars. The press reported that "some of their fellow Moloka'i citizens put up a purse of $600, which they offered these men not to race. These friends were fearful that they were taking dangerous chances and tried to dissuade them."

The spirited Moloka'i crew nevertheless opted to race, and the three canoes left from Kawakiu, according to the *Advertiser,* "under the worst of conditions. A fierce Kona wind blew ... and each canoe bucked a fearful surf getting out to the starting line."

Only one entry, Waikīkī Surf's thirty-nine-foot racing canoe *Malia,* had any semblance of a cover—a loose-fitting piece of canvas extending back only as far as the number two seat. The other two entries were barely thirty-foot-long surfing and fishing canoes turned temporarily into channel racing craft.

The Waikīkī Surf Club decided to use a "finned" *ama,* thinking it would aid them in their crossing. It didn't, and the problem was worsened by *'iako lama* lashings that kept working themselves loose. Twice the *ama* was retied, but the third time it came loose it could not be properly fixed, and the canoe finished the race with the *ama* lashed upside down.

Meanwhile, the crew from Moloka'i, who "sang the 'Hukilau' song, 'Kaimanahila' and 'Molokai Nui a Hina' when morale sagged," quietly passed Waikiki Surf Club, winning in a time of eight hours and fifty-five minutes. William Wainui, steersman, recalls that he had but two weeks previous steering experience. The paddlers—William Foster, Abe Bowman, William Ah Yee, Ulysses Puaa, and Charles Titcomb—were "stout-hearted older men, some of whom had never been in an outrigger canoe before." While inexperienced like Wainui, they actually had the benefit of a few days' familiarization and practice with a canoe before the race.

By today's standards, the first few years of the Moloka'i race were primitive. Crews raced in everything from hastily converted fishing canoes to bulky thirty-foot surfing canoes such as the *Malolo*, the *Veedol*, and Toots' canoe. Steamboat Mokuahi steered a crew in the famous 636-pound mini-battleship-*cum*-surfing-canoe-*cum*-racing-canoe, *Ka Mō'ī.*

The practice of changing paddlers, in which a tired paddler bails out of the canoe on the starboard side just as a relief paddler climbs into his seat from the port side while the canoe is on the run, evolved in the early years of the Moloka'i race. The first year there were no changes; the second year and for several years thereafter, two alternates were allowed; but once the alternate went in, that was it. The relieved paddlers could not go back in. Consequently, at least four of the paddlers ended up going the whole race without relief. This, while an improvement over no changes, still proved a little too grueling. Some clubs, however, ignored the alternate rule and chose to go the distance with the original starting six. In 1957 the use of three alternates and unlimited changes became, on authority of the race committee, standard practice in the Moloka'i race.

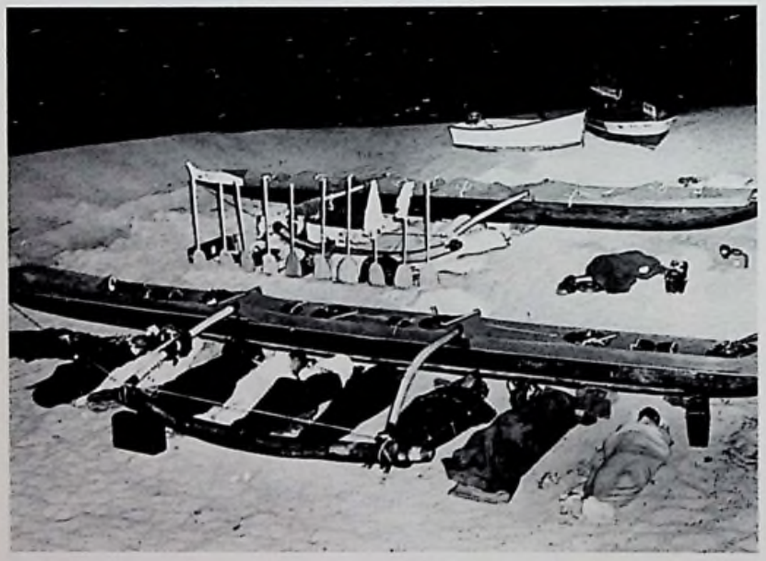
Today a highly specialized custom-made cover sewn from space-age fabrics is now taken for granted as part of a canoe's rig for an open ocean race. In the early years of the Moloka'i-O'ahu race, a controversy raged over whether a cover was an allowable canoe accessory or had historical precedence. Finally, after much bickering, Rudy Choy pointed out that David Malo and others spoke of the ancient use of *lauhala* mat covers *(pā'ū)* for canoes anticipating rough water or boarding seas. The matter was settled and covers have been a regular part of the canoe's rig since 1954.

Training for the Moloka'i-O'ahu Canoe Race during most of the first decade was relatively minimal by today's standards. Some of the clubs trained for a couple of weeks, but often many of the paddlers, especially those who came from "beachboy" ranks and did a fair amount of daily canoeing at Waikīkī, did not train at all. Those who did train did so modestly. Training in the manner that is done today was absolutely unheard of.

Until 1962, the Moloka'i-O'ahu race departed from Kawakiu on the northwestern tip of Moloka'i. However, serious and recurring problems with large and dangerous winter surf that often closed out the little bay, together with the growing logistical problems associated with the increasing number of entries and ill-equipped Kawakiu, prompted moving the race's starting point to Hale O Lono, a man-made harbor on the southwestern end of Moloka'i, about four miles shy of Lā'au Point. Twice since then the race has been run from Kaunakakai, fifteen miles up the coast. Over the years the race has started from these three different locations and has had no fewer than seven different finish points. It is therefore difficult to compare race times over the years. However, it is interesting to note that, given course length compensation, the fastest times have been on days when the ocean state and winds were light to moderate. This is in contrast to a rough day with large quartering and then following seas and strong following wind conditions, that some thought made for the fastest times.

Over the years, the Moloka'i-O'ahu Canoe Race has grown steadily in popularity and prestige; with only three entries in 1952, some forty-five crews finished the race in 1977. Crews from as far away as Japan, Canada, Tahiti, and California have all raced across the channel. No crew from outside the state gave the local clubs any competition until 1975, when a group of Tahitian canoe crews paddled for the first time ever in the Moloka'i race. Discounted as a real threat by the other competitors, they lost by the narrowest margin, coming in second, fourth, and eighth. This was an incredible performance, given their lack of familiarity with Hawaiian canoes, changes, rough-water steering, and the course. The following year twelve Tahitian crews returned, walking away with the race as they took the first four places and seven of the top ten. Hawaiian canoe paddling was in turmoil; an era had ended.

It gradually became clear to Hawaiian canoe paddlers that the traditional and time-honored Hawaiian canoe paddling techniques, equipment design, and training methods were not "state of the art." A totally unexpected win in 1978, three years after the first Tahitian onslaught, by a group of paddlers from California all but shattered those in the Hawaiian canoe paddling community who viewed Hawaiian canoeing as a Polynesian preserve. For a group of Mainland *haoles*, some with little Hawaiian canoeing experience, to defeat seasoned Hawaiian and Tahitian crews, some with more than one hundred and fifty years' combined experience in canoe paddling, was inconceivable. It was very healthy, nevertheless, and would prove to have a positive influence on the sport here.



Equally inconceivable to many die-hard male Hawaiian paddlers was the first Moloka'i-O'ahu race for women in 1975. The coming of age of the women has been one of the most impressive developments in Hawaiian canoe racing since the 1950's. No longer content to let the men alone savor the challenge and the anguish, the bittersweet thrill of long-distance open ocean racing, women in the mid-1970's began to create their own long-distance events. It wasn't easy, though, for in one of the fallacies attached to canoe paddling, most men in Hawai'i had convinced themselves—and had tried to convince the women—that long-distance canoeing was an arena for men, and men only.

A number of "upstart" women had a difficult time accepting a secondary role, refusing to consider the men's less than convincing reasons for their restriction to the more "suitable" regatta events. In 1974 a long-distance women's canoeing event was held for the first time: the Dad Center Race from Portlock to Waikīkī. The following year there was added a women's long-distance event as part of the Lili'uokalani Labor Day race activities in Kona. Other long-distance women's events have been added to the racing schedules, so that they are now almost as common as men's.

In 1954, six women belonging to the Waikīkī Surf Club wanted to paddle the Moloka'i Channel, but they could not get any support and were not allowed by the Coast Guard to make the attempt. Finally in 1975 a group of women, some of whom had been pushing for years for a women's Moloka'i-O'ahu Canoe Race, organized a crossing limited to two canoes and two eighteen-woman crews with members from Healani Canoe Club in one canoe and a group of women from a number of different clubs in the other. While both crews made the crossing successfully, with Healani winning, the support from the male canoe community still did not materialize. Consequently, the women decided to forget about the men, and began laying plans for the first official women's Moloka'i-O'ahu race in 1979. With twelve to a crew, combining of clubs allowed, and months of training, seventeen crews entered this first Moloka'i-O'ahu women's race. The high finishing crews, albeit with three more paddlers, beat the times of some of the slower men's crews.

Thinking and experience have come a long way since 1952 when many were very skeptical whether even a six-man canoe would be able to safely make it across the Moloka'i Channel. In 1979, as part of the second annual Kayak race, the first one-man canoe race across the Moloka'i channel was held.

Ocean Racing

Much of what makes long-distance open ocean canoe racing so challenging are the numerous variables missing in a flat-water straight-line regatta race. Currents, surf and swell direction and conditions, tides,

Members of the Waikiki Surf Club *pause in mid-channel* **(above)** *to retie an experimental finned ama during the first Moloka'i-O'ahu canoe race in 1952. Canoe covers were crude or missing entirely in the early years of the race.*

Paddling crews sleep *on the beach at Kawākiu* **(middle)** *on the eve of the 1955 Moloka'i-O'ahu canoe race. The starting point for the race was later moved to Hale O Lono Harbor, a location more protected from the heavy winter surf.*

Fishing canoes *often did double duty as racing canoes in the early years of the sport; they could still be seen* **(below)** *as late as the 1950's, as shown here in the second year of the Moloka'i-O'ahu event.*

winds, canoe design, crew composition, and position relative to other canoes all bear upon which course to take, and which strategy to use. Often the fastest route between two points is not the shortest route, especially when crossing one of Hawaii's channels. A good steersman is essential and can sometimes, by wise course choice, guide a mediocre crew to a better performance than a recognizably superior crew with a mediocre steersman.

The greatest variable, though, is always the ocean itself. The Moloka'i Channel has claimed a number of canoes as victims over the years, with its most lethal toll in 1966. While estimates range on the wave size and wind speed in the channel that year, it is generally agreed that swells were twenty feet and larger, and winds were in the vicinity of thirty to thirty-five miles per hour. One canoe, the *'Uila,* was totally destroyed; a number of others seriously damaged.

Typically, it is equipment failure that spells doom. If a cover breaks, an *'iako* snaps or a crack develops, it becomes very difficult to repair or bail out the canoe and continue. Under rough conditions canoes commonly flip but can usually be bailed out again provided everything is intact. In particularly rough water a canoe may even flip over its *ama,* the outrigger dipping and submerging until the canoe turns over.

Since 1966, the number of long-distance canoe races in Hawai'i has grown steadily, and more are always being planned. Some of the better-known events and the years they began are: The Duke Kahanamoku Race between Kailua and Waikīkī (1966), the Wailua to Kalapaki "Ironman" Prince Kūhiō Race on Kaua'i (1969), and the Queen Lili'uokalani races in Kona (1972). The decade of the 1970's saw an unprecedented flurry of long-distance events, both on all the major islands and between them.

Judging from the history of canoe racing events, there appears to be a saturation point with regard to the number of long-distance events that can be held in a given year with adequate participation. The practicality and logistics of some long-distance races have also come to bear on an event's acceptability; therefore, certain races have persisted while others have been discontinued. A notable example of the latter was the challenging but impractical race around O'ahu, taking from two to three days.

Probably the longest non-stop distance race, held only once on a calm day in 1978, covered the seventy miles between Hana, Maui and 'Anaeho'omalu, Hawai'i. The longer crossing from O'ahu to Kaua'i has been made three times by four crews, but not under race conditions. A race across this channel has been considered, but has never materialized.

Hale O Lono, *Moloka'i* (above), *has for many years been the starting point for the Moloka'i-O'ahu canoe races.*

Relief paddlers in the water motion to the approaching steerswoman and paddlers during the 1981 Women's Moloka'i-O'ahu race (right).

Heavy seas during the Moloka'i-O'ahu race (below) *have extensively damaged canoes in some years.*

California Racing

For years the Moloka'i-O'ahu race was the only long-distance canoe race anywhere. In 1959 a second long-distance canoe race was founded in California, again by the irrepressible canoeist Toots Minvielle, after surmounting almost as many hurdles as he encountered in founding the Moloka'i race. The Catalina-to-Newport race was not only the first long-distance canoe race outside of Hawai'i, but the first pitting a California crew against a Hawaiian crew. Two canoes, the *Malia* and *Niuhi,* were taken to the Mainland, and the *Niuhi* loaned to the California paddlers. A third crew of Californians paddled unofficially in a cottonwood canoe owned by Loren Harrison. The *Malia* won the race in 1959, and until the race was discontinued, Hawai'i crews dominated. This was primarily because Hawaiian crews had an edge in experience and expertise, together with a commitment to the sport that had yet to develop with California crews. However, under the watchful eye of Noah Kalama, who helped form the Kalifornia Outrigger Association (KOA) in the late 1950's, and later his son, Ilima, interest in California in canoeing grew steadily, with

several clubs from California competing amongst themselves and sending occasional entries to the Moloka'i race beginning in 1959. Their performances in local races since 1975, including the reinstituted Catalina Race, together with their 1978 Moloka'i win are mute testimony to how far they have come.

An interesting sidelight of the first Catalina-to-Newport race in 1959 was the alleged pirating of a fiberglass plug of the *Malia*. This shell, reportedly taken without authorization while the *Malia* awaited shipment back to Hawai'i, was later made into a mold. From this mold, and the hulls that came from it, other molds were made. The majority of the fiberglass canoes in use in Hawai'i and California today have been made from these molds. Thus the *Malia* inadvertently sired a noble fleet of fiberglass-and-resin canoes. In 1963 fiberglass canoes were first allowed to officially enter the Moloka'i-Oahu Race, though in a separate division.

As of 1981 there were some 16 different canoe clubs in California, spread out from San Diego to Santa Barbara. Currently all canoe racing in California is done in the so-called *Malia* Division. All canoes must be of a *Malia* mold and, as in Hawai'i, weigh a minimum of 400 lbs. However a number of Californians, not content with the current Hawaiian restrictions on canoe design, have been successfully designing an 'open class' canoe with no design or weight restrictions. It is anticipated that this 'open class' will be an official division beginning in 1982.

Outrigger canoe racing has come so far so fast that it may someday grow from its position now as a minor, regional sport to one of international status. Toots Minvielle was probably the first to think along these lines, having founded his Hawai'i International Outrigger Canoe Association back in 1965. In 1978, groups from Tahiti, Hawai'i and California, together in Honolulu for the Moloka'i race, formed the World Outrigger Canoe Racing Association; however, like Toots' organization, it has remained dormant. Besides the clubs from the three main centers of paddling, crews from Canada and Japan have raced in Hawai'i with participation from Australia expected soon. This is a far cry from the eighteen nations needed to qualify for the ultimate in competition, the Olympic Games. Still, the potential is there for a sport that is similar to rowing, but is more diverse in its kind and number of events, age groupings, length of races and opportunities to race under different conditions. Whether the existing racing associations will band together to define and organize international competition, and what role Hawai'i will play in this, remains to be seen.

Strokes and Strategies

Canoe racing in Hawaii has in the last half of the 1970's gone through tumultuous change. From its resurgence around 1948 until 1974, canoe racing in Hawai'i, while experiencing a steady growth of interest, underwent relatively little change in overall style, or in specific techniques or equipment design. In 1974 virtually every club in Hawai'i was employing a so-called "Hawaiian stroke," with very little variation from club to club. Where the stroke and style came from, very few knew. For thirty years nobody seemed to question whether the style was in fact efficient or optimal for Hawaiian canoes and waters. This would change with the arrival of the Tahitians in 1975, as their Moloka'i Channel performances turned the Hawaiian canoe paddling community inside out.

Remains of the canoe Uila *washed ashore on Sandy beach several days after it was destroyed in swells exceeding 20 feet during the 1966 Moloka'i-O'ahu canoe race.*

That which is termed the "Hawaiian style" of paddling is in fact not classically Hawaiian at all, but rather a neo-traditional method of paddling. Unlike in Tahiti, canoe paddling in Hawai'i for most of the latter half of the nineteenth century and the first half of the twentieth century was a relatively rare pastime. People forget! The canoe paddling and steering skills that I'i, Malo, Emerson and others noted as having been religiously and pointedly taught in old Hawai'i came to lose their value; they were seldom practiced except by a few fishermen, and thus were not passed on.

The modern Hawaiian stroke is characterized by the long forward reach gained with extreme body bend (touching one's ribs to the gunwale is a good indicator), followed by a long smooth pull and drive backward, with the paddle stopping well behind the paddler at the finish of the stroke. Recovery begins to the rear of the paddler's seat, requiring a lengthy swing before the blade can be set again. Power comes from the whole body (back, legs and arms) and is distributed fairly evenly throughout the stroke. There is much body movement and lunging in a Hawaiian canoe—the kind of movement that would not be possible in the more delicate Tahitian craft. Because of the length of the stroke and the long recovery distance it is impossible to effectively sustain as high a stroke count as is possible with the much shorter Tahitian stroke. A typical regatta racing stroke count using the "Hawaiian style" of paddling will range from forty-four to sixty strokes per minute, compared to sixty to ninety strokes per minute in Tahitian regatta paddling.

In the late 1940's and early 1950's, progressive Waikīkī Surf Club members Wally Froiseth and George Downing, along with their fellow paddlers, took the basic style of paddling a Hawaiian surfing or fishing canoe, and, by analyzing, refining and stressing certain elements, adapted it to a racing situation. The process yielded some fairly innovative ideas. Other clubs and coaches were doing much the same thing. Out of this period of experimentation came the "Hawaiian style" of paddling as we know it today. Waikīkī Surf Club, with their depth of prior experience, essentially led this redevelopment, as their paddlers dominated the sport in the 1950's and early 1960's. Other clubs, with variations, followed Waikīkī Surf Club's style. By the mid-1960's, Waikīkī Surf Club had lost its dominance, but their "Hawaiian style" legacy carried on until the late 1970's.

The Tahitian style of paddling, unlike the Hawaiian, has apparently not changed significantly for as long as it can be traced. This is primarily because the Tahitian fishing and general utility canoe has remained in regular use right up to the present day. There was at least a certain amount of ethnic continuity with regard to this institution attendant to the Tahitian canoe. However, the Tahitians, too, have made and continue to make minor adaptations in their racing stroke so as to move their racing canoes with all possible speed.

In fact, the Tahitian approach to paddling a racing canoe is very much a function of their lightweight, low-freeboarded, easily tipped and high-speed canoes. The Tahitian stroke is characterized by a quick, powerful and short stroke through the water, with a minimum amount of body

Paddlers leap from a canoe *during a "change"* (right) *as relief paddlers climb in to take their places.*

A Healani Canoe Club *crew paddles through sloppy waters in the 1981 Kualoa-to-Hawai'i Kai canoe race* (below). *While 10 years ago most of the canoes in long distance events were koa, Healani is one of the few clubs today that uses koa canoes in open ocean races.*

The women's crew *of the Hanalei Canoe Club* (right) *works to keep their canoe from flipping in the unpredictable and challenging Moloka'i Channel.*

Hui Nalu paddlers *battle shoulder to shoulder* (below) *against the Lanikai Canoe Club just feet from the cliffs past Sandy Beach.*

movement that might upset the delicate balance of the craft. The paddle enters the water about eighteen to twenty-four inches in front of the knees, with the main power thrust in the first part of the stroke between the knee and the hip. Recovery begins at the hip with a sharp exit of the paddle from the water followed by a stab forward again to the starting position. While the stroke sounds sharp, quick and thus jerky, it is actually nowhere near as lunging or disruptive as the Hawaiian stroke.

Most of the power in a Tahitian stroke comes from the arms, shoulders, and upper torso of the paddler. Owing to the relatively short power application, it is of utmost importance to have precise timing and coordination of movement among crew members to make this stroke efficient and smooth, and to keep the canoe from swamping. With this refined and efficient stroke, the Tahitian paddler can sustain a stroke count between sixty and ninety strokes per minute for the length of the regatta race.

It is interesting to note that the paddling style of most old-time Hawaiian paddlers (those who paddled in the early 1900's) did not approximate the current "Hawaiian style." Their approach more closely resembled a semi-Tahitian style, featuring a relatively short stroke with little follow through. In fact, it is probable that the paddling style in pre-contact Hawai'i was similar in some respects to the style evidenced by the Tahitians today.

Since 1975 there has been endless discussion and conjecture concerning the alleged superiority of the Tahitian style of paddling over the Hawaiian style. Virtually all Hawaiian canoe clubs have experimented at some time or other with the Tahitian style of paddling. Some clubs initially complained that the integrity of the Hawaiian style of paddling was being threatened, but as has been explained, the concern is unwarranted. Some Hawaiian clubs, after experimenting with the Tahitian style, have come full circle and are now back to their familiar Hawaiian style. Other clubs have either selectively adopted elements of the Tahitian style, thereby developing a hybrid style, or have attempted to totally embrace the Tahitian approach. However, there is much more to Tahitian canoe paddling than meets the eye. Beyond the gross physical aspects of the Tahitian stroke, there is a complex and sophisticated structure of strategies, maneuvers, stroke tempos and styles that are far too subtle to be easily mastered. The lighter and faster Tahitian canoes combined with a free-for-all regatta racing format encourage their more complex strategies.

Actually there are endless variations on Hawaiian, Tahitian or any other type of stroke. The 1978 Moloka'i-O'ahu race winners, all hailing from California, took both Tahitian and Hawaiian paddling elements and successfully melded them with some sophisticated kayak and Olympic canoeing techniques. Which stroke is better is hard to say, for no one style has dominated. As theories, canoe types, paddles, ocean conditions, race rules and courses, and even body types of paddlers change, so will the style or combination of styles that is perceived of as optimum for the situation and time.

The status of paddling in Hawai'i at this point can probably best be described as transitional. One doubts whether in Hawai'i there will ever again be enough uniformity and uniqueness in paddling techniques to justify defining a new "Hawaiian Style". But certain things won't change. For all of its subtleties, paddling can be reduced to a few primary elements: it is a sport of strength, stamina, discipline and timing. There are no substitutes for the basics.

Canoe paddlers train *in the calm waters off Kailua Kona, once a center of canoe building. During the early 1900's, canoe racing was quite popular in the Kona area, as it is once again today.*

16
PETROGLYPHS

On a Lava plate, now hot, now cold;
Now 'tis a canoe full-rigged for sea;
There are seats at the bow, amidships, abaft . . .

Canoe petroglyphs seem relatively scarce in light of the importance of the canoe in Hawaiian culture. Sails, canoe paddles, paddlemen and a rare man with an adze are depicted, but are not plentiful except in small concentrations in certain areas. As with all petroglyphs, one must be guarded in interpreting the message and accuracy of those figures related to canoes.

Not surprisingly, almost every known canoe petroglyph is found on either Maui or Hawai'i, the two major canoe-building islands. Exceptions are the single canoe petroglyph units found at Luahiwa, Lāna'i, and at Keoneloa, Kaua'i. Most sail, paddle and paddleman petroglyphs are also found on Maui and Hawai'i. A smattering are found on the other islands, with Kaua'i having the only significant number of these petroglyphs, which are predominantly sails.

Their prehistoric origin almost certain, a number of the canoe and sail petroglyphs take on special importance as pieces of the jigsaw puzzle involved in reconstructing a pre-contact canoe. Many of the canoes and sails appear to be quite true to form. This contrasts with most petroglyphs that are stylized, symbolic, or otherwise inaccurate representations. One can see, with varying degrees of accuracy, many details in the different depictions—hull design, mounted sails with occasional shrouds and stays, banners, weather vanes, tassels, *'iako, ama,* double hulls, *manu,* and people.

It is particularly interesting that the largest aggregation of canoe petroglyphs is located on central Maui, a number of miles inland in two gulches. Archaeologist Robert Hommon observes that "the canoe petroglyphs in Kalialinui Gulch [Maui] are of high quality and demonstrate a knowledge of individual features of the Hawaiian canoe. For example, several of the canoes include graceful hulls with upturned ends and projections at the stern [*moamoa*] as well as well-carved sails with banners at the tips of the mast."

Inspection of the petroglyphs in Kalialinui Gulch shows over twenty single and four double canoes, both with and without sails. At the tributary Kaluapulani Gulch, ten double canoes indicate the work of someone familiar with canoes. In fact, Hommon notes that "the occurrence of these petroglyphs so far inland suggests that the artists may have been associated in some way with canoe-building . . . . It is possible that the Kalialinui shelters [nearby the petroglyphs] were used by canoe-makers transporting roughed-out canoe hulls from the forests to the shore." Such a hypothesis is not unreasonable in that extensive *koa* forests were once found in the uplands, not far from the site of the petroglyphs. Furthermore, Wailea, once a reputedly active canoe-making center, was on the shore below these sites. Natural caves and depressions in Kalialinui Gulch, many of which were made into improved shelters, might even have been habitations from which canoe builders commuted to the higher slopes where they were felling and rough hewing canoe logs. The area of the shelters and petroglyphs in Kalialinui Gulch would have afforded a warmer habitation site, because of lower elevation and good protection.

Whatever the scenario, the numerous and well-made Kalialinui and Kaluapulani single and double canoe petroglyphs give some interesting insights into hull design, sails and rigging, and the differing number of *'iako* used on double canoes. Allowing for the limitations of the medium, hulls and hulls with sail rigs tend to resemble drawings made by early European visitors to Hawai'i.

Of note is a well-made sail canoe petroglyph in Kalialinui Gulch that is upside-down. It is at about eye level on the cliff face. Why it was done this way and what it means, if anything, is unknown. One might conjecture that it is to indicate a swamped canoe. It is, as far as is known, the only upside-down canoe petroglyph.

The largest petroglyph field in the state is located at Pu'uloa, Hawai'i, with over 15,000 figures. This is over one hundred times the number of figures at the Kalialinui and Kaluapulani sites, yet there are only four known canoe petroglyphs. Only one is worthy of note. As can be seen in the accompanying photograph, this one exceptional unit clearly shows various features of a canoe's sail rig. The other canoes found in the Pu'uloa complex are either too obscure or lacking in detail to be of importance. Lone canoe petroglyphs are also found on the Big Island at Kū'ē'ē, Puakō, Pōhue Bay and 'Anaeho'omalu.

Figures of paddlemen are almost exclusively confined to Hawai'i. A large cluster is found in a cave at Keāhole and smaller numbers are found at Puakō, Ka'ūpūlehu, and other sites. In their book *Hawaiian Petroglyphs,* authors Halley Cox and Edward Stasack note that the "many pictures of men holding canoe paddles horizontally over the head are probably mere symbols for paddlers. The position shown is of no importance in itself—that is, it is not an illustration of that pose." The paddles of most men are unusually elongated. These could have been stylized paddles or war clubs, or may have even been representative of what some paddles looked like at the time the petroglyphs were made.

Sails, often depicted without canoes, seemed to have been the most popular canoe-related petroglyph form, and are candidates for the most

1. *Kaʻūpūlehu, Hawaii*

2. *Kahalimui, Maui*

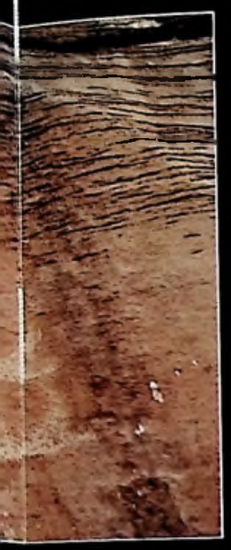
3. *Puʻuloa, Hawaii*

4. *Kaʻūpūlehu, Hawaii*

5. *Kahalimui, Maui*

6. *Puakō, Hawaii*

7. *Puakō, Hawaii*



9. *Kaluapulani Gulch, Maui*

12. *Kalialinui, Maui*

13. *Kaluapulani, Maui*

8. *Pōhue Bay, Hawaii*

10. *Kaluapulani Gulch, Maui*

11. *Kalaoa, Hawaii*

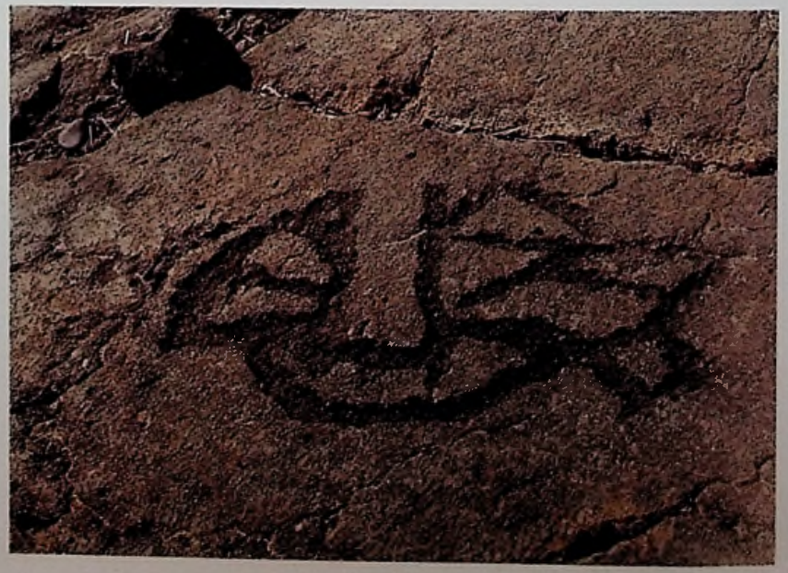
14. *Luahiwa, Lanai*

aesthetically pleasing of all. Judging from th drawings and sketches of early European visitors to Hawai'i, the fairl· numerous sail petroglyphs were very close to the actual form of the Hawaiian oceanic sprit or "crab claw" sail. Some of the sails have at the end of the boom a clearly defined starburst style tassel. On many of the sail figures pandanus panels or strips of uniform width are clearly in evidence, accurately reflecting how the early Hawaiian made his sails.

Probably the largest number and best examples of sail petroglyphs are near the ocean at Ka'ūpūlehu, North Kona. No canoes are found associated with this petroglyph site, though a few paddlemen are seen. It is possible this site was once a center for sail making. The needed material, pandanus, flourishes there today and would have done so in the past due to the large, brackish water pond, which was even larger before a relatively recent lava flow. The site was not far from Kona, one of the major canoe-building areas in the islands.

Canoe sails are also found at Pu'uloa, Kamoamoa, 'Anaeho'omalu and elsewhere on Hawai'i. Very similar sails are located at Keoneloa and Māhā'ulepū on Kaua'i. The canoe sails seen at Kalialinui and Kaluapulani Gulches on Maui, most of which are with canoes, display a slightly different style, though still accurate. Canoes with sails at Pu'uloa on Hawai'i, Luahiwa on Lāna'i, and Kalialinui and Kaluapulani on Maui show particular rigging detail generally consistent with what the first Europeans in Hawai'i observed.

Various sail canoe petroglyphs at Kalialinui and Kaluapulani also exhibit some obscure and never before depicted additions to the sail rig. In addition to a banner at the top of the mast, one figure shows a sail with many bunches of streamers tailing off the edge of the spar at regular intervals. The banner at the top of the mast has occasionally been referred to; the streamers coming off the spar of the sail are not found in any literature. Neither of these features were likely to have been fanciful additions to the petroglyph. They probably represented a canoe decked out especially for a chief, or for a special ceremony.



The tradition of carving petroglyphs ***continued for a time after contact with the west. European ships were represented*** **(Kapalaoa above; Pohue Bay above right and right)** ***in much the same style as canoes.***

17
BURIAL CANOES

Draw hither—the canoe!
Haul hither—the canoe!
To its pillow—the canoe!
To its bed—the canoe!
To the place where shall rest—the canoe!

As in life, the canoe also served in death. Scores of hidden caves and lava tubes, known of old to only a very few and to far fewer today, were used as natural tombs. In a number of these caves are "canoe burials," a form of interment shrouded in mystery. For the Hawaiian seeking renewal of certain aspects of his ancient culture and for the student of that culture, these canoe burials hold some interesting insights into both the culture and its artifacts.

Questions abound. Were canoe burials a pre-contact practice or were they a post-contact burial form patterned after the foreigners' coffin burial? If a prehistoric practice, was it modified after contact? When did the institution begin, and when did it end? Was it practiced on all islands, in all areas? Who was afforded a canoe burial and why? Why were there such especially heavy concentrations of canoe burials in certain areas, particularly on the island of Hawai'i? Were the canoes used for burials of a special type or retired fishing canoes? Were the canoes still functional, and if so why were they given up? Why were most observed burial canoes small and usually half sections of canoes? Why were fragments of canoe hulls often associated with burials though ostensibly not as part of the interment itself? Why were *ama, 'iako, manu,* paddles and other canoe-related items only very rarely found associated with burials? How did attendants get bodies, much less canoes, into some of the seemingly inaccessible cliff caves? Lastly, are there really, as reported, forty to fifty-foot and larger canoes associated with some chiefly burials? Many of these questions will never be answered; for others we have some limited insights.

The first known account of canoes associated with burials comes from an observation made by William Ellis at Ka'awaloa, Hawai'i in 1823. He writes that "towards evening we examined another buoa [burial cave] similar to the one we had passed at Hokukano. On entering it, we found part of a canoe, several calabashes, some mats, *tapa,* etc. and three small idols about eighteen inches long, carefully wrapped in cloth . . . The man [Hawaiian guide] who accompanied us said, 'My father lies here, don't disturb him; I have not yet done weeping for him, though he has been dead some years.'" The description and context of the burial suggests that this was a traditional burial likely not yet influenced by foreign burial practices. A note to Fornander's *Hawaiian Antiquities* recounts that "in former [pre-contact] days an old canoe or section thereof served the purpose [of a coffin], as found in some ancient burial caves." Kamakau records that canoe burials were definitely a pre-contact institution: "In very ancient times interment of the dead was in a burial place . . . The bodies at death were laid straight, and buried in an oblong receptacle, hollowed tree trunk or canoe."

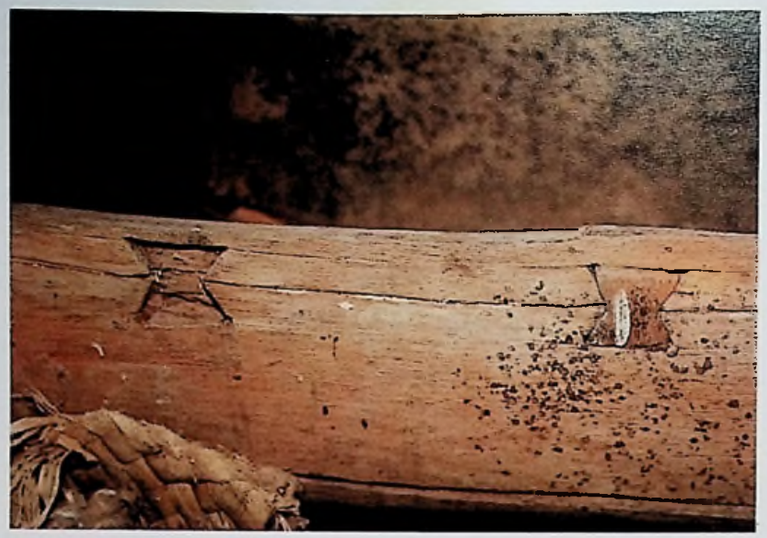
As to who was buried in canoes, Westervelt writing in 1904 notes that "sometimes the bodies of chiefs were placed in small canoes, or parts of a canoe, and hidden in roomy caverns . . . " Emerson, writing about the same time, remarks of Kamehameha's specially built war canoes: "their sides which were of unusual thickness were sometimes fashioned into paddles, doors; a favorite use to make of the pointed end was to make of it a coffin in which the bones of some chief were hidden away in some secret cave." However, no canoe sections even remotely close to the size that would have come from a *peleleu* have ever been reported.

W. C. Bennett notes in his *Archaeology of Kauai* that "a large burial cave at this place [Hā'ele'ele Ridge] is said to have once contained a chief in a canoe." Publisher T. G. Thrum, writing of the chief that built Kīhei *heiau* on Kaua'i, says that "at his death its paving was removed and he was buried in his canoe in the enclosure." This is the only known account of a canoe burial in a *heiau* and not in a cave. Where these gentlemen got the information that it was chiefs who were being afforded these canoe burials is unknown. Furthermore, characteristics of many canoe burials that have been studied in recent years by Bishop Museum personnel seem to indicate that there were commoners being buried in canoes.

Buck considers canoe burial an institution of pre-contact origin. He writes that "canoes cut in half made a combined stretcher and bier . . . The cut end was either left open or closed with a board. The body, flexed and wrapped in *tapa,* was placed in the half canoe and cords were woven tightly around the outside. A pillow of moss was placed under the head, so the body evidently lay on its back. It may be assumed that the half canoe was carried to the cave on the shoulders of bearers . . . The place of interment is said to have been known only to a superior retainer termed a *kahu,* whose position with the family was usually hereditary. However, the bearers who took part must have had some idea, so they were probably selected friends of the deceased who would not divulge the secret."

Bennett goes on to state that "most of the caves were sealed. The practice of closing the opening is referred to as 'sealing' . . . The old method of sealing was to pile stones carefully, making a wall which filled the whole mouth of the cave. So artfully was this done, that the camouflage was often effective at a few feet."

While Bennett feels that canoe burials were an ancient practice, he also believes the practice "has persisted until rather recent times as is



Butterfly patches, *recessed about a quarter of an inch into the hull, were used to mend a crack on this old canoe located in a cave on the island of Hawai'i* (above).

An old fishing canoe, *also located in a cave in the North Kona area of the island of Hawai'i, illustrates another method of salvaging a badly cracked canoe hull* (below). *Coconut sennit or olonā was passed through holes drilled on each side of the opening, and then tightened to close the crack.*

shown by the burials in other caves. In one a long, hollowed-out log was used. In another an imitation canoe squared at both ends was made with thin boards and nails. There are also coffins with lids, resembling a canoe in shape." William Barrera notes in his *Anaehoomalu: A Hawaiian Oasis,* that "such caves were used well into the 20th century as sepulchers for members of the families to whom the caves 'belong,' and corpses of such people were brought from as far away as other islands to be interred in their ancestral homelands." Buck adds that "within the caves, the older burials are at the far end and the more recent burials, distinguished by trade cloth in the bundles, are nearer the entrance."

More recently, archaeologist Patrick Kirch comments of canoe burials at Kalāhuipua'a on the Big Island: "the canoe-hull segments themselves, associated with prehistoric human burials, have not been disturbed." He notes that one cave "entombing at least 30 individuals... contains six canoe-hull segments. Each of these segments is from prow to midship at most, where they were cut in prehistoric times. These were used as 'coffins' to contain some of the burials." The absence of historic artifacts at the Kalāhuipua'a site contrasts with their presence at 'Anaeho'omalu, a few miles down the coast.

In addition to early written records, various archaeologists from the Bishop Museum have made the following observations concerning canoe burials. Canoe burials were investigated in many different cave sites mostly on the island of Hawai'i. Although most canoe burials exhibited portions of canoes, some nearly complete canoe hulls were observed. All but very few canoe segments observed were *koa.* A few appeared to be *wiliwili* judging by the thickness of the canoe and the spongy porosity of the wood. Most canoe burials are found within a couple of miles of the ocean, though some, including a whole-canoe burial, have been observed as much as fifteen miles inland in the Waimea area of Hawai'i. There seems to be a pronounced concentration of canoe burials in certain areas of the islands with an especially heavy congregation in certain coastal communities on the island of Hawai'i. This is logical, since the Big Island had by far the largest number of canoes and the most lava tubes and cliff-side caves. However, it remains unclear who was buried in these canoes and why such large numbers of canoe burials are found only in certain areas, when other areas had equally numerous caves, comparably sized maritime communities, and, by all indications, similar numbers of canoes.

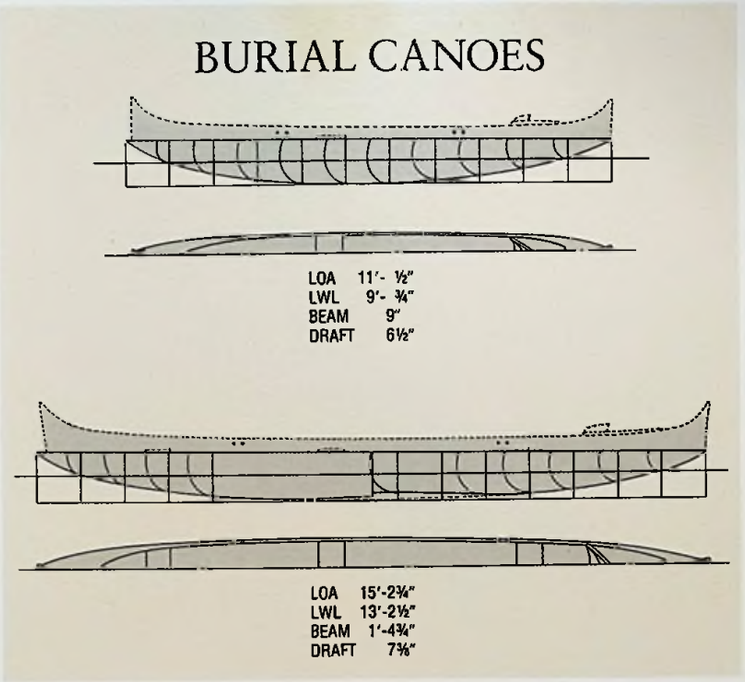
Some sites have clearly never been disturbed and show no signs of anything but a prehistoric context. Other canoe burial caves saw possible transitional use, as evidenced by the marked differential rate of decomposition of various canoe hulls in a cave where environmental factors are fairly constant. Studies indicate the most severely decomposed canoes are generally the furthest back, conforming to Buck's theory of the chronological placement of burials. More convincing are the reports that what appear to be the oldest canoes also display characteristic pre-contact features. Many of the canoes reported have the ancient longitudinal slits along the top edge of the canoe rim, and in some instances remnants of traditional flat weave sennit that tied the gunnels to the canoe rim are still seen in the slits. Other canoe portions have double holes through the gunnels where the *'iako* lashing to the *wae* would have passed. Kirch, making a fairly common observation, notes of the canoe burials at one site that "the hull segments all seem to have been cut with stone adzes and show no signs of other than indigenous methods of workmanship." Similarly, many of the canoe hull portions investigated at other sites displayed the same ancient form of cutting. However, there were also a number of canoe portions that were clearly cut by a metal saw, indicating a post-contact continuation of canoe burial.

Most of the canoe hulls reportedly showed signs of use, although a few appeared, as mentioned by Bennett, to have been made expressly for burial purposes. Even those might have been intended as functional canoe hulls but were never completed for one reason or another.

Various kinds of patches indicated that some of the canoe-hull portions had seen extensive sea duty while intact. One cracked canoe hull reportedly had a number of ancient "butterfly" type patches, which, rather interestingly, did not go all the way through the hull but were recessed about a quarter inch into the hull. Several other burial canoes displayed a lashing method of patching hull cracks that is very unusual for Hawai'i. Holes were drilled approximately one inch apart on opposite

"... in former days *an old canoe or section thereof served the purpose [of a coffin], as found in some ancient burial caves."*—*Fornander* (above).

Measured drawings *based upon portions of two old canoe hulls in a cave on the island of Hawai'i provide clues to the dimensions and lines of early fishing and general utility canoes* (right).



sides and along the length of the hull crack. Sennit was then used to bind the crack closed. Some form of caulking was probably applied to the holes to prevent leaking. Biologist Otto Degener provides the only early reference to this method of repairing cracked canoe hulls, and his source is unknown. Kirch, in his 1973 survey of Kalāhuipua'a, also describes canoes repaired in this fashion.

Of the previously functional canoe-hull portions recorded, the majority, regardless of age, were of consistent design and dimensions. All the reported canoe portions displayed both the classic primary and secondary design features associated with a Hawaiian canoe hull. There is also intriguing, if not total, uniformity with respect to other characteristics of the observed canoe portions. The majority of the hull sections were quite thin, the sides averaging about one-quarter to three-eighths inch thick and the bottom usually not more than one-half to one inch thick. A few hulls however were definitely thicker—up to one-half inch on the sides and two inches on the bottom. The median length of a typical section was about ninety-two inches. It appears that both sections of a whole canoe were located somewhere in the same or a nearby cavern, and that these sections were close to being equal in length. Doubling the median ninety-two inch canoe section's length, one arrives at a canoe roughly fifteen feet long. Consistent with this hypothetical original canoe length is the fact that the few complete hulls reported were in the twelve- to fifteen-foot range.

Such a length fits quite neatly with the notion reported by numerous early observers and supported by recent analysis that most canoes in a typical Hawaiian fishing village were small, light, twelve- to eighteen-foot, one- to three-man fishing canoes. The estimated weight of a typical canoe burial portion is about twenty to forty pounds. Doubling that, one had a fishing canoe hull weighing forty to eighty pounds, minus *manu*, gunnels, and other component parts.

The early literature, along with observations and analysis by leading Hawaiian and Pacific archaeologists, leads to a previously unrecognized and neglected window into the past; we appear to have evidence of pre-contact built canoes.

THREE-BOARD CANOES

The Hawaiians were quick to notice that the Europeans had new materials and techniques that could make life much simpler, especially when it came to building a boat or canoe. Milled lumber, screws, nails, and pitch were viewed by many as godsends. Sometime in the mid- to late 1800's some creative Hawaiians built the first outrigger canoe out of these western materials.

As these early composite canoes were essentially made out of three boards or planks, one on each side and one on the bottom, such craft came to be called "three-board canoes" or sometimes *waʻapā*.

Judging by old photographs, early three-board canoes were replacements for the increasingly scarce one-man *koa* fishing canoes, being about fifteen feet long with a single seat. Different sized models were built, but most remained under twenty feet. By the early 1900's, however, almost all were at least two-man craft and averaged twenty to twenty-four feet long.

The early version of the three-board canoe was apparently quite simple. The hull consisted essentially of three main planks and a couple of head boards, all nailed or screwed together. While three-board canoes were nowhere near as seaworthy, hydrodynamically efficient, or maneuverable as a traditional Hawaiian canoe, they were cheap and quick and easy to construct. In calm water they were quite serviceable, and they could even be used in fairly rough water. The outrigger arrangement and method of lashing remained as in traditional canoes until the middle 1900's.

Forester C.S. Judd, who writes in the early 1900's that "after the advent of the white man . . . canoes were more readily made of imported, sawn lumber," implies that three-board canoes go back well into the 1800's. Recounting a trip made down the North Shore of Molokaʻi in the summer of 1911, Kima Kuda bemoans the fact that "there are no longer *koa* canoes on Molokaʻi, the modern three-board outrigger affairs have taken their place, and in Wailau there is but one that can carry four paddlers."

As *koa* canoes became almost impossible to obtain, the number of three-board canoes grew considerably during the late 1800's. Judging from pre-1900 and early post-1900 photographs, three-board canoes were quite common and were used almost exclusively as fishing canoes. With lumber of all sizes and grades also becoming easier and cheaper to get from the 1920's on, there was increased interest in building this type of canoe.

With the increased availability of galvanized pipe in the 1930's and 1940's, there was a switch to bent pipe *ʻiako*, chain plated and screwed to a crude, nearly straight *ama*. In time, the hulls of three-board canoes became quite sophisticated. Reinforcing ribs, bulkheads, sacrificial keel pieces, baitwells, gunnels, and splash guards became standard. The final breakthrough came with the invention of the outboard engine. Quickly a transom was added, an outboard engine mounted, and a whole new world opened up. Motorized three-board canoes were commonly seen on the Kona coast until as recently as 1970.

However, the advent of fiberglass and the eventual proliferation of cheap, more versatile fiberglass skiffs during the 1960's has all but relegated the three-board canoe to the same fate as its *koa* predecessor. In 1960 there were numerous three-board canoes to be seen in Kailua-Kona. Today there are none. In 1970 there were twenty to thirty three-board canoes actively working out of each of the fishing villages of Keauhou Bay, Miloliʻi and Hoʻokena, all locations on the Kona coast. An inspection trip in 1980, only ten years later, showed only a few of these canoes still active at each spot, the remainder gone or abandoned. Interestingly though, just in the last year—1980—three-board canoes seem to be regaining popularity.

Successors to many koa fishing canoes, *three-board canoes were common at Keauhou in 1971 and at other locations along the Kona coast. They have nearly disappeared over the past decade, replaced primarily by fiberglass skiffs.*

WA'A TO VAT

In an early and most unusual cultural exchange, the white man and the Hawaiian displayed the "kind of ingenuity [that] necessity sometimes compels men to resort to in the absence of all proper materials for the purpose he wants to accomplish," wrote John Whitman after watching the not uncommon practice of using a Hawaiian canoe as a brewing vat.

The favored mash for making alcoholic beverages was made from the *ti* root, though sugar cane, sweet potatoes and even an introduced melon were used. In 1810, Archibald Campbell observed the first part of the operation. The *ti* root "is put into a pit amongst heated stones, and covered with plantain and taro leaves, through these a small hole is made and water poured in; after which the hole is closed up again, and allowed to remain for twenty-four hours. When the root has undergone this process, the juice tastes as sweet as molasses. It is then taken out, bruised and put into a canoe to ferment; and in five or six days is ready for distillation."

Whitman goes on to describe a marvelous still he observed, and partook from, sometime in 1813. "They had procured an iron pot of about four gallons, this was roughly set over a furnace built of stone and clay, to the top of it they had fitted a large calabash and luted them together, so as to be perfectly water tight, and on the top another calabash of still greater dimensions was fitted, and luted as before and enclosed in a wall of stone and clay so as not to be exposed to the fire, the three vessels forming the body of a still of no inconsiderable capacity. The top was a piece of cocoa nut tree about two feet long, made hollow and fitted to an orifice in the upper calabash, this was surmounted by an old tin saucepan reversed and set upon a piece of board, which was fitted to the cocoa nut tube, and had a groove cut in it to receive the edge of the tin pan, which served as a condenser, from which the liquor was carried by a small tube into a calabash. A stream of cóol water was conducted through the shed directly over the still by a trough made of the trunk of a cocoa nut tree, two holes being bored through the trough admitted a stream of water to fall on the condenser to keep it cool and supplied a sufficient quantity for the vats which were two large canoes placed parallel, one of which was filled with the fresh pounded pulp and the other with fermented liquor ready for the still. Several hands were employed in pounding the baked tea root to a pulp and others tending the stills. With this rudely constructed machinery they had made several barrels of rum and had from seven hundred to eight hundred pounds of tea root baked and ready for the vats."

Apparently it was a good product. Campbell gave it high marks. He wrote, "It is by no means harsh or unpalatable. Both whites and natives are unfortunately too much addicted to it. Almost every one of the chiefs has his own still." Ellis, too, was concerned about its popularity, noting in 1823 of remote Kealakomo on the Puna coast: "To our great regret, two-thirds of them appeared to be in a state of intoxication, a circumstance we frequently had occasion to lament, in the villages through which we passed."

The beverage was called *wai-wela,* warm water, as it was often served right from the still, warm or hot. It later came to be called *'ōkolehao,* named for the iron bottoms of the ships' pots that eventually became widely used in the brewing process.

A forerunner of today's "swipe," *wai-wela was often brewed by fermenting ti root, sugar cane or melons in retired fishing canoes.*

HISTORICAL CANOE OBSERVATIONS

Date	Source of Information	Single Canoe / Double Canoe	Length	Width (Beam)	Depth	Iako length to ama or hull	Number of paddlers	Number of people in canoe	Number of canoes sighted
1779	Clerke	x	70′	3′	3′	12′			
1779	Cook	x	generally 24′	15″–18″					1500
1779	King	x	70′	3′	3½′				1500
1779	Ledyard	x x	60′–70′				6 30		2500
1779	Rickman	x x					30	60	2500
1779	Samwell	x x	15′–24′ 60′				4–10 30–40	60–70	850 150
1786	Portlock	x x					16		250
1787	Dixon	x	12′–50′						
1788	Colnett	x x	20′–25′				2–4 17–28	50	
1792	Vancouver	x					36		
1793	Menzies	x	60′				16		
1793	Puget	x	60′–65′				46	40 warriors	
1793	Bell	x	65′				50	30–40	
1796	Bishop	x x							1200
1798	Townsend	x	70′	2′	6′	5′			
1798	La Perouse	x	24′	1′	1′		3–5		150
1813	Whitman	x	60′					60–100	
1816	Kotzbue	x					16–20		
1819	Freycinet	x x	12′–50′ 35′–70′						
1819	Arago	x	72′	3′					
1819	Barnard	x x	30′	18″	2′	3′		40 men	
1823	Ellis	x x	< 50′ 70′	1′ 2′	2′ 3′				
1824	Bloxam	x	16′–18′	12″	2′	6′	1–8		
1836	Rienzi	x	24′	18″–20″					
1839	Paris	x	46.8′-47.5′	1.64′-1.9′	3.2′	3′ 6′	24		
1843	Andrews	x	45′	18″	3′	9′	12		
1844	Jarves	x	44.5′	21″	3′				
1845	Lyman	x	20′–30′	12″–15″					
1847	Bingham	x	30′–50′		2′–3′	5′–6′	18–20		
1848	Cheever	x	70′		3′			70 men	
1875	Fornander	x	108′						
1899	Young	x	50′+	1′–2′	3′+				
1900	Cobb	x	18′–33′	17″–21″			1–3		

Comments

Arago—*"the number of his [Kamehameha's canoes] is immense; we see more of them here in a paltry village than you would find in all the Mariannes"*

Bishop—*Kamehameha's "fleet divided into 4 divisions each consisting of 300 canoes"*

Bloxam—*"extremely neat and well made . . . very narrow . . . some in broadest part not exceeding 12""*

Clerke—*"exceedingly well built and some very large"*

Cook—*"[canoes] are shaped and fitted with more judgement than any I had before seen"*

Dixon—*"innumerable quantity of canoes"*

Ellis—*"canoe thin, and consequently light . . . appear eminently calculated for speed"*

Fornander—*108′ canoe personally observed and measured at South Point in late 1800s.*

Freycinet—*"one single canoe measured 37.5′ long by 23" wide by 22" deep"*

King—*"no canoes equal or to be compared to their's in size or grandeur"*

La Perouse—*"We weighed one of this dimension [24′ × 1′ × 1′] which did not exceed 50 lbs."*

Ledyard—*"at least 15,000 men, women, and children in the canoes"*

Menzies—*"60′ long made of one piece of a pine tree"*

Townsend—*Peleleu at Kealakekua "sides of the canoe tumble in like a ship of war"*

Vancouver—*"3000 people of both sexes in their canoes"*

KOA RACING CANOES

NAME OF CANOE	CANOE CLUB/OWNER	LENGTH
ʻA	Bishop Museum	40ʻ
Adam Kahaleloa O Kauhanao Kawenawena Aha	Maunawili	43'
Aliʻi Kai	Puna	39'1"
ʻA Piʻi Piʻi	Kona Athletic Club	44'
Enay	Hui Nalu	45'
Haleakala	Haleakala	40'6"
Hanakeoki	Makaha	41'2"
Haʻupu	Kaiola	45'
Heipualani	Kai E Hitu	43'10"
Here Moana	Here Moana-Tooʻa Ote-ra	43'6"
Hianaʻu	Faaa	44'6"
Hokulele	Lanikai	39'8"
Holonakaiʻakea	Kamehameha	43'3"
Honaunau	Hale Hoʻikeʻike	33'6"
Honaunau	Honolulu	42'3"
Honaunau	Keoua	45'
Honolulu	Honolulu	40'11"
Honoura	Kai Ehitu	42'8"
Hoʻola	Lanikai	45'
Hoʻolale	Healani	44'9"
Hualalai	Kai Opua	42'10"
Iʻo	Kai Opua	35'7"
Iwalani	Kai Opua	43'5"
Kaʻala	Anuenue	43'2"
Kai Elua	Henriques	38'1"
Kai Hawanawana	Kawaihae	43'8"
Ka I Holokai	Hui Lanakila	41'
Kai Malia	Bob Puakea	36'6"
Kaimalino	Royal Waikoloa Hotel	35'
Kaimana Elua	Queen Liliʻuokalani	44'1"
Kaʻimiloa	Hawaii Maritime Center	38'4"
Kainalu	Lahaina	39'8"
Kaʻio	Lokahi	44'4"
Kai Opua	Hanalei	44'3"
Kai Opua	Kai Opua	33'10"
Kakina	Outrigger	38'
Kalanakila	Kailua	39'3"
Kalapana	Puna	44'
Kamoho Aliʻi	Beach Boys	44'11"
Ka Moi	Outrigger	34'2"
Ka Moi	Uhane O Pauahi	43'3"
Kamuela Koa (laminated)	Hawaiian Warriors	41'2"
Kanaʻi Au Moana	Kai Oni	39'
Kaoloa	Outrigger	45'
Kealaikahiki	Na Kai Ewalu	38'7"
Ke Ala Hou	Liliʻuokalani	42'11"
Ke A Laula	Waimanalo	41'2"
Keaukaha	Keoua	38'11"
Kehikai O Molokaʻi	Molokaʻi	39'2"
Keliʻi Kai	Lahaina	33'2"
Kokololio	Hawaiian	42'10"
Laka	Kawaihae	39'10"
Laka-a-Kaha (laminated)	Kamehameha Schools	40'9"
Lanakila Mau O Kalokahi	Kailua	43'8"
Leilani	Outrigger	42'4"
Lele Waʻa O Hawaiʻi	Keauhou	44'10"
Maehaʻa Piti	Kai Ehitu	43'9"
Mahoe	Kai Opua	40'9"
Maikaʻi Roa	Hui Nalu	45'
Makaleka	Hilo Bay	39'6"
Makoa	Kona Athletic Club	44'2"
Malama	Waikiki Surf	42'2"
Malia	Waikiki Surf	39'4"
Malia Kapeka	Ewa Beach	41'2"
Manuʻiwa	Kai Oni	41'2"
Meʻe	Leeward Kai	41'11"
Malolo	Tahiti CPP	43'7"
Mokulua	Lanikai	44'4"
Molokaʻi	Henriques	37'9"
Molokaʻi	Kamehameha (Hawaii)	38'8"
Na Holokai	Hanalei	44'8"
Naia	Kai Oni	43'9"
Nihoa	Bishop Museum	35'8"
Niuhi	Leeward Kai	37'10"
Niumalu	Kauaʻi	37'
Nokekula O Waihao	Lanikai	42'11"
Pakaka	Loaʻa	42'9"
Paoa	Ewa Beach	39'6"
Papaloa	Healani	42'4"
Princess	Kauaʻi	38'4"
Pukaua Koa	Hawaiian Warriors	44'6"
ʻUhanepanoakalani	Hui Nalu	41'6"
Uhi Wai	Queen Liliʻuokalani	43'2"
Uʻi Wahine	Kona Athletic Club	44'10"
Waʻa Kailele	Hawaiian Outrigger	43'1"
Waiaka	Keaukaha	41'9"
Waiakea	Hui Waʻa O Waiakea	41'6"
Waiakea Kane	Windward Kai	43'5"
Wailele	Wailani	39'2"
Waipuna	Kamehameha (Oahu)	39'1"
Waipunalei	Kawaihae	42'
White Horse	T.S. Restaurants	35'7"

MOLOKA'I-O'AHU RACE RESULTS

MEN'S RACE RESULTS

Year	Course	Class	Club	Time
1952	Kawākiu–Moana Hotel *(38.20 miles)*		Kukui o Lanikaula *(Molokai crew)*	8:55
1953			Waikiki Surf	6:53
1954			Hui Nalu	6:05
1955			Waikiki Surf	7:09:40
1956	Kawākiu–Hilton Hawaiian Village *(38.96 miles)*		Outrigger	7:54
1957			Kai Oni	5:56
1958			Waikiki Surf	6:32
1959			Waikiki Surf	6:09
1960			Waikiki Surf	5:29
	(This was the year that fiberglass canoes brought in by the mainland crews entered unofficially and participated.)			
1961			Waikiki Surf	7:48
1962			Waikiki Surf	7:41
1963	Hale o Lono–Hawaiian Village *(40.80 miles)*	K	Waikiki Surf	*6:40**
		F	Outrigger	6:51
	(Two classifications started: K=Koa, F=fiberglass.)			
1964		K	Kailua	*5:56**
		F	Hui Nalu	6:14
1965		K	Outrigger	6:48
		F	Lanikai	7:00:43
1966		K	Waikiki Surf	6:37
		F	Healani	6:40:46
1967		K	Outrigger	*6:03:09*
		F	Healani	6:12:14
1968		K	Outrigger	*5:55:16**
		F	Healani	6:03:28
1969		K	Waikiki Surf	*6:38:26*
		F	Lanikai	6:56:06
1970		K	Healani	*6:24*
		F	Waikiki Surf	7:10:11
1971		K	Healani	*5:59:02*
		F	Hui Nalu	6:05:12
1972		K	Waikiki Surf	*6:01:46*
		F	Lanikai	6:24:56
1973	Kaunakakai–San Souci	K	Waikiki Surf	8:00
	(53.32 miles)	F	Kailua	*8:04:15*
1973	Hale o Lono–Moana Hotel *(40.41 miles)*	F	Hanalei	6:38:06
	(Hui Wa'a race. No koa canoes were entered. One 6-man crew crossed the channel—the Beach Boys, fourth canoe to come in at 7:01:55.)			
1974		K	Lanikai	*6:18:55*
		F	Kailua	6:22:40
1975		K	Outrigger	*5:39:07*
		F	Maire Nui (Tahiti)	5:47:33
	(First year with participation by Tahiti.)			
1976	Kaunakakai–Magic Island	K	Maire Nui (Tahiti)	8:05:04
	(55.60 miles)	Non-K	Te Oropaa (Tahiti)	*7:54:40*
	(There were ten Tahitian entries, a record of 35 entries total.)			
1977	Hale o Lono–Magic Island	K	Maire Nui (Tahiti)	6:05:03
	(41.46 miles)	F	Outrigger	*5:55**
	(45 entries in the race—one entry from Japan.)			
1978	Hale o Lono–Ft. DeRussy	K	Maire Nui (Tahiti)	5:48:35
	(41.01 mi.–Wreck Buoy)	F	Blazing Paddles (Calif.)	*5:43:52**
1979		K	Hui Lanakila	6:14:51
		F	Outrigger	*5:46:38*
1980		K	Imua (Calif.)	6:14:17
		F	Outrigger	*5:52:26*
1981	Hale o Lono–Ft. DeRussy	K	Off Shore (Calif.)	*5:25:07**
	(40.80 miles)	F	Imua (Calif.)	5:29:53
1982		K	Off Shore (Calif.)	*6:08:35*
		F	Lanikai	6:22:45
1983		K	Outrigger	*5:45:09*
		F	Canadian Outrigger	6:14:28
1984		K	Outrigger	*5:18:19**
		F	Off Shore (Calif.)	5:20:23
1985		K	Off Shore (Calif.)	5:35:49
		F	Illinois Brigade	*5:33:05*
1986	*(52 entries in the race.)*	K	Tahiti	5:51:37
		F	Outrigger	*5:27:35*
1987		K	Kai Opua	6:13:40
		F	Outrigger	*5:32:46*
1988	*(58 entries in the race.)*	K	Hanalei	5:28:07
		F	Outrigger	*5:08:11**
1989		K	Hui Nalu	5:11:38
		F	Off Shore (Calif.)	*5:06:29**
1990		K	Outrigger	*5:19:38*
		F	Off Shore (Calif.)	5:28:52
1991	*(58 entries in the race.)*	K	Outrigger	5:48:16
		F	Outrigger Australia	*5:39:15*
1992		K	Dana Outrigger	5:49:00
		F	Panamuna Australia	*5:30:57*

WOMEN'S RACE RESULTS

Year	Course	Class	Club	Time
1979	Hale o Lono–Ft. DeRussy *(41.01 mi.–Wreck Buoy)*		Outrigger	6:35:14*
1980	(CANCELLED—rough water)			
1981	Hale o Lono–Ft. DeRussy *(40.80 miles)*		Outrigger	6:47:11
1982			Hui Nalu	6:43:38
1983			Hui Nalu	6:33:07*
1984			Outrigger	6:12:11*
1985			Outrigger	6:50:31
1986			Off Shore (Calif.)	6:31:04
1987			Off Shore (Calif.)	6:26:25
1988			Off Shore (Calif.)	6:14:22
1989	*(Two classifications started.)*	K	Hui Nalu	6:20:50
		F	Off Shore (Calif.)	*5:59:26**
1990		K	Lanakila (Calif.)	6:22:04
		F	Off Shore (Calif.)	*5:44:13**
1991	*(28 entries in the race.)*	K	Outrigger	6:38:53
		F	Off Shore (Calif.)	*6:22:04*
1992		K	Dana Outrigger	6:25:25
		F	Outrigger	*5:49:02*

Distances compiled by Cline Mann

Note: All clubs from Hawai'i unless so noted. When two classes, overall winner is listed in bold. Current course of 40.8 miles has been most often used course; *indicates record times for that course or any longer course where the time was better.

GLOSSARY

This is a compilation of canoe-related Hawaiian terms and phrases appearing in the text, supplemented by other canoe-related terms and phrases that were gleaned from various published and unpublished sources listed in the Bibliography. In most cases, the source for each definition is identified by the author's last name, for example, (Kaelemakule). For authors with more than one work listed in the Bibliography, an explanatory word is added after the last name as an aid to identifying the specific title, for example, (Kamakau/Works). Other sources are identified as follows: (AP), Andrews, Lorrin. *A Dictionary of the Hawaiian Language.* Revised by Henry H. Parker; (HEN), *Hawaiian Ethnological Notes on Canoe Making;* (PE) Pukui, Mary Kawena and Elbert, Samuel H. *Hawaiian Dictionary.* Other abbreviations used include: *cap.*, capitalized; *esp.* especially; *fig.*, figuratively; *lit.*, literally; *redup.*, reduplication; *spp.*, more than one species; *syn.*, synonym. Cross reference notes indicate preferred or principal terms *(see)*, synonyms *(also)*, and related terms *(see also)*. Alphabetization is word-by-word, in order to group terms with common roots. To achieve this, some terms are divided in a manner that may not be consistent with popular orthography. Diacritical marking, where none appeared in the original source, has been added using Pukui and Elbert as a guide. Where it was not clear from the definition how a term should be divided and marked, the orthography is retained as it appeared in the source. Any errors in interpretation rest entirely with the editors.

A

ʻAʻā. Sirius, the first magnitude star in the constellation Canis Major. It passes directly over Tahiti as a powerful beacon and according to tradition was used as a navigation star to return to Tahiti. *Lit.*, burning bright. Also *A-iki-e-lono, A-iki-kau-e-lono, Hiki-kau-e-lia, Hiki-kau-lia, Hiki-kau-lono-meha, Hōkū-hoʻokele-waʻa, Kauano-meha, Kaulu-i-kua, Kau-ʻōpae, Kele-waʻa, Lena.* (Johnson)

aʻe. Tradewinds; an east wind. (AP) *Cap.*, northeast tradewind. (PE) Also *kaomi.*

ʻaha. A prayer recited or sung in launching a canoe. (Emerson; PE) See also *paha.*

ʻaha. Sennit; cord braided of coconut husk fiber, human hair, etc. (PE) The manner of lashing, binding, or sewing. (Emerson) Also *aho.* See various types below.

ʻaha a Ka-lani-manuia. Type of canoe lashing. (Emerson)

ʻaha a ka lino. Tautly-braided canoe lashing. (Emerson; Iʻi)

ʻaha a Keawe-ʻula-lani. Type of canoe lashing. (Emerson)

ʻaha a Pʻi-kea. Type of canoe lashing. (Emerson)

ʻaha Aliomaomao. Type of canoe lashing. (Emerson)

ʻaha ʻāwili. Type of canoe lashing. (Maline)

ʻaha hauhoa waʻa. Lashing to bind *ʻiako* to *ama* or to canoe; lashing to tie two canoe hulls together. (Emerson) Also *ʻaha hoa waʻa.*

ʻaha hehe ʻia wau. Type of canoe lashing. (Emerson) Possibly *ʻaha heheia waʻa.*

ʻaha hiʻiau. Type of canoe lashing. (Emerson; Iʻi) Also *ʻaha heiau.*

ʻaha hoa ama. Lashing to secure the *ama.* (Emerson)

ʻaha hoa waʻa. See *ʻaha hauhoa waʻa.*

ʻaha holo. See *ʻaha kāholo.*

ʻaha holo a paʻa. Lashing to bind gunnels and *manu* to canoe. (Emerson) See also *ʻaha kāholo.*

ʻaha holo luahine. Type of canoe lashing. (Emerson; Iʻi) See also *kaula luahine.*

ʻaha ka inoa o nawo. Type of canoe lashing. (Emerson; Iʻi)

ʻaha ka muku pele lua. Type of canoe lashing. (Emerson; Iʻi) Possibly *ʻaha ka muku peleleu* or *ʻaha na peleleu.*

ʻaha kāhele honua. *Ama* lashing. (Emerson) Also *ʻaha kaʻahele honua.*

ʻaha Kahiki ʻula. Type of canoe lashing. (Emerson)

ʻaha kaholo. Lashing used to bind end pieces and gunnels to canoe body, and bow hatch to end pieces; used on royal canoes. (Emerson; Malo) Also *ʻaha holo, ʻaha holo a paʻa.*

ʻaha kākū. Lashing to bind gunnels to canoe hull; a continuous suture. (Emerson)

ʻaha kakua. Type of canoe lashing. (Emerson)

ʻaha kau. *Ama* lashing. (Emerson)

ʻaha kaukahi kaʻahi. Type of canoe lashing. (Emerson; Iʻi)

ʻaha kaula ʻōhiʻa. Lashing to tie outrigger for rough water. (Emory)

ʻaha kiʻihei. Type of canoe lashing. (Maline)

ʻaha kumu helc. *Kapu* lashing used on outrigger of a chief's canoe. (Emerson; Malo) Also *ʻaha kumu pou.*

ʻaha luʻukia. Type of canoe lashing. (Emerson) Possibly *ʻaha o ka pāʻū o Luʻukia.*

ʻaha manawa. Type of canoe lashing. (Emerson)

ʻaha na nuku ʻeono. Six-pronged lashing. (Emerson; Iʻi)

ʻaha na nuku ʻewalu. Eight-pronged lashing. (Emerson; Iʻi)

ʻaha na peleleu. Type of canoe lashing. (Emerson; Iʻi)

ʻaha na piko ʻehā. *Ama* lashing. (Emerson; Iʻi)

ʻaha na pūkolu o Kāne. Type of canoe lashing. (Emerson; Iʻi)

ʻaha o ka pāʻū o Luʻukia. Very decorative and intricate lashing sometimes made by interweaving a white cord of *wauke* (paper mulberry) bark with red coconut fiber sennit; reserved for royalty. (Emerson; Malo; *et al.*) See also *ʻaha luʻukia.*

ʻaha o Luʻukia. Four-pronged lashing. (Emerson) Possibly *ʻaha o ka pāʻū o Luʻukia.*

ʻaha oauaua ʻapo kahi. See *ʻaha ouaua ʻapo kahi.*

ʻaha oauaua ʻapo lua. See *ʻaha ouaua ʻapo lua.*

ʻaha ʻōʻio. Lashing used to bind the halves of the *manu.* (Kamakau/Works) See also *ʻaha ʻumiʻi.*

ʻaha ouaua ʻapo kahi. Double-wrap outrigger lashing. (Emerson) Also *ʻaha oauaua ʻapo kahi.*

ʻaha ouaua ʻapo lua. Lashing similar to *ʻaha ouaua ʻapo kahi.* (Emerson) Also *ʻaha oauaua ʻapo lua.*

ʻaha ouaua kai nui. Lashing quickly and hastily extemporized. (Emerson; Iʻi)

ʻaha paʻalia paʻa. Type of canoe lashing. (Emerson)

ʻaha pāʻū o Hiʻiaka. Type of canoe lashing. (Emerson; Iʻi)

ʻaha pāwehe. Canoe lashing used on Kauaʻi.

ʻaha peʻa. Type of canoe lashing. (Emerson)

ʻaha pepehi kanaka. Type of canoe lashing. (Emerson; Iʻi)

ʻaha peu. Type of canoe lashing. (Emerson)

ʻaha pueo. Type of canoe lashing. (Maline)

ʻaha ʻula kapu. Red, eight-strand sennit lashing; reserved for royalty.

ʻaha ʻumiʻi. Lashing to bind the halves of the *manu.* (Emerson) See also *ʻaha ʻōʻio.*

ʻahaʻaina hoʻolaʻa. Feast of consecration or dedication for a canoe. (Maline; PE)

ʻahaʻilono. The person who alone survives or escapes after a battle; a canoe out of a fleet, all others being taken or lost. (AP)

ʻahakea. Native trees and shrubs (species of *Bobea*); the wood is yellow and formerly was used for *poi* boards and canoe rims. (PE) It was also used for canoe paddles. (AP) The wood most favored for gunnels. (Emerson)

ʻahi. Hawaiian tuna fishes, especially the yellowfin tuna *(Neothunnus macropterus)*, an important fish in the Honolulu market. (PE)

ʻahi koʻa. Fishing grounds for yellowfin tuna.

ahina. A crack a few feet long in dry wood. (Emerson) A dry tree. (AP)

aho. Line, cord, lashing, fishing line, etc. (PE) See also *ʻaha*, lashing.

aho loa. A long line, as for fishing or depth sounding. (PE)

ʻahu. Mat used to protect a canoe at sea in rough water. (AP) Mat used as a canoe cover. (PE)

ʻahu uhi waʻa. Mat for covering freight in a canoe. (Emerson) Mat covering that protected paddlers in storms. (PE)

ʻahuʻawa. A sedge *(Cyperus javanicus)* with a basal tuft of long narrow leaves. (PE) The fibers made a mesh which was used to strain *pāʻele.* (Emerson)

ʻaiea. Tree found on Lānaʻi and other islands; used for finishing canoes. (AP) The endemic Hawaiian genus *Nothocestrum;* soft-wooded shrubs and trees with ovate or oblong leaves, yellowish flowers, and whitish to reddish berries. (PE)

ʻaina. Refuse adhering to the hollow in a rough hewn canoe log. (Kamakau/Works)

ʻāʻipuʻupuʻu. Canoe with provisions. (Maline) Also *waʻa ʻāʻipuʻupuʻu.*

ʻakaʻakai. The great bulrush *(Scirpus validus)* from North America, that grows on the edges of fresh and brackish water marshes in Hawaiʻi. Formerly used for house thatch or plaited into mats. (PE) The leaves were burned and used in making *pāʻele.* (Kalokuokamaile)

akahoe. To paddle carefully and silently. (PE; Emerson)

akaholo. To sail or run cautiously, slowly. (Maline; AP)

ʻake. See *ʻaki*, blocks.

ʻākea. The starboard or outer hull of a double canoe. (Maline; PE) Also *ʻekea, waʻa ʻākea.*

ʻākelekele. An escape from great danger, as a person in a canoe in a storm. (AP)

ʻaki. Blocks on which the canoe was mounted for finishing; generally of soft woods such as *wiliwili* or breadfruit. (Emerson) Blocks on which a canoe is placed on the shore. (AP; Emory; PE) Also *lona.*

ʻaki. Filled, as a canoe with waves. (PE) See also *ʻakia, ʻale ʻaki.*

ʻaki hoʻolana. Drydock. *Lit.*, floating canoe-rest. (Maline; PE)

ʻāki. To furl, as sails. (PE) To lop or double down, as the top of a sail when there is much wind. (AP)

ʻakia. To be filled but not swamped. (Emerson) See also *ʻaki*, filled.

ʻakoko. Endemic shrubs and small trees (*Euphorbia* spp.) with jointed stems. (PE) The juice of the buds and twigs was used in making *pāʻele.*

aku. Bonito or skipjack tuna *(Katsuwonus pelamys)*, an important food item. (PE) In ancient tradition, one of the two fish that accompanied Pili on his voyage to Hawaiʻi. *Aku* helped paddle the canoe and *ʻōpelu* calmed the winds when too strong. (AP)

ala kai. Sea course, as of a canoe. (Maline; PE) See also *ala waʻa.*

Ala-kea. A star probably used in navigation; *lit.*, white pathway. (Johnson; PE)

ala nui o na hōkū hoʻokele. Highways of the navigation stars; lines marked on gourd used as an astronomical aid. (Kamakau in Thrum)

ala waʻa. Canoe course. (PE) See also *ala kai.*

ʻalā. Basalt; a dense, fine-grained volcanic stone used for adzes. See various types below.

ʻalā haumekū ʻolokele. Basalt used to make adzes. (Kamakau/Works)

ʻalā lelekepue. Basalt used to make adzes. (Kamakau/Works)

ʻalā makahinu. Basalt suitable for adzes. (Kamakau/Works)

ʻalā piamakahina. Basalt used to make adzes. (Kamakau/Works)

ʻalā. A large, endemic tree *(Planchonella sandwicensis)* with smooth, oblong leaves. (PE) The wood was used for gunnels.

ʻalaea. Water soluble colloidal ocherous earth, used for coloring salt, for medicine, for dye. (PE) Red earth used for painting canoes. (Emerson)

alaheʻe. A large native shrub *(Canthium odoratum)* with shiny leaves and small, fragrant, white flowers. The wood is hard. (PE) Wood used to make a type of adze for working with soft woods, especially *wiliwili.* (Malo) Also *ʻōheʻe, walaheʻe.*

ʻalalā. The Hawaiian crow *(Corvus tropicus);* if heard in the forest when selecting a canoe log, it was an indication that the tree was rotten. (PE; Fornander) See also *ʻelepaio*, a bird.

alalakeiki. Method for righting an upset canoe. (Buke)

alamea. A tree occasionally used for canoe hulls. (Emerson)

alana. Tree used for component parts. (Emerson)

alani. A timber tree used in fitting up canoes. (Emerson; AP)

alapoki. Shipwrecked. (PE) Also *ʻōlulo.*

ʻale ʻaki. Billow with a sharp crest almost ready to break over. (Kaelemakule) A swamping wave, as one striking a canoe broadside from prow to stern. (PE) See also *ʻaki*, filled.

ʻale huʻe. A flowing swell. (Kamakau/Works)

ʻale huʻe i hope. Flowing swell in back, one that curls at the rear *ʻiako.* (Kamakau/Works)

ʻale huʻe i mua. Flowing swell in front, one that curls under the forward outrigger boom. (Kamakau/Works)

ʻale kapo. Double curl at the middle of the canoe. (Kamakau/Works) Also *ʻale kawa.*

ʻale kawa. Double curl at the middle of the canoe. (Kamakau/Works) Also *ʻale pani.*

ʻale kualoloa. A long, rolling billow much feared by seafarers. (Kaelemakule)

ʻale kūloko. A local swell. (Kamakau/Works)

ʻale kūpipi. Maui's fast moving billows; billows that follow immediately after each other. (Kaelemakule)

ʻale nui. Big billow; a billow that rises with its whole body and then bursts. (Kaelemakule)

ʻale olowalu. Billows that follow immediately after each other. (Kaelemakule) Also *olowalu ʻale.*

ʻale pā puaʻa. Pig pen wave; a wave striking the side of a canoe. (PE)

ʻale pani. Double curl at the middle of the canoe. (Kamakau/Works) Also *ʻale kapo.*

ʻale poʻi i ka ihu. Swell curling at the nose, in front of the canoe. (Kamakau/Works)

ʻale ʻūhā. Swell that curls behind the canoe. (Kamakau/Works)

alelo. Protuberance on one side of the paddle blade; point of the paddle. (Emerson) Protuberance at the tip of Hawaiian paddles. (Emory) Also *elelo.*

ʻalihi pāʻū. Line for lashing down the mat covering of a canoe. (Emerson; PE)

Aliʻi-o-Kona-i-ka-lewa. A navigation star. (PE)

aliʻi waʻapā. Boatswain. (PE)

"ʻalu na peʻa." Ease the sheets. (Lindo and Mower)

ama. Outrigger float, generally made of *wiliwili* or other light wood. (Emerson) Port hull of a double canoe, so called because it replaces the float. (PE; Iʻi) Also *iama, keakamilo.*

ama kaka. Outrigger float with a pronounced curvature, for use in rough waters. (Emerson)

ʻamana. Y-shaped stick used as a fish pole rack on a canoe. (Emerson; PE) Also *haka.*

ʻamaʻu. All species of an endemic genus of ferns *(Sadleria).* (PE) Sometimes burned to make charcoal used in making *pāʻele.*

ʻamoi. Wake of a canoe in water. (Emerson) Also *aweawe.*

ʻana. Pumice, used as a rubber. (Buck; AP; PE) Also *ʻane, lei ole.*

anana. Fathom; the distance between the tips of the longest fingers of a man with his arms extended on each side. (PE) Unit of measurement of canoe length. (Emerson)

ʻane. A soft stone used in polishing wood; pumice. (AP; PE) Also *ʻana, lei ola.*

ʻao. Dried baked taro or sweet potato; in Kaʻū this food was hung in baskets in the wind so it dehydrated; used on sea journeys. (PE) See also *ō,* sea rations.

ʻao ʻuala. Potatoes cooked and then quartered and dried until perfectly dry and placed in a gourd calabash. (Emerson/HHS)

ʻaoʻao ʻākau. Right or starboard side of a canoe. (Maline)

ʻaoʻao hema. Left or port side of a canoe. (Maline)

ʻapo. Union or fitting of the *ʻiako* to the canoe. (Lindo and Mower) See also *ʻaha ouaua ʻapo kāhi.*

ʻāpulu. See *waʻa ʻāpulu,* a canoe type.

ʻau. To swim, travel by sea. (PE)

ʻau kai. To travel or swim by sea; seafaring; sailor. (PE)

ʻau waʻa. A cluster or fleet of canoes; any number of canoes in company. (AP; Emerson)

ʻauwaʻa hoʻāpipi. Two single canoes hastily joined to do temporary service as a double canoe. (Emerson; Kamakau) Also *waʻa hoʻāpipi.*

ʻauwaʻa lākī. Little ships which children made of cane leaves. (AP)

ʻauwaʻa lau ki. A fleet of toy canoes made from *ti (Cordyline terminalis)* leaves. (AP; PE)

aualo. A shed or verandah adjoining a house, for storing canoes, calabashes, and other property. (AP) See also *auolo.*

ʻauana. Scattered, as things dispersed in the upsetting of a canoe, when men and all the cargo float off in different directions. (AP) Also *ʻauwana.*

auhā. Canoe shed. (Emerson) Also *auolo.*

auhele. To go looking from place to place without any definite course; to drift or sail aimlessly. (Maline; PE)

ʻaui. To have the outrigger float lifted or sunk by a wave; to be turned aside in a course. (Emerson; AP) To roll or rock from side to side; to rise and fall alternately at the bow and stern. (AP; PE)

ʻaui ʻale. Large swell or billow. (PE) To be shifted in course by a wave. (Emerson)

aukāhi. Smooth, of a canoe. (Emerson) See also *waʻa aukāhi.*

aukū. To pitch and toss. (PE) To swim or sail uprightly, as a vessel rising and pitching in a heavy sea. (Emerson; AP)

aukukui. Apprentice canoe maker; those who waited upon the *kahuna* in the mountains. (PE; Emerson/Prayers)

ʻaumākua kālai waʻa. Ancestors who had worked in the canoe-making profession in ancient times. (Kamakau/Works)

auolo. An outhouse generally used for sheltering canoes. (AP; Emerson; PE) Also *auwolo.*

ʻaupapa. One who is capsized in his canoe, losing everything but the board *(papa)* that he swims with. *Fig.,* a deprived and destitute person. (AP)

ʻauwaha. Outhouse, as for storing canoes. (PE) See also *auhā,* canoe shed.

ʻauwana. See *ʻauana,* scattered.

auwolo. See *auolo,* outhouse.

ʻawa. *Kava (Piper methysticum),* a shrub native to Pacific islands. The root is the source of a ceremonial drink of the same name. (PE)

ʻawa hiwa. A variety of *ʻawa* with long internodes; used in *lolo ka waʻa* ceremonies. (PE; Emerson)

awa kū waʻa. Canoe harbor or anchorage. (Lindo and Mower)

aweawe. The wake of a canoe; the curling water in the wake. (Emerson; PE) Also *ʻamio.*

awikiulaikalani. Paddles. (Maline) Also *hoe.*

ʻawola. To pull or paddle vigorously and steadily in time. (Emerson)

E

ʻeʻe. To board a canoe or ship. (Emerson)

eke. Excellent, nice, applied to canoes. (Emerson; AP)

ʻekea. The starboard hull of a double canoe. (Malo; Fi; Maline) Also *ʻākea.*

ʻeku. The snout of the canoe, or that part of the under curve which roots through the water. (Emerson; AP) The prow of the canoe when it reaches shore and all the parts are fitted on; the rooting of the canoe into the open sea. (Kamakau/Works) See also *ihu.*

ʻēkū. Back projection of a canoe bow piece, *manu ihu,* on which the weatherboard, *kua poʻi,* rests (not on all canoes). (AP)

ʻele. See *kaʻele waʻa,* unfinished canoe.

elelo. The protuberance at the tip of Hawaiian paddles. (Emerson) Also *alelo, koho.*

ʻelepaio. A species of flycatcher *(Chasiempis sandwichensis)* traditionally credited with the ability to detect defective *koa* trees. (PE; Fornander) A manifestation of *Lea,* goddess of canoe makers. (PE) See also *ʻāpekepeke, ʻalalā, Lea.*

"Emi mai ka la!" Lower the sail! (Lindo and Mower)

ēulu. That portion of a tree that is cut off, leaving the stump standing in the ground. (AP) See also *hōʻaea i ka eulu,*

H

hahae ka māmala. Chipping the canoe log from front to back. (Kamakau/Works)

"Haʻikūumauma!" A call to lift a canoe together or to rally together in any work. (PE)

haka. Rack to hold fishing spears and poles. (Buck) Most often found on outrigger canoes. Also *kau mōkoi.*

haka kau. To stand with a slender footing, as on the edge of a canoe, looking for squid. (AP)

haka kau luna. Stools on which double canoes were placed when out of water. (Emerson; PE) Also *lona.* See also *ʻaki,* blocks; *paepae.*

hākaokao. Hole in which the mast was inserted. (PE)

haku kā koʻi. Hard stone, round in shape, used in chipping and forming axes. (Malo; PE)

hākuʻikuʻi. Cracking sound announcing the fall of a *koa* tree. (Emerson/Kekahuna)

hala. The *pandanus* or screw pine (*Pandanus odoratissimus*), a tree with many branches which are tipped with spiral tufts of long, narrow, spine-edged leaves. (PE) These leaves were plaited to make sails and mats, and also burned to make charcoal for *pāʻele.*

hālau. A long house with openings at both ends, used mostly for canoes. (AP; PE)

hale lanalana. House built on a double canoe, as shelter for chiefs. (PE) See also *pāpaʻi hale.*

haluku. The sound produced by striking the side of a canoe with a paddle, so as to scare fish into a net. (AP; PE)

hāpai waʻa. Men assisting the landing of a canoe on a ramp. (Hauanio; Roberts)

hāpou. Pumice; soft porous stone used for smoothing and polishing. (Emerson; AP) Also *ʻana, ōlaʻi.*

hapuna. To scull a canoe; paddle with the hands. (Kamakau/Works; PE)

hāpuʻu. An endemic tree fern (*Cibotium splendens,* formerly *C. Chamissoi*), common in many Hawaiʻi forests. (PE) Occasionally used to cushion a tree being felled, or placed in a tree to minimize cracking on impact.

hau. A lowland tree (*Hibiscus tiliaceus*), found in many warm countries. The light, tough wood served for outriggers, the bast for rope, the sap and flowers for medicine. (PE) Two species were known to Hawaiians, *kaekae* (light), and *koii* (heavy or hard). The light wood served for outriggers. (AP) Sometimes the *ama* was also made from *hau.*

hauhana. Lashing, as of adze to handle; to lash. (PE)

hauhili maʻō maʻaneʻi. Binding this way and that. (Emerson)

hauhoa. To tie or fasten the knots of the cordage. (Emerson; PE) See also *ʻaha hauhoa waʻa.*

haukawewe. To strike the paddle at the end of the stroke against the side of the canoe, for joy or exultation, or to alarm an enemy. (Emerson)

haumekū. Stone used for adzes. (PE) See also *ʻalā haumekū ʻolokele.*

hāunu. A line crisscrossed from side to side through the loops of the *ʻalihi pāʻū* to keep the *pāʻū* (mat) in place. (Buck)

hē. Hollow container in which canoe paint was mixed. (PE)

heʻe nalu. To ride a surfboard; surf rider. (PE) See also *kai heʻe nalu.*

heihei waʻa. A race between two or more canoes. (AP)

hēkau. Anchor; stone anchor; towline; line for fastening boats; to anchor. (AP; PE) See also *helēuma.*

hihikolo. A legendary *koa* tree on Kauaʻi that was said to have no roots. (PE)

Hikianalia. A star described as medium bright and near the equator, visible from April to September, used as a guide to mariner and fisherman. (Johnson; PE)

hili kukui. The red inner bark of the root of the *kukui* (candlenut) tree. It was used in dying or tanning and in making *pāʻele.* (Emerson)

Hilo. A famous Polynesian navigator for whom the town and district of Hilo may have been named. (Maline; PE)

Hina-ke-kā. Goddess of canoe bailers. Most commonly she took the form of a gourd canoe bailer (*kā*). *Wākea* found her floating and took her into his canoe. (PE)

Hina-kū-waʻa. See *Lea,* goddess of canoe makers.

Hina-puku-ʻai. Goddess of food plants; sister of *Lea;* took the form of an *ʻelepaio. Lit., Hina* gathering vegetable food. (PE)

hiʻu waʻa. A straight tree suitable for a canoe. (Maline; PE) A tree that grows straight up with two branches growing perhaps toward the east. (Kalokuokamaile) See also *koa hiʻu waʻa.*

hoa. To tie, lash; to rig a canoe; rigging, lashing. (Emerson; AP; PE)

hoa waʻa. Canoe companion, mate. (PE) The tackling or rigging of a canoe. (AP; PE)

hōʻaea i ka ēulu. To lift the *ēulu.* (Emerson/Kekahuna)

hoana. Flat, smooth grindstone used in adzemaking. (Malo)

hoʻāpipi. To join together, as two or more canoes. (AP) To couple two canoes together temporarily. (Emerson) See also *mau hoʻāpipi.*

hōʻawa. All Hawaiian species of the genus *Pittosporum,* trees and shrubs with narrow leaves clustered at branch ends, thick-valved fruits containing many seeds. (PE) Wood used for gunnels. Also *hāʻawa.*

hoe. To paddle, row; a paddle for a canoe. (PE; Emerson) See also *ʻawiki-ʻula-i-ka-lani.*

hoe kala. Paddle with a narrow, long, pointed blade. (Emerson; PE)

hoe kawele. To paddle moderately or slowly. (Lindo and Mower)

hoe nanue. Paddle with a broad and round blade, named for the *nanue* or *nenue* fish. (PE)

hoe oeoe. Paddle with a narrow, long, pointed blade. (Emerson)

hoe uli. Steering paddle; oar; rudder. (Lindo and Mower; PE)

hoe waʻa. Oarsman, paddler; to paddle a canoe. (PE)

hōʻemi ʻana. The backing of a canoe by a back stroke of the paddles. (Emerson)

hoena. Paddling. (PE)

hoholo. Redup. of *holo,* to run, sail. (PE)

hokele. Basalt used for adzes. (Kamakau/Chiefs) See also *hoʻokele,* basalt.

hokeo. Gourd calabash for gear. (PE) Used to carry roasted and pounded kukui nuts. Also a gourd hula drum.

Hōkū-ʻai-ʻāina. Unidentified navigation star. *Lit.,* star ruling land. (Johnson; PE)

Hōkū-hoʻokele-waʻa. Sirius. *Lit.,* star-navigating canoe. (Johnson) A star, the appearance of which was the signal for sailing on a voyage; pole-star, guide in navigation. (AP) Also *Kau.*

Hōkū-leʻa. Arcturus. *Lit.,* clear star. (Johnson) A celestial beacon marking the northern destination in the long voyages from the Marquesas and Tahiti to Hawaiʻi; zenith star of Hawaiʻi. Also the name of the double canoe that sailed without modern navigational aids from Hawaiʻi to Tahiti in 1976.

Hōkū-loa. Venus. Used as a reference point in travel between Hawaiʻi and Tahiti. (Johnson; PE) Also *Hōkū-ao, Holo-i-Kahiki.*

Hōkū-pā. Probably Ursa Minor since *Hōkū-paʻa* in this group is Polaris. (Johnson) A constellation, perhaps Leo or the head of Cetus. *Lit.,* fence star. (PE)

Hōkū-paʻa. The North Star. *Lit.,* immovable star. (Kamakau in Thrum; PE)

hōlei. A small native tree *(Ochronsia sandwicensis)* related to the *hao* (*Rauvolfia*) and closely resembling it. (PE) Wood used to make *moʻo,* gunnels.

holo. Holes in the edge of a canoe through which lashings were passed to hold a mat cover in place. (Malo; PE) To tie. (Emerson) To sail, run. (PE)

Holo-i-Kahiki. Venus. Used as a steering star by Hawaiʻi-nui, the navigator from Kahiki-honua-kele, who sailed to Hawaiʻi with eight steersmen whose names are reminiscent of stars and places. (Johnson) Also *Hōkū-loa, Hōkū-komohana.*

holo lua. To run, sail; move in two ways. (PE)

holo kahiki. Sailor; to sail to foreign lands. (PE)

holo kai. Seaman; to sail on the sea. (PE)

holo moku. Sailor, anyone who sails; passenger; to sail. (PE)

holo puni. To sail or travel around; circumnavigate. (PE)

Holoholo-pīnaʻau. A star used in navigation, perhaps Mars or Saturn. (Johnson; PE)

hōlona. A man who buys a canoe and does not know how to make one; unskilled; novice. (HEN; PE)

homa. To hold a canoe to its course in a rough sea; the beat of a paddle against the canoe side, as in rhythmic paddling while fish are being driven into a net. (PE) See also *hoʻohalulu, hoʻoma.*

honua. Middle section of a canoe; central section of a canoe fleet. (PE)

hoʻoha. To tie, bind, secure; rigging, lashing. (Maline) Probably *hōʻaha,* to tie.

hoʻohaluku. To make a noise, especially by striking a paddle against the canoe to scare fish into a net. (Maline; AP)

hoʻoika. To put ashore, go ashore, as from a canoe or boat. (AP; Maline)

hoʻokapeke. To set askew; to tilt, as a canoe. (PE)

hoʻokele. Steersman, helmsman; to sail or navigate; to steer. (PE)

hoʻokele. Type of basalt suitable for adzes; kind of stone found at craters such as Kilauea and used for adzes. (PE) See also *hokele.*

hoʻokele waʻa. Steersman, navigator. (Emerson) See also *Hōkū-hoʻokele-waʻa,* Sirius.

hoʻokele waʻa lolo niu. To sail coconut bloom sheaths as toy canoes. (Maline; PE) See also *ʻauwaʻa lau kī.*

hoʻokelekele. To sail about for pleasure; to steer, navigate, or sail frequently. (AP; Emerson; PE) Also *kākelekele.*

hoʻokī. Finishing off a canoe log. (Maline; Kamakau/Works)

hoʻokū. To hold water with the paddles when the canoe is sailing; to brace a canoe with a paddle while sailing or coasting over the waves in order to steer and steady the canoe. (Emerson; AP; PE)

hoʻokūpā. To cut; to hew, as in hollowing out a canoe. (Maline; AP)

hoʻolaʻa waʻa. The blessing of a canoe launching; to dedicate a canoe. (Maline; PE) See also *lolo waʻa.*

hoʻolala. To turn aside, out of one's course. (Emerson; PE)

hoʻolana. To cause to float, launch; to right a canoe. (PE; Lindo and Mower)

hoʻolanalana. To make lashings; to lash. (PE)

Hoʻolua. A strong north wind, famous in song. (Johnson; PE)

hoʻoluʻe. To shape a log for a canoe, as at the bow and stern. (PE)

hoʻoma. To hold a canoe to its proper course in riding the swell of the sea; to signal by striking with the paddles of a canoe. (AP) See also *homa.*

hoʻomana. The ceremonies and rites connected with the canoe; to perform the same. (Emerson)

Hoʻomananalo. Jupiter. (Johnson)

hoʻomo. Double and single *aku* fishing canoes. (Kahaulelio)

hoʻonohu. To reef, take in sail. (Emerson; PE)

hoʻonolunolu. Straight part of the canoe rim. (Fornander)

hoʻopaʻa. To tie, make fast; to lash. (Emerson)

hoʻopae. To go ashore, run upon a beach. (Lindo and Mower; AP)

hoʻopaepae. To cause a canoe to shoot landward on the crest of a wave. (AP)

hoʻopāhuʻa. To sail to windward; to move sideways. (PE; AP)

hoʻopihō. To plunge a canoe under a wave; to let a sea go over a canoe. (Emerson)

hoʻopiʻipiʻi. To sail or tack against the wind. (PE)

hoʻopinana. To pitch, as a canoe in a rough sea. (Emerson; PE)

hoʻouka. To put on board a canoe; to freight, send property by ship. (Maline; AP)

hoʻoūlu. To inspire canoe haulers by chant and prayer. (PE)

hoʻowaʻa. To make or shape a canoe. (PE)

hoʻowaha. To dub out a canoe. (PE)

hua. The bulging of the broadest part of the paddle blade. (Emerson; PE)

huakē. Well-proportioned, as a properly built canoe. (Maline; AP; PE)

hualala. Bow cover. (Maline) Also *kupe ihu.*

huʻe lepo. A style of felling a tree by cutting the roots and letting it fall, to prevent cracking and splitting. (Emerson) From *huʻe,* to uncover, and *lepo,* dirt.

huhui. A tree that grows straight up and branches out to three or four branches. (Kalokuokamaile; Emerson)

Huihui. Pleiades, a constellation used in navigation. (Johnson; PE) Also *Huhui.*

hūkaʻa. Resinous timber drifting to Hawai'i from the northwest coast of America. (PE)

huli ʻaoʻao. To lean to one side. When sailing it is sometimes necessary to get the crew weight to the windward side to help stabilize the vessel. (Lindo and Mower; PE) See also *kalelemuku.*

huli pau. To capsize. (Lindo and Mower)

hulilau. A calabash for carrying clothes in a canoe. (Emerson; PE)

Humu. Altair, said to be one of the guiding stars from Hawai'i to Tahiti when used with *Newe* and *Hōkū-pā.* (Johnson; PE)

Humu-mā. Probably Aquila, a star. (Johnson) The cluster of three stars in a row in the constellation Aquila. *Lit., Humu* and companions. (PE)

humu peʻa. Sail making; to sew sails. (PE)

huti. Slow, deep, long stroke employed over long stretches. (Cowan) Tahitian.

I

ʻiako. Outrigger boom, usually made of *hau;* cross boom, usually made of *ʻōhīa;* a class of persons skilled in clearing, righting, and refitting a canoe upset at sea. (Emerson; AP) See also *ama,* outrigger float.

iama. Port hull of a double canoe; outrigger float. (PE; Maline) Also *ama.*

ʻiao. Silversides (*Pranesus insularum*), a fish two or three inches long, found in shallow pools, used as bait for fish such as the *aku.* (PE) Also *ʻīiao, ʻioma.*

ʻie. Panels of matting sewn together to make sails. (Emerson) The aerial root of the *ʻieʻie* vine. (PE)

ʻieʻie. An endemic woody, branching climber (*Freycinetia arborea*). (PE) It was sometimes used to make cordage for lashings. (Emerson)

ʻihoe. Canoe paddler. (PE)

ihu. Prow or bow of a canoe or ship. (PE) Prow of the canoe log while unfinished in the mountains. (HEN) See also *ʻeku.*

Ihu-kū. Name reported for a Hawaiian star. (PE) Probably a general term for any guiding star standing (*kū*) above the bow (*ihu*) of a canoe. (Johnson)

ihu nui. Canoe with a broad bow; made from the butt end of a log. (Buck; Malo)

ihu waʻa. Prow or bow of a canoe; bowsprit. (PE) See also *ʻēkū.*

īkā. To be driven on shore by the surf; to be turned aside, as a canoe by wind or current; to run before the wind. (Emerson; AP; PE)

Ikiiki. Jupiter. (Johnson; PE)

ʻīkoi. A buoy; a float, as on a fish net. (PE) Also *lālea, mouo.*

ʻilau hoe. To paddle together. (PE)

ili. To be stranded. (Emerson; PE) To strike, rub, or scrape on the rocks or reef, as of a canoe or ship. (Emerson; AP)

ʻili-ahi. All Hawaiian kinds of sandalwood (*Santalum* spp.) shrubs and trees with fragrant wood. (PE) It was the wood favored for making the *pola.* (Kelsey)

ʻili hau. Bark of the *hau* tree, as used for rope. (PE) It was also used for rigging and sheets of sail. (Emerson)

imu hau hana. Earth oven in which *hau* wood was heated (*hana*) to be bent for a canoe outrigger. (PE)

io. The short rib extending upward from the tip of a paddle on the forward surface. (PE) Also *ʻupe.*

ʻīʻo lau maiʻa. Yellowish grain in wood, esp. *koa;* named for its resemblance to the yellow color of a banana leaf (*lau maiʻa*). (PE)

ipu holoholona. Gourd containing a fisherman's gear and bait, or a traveler's possessions. (PE; Maline) *Lit.,* traveling container.

ipu wai. Wood rollers laid under a canoe being hauled to prevent it from being scratched or damaged. (Emerson; PE)

iwi kaʻele. Keel. (Emerson; HEN; PE) Also *kuamoʻo.* Body of a canoe. (AP) See also *kaʻele.*

iwikuamoʻo. Bottom of the hull. *Lit.,* backbone. (Maline; PE)

iwilei. Measure of length from the collarbone to the tip of the middle finger with the arm extended; a yard. (PE; AP; Kalokuokamaile)

K

kā. Canoe bailer; to bail water; to hit, strike, hack, toss, fling, hurl, dash, esp. with a quick hard stroke. (PE) See also *Hina-ke-kā,* goddess of canoe bailers.

kā i ka hoe. To pull on a paddle with all one's strength. (PE)

kā i ka liu. To bail out the water from a canoe. (Emerson; Lindo and Mower)

kā liu. Dish to bail out the water from a canoe. (Emerson; Lindo and Mower) Also *kā waʻa.*

Ka-nuku-o-kapuahi. Hyades. *Lit.,* the opening of the fireplace. (Johnson; PE) Also *Ka-miki-o-kapuahi.*

ka pou kahi. Method for righting an outrigger canoe. (Buke)

ka pou lua. Method for righting an outrigger canoe. (Buke)

Ka-pū-o-alakaʻi. Forest goddess who presided over the lines (*pū*) by which the rough-hewn canoe log was guided (*alakaʻi*) in transporting it from mountains to sea. (Beckwith; Emerson; PE) Also *Ka-pū-ʻā-o-alakaʻi.*

kā waʻa. Canoe bailer; to bail a canoe; a method of putting a victim to death by throwing him overboard from a canoe far out at sea. (Buck; PE; AP)

Ka wai kuʻi a Kamehameha. The water dug by Kamehameha; "canoe holes" dug at Ka Lae, Hawai'i, where canoes could tie up for mooring.

kaʻalalo. To sail to leeward. (Maline; PE)

kaʻaluna. To sail to windward, against the wind. (Maline; PE)

kaʻaoki. The fairing of the canoe; to finish off or complete a canoe. (Emerson; AP; PE) See also *kīkoni.*

kaekae. *Koa* tree with whitish bark, soft and easy to hew. The wood is all of one kind and does not twist. (HEN; Kalokuokamaile) A new, smooth canoe, without knobs. (AP)

kaʻeke. The canoe body as brought down from the mountains. (Emory) See also *kaʻele.*

kaʻele. An unfinished canoe; the body alone. (Emerson) The *kaʻeke* when completely hewn and rubbed smooth. (Maline) Also *kaʻele waʻa.*

kaʻele waʻa. An unfinished canoe; the body alone. (Emerson) Empty and hollow, as a canoe hull. (PE) Also *ʻele.*

kahahei. Method of righting an outrigger canoe. (Buke)

kahao. Method of righting an outrigger canoe; bracing stick used in righting a double canoe. (Buke)

kahela. Chisel. (Maline; Kamakau/Works)

kahi mālie. A long and easy stroke. (anonymous informant) From *kahi,* to stroke, and *malie,* gentle, slowly.

kahihia. Method for righting a canoe. (Buke)

kāhihikaʻale. Seat in front of the *pani;* second seat ahead of the steersman's seat; where the waves lap into the canoe. (Maline)

Kahiki-nui. A navigation star, said to be named for one of the eight steersmen of Hawaii-loa. (Johnson; PE)

kāholo. Sennit lashings on royal canoes. (PE) See also *ʻaha kāholo.*

kaholopapa. Method for righting an outrigger canoe. (Buke)

kāhonua. Place where canoes rest or touch ground when approaching a landing. (Emerson; AP)

kāhulilua. Method for righting an outrigger canoe. (Buke)

kahuna kālai waʻa. Canoe builder. (PE)

kahuna poʻo. One who superintended the hauling of the unfinished canoe to shore; high priest. (Emerson; PE) See also *poʻo o ka waʻa.*

Kai-omo. A historic sea battle. (Kamakau/Chiefs) Also *Moku-ko-hekohe.*

kaiako. Method for righting an outrigger canoe. (Buke)

kāʻiliʻili. Snatching or pulling a newly carved canoe from the mountains to the sea. (Maline; PE)

kainaliu. Central part of a canoe, just aft of the point where the forward outrigger boom is attached to the hull. (PE) Part of the canoe forward of the aft comb cleat. (HEN)

kaka. Term applied to an elegent clipper-built canoe. (Emerson) Arched, curving from end to end, as the top of a canoe. (PE)

kakāhi. The external piece of the *manu* when this was made in two parts. (Emerson)

kakakauluna. Stools on which double canoes were placed when out of water. (Maline; AP) Also *ʻaki,* blocks.

kākelekele. To boat for pleasure. (Emerson; AP) Also *hoʻokelekele, kākele.*

kalaʻaulana. Method for righting an outrigger canoe. (Buke)

kālai. To carve, cut, hew; to shape a canoe. (PE) See also *kahuna waʻa.*

kālai pū maiʻa. The shaping of the "banana stalk"; a rough hewing and dubbing out of a canoe log. (Maline; Kamakau/Works)

kālai waʻa. Canoe carver; to build a canoe. (PE) See also *kahuna kālai waʻa.*

kalanalua. Method for righting an outrigger canoe. (Buke)

kalelemuku. To lean back; to lean over the outrigger of a fast-moving canoe to keep it from capsizing. (Maline) See also *huli ʻaoʻao.*

kalepa. Canoe sail, as made from young *pandanus* leaves. (PE) See also *peʻa,* sail.

kama i ka huli pū. The art of righting upset canoes. (Kaelemakule) *Cap.,* a canoe god.

Kama-i-ka-huli-waʻa. God who aided in floating, righting, and bailing out canoes upset at sea. (AP; Emerson) Also *Kama-i-ka-huli-waʻa-pū, Kama-i-ka-huli-pū.*

kamahele. Traveling branch. (PE) See also *lālā kamahele.*

kāmala. Temporary mountain shelters for canoe builders.

kamaniʻula. The bow seat in a canoe. (Maline)

kamoahuula. Method of righting an outrigger canoe. (Buke)

kamuku. Method of righting an outrigger canoe. (Buke)

kanaka. Portion of the outrigger float aft of the rear boom; the after end of the outrigger. (Emerson; AP)

kānaka kāʻiliʻili. Men who managed the check ropes, whose duty it was to keep the snout of the canoe log on the right course down the mountain. (Emerson/Kekahuna)

kānaka kō waʻa. The great multitude of men who hauled the canoe log from the mountains. (Emerson/Kekahuna) See also *kō waʻa.*

kānaka pū. Men whose duty it was to keep the rope straight and taut when hauling the canoe. (Emerson/Kekahuna)

Kanaloa. One of the major gods in the Hawaiian pantheon; considered a god of the sea. (Maline; PE)

Kāne. The leading god of the Hawaiian pantheon; a god of creation, sunlight, fresh water, forests; ancestor of chiefs and commoners. *Lit.,* male. (PE)

Kānealuka. A god of canoe building. (Fornander; HEN)

Kaneiahuea. A celebrated steersman of the canoe by night; one skillful in managing a canoe by night or day. (Emerson; AP)

"Kani ka papa waʻa." "The canoe floor sounds," a poetic expression referring to aged persons just before death. The dead were sometimes laid in canoes placed in burial caves. (Maline; PE).

kano. Tool handle. (Emerson) Also *Kiʻiau.*

Kaomi. Northeast tradewind. (AP; PE) Also *Moaʻe.*

kapa. Bark cloth made from *wauke* or *mamaki.* A material used rarely for sails. (PE) Also *tapa.*

kapae waʻa. Man at the rear in hauling down a canoe log. (Kalokuokamaile)

kapakahi. Method for righting an outrigger canoe or a double canoe. (Buke)

kapapa. Weatherboards. (Emerson/HHS)

kāpapa. Rhythmic tapping of the paddle against the side of the canoe, to drive fish into a net. (PE)

kāpeʻa. Method for righting an outrigger canoe. (Buke)

kapena. Tree sometimes used for making canoes. (Emerson/Kekahuna)

kāpili. Type of fishing canoe. (Kahaulelio)

kāpili waʻa. Process of adding on canoe parts after the hull has been carved and rubbed smooth. (PE)

kāpi'o. Method for righting an outrigger canoe. (Buke)

kāpū'ā. Method for righting an outrigger canoe. (Buke)

kapua'i. Method for righting an outrigger canoe. (Buke) Part of the outrigger float where the boom is joined to it. (PE)

kapua'i hope. Place where the rear outrigger boom is lashed to the float. (Maline; PE)

kapua'i mua. Place where the front outrigger boom is lashed to the float. (Maline; PE)

kau. Wooden handle sometimes used on adzes or chisels; pole raised longitudinally over a canoe, on which mats were placed for protection in stormy weather. (PE; AP)

Kau. A star in the northern sky that served as a guide to mariners. (Johnson) The Milky Way. (PE) See also *Hōkū-ho'okele-wa'a*, Sirius.

kau mōkoi. Rack to hold fishing poles. (PE) Also *'āmana*.

kaualakō. Dragging the canoe log from the mountains. (Emerson) See also *kauō wa'a*.

kaualune. Carved knob to which the heavy lines were tied to drag the pre-shaped log down the mountain. (Maline) Possibly *kaulupe*. Also *maku'u*.

kaukāhi. Single canoe. (PE) Also *wa'a kaukāhi*.

kaula hauhoa wa'a. Canoe binding cords. (Maline; HEN) Also *lanalana*.

kaula ho'omaha. Line attached to the outrigger booms at both bow and stern. (Emerson/HHS)

kaula hope. A back stay. (Emerson) Also *pū o hope*.

kaula huki. The halyard to hoist the sail. (Emerson)

kaula ihu. Stay attached to the canoe prow. (Emerson)

kaula 'ili'ili. Check rope; rope which held back the canoe log from going headlong down the mountain. (Emory) Also *kaula kā'ili'ili*.

kaula inaoakama. Method for righting an upset canoe. (Buke)

kaula kā'ili'ili. Guide rope used in hauling the canoe to shore; check rope. (Kalokuokamaile; Emory) Line from the forward outrigger boom to the prow, to strengthen the boom in storms. (PE)

kaula kā mua. Forestay. (Maline)

kaula kaualakō. Rope used in hauling a canoe log. (Emerson)

kaula kō. Cable by which the canoe log was hauled from the mountains. (Emerson/Kekahuna)

kaula likini. Rigging. (PE) Possibly from English.

kaula luahine. Line running from the prow of a canoe to the after end, used to lash the mat cover. *Lit.*, old woman line. (PE; AP; Emerson) See also *'aha holo luahine*.

kaula 'ōhi'a. Strong outrigger lashing used on deep-water canoes. Probably so called because of the hardness of *'ōhi'a* wood. (PE) Also *'aha kaula 'ōhi'a*.

kaula paepae. Main sheet of the sail, attached somewhere near the middle of the spar. (Emerson)

kaula pahe'e. Sheet which went under the *'iako* and over the *wae* to the steersman, who held it. (Emerson/Kekahuna) Line, as to raise a sail. (PE)

kaula pā'ū. Line holding the mat canoe cover *(pā'ū)* in place. (PE)

kaula pū. Shrouds holding the mast to the forward outrigger boom. (Emerson) Rope which pulled the canoe to shore. (Kalokuokamaile)

kaula 'ūlili. Strengthening cords holding the canoe cover in place. (PE)

kaula waha. Line extending from sail tip to the outrigger boom, on the edge of the canoe. (Maline; PE)

Kaulana-o-ka-la. See *Hōkū-ho'okele-wa'a*, a star.

kaulana wa'a. Place where canoes stop, as while fishing. (PE)

kaulua. Double canoe; canoe with two hulls. (PE) See also *wa'a kaulua*.

kaumelimeli. Canoe hull. (Maline) Also *ka'ele*.

kaumoli. A stick about four inches long, with holes down its middle, used to hold gunwales in place while being sewn to the canoe hull with sennit. (PE; HEN)

kaumo'o. To fasten the gunwale. (AP; PE) Wooden canoe clamp. (Buck; PE) Also *pūki'i wa'a*.

kauō wa'a. Dragging the canoe log from the mountains. (Emerson; AP) Also *kauwō wa'a*.

kaupē. To paddle very quickly. (Emerson/Kekahuna) To put the paddle forward. (PE)

kaupo'i. Median bow cover. (Buck) Triangular hatch plank, generally painted black. (Emerson) Also *kuapo'i*.

kauwō wa'a. See *kauō wa'a*.

kawae. Method of righting an outrigger canoe. (Buke)

kāwa'ewa'e. Stone, coral, used in polishing canoes. (AP; Emerson; PE) See also *pōhuehue*.

Kāwai. A navigation star. (Johnson; PE)

kāwa'u. A native holly (*Ilex anomala* f. *sandwicensis*), also called *'aiea*. (PE) A tree *(Xanthoxylum dipetalum)* used to make *tapa* beating boards. (AP) Wood used to make gunnels.

kawele. To work slowly or moderately, as at rowing a canoe. (AP; Emerson; PE)

kawelewele. The canoe at the end of a line or train of canoes drawing the *lau* (rope hung with leaves) in the method of fishing called *hukilau*. (AP)

ke kā. The *ihu*, snout, of the canoe in its unfinished state in the mountains.

Ke-pū-waha-'ula'ula. A sea battle fought in 1791 offshore of Waipi'o, Hawai'i. (Kuykendall)

ke'a. Booms used in front and back. These lay very close to the stern and bow pieces of the canoe. (I'i) Sticks connecting the two hulls of a double canoe. (PE) See also *'ūmi'i*, tie booms.

keahula. Method for righting an outrigger canoe. (Buke)

keakamilo. Outrigger float. (Maline) Also *ama*.

keama. Method for righting an outrigger canoe. (Buke)

keamo. Method for righting an outrigger canoe. (Buke)

keanahā. A specially built place on a platform of a double canoe, reserved for the high chief. (PE)

keaume. Method for righting an outrigger canoe. (Buke)

kele. To sail out to sea; to steer. (Emerson; PE) See also *ho'okele*.

Keoe. Probably the constellation Lyra. (Johnson; PE) Also *Keho'oea*.

kī. A plant *(Cordyline terminalis)* in the lily family, found from tropical Asia eastward to Hawai'i. (PE) All parts were put to many uses. Juice from the uncooked root was sometimes added to *pā'ele*. (Emerson) Stems were inserted into gunnel holes to aid in fitting and alignment. Also *tī*.

kia. The mast. (Buck) The base of the mast. (Maline) Also *pou*.

kia hope. Aftermast. (Lindo and Mower)

kia ihu. Foremast. (Lindo and Mower)

kiakahi. Jib. (Kamakau)

kialoa. A long, light, and swift canoe used for display and racing. (PE) See various other definitions and sources in Chapter 14. Also *kıoloa*.

kiapā. Swift sailing canoe; any vessel equipped with cross spars. (AP: PE)

kiapoho. Canoe with a deep, curving hull. (PE)

kiapoko. Short canoe with a rounded hull; nearshore fishing canoe. (PE).

kī'apu'apu. The forward curving portion of the canoe rim. (Fornander) Also *manu*.

"Kiauau!" Interjection encouraging workers in drawing an unfinished canoe hull from the forest to the sea. (PE) To encourage with song, as was the custom when great numbers of workmen were drawing canoes from the forests to the seashore. (AP)

kiele. To paddle. (PE)

kīhā. To rise and pitch, as a canoe in a heavy sea. (AP; PE)

kihi. Canoes guarding the sides of *mālolo* and *iheihe* fishing nets; to plug or patch a canoe. (PE)

kihikihi. To belly, as sails in the wind. (Emerson)

kīkala. Stern; posterior. (PE)

kīkepa. Edge or rim of a canoe. (PE)

kiki. A plug shaped like the *kepa* wedge, but with a longer outer edge, used in filling cracks in the canoe; to patch a canoe. (PE)

kīkihi. Canoe sailing; to sail. (Emerson; AP; PE)

kikoni. Small adze used for smoothing and finishing; to shave off and smooth off projections in finishing a canoe. (Emerson; PE; AP) Also *ko'i kikoni*, finishing adze.

kiko'o. Unit of measurement; the distance between the extended tips of thumb and forefinger of one hand; used to measure the depth of a canoe. (Emerson; PE)

kila pao. Steel chisel. (Buck; PE) Possibly a post-contact innovation.

kilo. One of the *kahuna* holding the check rope, and who recites the *paha*, when the canoe log is being hauled. (Emerson) Stargazer, reader of omens, seer, astrologer; to watch closely, spy, examine. (PE) A predictor of future events; to watch omens; to watch or look earnestly at for the purpose of discovering something. (AP)

kilo makani. One who observes the winds for purposes of navigation; to observe the winds. (AP; PE)

kīmō. To dub out the inside of a canoe log with an adze, tamping and smoothing the surface. (PE) Also *kīmōkīmō, kīpō*.

kīmōkīmō. To hew the inside of the canoe with the adze. (Emerson)

Kini-a-ke-akua. Multitudes of spirits of the wilderness. (Emerson) Also *Lehu-a-ke-akua*.

kino. The body, hull of the canoe. (AP)

Kio-pa'a. Polaris. *Lit.*, fixed projection. (Johnson; PE)

kī'o'e. Arm or wrist motion in paddling or dipping. (PE)

kioloa. See *kialoa*, racing canoe.

kīpō. See *kīmō*, to dub out.

kīpū. To turn back the paddle; to row the other way. (Emerson) To turn the paddle, as in back-paddling a canoe. (AP) To hold back or brace the canoe on a wave with a paddle. (PE)

kīpuka. A loop at the extreme forward end of the hauling ropes, to keep the *kaula kō* straight and taut. (Emerson)

kīpupū. To brace an oar or paddle; to set back an oar; back little by little. (Emerson; AP)

kīwa'a. Stick used as a vice to hold the canoe while the gunwale strakes are attached. (PE) Also *mōlī*.

kō wa'a. A line for hauling a canoe hull from the mountains. (Emerson) To tow or drag a canoe. (PE) See also *kānaka kō wa'a*.

koa. The generally preferred forest tree for canoes. (Fornander) The largest of native forest trees (*Acacia koa*), with light gray bark, crescent shaped leaves, and white flowers in small round heads. A legume with fine red wood, a valuable lumber tree, formerly used for canoes, surfboards, calabashes, etc. (PE) See various types below.

koa 'awapuhi. *Koa* with yellowish wood, regarded as female. *Lit.*, ginger *koa*. (PE) Also *koa lā'au mai'a*.

koa hi'u awa. Tree that grows straight up and then branches on either side. (HEN) Also *koa hi'u wa'a*.

koa hi'u wa'a. Tree that grows straight up with two branches growing perhaps toward the east. (Kalokuokamaile) A straight tree suitable for a canoe. (PE)

koa huhui. Tree with a clustering branching pattern, growing straight up with many branches at the top. (HEN) Tree that grows straight up and branches into three or four branches. (Kalokuokamaile)

koa huli pū. *Koa* having wood of such good quality throughout that it was thought best to avoid cracking the log by exposing and drying out the roots, letting the tree fall over, rather than cutting it down. (Emerson)

koa iho 'ole. Tree that was crooked but nicely bent in an arc, considered the handsomest and most desirable log to make the *wa'a kaka* (canoe with a good deal of sheer). (HEN) A tree bent and forming an arc; a hard tree to hew. (Kalokuokamaile) Tree without a core, easily shaped into a canoe. (PE)

koa 'i'o 'ōhi'a. High density *koa* (60–80 lbs./sq. ft.), with wood almost black in color; usually avoided for canoes because the wood was heavy and hard to work. (Kalokuokamaile) Also *'i'o 'ōhi'a*.

koa kamahele. A *koa* tree one of whose branches was larger and more serviceable than the main stem itself. (Emerson) Also *koa lālā kamahele*.

koa ko'amoku. This type of tree is large and rounded but not long; sometimes called *pou* (post); a canoe made from this type will have the same width from stern to prow. (HEN)

koa kolo. A tree that is leaning or sprawling, though fit for use. (Emerson/Kekahuna; PE)

koa kolopū. Tree that grows straight up with no significant branching, very straight, same size the whole length of the trunk. Waves will wash into a canoe made from this type. (HEN; PE)

koa kū ke'ele wa'a. A straight tree somewhat flattened on both sides. Also *kū ke'ele wa'a*.

koa kūpalaha. *Koa* tree with a thick, straight trunk, perhaps flat on one side or leaning close to the ground; good for a canoe hull. (PE) Tree that grows straight up, broad and rather flat. (Kalokuokamaile)

koa kūpalina. Generally a usable but imperfect tree, being bent, flattened, or short; thicker than it is tall; not so well proportioned as the other types. *Lit.*, stands blemished. (HEN) Also *kūpalaha*. (PE)

koa kupulā'iki. *Koa* tree with a thick straight trunk, perhaps flat on one side or leaning close to the ground; good for a canoe hull. (Maline) Also *koa kūpalaha*.

koa lā'au mai'a. *Koa* having soft, low density (30–45 lbs./sq. ft.), light wood, yellowish in color ("banana colored"); used for paddles. (Kalokuokamaile)

koa lālā kamahele. Tree that grows straight up with a single branch ("traveler's branch") that extends straight out. When the tree is cut, it will fall in the direction to which the branch is pointing. (Kalokuokamaile) Also *koa kamahele*.

koa lau kane. Type of *koa*. (Fornander) Also *koai'e*. (AP)

koa lau kani. Type of *koa* regarded as male. *Lit.*, strong. (PE)

koa lau nui. A large leafed variety of *koa*. (PE)

koa no'u. A tree that is straight, thick, and not very tall. (Kalokuokamaile) A short, stocky tree suitable for a wide, short canoe. (PE) A tree that grows straight up, without a blemish, handsome to behold. From *no'u*, chunky. (HEN) Many *'ōpelu* (heavy duty fishing canoes) were probably made from this type of tree.

koa poepoe. A short, thick tree good only for a short, thick canoe. (Emerson/Kekahuna)

koa'ekea. To adjust and fit canoe parts to the canoe body. (PE)

kō'ai. To place the paddle in the water to one side of the canoe, as to prevent drifting when fishing; to brace with a paddle. (Emerson; PE)

koai'a. See *koai'e*.

koai'e. A native tree (*Acacia koaia*) much like the *koa* but much smaller, the pods narrower and curved, leaves averaging narrower, wood harder. Formerly used for fancy paddles. (PE) Dwarf *koa* trees growing singly. (AP) Also *koa'ohā, koai'a*.

koali. To scull a canoe. (Kamakau/Works) Also *hapuna*. Some kinds of morning glory vines (*Ipomoea* spp.) used for swings and nets. (PE)

koa'ohā. See *koai'e*.

kō'ele kālai wa'a. Canoemaking for a chief. (PE)

koho. The point at the tip of the paddle blade. (Emerson; PE) See also *ʻoupē*.

koʻi. Adze, axe; adzelike, sharp. (PE) See various types below.

koʻi ʻāhuluhulu. Planing adze. (PE) See also *koʻi kaholo*.

koʻi alaheʻe. Hardwood adze. (Malo; Kamakau)

koʻi ʻauwaha. Scoop adze. (Kalokuokamaile)

koʻi ʻawili. Socketed adze. (PE) Also *koʻi wili*.

koʻi holu. Bent adze, used to shave off or smooth off a canoe in the direction of the grain. (Emerson; Kalokuokamaile) Broad, tanged adze. (Kamakau/Works)

koʻi hoʻoma. Narrow and deep adze. (Kamakau/Works)

koʻi kahela. Chisel. (Emerson; Kamakau/Works) Also *kahela*.

koʻi kahi. Plane made of wood. (Kamakau/Works) *Lit.*, shaving adze. (PE)

koʻi kāhili. Finishing adze. (anonymous informant) See also *koʻi kāpili*.

koʻi kāholo. Planing adze. (Kalokuokamaile) See also *koʻi ʻāhuluhulu*.

koʻi kālai. Carving adze. (PE)

koʻi kāpili. Finishing adze. (Kamakau/Works) Joiner's axe. (Malo) See also *koʻi kāhili*.

koʻi kīkoni. Adze used to shave off and smooth off projections. (Emerson/Kekahuna) Small finishing adze. (PE) Also *kikoni*.

koʻi kila. Steel adze. (Kamakau/Works) See also *koʻi meki*.

koʻi kuehu. Shaving adze. (Kalokuokamaile)

koʻi kūkulu. Straight-edged adze; used to shave down the sides of a canoe. (Kalokuokamaile)

koʻi kūpā. Adze for digging out, hollowing out the inside of a canoe hull. (Emerson; HEN) Also *koʻi kūpā ʻai keʻe*.

koʻi kūpā ʻai keʻe. Swivel-headed adze, used for hollowing out the narrow bow and stern of a canoe, smoothing and polishing. (numerous sources) Also *koʻi ʻowili*.

koʻi lipi. Sharp adze. (PE) Adze for cutting *koa* trees. (Nalimu) Axe, hatchet. (Kamakau; AP)

koʻi meki. Iron adze. (Kamakau; PE) The canoes of Wākea were said to have been hewn by *koʻi meki* whose names were Haumeku and ʻOlopu, adzes that belonged to Hawai'i from remote times. (Kamakau/Works)

koʻi milo. Adze used on the outside of the canoe. (Kalokuokamaile)

koʻi nunu. *Lit.*, greedy adze. (PE) Also *koʻi kālai*.

koʻi ʻolē. Conch shell adze. (PE)

koʻi oma. Small, oval adze, used for finishing. (PE)

koʻi ʻōpaka. Adze for the outside of a canoe. (Kalokuokamaile)

koʻi ʻōwili. Gouge. *Lit.*, twisting adze. (PE) Also *koʻi kūpā ʻai keʻe*.

koʻi pāhoa. Chisel, stone battle-axe. *Lit.*, dagger adze. (PE)

koʻi pāpale. Type of adze. (Kamakau/Works)

koʻi paukūkū. Adze to cut into sections. (Kalokuokamaile) Adze used for cutting sections in a canoe log that is to be made into a canoe. (PE)

koʻi pele. Adze to break into pieces. (Kalokuokamaile) Axe used to cut zigzag trenches in the bottom of a canoe, from which the intervening chips were then to be removed; axe used in hollowing out a canoe. (Emerson) See also *kūpele*, to dig out.

koʻi wili. Socketed adze. (Emerson; Kamakau/Works) Also *koʻi ʻāwili*.

Koko-iki. Star mentioned in the *Kumulipo*, creation chant. (Johnson) Star seen at the time of the birth of Kamehameha I and named for his birthplace. *Lit.*, little blood. (PE)

kōlea. Pacific golden plover (*Pluvialis dominica fulvus*), a migratory bird that arrives in Hawai'i about the end of August and leaves early in May. (PE) Native trees and shrubs (*Myrsine Suttonia*) used for gunnels.

kōlea a me Kahiki. A reference to the islands to the south of Hawai'i.

komo. To be loaded to the proper limit, said of a canoe; to be freighted. (AP)

koʻo. The sprit of a canoe's sail; a pole used to impel a canoe. (AP)

koʻokāhi. Canoe carrying one person. (PE) This term may be modified to indicate the number of persons in the canoe; two (*koʻolua*), three (*koʻokolu*), etc., up to eight (*koʻowalu*).

koʻūkoʻū. Heavy, as a canoe which sinks deeply into the water instead of floating lightly. (Emerson; AP)

kū. See *hoʻokū*.

Kū. A major god of the Hawaiian pantheon; represented the male generating power. Various forms of *Kū* were appealed to for rain and growth, fishing and sorcery; best known as the god of war. *Lit.*, upright. (PE)

Kū-ʻālana-wao. A god of the forest (*wao*) and of canoe makers. *Lit.*, *Kū* of the upland offering. (PE)

Kū-holoholopali. A god of canoe building. (Fornander) *Kū* who steadies the canoe when it is carried down steep places. (Beckwith)

Kū-kaʻieʻie. *Kū* of the wild *pandanus* vine. (Beckwith)

Kū-kalanawao. *Kū* the guide through the mountain wilderness. (Emerson)

Kū-kanaloa. A god associated with canoes. (Emerson)

Kū-ka-ʻōhiʻa-laka. *Kū* of the sacred *ʻōhiʻa* tree. (Emerson) See also *Laka*.

kū keʻele waʻa. See *koa kū keʻele waʻa*, a tree type.

kū kia. The socket or shoe upon the platform across a double canoe. (Emerson) Presumably the socket in which the mast (*kia*) was stepped. See also *kū pou kia*.

Kū-maha-aliʻi. God of him who journeys in the canoe. (Henriques)

Kū-mauna. *Kū* of the mountains. (Emerson; Beckwith)

Kū-moku-hāliʻi. *Kū* spreading over the land. (Beckwith) *Kū* who bedecks the island. (Emerson; Malo) A god of forests and canoe makers; husband of *Lea*. (HEN)

Kū-ohanawao. A god associated with canoes. (Henriques)

Kū-ʻōhiʻa-Laka. See *Laka*, a god of canoe builders.

Kū-olonowao. *Kū* of the deep forest. (Beckwith) A god of canoe makers. (Fornander; HEN)

kūpalalakē. See *koʻi kūpā ʻai keʻe*, an adze.

Kū-palalakē. A god associated with canoes. (Emerson; Henriques; Malo)

Kū-pepeiao-loa. *Kū* of the long comb-cleats; god of the seat braces by which the canoe is carried. (Beckwith; Henriques)

Kū-pepeiao-poko. *Kū* of the short comb-cleats; god of the seat braces by which the canoe is carried. (Beckwith; Henriques)

Kū-pulapula. *Kū* with many offspring. (Emerson)

Kū-pulupulu. *Kū* of the undergrowth. (Beckwith) *Kū* the rough one, chipmaker. (Malo) Fuzzy, damp, or dew begetting *Kū*. (Emerson) Also *Kū-pulupulu-i-ka-nahele, Kulauka*.

kū pou kia. Small opening in canoe bottom for mast. (PE)

Kū-puku. The Pleiades, a constellation of seven clustered stars. (Johnson; PE)

kūʻula. Fishing shrine; any stone god used to attract fish; named for the god of fishermen; open altar near the sea for worship of fish gods; hut where fish gear was kept with *kūʻula* images so that it might be impregnated with spiritual power. *Lit.*, red *Kū*. (PE)

Kū-ʻula-kai. God of fishermen; husband of *Hina-puku-ʻai;* lived at Alea-mai on East Maui and built the first fish pond. (PE)

kua. Splash guard. (Lindo and Mower)

kua ʻiako. Inboard part of the outrigger boom. (PE) Portion of the outrigger boom that spanned the hull of the canoe and around which many of the lashings wrapped; place where the outrigger booms were bound on. (Emerson)

kua ʻiako hope. Aft outrigger boom, lashed to the aft comb cleat. (Maline) Back brace. (HEN)

kua ʻiako kainaliu. Outrigger boom associated with the *pepeiao kainaliu*. (Maline)

kua ʻiako mua. Forward outrigger boom. (Maline) Front brace. (HEN) Space between the front outrigger boom and the bow cover. (Emerson)

kua ʻiako paʻihua. Outrigger boom associated with the *pepeiao paʻihua*.

kua laʻau. To hew down a tree; hewer of wood; feller of trees. (PE)

kua moʻo. Canoe keel. (Emerson; AP) Clamps used in making or repairing canoes. (PE)

kuaʻau. Paddle handle. (Lindo and Mower)

kuaʻe. Canoe keel. (AP; PE) Also *kua moʻo*.

kuakua. To cut down a tree; to hew out a canoe. (AP)

kuakea. Foamy and violent sea state. (Emerson)

kualana. Deserted, abandoned, given up; as when a rower lays down his paddle from fatigue. (AP)

kualono. To overturn, as an unfinished canoe. (PE)

kūaluʻula. Red cords used to decorate a chief's canoe. (PE)

kuamoʻo. See *iwi kaʻele, iwikuamoʻo*, or *kua moʻo*.

kuānuenue. Boom connecting canoe hulls of a double outrigger. (PE)

kuanuʻuanu. The main boom. (Maline)

kuapoʻi. Cover over the open part of the bow or stern of a canoe. (Emerson) Dash board, appearing only on the front of a canoe. (Emory; AP) Weatherboard covering the canoe top fore and aft. (PE) Weatherboards spanning the *kupe* on each side. (Maline) Triangular hatch plank. Also *kaupoʻi*.

kuapoʻi o mua. Hatch used at the stern of the canoe. (Emerson/Kekahuna)

kuʻau hoe. Paddle handle. (Emerson) See also *kuaʻau*.

kūʻēʻē. Double canoe with hulls of unequal length. (Buck; PE)

kukui. Candlenut (*Aleurites moluccana*), a large tree in the spurge family. The soft wood was used for canoes and for gunnels. (PE) The root bark was mixed with charcoal and used in painting the canoe black. (AP) The nut oil was used to dress the canoe after the black paint was daubed on. The nut was chewed and spewed upon the water to clear it, when fishing. (Kamakau/Works)

kula. Place for landing from deep water; spot where a canoe or a swimmer touches bottom. (AP)

Kulauka. A god of canoe makers. His territory extended from the lower limits of the forests to the mountain tops. (AP) Also *Kū-pulupulu*.

kūlepe. A violent blast of wind accompanied by rain, generally in the middle of a channel. (AP) A strong wind of the Kaʻieʻie Waho Channel, between O'ahu and Kaua'i.

kūmū. Goatfish (*Upeneus porphyreus*). (PE)

kumuhele. Type of lashing used on the outrigger of a chief's canoe. (PE) Also *ʻaha kumu hele*.

kumuhonua. Base of the mast. (Maline) See also *kia, pou*.

kumupou. Type of lashing on canoe outrigger. (PE)

kūpā. Trimming down the outside and inside of a rough hewn canoe. (Kamakau/Works) To clean off or dig out the inside of a canoe. (AP) See also *koʻi kūpā ʻai keʻe*.

Kūpā-ʻai-keʻe. A god of canoe makers, worshipped as the inventor of the adze. *Lit.*, *Kūpā* who eats defects. (PE) *Kū* of the bevelled adze. (Emerson)

kupakeʻe. Stern end pieces. (Maline) Also *kupe hope, lāʻau hope*.

kūpalaha. Tree that grows straight up and is broad and rather flat. (Kalokuokamaile; PE)

kupe. To steer a canoe. (PE) To manage or direct a canoe with the steering paddle. (AP; Emerson)

kupe. End pieces. (PE) One half of the manu; rim of a canoe before and behind. (Emerson) Part forward and back of the canoe that holds the outrigger. (HEN) See also *manu*.

kupe hope. Stern end pieces. (Maline) Also *lāʻau hope, kupakeʻe*.

kupe ihu. Bow cover. (Maline) Also *hualala*.

kupe ʻulu. A *manu* constructed from a single piece of wood. (Emerson)

kūpele. To dig out, hollow out a canoe; series of oblique cuts from stern to bow. (Emerson) To dig out the inside of a log in the process of making a canoe by softening and breaking up the wood. (AP) To dub out the inside of a log for a canoe hull. (PE)

kūpele maloko. Hollowing out the interior of the canoe hull. (Buck)

kupeʻulu. An old, worn out canoe; an old broken canoe, without sail or other conveniences. (Emerson; AP) A canoe with a large bow; a canoe with a large or blunt forepart. (Emerson; AP)

kuwā. Prayer made when a canoe was finished. (Emerson; AP)

kūwā. Block out-put under the end of the outrigger booms to raise them. This was done before curved booms were developed. (Emerson)

L

la. Sail. (Maline) Also *ʻūpoʻi*.

la hope. Aftersail. (Lindo and Mower)

la ihu. Foresail. (Lindo and Mower)

la peʻa. Emblem woven into the center of a *peʻa lā*, consisting of a circle with twelve rays of a red color pointing inward towards the center where was inscribed another smaller circle, the central part of which was white. (Emerson)

laʻau hope. After end piece. (Buck; PE) Also *kupe hope, kupakeʻe*. (Maline)

laʻau huli pū. Stick lashed athwart the canoe forward of the forward boom. (Emerson) *Hau* sticks used as leverage in righting and then emptying the canoe of water.

laʻau ihu. Forward end piece. (Buck; PE) Also *lehiamanu*.

laʻau kaha. Boom of a vessel. *Lit.*, turning stick. (PE)

laʻau kū. Mast. *Lit.*, standing stick. (PE)

laʻau lalo. Boom of a vessel. (PE)

laʻau paepae. Boom of a vessel. (PE)

Laea. See *Lea*, a goddess.

Laea-ka-wahine. Female diety of the canoe. Also *Lea-ka-wahine*.

Laka. A hero whose log, which was felled for a canoe, was found growing upright the following morning. (PE) A god worshiped by canoe makers. (Emerson; PE) Also *Kū-ʻōhiʻa-Laka*.

lala. See *hoʻolala*, to turn aside.

lala. Paddle blade. (Emerson) Timber, as the outrigger boom or float. (PE)

lala kamahele. Tree that grows straight up, with a branch that extends straight out. (Kalokuokamaile) Traveler's branch. (Emerson) A far-reaching, strong, or heavy branch; the main branch. (PE)

lama. All endemic kinds of ebony (*Diospyros*, syn. *Maba*), hardwood trees with small flowers and fruits. (PE) Wood sometimes used for making the *pola*. (Kelsey)

lana. To lie at anchor, as a fishing canoe. (PE)

lanalana. Lashings in general, but esp. ornamental plaited knot lashings and lashings of outrigger booms to float. (HEN) Rope made from coconut fiber. (AP) To bind an adze stone to its handle. (Emerson)

lapauila. Cross booms; booms joining the hulls of a double canoe, corresponding to the outrigger booms of a single canoe. (Emerson; PE) Also *ʻiako, lapauwila*.

lau hala. *Pandanus* leaf, esp. as used for plaiting. (PE) Material favored for making sails.

lauʻapo. Port side of the canoe; side where the seine nets were hauled in. (Maline) Also *ama, ʻaoʻao hema*.

lauhoe. Paddle blade. (PE) To paddle together with strength and resolution. (Emerson; AP) To paddle together and uniformly, either in the same canoe or in different canoes. (PE)

laulau hoe. Paddle blade. (Emerson)

lauoha. The sail of a vessel above the spanker. (Emerson; AP)

Lea. Goddess of canoe builders; wife of *Kū-moku-hāli'i*; sister of *Hina-puku-'ai*; took the form of an *'elepaio*. (PE) Also *Hina-ku-wa'a, Laea, Lea-ka-wahine.*

lehia manu. Skillfully shaped front end piece. (Maline) Also *kupe ihu.*

Lehu-a-ke-akua. Spirits of the wilderness. (Emerson) Also *Mano-a-ke-akua.*

lei ole. A soft stone used in polishing. (AP) Also *'ana.*

lei ola. A soft stone used for polishing. (AP) Also *'ane.*

lē'iwi. Canoe with a very flat *manu* or none at all. (Emerson) See also *leleiwi.*

lele. To land, go ashore, disembark from a canoe. (Emerson; PE) See also *pae.*

lele. A tall variety of wild banana (*Musa sapientum*) formerly planted near the altar (*lele*). Its essence was thought to fly (*lele*) to the gods. This banana was *kapu* to women. (PE)

lele aoa. Act of sailing away rapidly without baggage in a canoe or ship to another land. (Emerson) To sail, as a canoe fleet. (PE)

lele lupe. To rise high and submerge or subside, as the forward end of the outrigger float in a stormy sea. (AP)

lele wa'a. Canoe leaping. (I'i) Transferring at sea from canoe to canoe or canoe to surfboard for the sport of surfing to shore. (PE)

Lele-wa'a. A shark, perhaps the friendly shark that was said to lean on canoe outriggers for food and company. (PE)

leleiwi. Canoe with broad bow ornaments. (Buck) Ornamental carved figurehead on a bowsprit. (PE) A canoe with an unusually broad and allegedly very decorative *manu*. See also *lē'iwi.*

lelekepue. Hard volcanic rock used for adzes. (PE) See also *'alā lelekepue.*

lemuku. To turn a canoe from its appointed course. (AP)

lepa. An ensign or flag used in a war canoe. (Emerson; AP)

lepe ulu. A split in a tree; a crack running with the grain of the wood. (Emerson; PE)

leuwi. Canoe with an extra wide weatherboard; the fore point of the canoe, where the two ends of the weatherboards come together. (PE; AP)

likini. Rope for the mast. (Emerson) Possibly from English *rigging.*

limalau. Cooperation on canoe building. (PE) Related to *laulima*, cooperation.

limu kala. Common, long, brown seaweeds (*Sargassum* spp.). Eaten raw, mixed with other seaweeds, used in ceremonies to drive away sickness. (PE)

liu. Bilge; water leaking into the canoe; to leak. (PE)

lolia. To wobble, as a canoe when drawn from the mountains; to turn on one side then on the other. (Emerson; AP)

lolo. Religious ceremony at which the brain (*lolo*) of a sacrificial animal was eaten. (PE) The hog-sacrifice ceremony performed at the completion of a canoe; its consecration, when the diety is invoked to witness its satisfactory completion. (Fornander)

lolo 'ana i ke ka'ele ma ke kuahiwi. Ceremony consecrating the canoe in the mountains or wilderness. (Emerson)

lolo 'ana ka wa'a i ka hālau. Final consecration ceremony of a canoe. (Emerson)

lolo wa'a. Canoe launching ceremony; to perform this ceremony. (PE)

loloniu. A rare type of canoe made from the trunk of a coconut tree. (Emerson; AP; PE)

lona. Blocks placed beneath a canoe when out of water to prevent contact with the earth; the wood from which such blocks were made. (Emerson; AP; PE) Rollers put under the canoe in hauling. (Emory) Blocks of light wood sometimes taken along to serve flotation devices in the event of swamping. See also *paepae.*

lou. To cause a canoe to move sideways by dipping the paddle flat side to the canoe and pulling inward. (Emerson)

loulu. All species of native fan palms *(Pritchardia)*. Used to make sails. (Emerson; PE) Also *noulu.*

luahine. Method of righting an outrigger canoe. (Buke)

lupe. Flattened forward end of the outrigger float outside of the joining of the boom to the float. (PE) It was not painted black like the rest of the float. (HEN)

lu'u i ke kai. Starboard side of the canoe. *Lit.*, dip to the sea. (Maline) Also *'ao'ao 'ākau, muliu.*

lu'ukia. Coconut fiber lashing; sennit. (PE)

M

mā. Fermented breadfruit. (Handy) A voyaging provision.

maha. Swollen stern of the canoe body. (Emory) Part of the canoe log in front of the neck. (HEN) Lower portion of the *manu*. (PE)

mahimahi. Dolphin *(Coryphaena hippurus)*, a game fish up to five feet long, popular for food. (PE)

māhoa. To travel together in company, as canoes. (PE)

Maiao. A navigation star. (Johnson; PE)

maile. A native twining shrub *(Alyxia olivaeformis)* with shiny, fragrant leaves, used for decoration and garlands. (PE) Reportedly used in making the crab claw sail on Kaua'i. (Emerson)

maka. Canoe parts. (Kalokuokamaile) Probably *manu*, bow and stern pieces. (PE)

Maka-hai-wa'a. A star. *Lit.*, eye following canoe. (Johnson; PE)

makahinu. Kind of hard stone. (PE) See also *'alā makahinu.*

Maka-holo-wa'a. A star, perhaps another name for Polaris. *Lit.*, sailing canoe eye. (Johnson; PE)

maka ihu. Bowsprit; sharp point at the bow of a canoe. (Emerson; AP; PE)

Maka-'unu-lau. A navigation star. *Lit.*, eyes drawing many. (Johnson; PE)

makai'a. Type of basalt suitable for adzes. (Kamakau/Works; PE) Also *mahikihiki.*

Maka'iwa. The nine principal navigation stars. (Johnson)

Makali'i. Pleiades. *Lit.*, little eyes. (Johnson) Castor and Pollux. (PE)

makaloa. A perennial sedge *(Cyperus laevigatus)* found in or near fresh or salt water in warm countries. (PE) The small rush from which the fine Ni'ihau mats were made. (Emerson) Used to make sails. Also *makoloa.*

make'ewa'a. Unlimited love of canoes. (AP)

makiau. The neck or isthmus at the butt end of a log, destined to be the stern of the canoe. (Emerson; I'i)

mākini. Gourd mask, as worn by canoemen. (PE)

Makulu. Saturn. (Johnson; PE)

maku'u. The crease or constriction at the end of a canoe log for attaching lines to drag it. (Emerson) Neck cut at the stern of the canoe to which the lines for hauling were attached. (Emory/Notes) Back end of the canoe while in the mountains. When hewn and finished on shore it was called *moamoa*. (HEN) Endpiece of a canoe. (PE)

mālana. Bouyant, light; to float, as a canoe. (PE) To float together, as a body of canoes. (AP)

malau. Large canoe somewhat like a *pelelau*, capable of carrying much freight. (Emerson) Canoe bait carrier, two or three fathoms long, with holes pierced in the sides and bottom to admit water, used in bonito fishing. (PE)

mālolo. General term for Hawaiian flying fishes. (PE)

māmala. Paddle stroke. (PE)

mamau. To run aground, as a canoe when it touches bottom in shallow water. (AP)

mānalo. Sound, strong, said of a canoe. (Emerson)

Mānanalo. Venus or Jupiter, (Johnson; PE)

Mano-a-ke-akua. Spirits of the wilderness. (Emerson) Also *Kuu-a-ke-akua.*

mano 'au wa'a. A large fleet of canoes. (PE)

manono. Species of an endemic genus *(Gouldia)* of shrubs or small trees belonging to the coffee family. (PE) Block set athwart the canoe, to which outrigger booms are lashed. (PE)

manu. Canoe end piece, together with that portion of the rail that was of one piece with it, generally as far as to the outrigger. (Emerson) Elliptical or spatulated ornamental extremity at the upper end of the bow and stern pieces. (Buck; PE) See also *kupe, uniu.*

manu o ka 'iako. The knob to keep the lashing from slipping off the lower part of the outrigger boom. (Emerson)

manua. Type of fishing canoe. (Kahaulelio)

mā'oki'oki. A short, ¾ stroke often used into the wind. (Kekai from Kaupiko)

mapū. Rope tied to a canoe endpiece. (PE) Also *pū.* Spattering, as water from a paddle; to spatter, as when rowing a canoe. (AP)

mapuna hoe. Backwards paddle stroke. (Emerson) Dip of the paddle. (PE)

mau. To sail easily. (Emerson) Grounded. (PE) To be retarded in moving forward, as a canoe when it grounds in shallow water. (AP)

mau ho'āpipi. Two canoes coupled together. (Emerson) See also *wa'a ho'āpipi.*

maua. Dark red bark that typically sheathed the tough, heavy, black grained *'ō'ō 'ōhi'a* wood. (Kalokuokamaile)

mea wa'a. Canoeman; canoe owner. (PE)

melomelo. A chum stick used with a style of net fishing. (Kahaulelio; Kamakau) Club used as a lure. It was smeared with bait, such as roasted *'ala'ala he'e*, roasted coconut flesh, or various aromatic leaves, and let down into the water. It was believed to attract fish into the net. (PE) Also *mākālei.*

mimilo. To plunge the paddle into the water. (Emerson)

miomio. Pointed in front; narrowed, as the bow of a canoe; beautiful, as a well shaped canoe. (Emerson; AP)

moa'e. Northeast tradewind. (PE) Also *na'e.*

moamoa. The protuberance at the stern; small projection extending just beyond the end of the stern end piece. (Emerson) Stern of the canoe after it is hewn and finished on shore. (HEN) Sharp point at the stern. (PE) Small projection at the stern end piece after the pronounced neck has been shaved away.

moamoa wa'a. Rollers used in conveying a canoe from a landing into the canoe house. (AP)

moe wa'a. A dream of a canoe, formerly considered bad luck. (PE)

Moku-hāli'i. God of canoe makers. (PE) Canoe makers' chief god. (Emerson) Also *Kū-moku-hāli'i.*

moku kele. In ancient times, the action of sailing from island to island in a canoe. (AP)

moku kele kahiki. A canoe sailing to a foreign country. (AP)

Moku-kohekohe. A historic sea battle. (Kamakau/Chiefs) Also *Kau-omo.*

moli. See *kiwa'a*, stick.

momoa. Neck of the stern; horizontal projection at the stern of the canoe, part of the original log. (Emerson) Under part of the rear covered section of a canoe. (PE) See also *moamoa.*

momona. Sections cut into a canoe log. (Emerson; Kalokuokamaile) Also *ke'a.*

mo'o. Gunnels; gunwale strakes. (Buck) Rail of the canoe between the two outrigger booms. (Emerson) Side planks fitted to the middle section on each side of a canoe hull; gunwale strakes. (PE)

mouo. A buoy or float, often made of *wiluwili*. (Emerson) A calm place in the sea where one may float; to lie at anchor. (PE)

mua. Bow with fittings in place on the *ka'ele* (unfinished canoe). (Maline)

muaiwa. A crack or split in wood due to drying; a short crack or split. (PE)

muikiki. To be cramped, as in the posture of one sitting on a low and narrow seat like the paddlers in a canoe. (PE) Also *muikiiki.* (PE)

muku. Outer ends of the booms. (I'i) End of the outrigger which joins the canoe on the right. (HEN) Starboard ends of the outrigger booms, hence, starboard side of a canoe. (PE) The starboard or right side of a canoe. (Emerson)

Mūlehu. One of three stars in a triangle, the others being *Polo-'ula* and *Polo-ahi-lani*. They may be Alpha, Beta, and Gamma Cassiopeiae. A variant name for Venus. (PE)

muli. The stern of a canoe. (PE)

mumuku. Canoe with one end cut off and boarded up. (Emerson) A canoe cut in two in the middle (AP) Possibly a burial canoe. *Cap.*, a strong wind at Kawaihae. (PE)

mu'o. Budding *pandanus* leaf at the top of a branch. (PE) The best mats were made of these, and from them the sails of the canoes. (Malo)

N

Na-alanui-o-hōkū-ho'okele. A star. *Lit.*, highway of navigation stars. (Johnson) See also *ala nui o na hōkū ho'okele.*

Na-huihui-o-makali'i. Pleiades. (Johnson)

Na-kao. Orion, a star used in navigation. (Johnson) The belt and sword in the constellation of Orion. *Lit.*, the darts. (PE)

Na-lalani-o-Pililua. Probably Gemini. (Johnson) A constellation. *Lit.*, the lines of the clinging ones. (PE)

Na'e. The Northeast tradewind. (PE) Also *a'e, moa'e.*

naia. A yellow-grained wood used for paddles. (Kalokuokamaile) Possibly *naio.*

naio. The bastard sandalwood (*Myoporum sandwicense*), a native tree with hard, dark yellow-green wood, scented like sandalwood. (PE)

nāki'i. To tie, fasten, to tie a knot. (PE)

naku. A reed used in making *pā'ele*. (Kalokuokamaile) A bulrush. (PE) Also *'aka'akai, nānaku.*

"Nalu, e!" An exclamation of warning to the steersman; caution against danger from the breaking of a heavy sea. (AP)

nalukai. Weatherworn, as old canoes or old persons who have weathered the storms of life. *Lit.*, ocean wave. (PE)

nānai. Taking an uneven course, as a canoe in a rough sea. (PE)

nananana. Lashings. (Emerson) Also *lanalana.*

nanue. See *"Nalu, e!"*

nehu. Anchovy (*Stolephorus purpureus*), a fish for eating and as bait for bonito. (PE)

nenue. A paddle with a broad blade. (PE) Also *nenuwe.*

Newa. A constellation, probably the Southern Cross. (Maline; PE) See also *Newe.*

Newe. The Southern Cross; used in navigation. (Johnson) A constellation said to be one of the guiding stars to Tahiti from Hawai'i. (PE) Also *Newa, Newenewe.*

niao. Gunwale, or rail of the canoe from the fore-seat to the after-seat. It was sometimes painted a different color, yellow or red. (Emerson/Kekahuna) Upper edge of the canoe. (HEN) Also *niau.*

niau. Gunwale; groove along the bottom of the *mo'o*; edge of the *ka'ele*. (Emerson/Kekahuna; Emory/Notes) See also *niao.*

niau. To sail easily, gently. (AP)

niu. Coconut *(Cocos nucifera)*, a common palm. (PE)

niu hiwa. A variety of coconut with fruit husk dark-green when mature and inner shell black; used ceremonially, medicinally, and for cooking. *Lit.*, dark. (PE) The fibers of the husk were favored for making cordage.

niu lelo. A variety of coconut with reddish fruit and yellow shell. *Lit.*, yellow. (PE) The fibers of the husk were favored for making cordage.

niuhi. A large grey, man-eating shark; its flesh was *kapu* to women. Catching this shark was a game of kings; it was a dangerous sport and special techniques were used. (PE)

noho ʻana kū kia. The seat into which the mast was stepped if it was short. (Emerson)

noho ʻana waʻa. The rower's seat in a canoe. (AP) Thwarts, canoe seats, generally made of *koa, kukui,* or breadfruit. (Buck) Also *nohona waʻa.*

nohona waʻa. Canoe thwart, seat. (PE)

noʻu. Tree that is straight, thick, and not very tall. (Kalokuokamaile)

Nuʻuanu. Unidentified star; place name on Oʻahu. (Johnson) *Lit.,* cool heights. (PE)

O

ō. The mast. (Emory) The spirit of a sail; stick used to keep the tip of the spar in place. (Emerson) Food provisions for a journey, esp. one by sea. (PE)

ʻoahi. Dense close-grained coral reefrock of circular shape with a flat under surface and evenly convex upper surface; used as a canoe rubber. (Buck) Rough stone or pumice, as used for polishing surfboards or bowls. (AP, PE)

ʻoai. Porous stone, as used for polishing canoes and calabashes. (Maline; PE) Also *owai.*

ʻoeʻoene. Small *kalo* with skin removed, cooked and dried to prevent mold, used on long voyages. (Emerson/HHS)

ʻohe. Bamboo, used as a needle in introducing the *ʻaha,* lashing. (Emerson)

ʻoheʻe. See *alaheʻe,* a shrub.

ʻōhiʻa hā. A native tree *(Eugenia sandicensis)* which attains the height of over 60 feet. The wood, which is exceedingly hard, was used in all kinds of building. The bark furnished material for a dye. (PE; AP) Also *hā, pāihi.*

ʻōhiʻa kō. *ʻŌhiʻa* log dragged *(kō)* from the uplands to the sea to be made into a canoe. (PE)

ʻōhiʻa lehua. A tree *(Metrosideros macropus, M. collina)* with hard wood, favored for *ʻiako* and mast. (PE)

ʻōʻio. A between section of the canoe rim; of fine or straight grain. (Fornander)

ʻōʻio. Close-grained basalt. (Buck) Polishing stone. (PE) The last and finest stone used.

okaka. A crack in a piece of wood; a split, chap, long crack or split. (Emerson)

ʻōkole. Stern.

ʻōkolehao. Liquor distilled from *tī* root in a still of the same name. *Lit.,* iron bottom. (PE)

ʻōkumu. Pommel; canoe end piece. (Maline; PE) See also *makuʻu.*

ʻokūʻokū. To rise up; to pitch, as the bow of a canoe in a storm. (Emerson) To pitch, as a canoe tossed by waves. (PE)

ōlaʻi. Light porous stone or pumice; used for polishing canoes. (AP; PE; Emerson) Also *hāpou.*

ʻole. A shell which served as an axe for some purposes; useful in cutting soft woods. (Emerson in Malo) Conch shell *(Charonia tritonis).* (PE) See also *koʻi ʻolē.*

ʻolo. Container with water to hold fish. (Emerson/Kekahuna) Also *hokeo.*

oloi. To run aground or onto a stone, as a canoe. (Emerson; AP) To run upon or over, as a vessel runs over or upon a canoe. (AP)

olonā. A native shrub *(Touchardia latifolia)* related to the *mamaki.* The bark was highly valued as a source of strong, durable fiber for cordage. (PE)

olowalu ʻale. Billows that follow immediately after each other. (Kaelemakule) Also *ʻale olowalu.*

ʻōlulo. Shipwrecked, storm-beset at sea. (PE) See also *alapoki.*

oma. A small oval adze used in completing work on a canoe. (AP) Also *koʻi oma.*

ono. Large mackerel type fish *(Acanthocybium solandri)* which grows up to five or six feet in length. Known in Florida and the West Indies as *wahoo.* (PE)

ʻopaka. To hew smoothly and leave no knots. (Kamakau/Works; AP)

ʻōpeʻa. Small boom or spar to extend and elevate the sails of a canoe. (AP; PE)

ʻōpeʻapeʻa. Canoe sails. (PE) See also *peʻa.*

ʻōpelu. Present-day term for a short, thick hulled, wide bodied and heavy fishing canoe. A long and easy stroke, borrowed from paddling fishing canoes. (Kaupiko)

ōpū maiʻa. Flowers and buds of the banana, used in making *pāʻele.* (Emerson) Clump, as of bananas, sugar cane. (PE)

ouʻa. A kind of stone used in polishing canoes. (Emerson)

ʻoupē. The extreme lower end of a canoe paddle. (Emerson; PE) See also *alelo.*

ʻoʻupe. To tilt, as a canoe in the water. (PE)

owai. See *ʻoai,* porous stone.

P

pā ipu. Calabash in which tapa or clothes are packed to keep them dry on a canoe. (AP)

pā waʻa. Canoe enclosure; touching of canoes. (PE)

paʻa aliʻi. Method of righting an outrigger canoe. (Buke)

Paʻao. A star, said to be one of a large group resembling a double canoe; a famous priest who, according to tradition, conveyed a colony from Samoa to Tahiti to Hawai'i. (PE)

pae. To land, put ashore. (PE)

paʻe. To flap, as a sail. (Emerson; Johnson)

pāʻele. Mixture of organic material used as blackening. (Emerson) To blacken; to paint black, as a canoe. (Buck; PE)

paena waʻa. Canoe landing place. (Maline; PE) See also *pae.*

paepae. Block of soft wood on which the canoe was mounted for finishing; wooden block to keep an outrigger float off the ground. (PE) Spar. (Emerson) Sprit. (Emory) Boom. (PE) See also *ʻaki,* blocks.

paepae waʻa. Canoe ladder.

pāʻewaʻewa. A stroke not in good time. (Emerson) When the paddlers are not together. (Lindo and Mower)

paha. A chant used in stimulating those who drew the canoe log along. (Emerson)

pahi. Canoe or ship. (AP) Tahitian.

pāhoa. Rock used for adzes. (Kamakau/Chiefs) Sharp stone. (PE)

pāhoe. A fleet of canoes fishing for flying fish. (Emerson) To paddle; to drive fish into a net by beating the paddles rhythmically against the canoe. (PE)

pahu pū. A style of cutting down a tree in which the cut is made a good ways from the ground because the stump is not wanted. (Emerson/Kekahuna)

pāhuʻa. See *hoʻopāhuʻa,* to sail to windward.

pai. The loop in the two small ropes attached to the end of the main log hauling rope. These loops were put over the shoulders of the men who kept the rope straight. (Emerson) Possibly also *paʻi.*

paʻi aʻa. Style of felling a tree in which the cut began from the surface of the ground. (Emerson/Kekahuna)

paʻi ʻai. Cooked *kalo* beaten without water, wrapped in *tī* leaves, *pandanus* leaves, and tied up very firmly; provision for long voyages. (Emerson) See also *ʻao.*

paʻi ʻeleʻele. Black canoe paint. (Emory) Also *pāʻele.*

paʻi hua. Middle of the canoe body. (Emory) Bulge in the canoe side. (PE) Side of the canoe that rose straight and bulged outwards. (Kalokuokamaile)

paʻiahua. Part of the canoe log forward of the rear comb cleat. (HEN)

paʻimalau. Fleet of canoes fishing for bonito with the *malau* (bait carrier). (AP; PE)

pākā. To glide on the surf with a canoe or board. (Emerson) To surf, as with a canoe; to skim, as a surfing canoe. (PE) To turn off, as a canoe is turned to avoid a sea. (AP) Also *pākākā.*

pākākā nalu. Canoe surfing.

pakakeʻa. The notched holes in the hull for lashing the end pieces and outrigger booms. (Maline)

pakīpakī. To slip, slide; to sail along; to divide the water, as the keel of a vessel or as a canoe; to spatter the water in rowing a canoe. (Emerson; PE)

pākōlea. To tie or fasten as a canoe mast. (PE)

pākū. Curtain on the double canoe platform for a chief. (Emerson)

palaʻā. Lace fern *(Sphenormeris chusana),* a common wild fern in Hawai'i. A brown dye was extracted from the fronds. (PE) Also *palapalaʻā.*

palani. To dip an oar lightly; to row lightly. (AP)

pālaulau. The broad flat part of a paddle. (PE) Also *laulau, lauhoe.*

pale. Upper rim sewed to a canoe; gunwale. (AP; PE) Cloth wrapped to fit the handle of an axe to protect the lashing from being cut by the chips. (Malo) One who guides the canoe.

pale hauhana. Cloth wrapped around the outrigger boom to protect it from the lashing of the float. (Emerson)

pale hope. The after part of a canoe; bearers of the after part of a canoe. (PE)

pale mua. The fore part of a canoe; bearers of this part. (PE)

pale waʻa. Person who protects *(pale)* a new canoe being carried from the forest to the sea. (PE)

palepale. Gunnel. (Kamakau/Chiefs) See also *pale.*

palepaleha a pau. Removing all the chips from a canoe log that is rough hewn. (Kamakau/Works)

pali. Cliff, precipice, steep hill, side of a steep ravine. (PE; AP)

palipali. The upper board on the side of a canoe to keep the water out. (AP) Possibly also *palepale.*

pānānā. To paddle here and there irregularly. (Emerson) To direct the course of a canoe irregularly; to sail crookedly; to exhibit awkwardness in steering a canoe. (AP) Compass; pilot. (Emerson; PE)

paneʻe. To shove along, as a canoe on the sand; to launch. (Emerson) To shove, as in floating a canoe. (AP)

pani. Seat immediately forward of the steerman's seat. (Maline)

panipani. Type of fishing canoe. (Kahaulelio) A small outrigger canoe. (PE)

pao kapakahi. To sliver off a little at a time; glancing blow of the adze in felling a tree. (Emerson) Also *kā kīkepa.*

papa heʻe nalu. Surfboard. *Lit.,* board sliding wave. (PE)

pāpā kai. Narrow escape of a canoe landing in surf. (Emerson; AP) Shoved, pounded by the sea. (PE)

pāpā kiʻi. Steersman's seat. (Maline)

papa kōnane. Seat at the main outrigger boom. (Maline) Checkerboard. (PE)

papa kū kia. Slab holding the mast. (PE)

papa paʻakai. To be agitated into foam, of a turbulent sea when a canoe narrowly escapes disaster. (Emerson; AP)

papa uhi waʻa. Boards used to cover the space in front of the forward outrigger boom. (Emerson; PE)

papalima. Bracket to support a sea. (Emerson)

papaʻi hale. A shelter hut on a double canoe, as a shield from sun and rain. (Emory) Also *hale lanalana.*

pāpaʻu. Shoal; shallow water. (PE; AP)

papau lua. Blow to the side of the canoe at each paddle stroke. (Emerson)

pau. Rim overhanging the gunwale. (Emerson)

paʻū. Mat canoe cover to keep out water; sometimes with holes for crew to stick their heads out. (Emerson; PE) See also *ʻalihi paʻū.*

paʻū o Luʻukia. Ornamental sennit lashing of float to outrigger booms, said to have been named for the chastity belt worn by Luʻukia, a legendary woman. (PE)

paukū. Cleats which support the canoe seats. (AP) Also *poukū.*

paukū. Cuts made in sections *(paukū)* along the length of the canoe log. (Kalokuokamaile)

pāuma. To turn a canoe to the wind to empty it of water. (Emerson) To slash a canoe back and forth, so as to empty it of water. (PE)

pāwehe. Colored geometric motifs, as seen on *makaloa* mats made on Niʻihau, bowls, and gourds. (PE) See also *ʻaha pāwehe,* a type of lashing.

peʻa. Sail; sail for the ordinary canoe of the people. (PE; Emerson) See also *ʻōpeʻapeʻa.*

peʻa hope. Mainsail. (PE)

peʻa ihu. Jib sail. *Lit.,* bow sail. (PE)

peʻa la. Sail intended for a king, a distinguished priest, or for a war canoe. (Emerson/Kekahuna) Also *lā.*

peʻa nui. Mainsail. *Lit.,* big sail. (PE)

peʻa oe. A long sail. (Emerson; PE) Also *peʻa oeoe.*

pehua. Socket into which the mast was rigged. (Maline) Also *kū pou kia.*

peleleu. Extremely large (deep and wide), unique type of war canoe commissioned by Kamehameha I in the 1790's to aid him in his conquest of the Hawaiian Islands. (Emerson) A very large canoe type, sometimes a double canoe. (PE) A fishing canoe of the largest size, made shorter in proportion than ordinary; a large double canoe used in war; a short canoe. (AP) See also *waʻa peleleu.*

pepe. Canoe seat; chock on which a canoe rests. (Emerson) Perhaps short for *pepeiao.* (PE)

pepeiao. Projections on the inside of a canoe to sustain seats, etc. (Emerson) Comb cleats to which the booms were attached. (I'i) Comb cleats for canoe thwarts or seats; lugs or blocks inside a canoe hull to which the outrigger booms are fastened. (AP; PE) See also *Kū-pepeiao-loa,* a god.

pepeiao hope. Aft cleats. (Maline)

pepeiao kainaliu. Cleats just aft of the forward outrigger boom, where the bailer usually works. (Maline) See also *kainaliu.*

pepeiao mua. Forward cleats. (Maline)

pepeiao paʻi hua. Pair of cleats located at the widest part of the canoe. (Maline)

peu. The point at the bow of the canoe. (Emerson; PE)

pihō. Swamped but not sunk. (Emerson)

piholo. To sink; to be swamped. (PE)

pihōpihō. To pitch frequently in the sea, as a canoe that takes in water; heavy and sinking too much in the water, as a canoe that is too heavily loaded. (Emerson; AP) To bob up and down or swamp, as a canoe. (PE)

pīkaʻo. Canoe hold under both forward and after covers. (PE) Dehydrated food, as yam cooked, grated, dried, packed in banana fiber, and used on long voyages. (PE)

pīkaʻo hope. Space aft of the aft outrigger boom. (Emerson)

pīkaʻo mua. Space between the forward outrigger boom and the bow. (Emerson)

Piko-o-Wākea. The equator. (Kamakau in Thrum; PE)

pili. A grass *(Heteropogon contortus)* formerly used for thatching houses. (PE)

pinanai. To rise up, as the bow of a canoe in passing over a swell. (AP) Possibly from *pinana,* to climb. (PE)

pinanaʻiea. To turn aside, as the bow of a canoe when struck by a heavy sea. (Emerson; PE)

pine. A quick, choppy, shallow paddling stroke. (Cowan) Tahitian.

pio. Disappeared, as a ship at sea; to have gone out of sight. (PE)

pōʻaeʻae. Unit of measurement; distance from armpit to finger-tips of the outstretched arm. (Kalokuokamaile) Armpit. (PE)

pōʻalaʻala. Going toward land and out to sea again, as in sailing along a coast in a canoe. (AP) To sail off and on. (PE)

poʻe aukukui. Attendants and assistants to the *kahuna kālai waʻa*, who gather up scraps and remains of offerings and bury them, and who see that all wants are supplied. (Emerson) See also *aukuki*, apprentice canoe maker.

poʻe kā koʻi. Class of adze makers who formed a specialized guild of stone craftsmen, a greatly esteemed class. (Malo)

pōhākau. Anchor. (Emerson; AP; PE) Also *helēuma*.

pōhaku ʻānai waʻa. Stone and coral rubbers used to smooth and polish the canoe. (Buck; PE)

pōhaku ʻelekū. Lava crust with a coarse rubbing surface. (Buck) Rubber of coarse vesicular basalt. (PE)

pōhaku hekau. Stone canoe anchor. (various sources) Also *helēuma*.

pōhaku kāpili waʻa. Stone hammer used to tap chisel in making lashing holes in canoe hull. (Buck; PE) See also *ʻulu maika*.

pōhaku kikē moʻo waʻa. Stone for tamping gunwale strakes. (PE)

pōhaku kuʻi waʻa. Stone canoe breaker used in warfare. It had deep grooves in the middle, in which ropes were placed. The stones were hurled into opposing canoes and hauled back with the rope, to be thrown again. (PE)

pōhaku lana. Mooring rack, said to float, for anchoring canoes, perhaps of pumice. *Lit.*, floating stone. Perhaps mythical. (PE)

pōhaku pao. Stone chisel. (Buck; PE)

pōhaku pohā kaʻa. Anchor. (Emerson) Possibly also *pōhākau*.

pohaku wawahi waʻa. Stone hammer used under water to break enemy canoe hulls in war. (PE)

poho. The hollow of a canoe. (PE) A plug; a piece used to stop a hole in a canoe. (Emerson; PE)

poho hope. The rear third of the mouth of hollow of a canoe. (Emerson)

poho mua. The front third of the mouth or hollow of a canoe. (Emerson)

poho waena. The middle third of the mouth or hollow of a canoe. (Emerson)

poholua. To set sails so as to lie to. (Emerson; AP) To billow out, as sails. (PE)

pōhuehue. Stone used in polishing canoes. (AP; Emerson; PE) See also *kāwaʻewaʻe*.

poʻi. The top of a curling wave when it breaks; a cover. (Emerson; PE)

poʻi pālua. A double curl. (Kamakau/Works; PE)

pōkaʻa. The hollowed out area of a canoe log. (Maline)

poke i ka ēulu. To cut off the head of the tree.(Emerson)

pōkiʻi. Term designating the canoe or the owner of the net used in fishing for flying fish or *iheihe*, another fish. (PE)

pola. Narrow platform lash on top of the arched cross booms of a double canoe. (Buck; Iʻi) A platform roofed over. (Emerson)

pōlena. Sails drawn tightly; all the sails made fast, tight, and secure. (Emerson) Furled, as sails; bowline. (PE)

Polo-ahi-lani. A star said to be associated with *Mūlehu*. (Johnson; PE) Also *Po-hina, Polohilani, Polo-ʻula, Polo-wehi-lani*.

ponawaʻa. Circle of canoes. (PE)

poʻo. To cause the outrigger float to dip in order to sink the canoe. (AP) Bow of the canoe.

poʻo o ka waʻa. *Kahuna* superintending the building of a large canoe, as for a chief. (Emerson) See also *kahuna poʻo*.

poʻo pāoʻo. The highest tip of the canoe end piece. (PE)

pou. A short canoe. (Buck) A canoe broad for its length, thick and blunt at the ends; baggage canoe. (Emerson) Canoe mast. (PE) Base of the mast. (Maline)

pou hiō. Bent corner post, probably used as supporting the ridge-pole of a canoe house. (Maline; PE)

poukū. Cleats which support the seats on a canoe. (PE)

pū. Canoe end pieces, fore and aft. (AP; PE) Rope attached to the front of an unfinished canoe to haul it to shore. (PE)

pu hoe. Paddling canoes of the Society Islands. (Haddon and Hornell)

pū i ka waʻa. Ceremony during which a head craftsman prayed that the gods would protect the newly carved canoe hull as it was drawn from the forest to the sea; to attach a line to a canoe; such a line. (Maline; PE)

pū kuni ahi. Cannon. (Emerson; PE)

pū o hope. Back stay. (Emerson) Also *kaula hope*.

pū o mua. Fore stay. (Emerson) Also *kaula ihu*.

pūʻā. To cut crosswise. (PE) To hew off obliquely the end of a log in sharpening it for the bow and stern of a canoe. (Emerson)

puaʻa hiwa. A solid black pig, much desired for sacrifice. (PE) See also *lolo*, a ceremony.

pūʻali. Constriction on the flattened forward end of the outrigger float.

puehu. To be scattered or separated, as a fleet of canoes in a storm

pueo. A shroud of a canoe. (Emerson; PE)

pūhā. Rotten, unsound, of timber. (Emerson) Hollow, as a tree. (PE) The *ʻelepaio* was the bird whose inspection was depended upon to indicate any decayed point in the tree trunk.

pukahi. A type of fishing canoe. (Kahaulelio)

pūkīpūkī. To spatter water in paddling a canoe. (Emerson)

pūkōkeʻe. Line that holds the canoe spreader in place. (PE)

pūkōlu. Canoe with three hulls; triple canoe. (Buck; PE)

pule kanaenae. A propitiatory prayer. (Emerson)

pūloʻuloʻu. A canoe covering. (AP)

pūkiʻi waʻa. Wooden clamps used to bind down the gunnels, gunwale strakes, and possibly the end pieces, while they were being sewn to the canoe hull. (Buck; PE) Also *kaumo*ʻo.

puleheke. To gather together, as canoes. (PE)

pūlua. Two men in a canoe. (Emerson; AP) See also *koʻolua*.

pulu niu. Coconut husk or fiber, sometimes used to apply the black paint. (PE; Buck)

puna. Beach coral. (Buck) Stone coral. (AP) Possibly used as a polishing stone.

pūnini. To sail crookedly; to go here and there; to tack. (Emerson; AP) To drift. (PE)

pūniu. Seam where the two parts of the end piece meet. (Maline)

pūnohu. To billow out, as a sail. (PE)

pūʻoʻa. Burial cave. (Ellis) House for depositing a corpse. (AP; PE)

puʻōpuʻō. To bob up and down, as a canoe in the waves. (PE)

pupū. To stall; to move slowly and with difficulty, as a canoe or invalid. (PE)

pūpū maka loa. Flesh of a small shell resembling the conch in shape, dried and packed in a gourd for long voyages. (Emerson) Shells with long sharp edges, made into adzes. (Kamakau/Works) See also *koʻi ʻolē*, shell adze.

puʻuhānau. Hillock or obstacle encountered while hauling a new canoe from the forest to the shore. (PE)

puʻuhele. Base of the paddle blade next to the handle.

puʻukole. Point on the paddle where the handle joins the blade. (Emerson) Upper part of paddle blade joining the handle. (PE)

Puʻuwepa. A star. (Johnson; PE)

pualu. Ancient flag of the Hawaiians, placed on the triangular sails of canoes. (Emerson) Also *puwalu*.

U

ʻuha-loa. A small, downy American weed (*Waltheria americana*). (PE) Probably introduced by foreigners to Hawaiʻi; sometimes added to *pāʻele*.

ʻūhā o ke akua. Another name for the canoe. (Emerson/Kekahuna) Also *waʻa*.

uhauhumu. To sew together, as sails; to interlock. (Maline; PE)

uili. To steer, as a canoe. (Emerson) See also *uli*.

Ukali-aliʻi. Mercury. *Lit.*, following the chief (sun). (Johnson; PE)

ukana. The lading of a canoe or vessel; cargo; freight. (AP)

ukuwai. Term sometimes applied to the central space of the canoe between the two *ʻiako*. (Emerson) Portion of the canoe between the forward and after outrigger booms. (PE)

uli. A canoe steerer for the king's canoes. (Emerson) To steer. (PE) See also *uili*.

ʻulili wāwae. Flooring inside a *peleleu* canoe where paddlers might rest their feet. (PE)

ulu. Center of a canoe. (PE)

ʻulu. Breadfruit (*Artocarpus incisus*), a tree originating in Malaysia and distributed throughout tropical Asia and Polynesia. It belongs to the fig family and is grown for its edible fruits. (PE) The wood was sometimes used for canoes.

ʻulu maika. Stones used in *maika*, an ancient Hawaiian game suggesting bowling. (PE) Sometimes used as hammer stones.

ulu waʻa. Fleet of canoes. (Maline; PE) Also *ʻau waʻa*.

ulua. Certain species of crevalle or jack, an important game fish and food item. Substitute for human sacrifices. (PE)

uma. The crest shaped stern on the *kaʻele*. (Maline) Stern of a canoe; curve. (PE) Bow.

ʻumiʻi. Fore-and-aft tie booms. (Maline) Clamp. (PE) Also *keʻa*.

ʻumiʻumi. Ropes attached to the back end of the canoe log in hauling it down from the mountains. (Kamakau/Works; PE)

une. To use the paddles as a lever to change the heading of a vessel. (Lindo and Mower)

uniu. Part above the *kupe* and the *maka*. (HEN; PE) Also *manu*, canoe projections.

unu. The after curving portion of the rim, known also as the after *manu*. (Fornander)

uo. To sharpen; to cut diagonally in making the bow and stern of the canoe. (Emerson)

ʻupe. Protuberance at the tip of Hawaiian paddles; point of the blade of a canoe paddle, turned towards the oarsman. (Emerson/Kekahuna) Rib on a paddle. (PE) See also *io*.

ʻūpoʻi. Sail. (Maline) Also *lā*.

ʻuʻu. To hoist a sail. (Emerson; PE)

ʻuʻupekupeku. To sway or swing backward and forward, as the mast of a canoe. (AP)

ʻuwia. A split in a tree. (Emerson; PE)

W

waʻa. Canoe; small boat; chant in praise of a chief's canoe. (PE) See various types below. See also *ʻūhā o ke akua*.

waʻa ʻāʻipuʻupuʻu. Canoe with provisions. (Maline) Also *ʻāʻipuʻupuʻu*.

waʻa ʻākea. Starboard hull of a double canoe. (PE) Also *ʻākea, waʻa kea*.

waʻa ʻaki. Canoe with a rather sharp bow and stern. (Emerson)

waʻa akua. Sacred canoe for a specialized purpose. (Emerson/Kekahuna)

waʻa ʻāpulu. Old, worn out canoe. (AP)

waʻa ʻauhau. Tribute or tax canoe; basket filled with food and set adrift during the *Makahiki* ceremonies; represented the canoe in which Lono returned to Tahiti. (PE)

waʻa aukāhi. Canoe whose wood is all of one color; a smooth canoe. (Emerson)

waʻa hoʻāpipi. Two single canoes hastily joined to do temporary service as a double canoe. (AP; PE) Also *ʻauwaʻa hoʻāpipi*.

waʻa honua. Wide canoe. (PE)

waʻa humu. Sewn canoe; canoe built up of planks sewn together with sennit. (Emerson) See also *waʻa pā*.

waʻa kae. Slow canoe. (Emerson)

waʻa kailike. Canoe with little sheer. *Lit.*, equal sea canoe. (Emerson; PE)

waʻa kaka. Canoe with a good deal of sheer. (Emerson/HHS)

waʻa kakaka. Long, clean-built clipper canoe. (Emerson)

waʻa kau. Head fisherman's canoe. (PE)

waʻa kaua. War canoe; fleet of canoes about to enter into battle. (Malo; AP)

waʻa kauhi. *Aku* fishing canoe. (PE)

waʻa kaukāhi. Canoe with one hull; outrigger canoe; a canoe moved with one paddle. (Buck; PE; AP) Also *kaukāhi*.

waʻa kaulua. Double canoe; canoe with two more or less equal hulls; two canoes united. (Buck; Emerson; AP; PE) Also *kaulua*.

waʻa kea. Unpainted canoe set to sea after *kapu* were lifted during the *Makahiki*. *Lit.*, white canoe. (PE)

waʻa kea. Starboard hull of a double canoe. (PE) Also *waʻa ʻākea*.

waʻa kome. Bulrush canoe. (Emerson; AP)

waʻa kūpāhoa. Long, thin canoe; clipper built canoe. (PE; Emerson) Also *waʻa pāhoa*.

waʻa lawaiʻa. Narrow and deep fishing canoe with sides straight up-and-down. (Emerson) Also *waʻa pāhoa*.

waʻa naku. Bulrush canoe; possibly a search canoe. (Emerson; Fornander) See also *waʻa kome*.

waʻa pā. Canoe constructed of boards; rowboat. (PE; AP) See also *aliʻi waʻapā, waʻa humu*.

waʻa pāhoa. Narrow and deep fishing canoe with sides straight up-and-down; longish canoe with straight sides of equal width all the way. (Emerson; PE) Also *waʻa kūpāhoa, waʻa lawaiʻa*.

waʻa paulua. Large or double canoe with three *ʻiako*. (PE)

waʻa peleleu. A very large canoe type, sometimes a double canoe. (PE) See also *peleleu*.

waʻa pū maiʻa. Canoe with rather full and round waist, short at either end; good working canoe; canoe in which some of the sap-wood still remained. (Emerson; PE)

waʻa pūhi. Small canoe, slim and higher in the middle; used by chiefs in surfing. (Emerson/HHS; PE)

waʻa ʻula o ke aliʻi. Canoe for display, to show kingly state, typically colored red; a chief's canoe with red sails. (Emerson; PE)

wae. Elliptical U-shaped or V-shaped canoe spreaders, often made of *ʻōhiʻa* wood. (PE) The two "knees" of a canoe, affixed across the canoe near the *ʻiako* to stiffen and strengthen the sides. (Fornander)

waha. Open top of a canoe. *Lit.*, mouth. (Maline; PE)

wai lāʻau. Liquor made from vegetable juices, in which adze stones were soaked to "soften" them. (Malo)

Waka. Guardian of *Hina-ke-kā* or equated with her; floated as a gourd in the sea and was taken into *Wākea's* canoe. (PE)

wakakaiau. Sail. (Maline) Also *lā*.

walaheʻe. Wood used to make adze handles. (Kamakau/Works; PE; Malo) Also *alaheʻe*, a shrub.

walawala. Rising up, as the stern when lifted by a wave. (Emerson) To tilt, as a canoe in waves. (PE)

wao maʻu kele. Forest zone in which *koa* grows; rain forest area. (PE)

wāwāhi. To split, break into pieces, as a canoe or ship. (AP)

wāwāhi waʻa. Borer that eats into canoe hulls; teredo. *Lit.*, canoe breaker. (Maline; PE)

wiliwili. A Hawaiian leguminous tree (*Erythrina sandwicensis*) found on dry coral plains and on lava flows. The wood is very light and formerly was used for canoe outriggers. (PE) Wood which was burned for charcoal and used in making *pāʻele*. (Emerson) Wood favored for making *ama*.

CHAPTER NOTES

1 ORIGINS

"And the source chanted": From a Tuamotu creation chant
Austronesian language: Siers, *Taratai*, p. 225
"A major impetus to the evolution": Kirch, "Polynesian Prehistory," p. 40

2 VOYAGING

"Here are the canoes": Fornander, *Account*, p. 10
kōlea energy output: Fisher, "Fantastic Voyagers," p. 141
Kōlea-a-me-Kahiki: Cartwright, "Golden Plover," p. 33

Motivations

"often remaining away from home": Banks, *Journal*, p. 159
"enterprising spirit": Williams, *Narrative*, p. 57
"became an object of ambition": Williams, *Narrative*, p. 58
"the grandfather of Gattanewa": Porter, *Journal*, p. 54
computer simulation analysis: Levinson, et al., *Settlement of Polynesia.*
"there is ample evidence": Lewis, *Navigators*, p. 24
"The basic data on winds": Finney, "Voyaging Canoes," p. 1283

Design

"the canoes of the voyagers": Kamakau, *Works*, p. 119
Hōkūle'a specifications: Finney, "Voyaging Canoes," p. 1279–1283
comparison with western craft: Only with the advent of enormous clipper ships did western man begin to achieve some of the 15–22 knot speeds that certain oceanic craft were capable of attaining hundreds of years before.
"There is abundant": Parsonson in Golson, p. 39.

Navigation

"'His head all same'": Golson, *Polynesian Navigation*, p. 38
demand recall of star positions: Dodd, *Polynesian Seafaring*, p. 52
"Take the lower part of a gourd": Kamakau, "Instruction," p. 142–143. These instructions, translated by Kamakau, could have been influenced or colored by his exposure to western concepts and terminology of navigation.
"holding course by swells": Lewis, *Navigators*, p. 87
"that for three days ahead": Dening, "Geographic Knowledge," p. 117
Little Climatic Optimum: Finney, "Voyaging Canoes," p. 1284

Provisioning

"Mr. Handy has seen": Handy, *Native Culture*, p. 188
voyagers' diet: Because of variations in geoclimatic conditions not all the foods mentioned were available at all island groups.
list of voyages: Dening, "Geographic Knowledge," p. 132–153
1964 drift voyage: Jourdain, "Tahitian Canoes," p. 27

3 MATERIALS

"Give of me your trunk": Pope, *Rainbow Land*, p. 10

Koa

"Their huge trunks": Rock, *Indig. Trees*, p. 175
"Some of our Explorers": Beaglehole, *Cook Journals*, III, p. 598
"The largest trees which compose": Menzies, *Hawaii Nei*, p. 84
"huge branches dangling": Rock, *Indig. Trees*, p. 175
"On the continents": Gilbert, "Hellish Spot," p. 34
"On Hawaii they found": Gilbert, "Hellish Spot," p. 34–35
"There have been more animal and plant": Kimura and Nagata, *Hawaii's Vanishing Flora*, p. 11
"the question of whether or not": Mueller-Dombois, et al., *Island Ecosystems.*
cattle multiplied prolifically: Doyle, *Makua Laiana*, p. 47, notes that "In 1858 it was estimated that wild cattle on Mauna Kea numbered 10,000 . . ."
"there are more endemic insect species": Swezy, *Forest Entom.*, p. 1
Logging *koa:* As early as the 1840s Reverend Lorenzo Lyons observed Hawaiians and foreigners engaged in primitive *koa* logging operations in the forests above Hāmākua. Doyle, *Makua Laiana*, p. 114
"A grove of very large *koa*": Emerson, Kekahuna collection
"the bark of the *koa*": Rock, *Indig. Trees*, p. 177. See also Doyle, *Makua Laiana*, p. 48, 49
"the management of these *koa*": Mueller-Dombois, et al., *Island Ecosystems.*
"there is a great probability": Mueller-Dombois, et al., *Island Ecosystems.*
fires in post-contact Hawai'i: Post-contact accidental and purposeful (for clearing) fire episodes were more frequent and on a larger scale than in pre-contact Hawai'i. Furthermore, the presence of cattle and other herbivores unknown in pre-contact Hawai'i eating young seedlings, disrupted the natural reforestation process.
straight *koa* on Maui and Hawai'i: Fornander writes that "while *koa* forests of all the islands furnished canoes, there were certain sections more favorable than others . . . Hilo and Kona districts of Hawaii and Hana of Maui were such."
legendary *koa* trees: Emerson, Kekahuna collection
Haleakalā produced such an abundance: Whitman, *Account*, p. 64, "The two peninsulas (of Maui) are mostly high craggy and broken mountains of rocks, with intervening spaces of rich lands that are covered with heavy timber from which the largest and handsomest canoes are made."
"possible to determine the average age": Mueller-Dombois, et al., *Island Ecosystems.*
"Owhyhee and Mowee furnish the best": Whitman, *Account*, p. 60
"Kona, with its great *koa* forests": Bishop, *Reminiscences*, p. 18
"canoes cannot be obtained": Catherine Stauder, personal communication
Acacia koaia use: Judd, "Woodcraft," p. 259

Koa for Canoes

early Hawaiians' knowledge of woods: The early Hawaiian was intimately familiar with the island forest system, breaking it down into distinctly different forest zones. C. S. Judd, Sr., state forester in the early twentieth century, provides a brief description:

> "In classifying the features of an island, the mountains in its center were called the *kuahiwi* or backbone. A broad plateau between two valleys was a *kualono*, and a narrow ridge near the summit was a *kualapa.*
>
> "Below the *kuahiwi* came a belt adjoining the rounded swell of the mountain and this was called *kuamauna*, or mountain side. The early Hawaiian foresters had established their own forest types for the belt below the *kuamauna*, in which small trees grew was called the *kuahea.* The belt below the *kuahea* where the larger sized forest trees grew and where there was a wilderness of trees and bushes, was called the *wao*, or *wao nahele* or the *waoeiwa*, a place of spirits or a wild place.
>
> "Just below the *wao* was the zone in which grew the monarchs of the forest (*koa*) and this was the *wao maukele.* Below this, where the trees again were smaller, was the *wao akua*, the wilderness of the gods where the ghosts, spirits and hobgoblins were supposed to reside. The lowest forest type was the *wao kanaka* or *mau* where the *amau* fern grew, where it was safe to live and where vegetables could be cultivated." Judd, "Woodcraft," p. 258–59

Koa classification: *Hawaiian Ethnological Notes;* Kalokuokamaile; Emory, field notes
"will never lose": Kalokuokamaile, "Canoe Making," p. 14
"to be very careful": Kalokuokamaile, "Canoe Making," p. 14
"a very light canoe": Kalokuokamaile, "Canoe Making," p. 14
"the grain of the wood": Kalokuokamaile, "Canoe Making," p. 14
List of *koa* terminology: compiled from Emerson, Kekahuna collection; Kalokuokamaile; *Hawaiian Ethnological Notes;* Emory, field notes

Other Woods

"other useful woods": Emerson, Kekahuna collection
"the trunk was hollowed": Degener, *Plants*, p. 74–75
"though never abundant": Emerson, Kekahuna collection
"three other kinds of wood": Fornander, *Collection*, V, p. 636
"to be one of their": Handy, *Native Planters*, p. 551. Malo notes too that the "*ku-kui* was a wood sometimes used in making the dug-out or canoe." Malo, *Hawn. Antiquities*, p. 42
"it was also made": Fornander, *Collection*, V. p. 618–620. Experience has shown that *wiliwili* rots readily and because of its unduly fibrous nature is difficult to hew when soft and dry.
"If not sufficiently": Emerson, Kekahuna collection
"favor because of the belief": Degener, *Plants*, p. 218
"had learned a little": I'i, *Fragments*, p. 55
"These canoes had outriggers": La Perouse, *Voyages*, II, p. 39
"in the olden days": Kalokuokamaile, "Canoe Making," p. 23
"constructed a vessel": Emerson, Kekahuna collection
training *wiliwili:* Emory, field notes
"the rushes, after being": Emerson, "Long Voyage," p. 18
"Ulu, the king of Kau": Fornander, *Collection*, IV, p. 156
"make your way": Cheever, *Island World*, p. 339–340

Drift Logs

"many of the largest": Brigham, *Index*, p. 12
"in Hawaii giant logs": Hornell, "Outrigger Devices," p. 94
"the circumstance of fir": Vancouver, *Voyages*, II, p. 219
"the largest single": Menzies, *Hawaii Nei*, p. 127

4 TOOLS

"May my adz fly": Emerson, N. B., Kekahuna collection

The Adze

"When we reflect upon": Whitman, *Account*, p. 52
object of barter: Malo, *Hawn. Antiquities*, p. 77
"was a *wahi pana*": Ellis, *Narrative*, p. 158
"any prehistoric expedition": McCoy & Gould, "Alpine Archaeology," p. 236
adzemakers' rocks: Kamakau, *Ruling Chiefs*, p. 240 and *Works*, p. 122. Malo notes that, "the stones used for axes were of the following varieties: *ke-i, ke-pue, ala-mea, kai-alii, humu-ula, pi-wai, awa-lii, lau-kea, mauna.*" N. B. Emerson, his editor, disagrees with his statement. Malo, *Hawaiian Antiquities*, p. 40–41
"compact water-worn basalt": Kamakau, *Works*, p. 122
"The ancient Hawaiians": McCoy & Gould, "Alpine Archaeology," p. 238
"to a basic preform": McCoy & Gould, p. 237
"the quality of some preform": McCoy & Gould, p. 237
"evidence of ritual behavior": McCoy & Gould, p. 239
"after splitting the rock": Malo, *Hawn. Antiquities*, p. 77
adze kit: Bryan, *Hawn. Life*, p. 37
"you noticed the skill": Kalokuokamaile, "Canoe Making," p. 7
"used for grooving": Kamakau, *Works*, p. 122
"at work with the native": Manby, *Journal*, p. 40
"had reached Hawaii": Malo, *Hawn. Antiquities*, p. 77
iron adzes: Kamakau, *Works*, p. 122
"metal chisels and adzes": Apple, "Village Sculptor."
"though they now use": Ellis, *Narrative*, p. 239
"I have seen them used": Brigham, *Index*, p. 76–78
List of adzes: compiled from Buck; Emerson, Kekahuna collection; Kamakau; Kalokuokamaile; Malo; Nalimu; Pu-Kui & Elbert and *Hawaiian Ethnological Notes*

Other Tools

"were drilled with": Kamakau, *Ruling Chiefs*, p. 240
wooden clamps: Buck, *Arts & Crafts*, p. 265
"three small sticks": *Hawaiian Ethnological Notes*, "Canoe Making," p. 42
"The clamp piece": Buck, *Arts & Crafts*, p. 266
"not see how caulking": Buck, *Arts & Crafts*, p. 267

5 CANOE BUILDING

"Swept with clouds": from "*Ho'okumu Hilo ia Hakau*," trans. T. Kelsey

The Gods

"building of a canoe": Malo, *Hawn. Antiquities*, p. 168
"this occupation": Fornander, *Collection*, V., p. 612
"I can believe": Puget, *Log Book*, 27 February 1793
"the ceremonies and their": Emory, "Flying Spray", p. 35
"troublesome and wearisome work": Kamakau, *Works*, p. 118
"everyone may think": *Hawaiian Ethnological Notes*, "Canoe Making," p. 41
"the class of royal": Pukui, "Canoe Making Profession," p. 151
"in building a canoe": Emerson, Kekahuna collection
"very much like the preachers": *Hawaiian Ethnological Notes*, "Canoe Making," p. 40–41
"the religious ritual": Buck, *Arts & Crafts*, p. 254
"with the Hawaiian": Emerson, Kekahuna collection
List of Gods: compiled from Emerson, Kekahuna collection; Malo; Kamakau, *Works;* Pukui & Elbert; Beckwith
"god of the *wa'a*": Emerson, Kekahuna collection
other goddesses: Emerson, Kekahuna collection
"without mention of that": Emerson, Kekahuna collection

The Search

"reference to death": Fornander, *Collection*, VI, p. 142
"when a man desires": Fornander, *Collection*, V, p. 610
"for three nights": Henriques, "Hawn. Canoes," p. 15
"Then, for three days more": Henriques, "Hawn. Canoes," p. 15
"hewed a deep groove": Henriques, "Hawn. Canoes," p. 15
"years later another": Kalokuokamaile, "Canoe Making," p. 13
"frequently remains for two or three": Whitman, *Account*, p. 53
"catch a quantity of fish": Kalokuokamaile, "Canoe Making", p. 3
"should a woman": Fornander, *Collection*, V, p. 610
"woods are some paths": Beaglehole, *Cook Journals*, III, p. 592–593
"they pass'd many Canoes": Beaglehole, *Cook Journals*, III, p. 523
"they had got a very": Beaglehole, *Cook Journals*, III, p. 523
"after having followed": Beaglehole, *Cook Journals*, III, p. 1167
"we found a small hut": Menzies, *Hawaii Nei*, p. 155–156
"The house was large": Ellis, *Narrative*, p. 159–160
"we found a large": Wilkes, *Narrative*, p. 181
"Occasionally one can find": Rock, *Indig. Trees*, p. 177

The Tree

"to learn in dreams": Emerson, Kekahuna collection
"if anyplace look twist": Krauss, "Jas Kahoolilihala."
offerings: Emerson, Kekahuna collection
"In the case of a large": Young, *Real Hawaii*, p. 115
"if the canoe": Fornander, *Collection*, V, p. 614
"particular observation of": Fornander, *Collection*, VI, p. 144
"the best plan to cut": Emerson, Kekahuna collection
"the axe was not struck": Emerson, Kekahuna collection
"making two transverse cuts": Emerson, Kekahuna collection
"The experts of the olden": Pukui, "Canoe Making Profession," p. 155
"cut in on the side": Kalokuokamaile, "Canoe Making," p. 4
"scarfs were continued": Buck, *Arts & Crafts*, p. 254
"Where one expert chopped": Pukui, "Canoe Making Profession," p. 155
"pahu pū": Emerson, Kekahuna collection
"This is the way": *Hawaiian Ethnological Notes*, "Canoe Making," p. 48
"so good from one end": Emerson, Kekahuna collection
"place where the tree": Kalokuokamaile, "Canoe Making," p. 4
"Cut the core right": *Hawaiian Ethnological Notes*, "Canoe Making," p. 37
"It would take one man": Fornander, *Collection*, V, p. 612
"iron axes simply cut": *Hawaiian Ethnological Notes*, "Canoe Making," p. 49
"if there was but one": Malo, *Hawn Antiquities*, p. 169
"the experts who did": Pukui, "Canoe Making Profession," p. 151–153

The *'Elepaio*

"occurs only on Kauai": Berger, *Hawn. Birdlife*, p. 18
"if they should hear": Fornander, *Collection*, V., p. 614
"If the bird darted down": Fornander, *Collection*, VI, p. 144
"wherever the bird": Emerson, Kekahuna collection
"it acted its part": Emerson, Kekahuna collection

Rough Hewing

"The head *Kahuna* mounted upon": Malo, *Hawn. Antiquities*, p. 169
Emerson calls the ritual of severing the head of the fallen tree "*'oki 'ana i ka 'eulu*".
"when severed, the *tapu*": Buck, *Arts & Crafts*, p. 255
"E ho'olele wale": Emerson, Kekahuna collection
"make a hole": Kalokuokamaile, "Canoe Making," p. 6
"across the surface": Emerson, Kekahuna collection
"When the center": Kalokuokamaile, "Canoe Making," p. 7
"the thing that remained": Kalokuokamaile, "Canoe Making," p. 7
maku'u: By some accounts there was also a neck *(maku'u)* fashioned at the bow (later completely removed) which apparently served as an additional point to attach restraining lines.
"after laying some times": Menzies, *Hawaii Nei*, p. 82
"Our people who made": Beaglehole, *Cook Journals*, III, p. 593. Clerke also makes a strange reference to repairing finished canoes, writing, "but what is somewhat singular, if one of their vessels wants repairing she is immediately removed into the woods, though at the distance of 5 or 6 miles." Clerke's statement here is a bit confusing. Typically finished canoes that had been damaged or cracked were patched at the beach. It is conceivable though, that canoes might have occasionally been carried back up to the mountains where cool and damp conditions would favor closing and patching a crack.

Water Tanks

"at last found some rain": Beaglehole, *Cook Journals*, III, p. 523
"was informed that": Wilkes, *Narrative*, p. 130–131
"hawking water about": Wilkes, *Narrative*, p. 134
"A cave in which was": Emory, field notes.

Hauling

"It took three of these": Damon, *Father Bond*, p. 126
Coan and Paris: *Missionary Herald*, 1842, p. 377
"it was useless": Kalokuokamaile, "Canoe Making," p. 16
"the wood continued": Menzies, *Hawaii Nei*, p. 83–84
"every male inhabitant": Manby, "Journal," p. 40
"not unfrequently": Damon, *Wilcox*, p. 122
"According to the size": Fornander, *Collection*, V, p. 632
"a proclamation went to all": Pukui, "Canoe Making Profession," p. 157
"The hauling to the shore": Emerson, Kekahuna collection. The death of Pine, the head *kahuna kālai wa'a*, indicates that on this historic hauling occasion traditional in almost all respects, Pine was not occupying the standard position some distance behind the canoe, but rather was superintending very close by.
"Be very careful": *Hawaiian Ethnological Notes*, "Canoe Making," p. 50
"The *pale* says": *Hawaiian Ethnological Notes*, "Canoe Making," p. 46
"it is the man guiding": Fornander, *Collection*, V., p. 634

Finishing

curing logs: Bryan, *Hawn. Life*, p. 39
"a piece of sennit": *Hawaiian Ethnological Notes*, "Canoe Making," p. 49
"there are two methods": Fornander, *Collection*, V, p. 634
"hollowing out of the": Buck, *Arts & Crafts*, p. 256
"could be turned": Buck, *Arts & Crafts*, p. 256
canoe rubbers: Buck, *Arts & Crafts*, p. 257
breadfruit leaf as sand paper: Bryan, *Ancient Hawn. Life*, p. 39. Bryan also mentions, p. 42, "the hull being finally polished down with sand caught in the fibers of a coconut husk . . . "
"Our cabinet-makers do not": Arago, *Narrative*, p. 65–66
"After working and finishing": Kalokuokamaile, "Canoe Making," p. 20

Painting

"when the piecing": Pukui, "Canoe Making Profession", p. 159
"alaakai (bulrush) and the *naku"*: Kalokuokamaile, "Canoe Making," p. 22
"To make the paint colorfast": Kalokuokamaile, "Canoe Making," p. 22. An early twentieth century informant of Emory's corroborates the fact that *ti* root "was better than *kukui* paint . . . it was *pilipili*, i.e., never come off." Emory "Field Notes."
"is painted black": Arago, *Narrative*, p. 66
"instead of the charcoal": Emerson, Kekahuna collection
"waa 'ula": Emerson, Kekahuna collection. On occasion the canoe of a chief was "for display (or) to show kingly state" painted red. "The *ula* (red) was made thus: 1) The sap of the *noni;* 2) the inner bark of the *mamaki* tree; 3) the *ma'o*, the red *tapa* skirt stain its flowers was used; 4) *ki*, the juice of the uncooked ti root; 5) *'alaea*, red clay at Kaawaloa, Kona and other places." Emerson, Kekahuna collection
canoe of royalty: Fornander, *Collection*, Vol IV, p. 218, suggests that if a canoe were not painted red there was a form of "red insignia of the canoe" alerting people that royalty was aboard.
"pandanus aerial roots": Buck, *Arts & Crafts*, p. 258

Consecration

"There are many kinds of *lolo*": Emerson, Kekahuna collection
"The *lolo* ceremony": Emerson in Malo, p. 178
"if the pig goes along": *Hawaiian Ethnological Notes*, "Canoe Making," p. 50
"The pig symbolized": Kamakau, *Works*, p. 121
"when the *kahuna*": Malo, *Hawn. Antiquities*, p. 173
"man who buys a canoe": *Hawaiian Ethnological Notes*, "Canoe Making," p. 50
"No woman was allowed": Emerson, Kekahuna collection

Post-Contact Construction

"entreated that a carpenter": Meares, *Voyages*, p. 338
"Captain Vancouvre laid": Turnbull, *Voyage*, p. 224–226
"the thing which more": Langsdorff, *Voyages*, p. 166
western craft: In 1805 Captain William Shaler reported seeing thirty western-type vessels in the war fleet of Kamehameha.
"navy consisted of": Simpson, *Narrative*, II, p. 72
"the older ones are": Cobb, p. 394
"the lashing of sennit": Jenkins, *Explorations*, p. 392

6 ACCESSORIES

"Thick grew the forests": Thompson, *Hawn. Myths*, p. 13
"the various parts added": Emerson, Kekahuna collection
"you had to seek": Kalokuokamaile, "Canoe Making," p. 20

Gunnels

"the customary way": Kalokuokamaile, "Canoe Making," p. 21
woods used: Emerson, Kekahuna collection; Malo; Kamakau, *Works;* Kalokuokamaile; *Hawaiian Ethnological* Notes.
"The scarf joint was": Buck, *Arts & Crafts*, p. 259
"The sennit braid used": Haddon & Hornell, *Canoes*, p. 10
"a plank about a foot": Beaglehole, *Cook Journals*, III, p. 598
2½ inch thickness: Haddon & Hornell, *Canoes*, p. 8
"to smear some thick coloring": Emerson, Kekahuna collection
"ti leaf stems": Pukui, "Canoe Making Profession," p. 159

End Pieces

"The extremities of both": Beaglehole, *Cook Journals*, III, p. 282

"end pieces were referred": Buck, *Arts & Crafts*, p. 260
"the term *manu*": Emerson, Kekahuna collection
"combined the functions": Buck, *Arts & Crafts*, p. 261
"which may be the survival": Emory, *"Flying Spray"*
leleiwi: Malo, *Hawn. Antiquities*, p. 174
rarity of end pieces of single piece of wood: A one piece *manu* required an exceptionally large and heavy piece of wood. This was difficult to transport from the mountains, and because of the awkward shape and need for exact fitting, more difficult to carve than two halves.

Median Bow Cover
description: Buck, *Arts & Crafts*, p. 263
"in stormy weather": Emerson, Kekahuna collection
"When they are about": Whitman, *Account*, p. 54

Comb Cleats
descriptions: Maline, "Terminology," p. 3

Seats
descriptions: Maline, "Terminology," p. 6

U-Spreaders
"these spreaders gave support": Haddon & Hornell, *Canoes*, p. 11
"there is no evidence": Buck, *Arts & Crafts*, p. 264
"lashed directly as is": Haddon & Hornell, *Canoes*, p. 11

Outrigger Booms
"you had to select": Kalokuokamaile, "Canoe Making," p. 22
there were two *'iako:* Emerson recorded an informant telling him that if "the canoe (single) were very long, it would have three *iako(s)*," which he himself doubted. Emerson, Kekahuna collection.
"was held in such high": Degener, *Plants*, p. 213
"imu hau hana": Pukui & Elbert, *Dictionary*, p. 94
"if there were no": Kalokuokamaile, "Canoe Making," p. 22
"the booms for larger": Buck, *Arts & Crafts*, p. 272
"finished to an octagonal": Houston, "Double Canoe," p. 23
"the aft boom was always": Buck, *Arts & Crafts*, p. 272

Cross Booms
"The arched sticks": I'i, "Canoes," p. 1
"some double canoes": I'i, "Canoes," p. 1
Hau used for cross booms: Haddon & Hornell, *Canoes*, p. 13
eight cross booms: Maline, "Terminology," p. 5
"*iakos* used in ancient": Malo, *Hawn. Antiquities*, p. 173
"a late survival": Haddon & Hornell, *Canoes*, p. 13
"in those with two": Haddon & Hornell, *Canoes*, p. 12
"usually bowed slightly higher": Haddon & Hornell, *Canoes*, p. 13
Cook estimate: Haddon & Hornell, *Canoes*, p. 19
Townsend estimate: Townsend, E., *Diary*, p. 23

Float
"When a man found": Kalokuokamaile, "Canoe Making," p. 23
wiliwili favored for use: Buck, *Arts & Crafts*, p. 275
"*wiliwili* trees were trimmed": Emory, field notes
alahe'e adzes: Kamakau, *Works*, p. 122. Kamakau used the name *walahe'e*, which is a synonymous term.
"different people hewed out": Pukui, "Canoe Making Profession," p. 159
"had the sides cut": Buck, *Arts & Crafts*, p. 275
ama kaka: Wally Froiseth, personal communication
"rather pronounced curvature": Houston, "Double Canoes," p. 23
post-contact *ama:* transplanted Tahitians and Gilbertese also had some influence on *ama* design. Cobb, *Commercial Fisheries*, p. 719, notes in 1905 that "The South Sea Islanders on the Hawaiian Islands use a slightly different arrangement of the outrigger. At the ends of the cross poles short forked sticks are lashed with the closed part of the fork upward. The long sapling is then lashed to the lower ends of the forks, but does not enter the v-shaped openings."
"the *lupe*": Emory, field notes

Lashing
fibers used: Emerson, Kekahuna collection. Rowena Keaka, Beatrice Krauss and others note one method for preparing the cording:

> "There are several ways in which Polynesians prepare the coconut fibers. One method is to break the husk apart into sections. Each section is then turned over to expose the slick outer skin. This outside portion is then pounded. Pounding aids in breaking the inner fibers away from the outer skin. The sections are next soaked in seawater for several weeks before the long fibers that are worked into cordage are removed. Another method is to break the husk apart, then remove some of the long fibers which are soaked in seawater for eight weeks. Pacific islanders who use the green husk just remove the long fibers by pulling the husk apart and working the fibers into cordage." (Lindo & Mower, *Polynesian Seafaring*, p. 65)

Handy goes on to note that the

> "Cord *('aha)* was then made by rolling *(nino)* fiber strands on the thigh, placing three or four strands together to start with and then proceeding by placing another strand a little way below the upper end of the first lot, and continuing with another and another, rolling the *'aho* back and forth on the thigh all the while. The heavy cords used in lashing together house timbers, parts of canoes, adzes, and other materials and implements, were then made by plaiting the cords rolled together. These plaited cords were also termed *'aha*. Such cords were not used for fishlines or nets because they were stiff and subject to kinking." (Handy, *Native Planters*, p. 176)

"nor can one help": Freycinet, "Hawai'i in 1819," p. 86
"which is of a lighter": Emerson, Kekahuna collection
"in the time of": Kalokuokamaile, "Canoe Making," p. 21
"the sennit braiders in": Pukui, "Canoe Making Profession," p. 159
"that ships are supplied": Langsdorff, *Voyages*, p. 165
purchase: A nonslipping mechanical advantage, in this case afforded by the inherent coarseness of sennit.
"the outrigger is more": Whitman, *Account*, p. 54
"a strong piece of line": Whitman, *Account*, p. 54
"'halves' *(puniu)*": Kamakau, *Works*, p. 121
"the cloth wrapped about": Emerson, Kekahuna collection
"they had many patterns": Emerson, Kekahuna collection
"a famous beauty": Emerson in Malo, p. 178
"the best *aha* to bind": Emerson, Kekahuna collection
"an old Hawaiian named Paila": Emerson, Kekahuna collection
"when it came to making": Malo, *Hawn. Antiquities*, p. 174
"the more ornate and decorative": Emerson, Kekahuna collection
"the operation of binding": Emerson, "Long Voyage," p. 6
"horizonal grooves worked": Haddon & Hornell, *Canoes*, p. 12
"two massive connecting collar": Haddon & Hornell, *Canoes*, p. 12
"it is possibly one of the": Haddon & Hornell, *Canoes*, p. 12
List of Canoe Lashings: compiled from Emerson, Kekahuna collection; Malo; Maline; I'i; Emory, field notes; Fornander

Sails
"details concerning the mast": Buck, *Arts & Crafts*, p. 281
"was kept in place": Emerson, Kekahuna collection
"bent in toward the masthead": Haddon & Hornell, *Canoes*, p. 18
"pendant made of streamers": Haddon & Hornell, *Canoes*, p. 18
"the young leaves": Malo, *Hawn. Antiquities*, p. 75. One method for preparing the *hala* was summarized by Beatrice Krauss:

> "Leaves for plaiting were prepared early in morning when they are moist and fresh; when brittle, they are soaked in sea water. Tip end was cut off where leaf narrows; base end was cut off 3 or 4 inches from butt end. Spines (thorns) along side (on margins) were ripped off, and those on back of midrib scraped off. With base of leaf in the hand, leaf was smoothed with considerable pressure along its whole length. Several leaves were laid, one upon the other, bottoms held in left hand, flattened, and rolled into a small roll, and tied. Later these were sorted, rolled into large rolls, tied, and stored until ready for use. When ready for plaiting, leaves were torn into strips from ⅛–1 and ½ inches wide, according to article made, or grade—articles made of narrower strips wore best." B. Krauss, *Ethnobotany*, p. 180

"where a white effect": Emerson, Kekahuna collection
"the sail of the Hawaiian": Emerson, Kekahuna collection
"for a king": Emerson, Kekahuna collection
"a special pattern": Emerson, Kekahuna collection
"the leach and luff": Emerson, Kekahuna collection
"The bottom of the mast": Kamakau, *Ruling Chiefs*, p. 43
"the fashion of *La*" Emerson, Kekahuna collection
"the kind of sails": Fornander, *Collection*, V, p. 688
"the natives were deceived": Meares, *Voyages*, p. 21
"to come off in great": Vancouver, *Voyage*, p. 163
"today they are rigged": Freycinet, "Hawai'i in 1819," p. 86
"all the canoe sails": Freycinet, "Hawai'i in 1819," p. 86
"the sails they now use": Ellis, *Narrative*, p. 256
"in 1869 Moe-honua": Emerson, Kekahuna collection

Mast
"was set up": Malo, *Hawn. Antiquities*, p. 174
"The conclusion most probable": Haddon & Hornell, *Canoes*, p. 18
"probably an innovation": Haddon & Hornell, *Canoes*, p. 18
"was set in the forward": Emerson, Kekahuna collection

Platform
"*iliahi* was best": Kelsey, "Canoe Notes"
"the two poles": I'i, *Fragments*, p. 130
"at least two feet": Ellis, *Narrative*, p. 255
"about four feet": Townsend, E., *Diary*, p. 8
"a further framework: Andrews, R. W., "Canoeing"
"double canoe with its": Fornander, *Collection*, IV, p. 286

Mat Cover
"When the lashings": Malo, *Hawn. Antiquities*, p. 174
"only the waist": Emerson in Malo, p. 179
"each of these three": Emerson, Hawaiian Historical Society collection
"A number of holes": Emerson in Malo, p. 179
"*'ahu uhi waa":* Emerson, Hawaiian Historical Society collection
"one of them was quite": Gilman, "Canoe Voyage," p. 7
"to cross the channel": Barnard, *Narrative*, p. 236

Bailers
"of the general Polynesian": Buck, *Arts & Crafts*, p. 280

Anchors
"not used much": Buck, *Arts & Crafts*, p. 281

Canoe Sheds
"They are exceedingly": Puget, *Log*, 27 February 1793
"the afternoon was spent": Menzies, *Hawaii Nei*, p. 182
"The roof and sides": Handy, *Native Planters*, p. 300
"by the time I got": Dixon, *Voyage*, p. 126
"the people of the village": Ellis, *Narrative*, p. 142
"Mauae and his companions": Ellis, *Narrative*, p. 143
"sleeping in a long": Alexander, *Dr. Baldwin*, p. 50
"to the house": J. Paris, *Missionary Life*, p. 14

7 PADDLES

"Sit up, those in front": Fornander, *Collection*, p. 104
"characterized by a straight thick shaft": Buck, *Arts & Crafts*, p. 277
Kona paddle: In a private collection, the paddle has been examined by the author in collaboration with Bishop Museum staff. Dr. William S. Adams of UCLA kindly dated the paddles at no cost.
paddle designs: Emerson, Kehahuna collection
"sign of authority": Fornander, *Collection*, V, p. 122, writes that "Kuapakaa at once looked at the two sailing masters and asked that they give him one of the paddles, but they refused, saying: 'We cannot give you one because this is our sign of authority.'"

"their paddles are about": Dixon, *Voyage*, p. 276
"broad, and made of light wood": Samwell, "Diary," p. 262
"their paddles which are large": Ellis, *Narrative*, p. 256
"paddles were large": Young, *Real Hawaii*, p. 116
typical paddle size: Buck, *Arts & Crafts*, p. 277–278; Cobb in his *Commercial Fisheries* notes that in 1905 a typical man's paddle for a fishing canoe was "about 46 inches in length, with an oblong blade about 23 inches long by 13½ inches wide."
"The upper part of the blade": Buck, *Arts & Crafts*, p. 278
"the blades of old paddles": Buck, *Arts & Crafts*, p. 278
raised projection: Buck, *Arts & Crafts*, p. 278; Haddon & Hornell, *Canoes*, p. 17
"served no known useful": Haddon & Hornell, *Canoes*, p. 17
paddles from other Pacific islands: Buck, *Arts & Crafts*, p. 278–279
"to protect the point": Emory, field notes
"reefs and shoal waters": Emerson, Hawaiian Historical Society Collection
Kawela, Moloka'i paddle: Kirch, personal communication
"the paddle is probably": Kirch, personal communication
use of rudder: Freycinet, "Hawai'i in 1819," p. 86
"was rigged as a schooner": Emerson, Hawaiian Historical Society Collection
"*koa* which had a yellow wood": Emory, field notes
koai'e paddles: Cobb, *Commercial Fisheries*, p. 719, says that in 1905, "The wood of the paihi tree is frequently used, especially on Hawaii, in making the ordinary paddles, while the wood of the *koaia (Acacia koaia)* is generally used in the manufacture of fancy ones."
"the beauty and strength": Whitman, *Account*, p. 60
"I also send you 10 canoe paddles": Alexander, *William Patterson Alexander*, p. 186
other woods used: N. B. Emerson also reports that *pa'ihi*, the Maui name for *'ōhia-hā* was also used to make paddles.

8 DESIGN

"What tree is best": Pope, *Hawaii Rainbow*, p. 10
"We can divide": Freycinet, "Hawai'i in 1819," p. 85

Primary Design Features
one-piece wooden hulls: Emerson reports a "*waa kapilipili*. He (Ka-io-'oni) says that he heard that in Hono-kua, in Kona, in very ancient times, a canoe was made called a sewn-canoe *(he waa humu)* in which Ala-pa'i sailed on occasion to Ka'u. Ala-pa'i had his residence in Ka-'awa'loa. The canoe was large, built up of planks with sennit *('aha-niu)* . . . This sewn-canoe *(waa humu)* of Ala-pa'i was named *Ka-ihu-pekekue*. Kamehameha First's canoe of the same name was named after it." Emerson, Kekahuna collection
double and single canoes: There is also a *"pūkolu,"* three canoes lashed together trimaran fashion, a post-contact innovation that so far as is known, was tried only once with little success.
ihu-nui: Malo, *Haum. Antiquities*, p. 174

Secondary Design Features
Dowsett and breadfruit canoes: The Dowsett canoe is at the Bishop Museum; the breadfruit canoe reportedly built in Waipi'o Valley is in a private collection.
Paris' drawing: Allowing that the drawing is inaccurate in several respects, the medial ridge which presumably was present in the canoe being drawn, most likely was a transitional feature.
calabash at lower part of hull: This can also be described as a hull section displaying a marked amount of tumble-home or tumble-in.
"their canoes are of various": Whitman, *Account*, p. 53

Canoe forms
compiled from N. B. Emerson, Kekahuna collection; Malo; Kamakau; Haddon and Hornell; Emory, field notes; Kahaulelio; Kelsey, "Canoe Notes"

Ornamentation
conspicuous by its absence: In war time or for purpose of pomp and ceremony, Samwell, traveling with Captain Cook, notes that "in the stern of their canoes they carry small wooden images which they call Etee." Samwell, *Extracts*, p. 262. Rickman, also with Cook, observed a "most superb vessel in which were four idols, two at each end, representing men of a monstrous size, covered with mantles of feathers, interwoven with various colours, red, black, green, and yellow." Rickman, *Journal*, p. 303

Post Contact Design
"except for the substitution": Emory, *Flying Spray*
"the outrigger canoes": Haddon & Hornell, *Canoes*, p. 6
European influenced *peleleu:* By the 1790s Kamehameha had several European carpenter/ship builders in his employ or on retainer. It is fairly widely agreed upon that these Europeans had a hand in the design of the hybrid *peleleu*.

9 CANOEING SKILLS

"Watch for the coral and stones": Emerson, Kekahuna collection

Paddling Speed
"They row very fast": Bloxam, *Diary*, p. 22
"these canoes are so well": Turnbull, *Voyage*, p. 232
"one man will sometimes": Ellis, *Narrative*, p. 256
"hulls were primarily": Haddon & Hornell, *Canoes*, p. 16
"the usual and favorite mode": Haddon & Hornell, *Canoes*, p. 16
"had the impression": Freycinet, "Hawai'i in 1819," p. 86
"eleven large canoes": Vancouver, *Voyage*, II, p. 126–127
"He came off": Beaglehole, *Cook Journals*, III, p. 281
canoeing activity: Many once heavily populated areas were difficult to reach by foot but had easy access by canoes.
"The kings had a class": Hommon, "Inter-Island Channels," p. 112
"six athletic paddlers": J. Paris, *Missionary Life*, p. 18
"half a day and the": Cheever, *Island World*, p. 188

Paddling Techniques
"nine or ten athletic men": Bingham, *Residence*, p. 83
"The sailors took turns": Freycinet, "Hawai'i in 1819," p. 86–87
"(their ma)nner": Hewett, marginal notes, III, p. 60
"If the paddles remained quiet": I'i, "Canoes"
"the rate of paddling": R. W. Andrews, "Canoeing"
"Rules for canoe paddling": I'i, *Fragments*, p. 133
"it was his mother": I'i, *Fragments*, p. 55
"no small mortification": Menzies, *Hawaii Nei*, p. 51
"The bay had been": Menzies, *Hawaii Nei*, p. 72–73. Menzies notes that the operation witnessed was called *"lua."*
"it is easy to imagine": Emerson, "Long Voyage," p. 18–19
"there were many ways": I'i, "Canoes"
styles of paddling: Emerson, Kekahuna collection
Kaupiko list: Kekai, personal communication

Steering and Navigating
skill in steering: The first regular pilot and tug boats in the Pacific were versatile Hawaiian canoes. These canoes began around 1800 towing and guiding visiting European vessels through the narrow entrance to the sanctuary of Honolulu's natural harbor, a practice and setting similar today except for the widened and deepened entrance and the size and type of vessel.

Chamisso relates in 1815: "At four A.M. of the 28th in accordance with a pre-arranged gun signal we called the canoes alongside that were to tow us into the harbor. The pilot and eight double canoes, each under its owner with sixteen to twenty men came out. Mr. Young was in a smaller canoe. The anchor was gotten up and playfully; laughing the while and noisily, the Sandwich Islanders towed the *Rürik* into the harbor in fine style, with a power that surprised our crew. We were making three knots by the log. We dropped anchor under the walls of the Fort and Mr. Young came on board to demand payment for the services, which were not performed by the King's men." Chamisso, *Werke*, p. 63

"Ordinarily, a man located": Freycinet, "Hawai'i in 1819," p. 86
interisland navigation: Following is one of the very few accounts known, and it is fragmentary, of navigation between the Hawaiian islands. J. Waiamau writes in the Sept. 16, 1865 edition of *Nupepa Kuokoa* (*Hawaiian Ethnological Notes:* Thrum collection #36):

> Kawa'unuiaola appears on the first day of Wilinehu, and continued its allotted period. At the end of its course in benefitting its people Kawa'unuiaola disappears. The canoe-steerers star then emerges, the star the steering people watch for as is their custom in ocean voyaging. That is the manner of observing the thirteen stars of the canoe steerers, which are the land stars referred to in this category, viz: Holoholopinaau, Kawa'unuiaola, Hoku Hookele Waa Hoku Kauopae, Hokuikaweolani, Hoku Hookeleale, Hoku Kaukamalamala, Hoku Ukalialii, Kelalakea, Napeha, Ululoa, Kawae Hoku Kau Opua.
>
> These are the stars desired by the navigators for the benefit and prosperity of after generations . . .
>
> Thusly: In preparing for a long ocean voyage to Oahu, or to Kauai perhaps, evening is the time to commence this work. In manner as follows: Chew the *awa*, bake the pig, mix the *awa*. The pig being cooked and all cut up is placed on polished wooden platters, with the *awa* cups at hand. When all these are ready then the priest offers prayer to the god of the canoe voyagers. The prayer ended, the food is all eaten, after which the priest observes the heavens. If a rainbow stands arched in front of the canoe, or the rising column-cloud perhaps, the priest will say: "it is not right to sail lest disaster occurs on the ocean," or if in his observing the clouds instead of standing forth well they fly threateningly, scattered in fragments in the air the priest would again say, "yes it is well, there is nothing that will interfere: but one thing remains; if during my sleep I should have a good dream, then, ever pleasant sailing will attend the voyage." The priest will then lie down and on awakening will say, "I have had a favorable dream, therefore set sail, you will have no trouble." At this point the instruction of the priest ends, it is of the canoe steerer we must continue our remarks.
>
> The sailing. There are two sailing times of canoeists, one is at night and the other in the day time. If sailing at night then the starting time is when the Kanopae star appears, that is the canoe steerer's star being spoken of. At its appearance then the steerer being prepared with all else on the canoe ready they will set sail. In this sailing forth there are two things in particular for the steerer to observe, one is the waves, the other the stars. In the observance of the stars by the steerer there are two in particular to which he must give attention, these are the canoe steerers at the bow of the canoe, and the fixed North Star at the rear of the canoe. Thus will the voyaging be till reaching the place of landing. But if the steerer will observe the stars to the right, they are a group of seven stars and are called the (*"na hiku"*) seven, at that place is a certain small star. If the steerer observes this star to wink frequently, then he will say to the canoe paddlers, of the sail and the paddles, it will be well to effect a landing because a wind will follow. The steerer foresees the storm. . . .
>
> If the sailing be in the daytime then there is nothing need be said thereon, but if in darkness, on the ocean, the steerer will watch the evening star for the course of the canoe. That star is called Mananalo (Venus), which is the direction of the canoe till reaching the land.

"when his canoe left": I'i, *Fragments*, p. 132
"he was a strong": Kamakau, *Ruling Chiefs*, p. 37

Women Paddlers
"One day an old woman": Tyerman & Bennet, *Voyages*, p. 103
"Kamamalu, the favorite": Tyerman & Bennet, *Voyages*, p. 126
"several canoes, filled": Kotzebue, *Voyage*, I, p. 295
"a great number": Arago, *Narrative*, p. 62
"taught canoe surfing": I'i, *Fragments*, p. 133

"the women are subject": Campbell, *Voyages*, p. 187
"the taboo which had been": Menzies, *Hawaii Nei*, p. 53–54

Sailing
"in sailing against the wind": Emerson, Kekahuna Collection
"in going a long voyage": Emerson, Kekahuna Collection
"They glide over": Houston, "Double Canoes," p. 23
"would probably paddle": Ellis, *Narrative*, p. 256
"I hired a canoe": C. Lyman, *Around the Horn*, p. 119
"We went to Waioli": Alexander, *W. P. Alexander*, p. 183
"when sailing towards": *Missionary Herald*, 1843, p. 172–173

Sea, Swell and Wind
"These are the 'gods'": Kaelemakule, 7 May 1929
"the storm that": Kamakau, *Works*, p. 77
"how to tell when": Kamakau, *Ruling Chiefs*, p. 36
"The swell that 'grows'": Kamakau, *Works*, p. 13
types of waves: Kaelemakule, 7 May 1929
"the natives informed us": Menzies, *Hawaii Nei*, p. 177

Refloating a Canoe
"Many have perished": I'i, *Nupepa*, 16 April 1870
"one hundred and fifty": La Perouse, *Voyage*, p. 39
"both the men had much": Kotzebue, *Voyage*, I, p. 294–295
"they immediately took hold": Townsend, *Diary*, p. 3–4
"their good management of them": Wilkes, *Narrative*, p. 44
"ke kamaihulipu": Kaelemakule, 19 March 1929
"two things that made": I'i, *Fragments*, p. 131
flotation device: Kamakau states that students were taught "to right upset canoes . . . with the aid of a canoe roller" but does not define these so-called "canoe rollers," *Ruling Chiefs*, p. 37
"netting under the floater": Kaelemakule, 9 April 1929
methods for righting: *Hawaiian Ethnological Notes*, "Buke Kilokilo Waa"
"head to the wind": Emerson, Hawaiian Historical Society collection
"When a single canoe": I'i, *Fragments*, p. 131.
"The men stood on the sunken": I'i, *Fragments*, p. 131
"The *hau* sticks": Kaelemakule, 16 April 1929
Kaelemakule notes further of a swamped canoe that "If one climbed in from the back the canoe capsized again. It was also *kapu* to climb in at the stern or prow when a canoe was being righted." Kaelemakule, 21 May 1929
"Mauli-'awa tells me": Emerson, Hawaiian Historical Society collection

Canoe Mishaps
"Mr. Bligh attempt'd": Beaglehole, III, p. 526
"from the suddenness of the bad": Beaglehole, III, p. 526
"We saw a canoe": Beaglehole, III, p. 526
"was formerly": Doyle, p. 48.
"soon after doubling": Bishop, *Missionary Herald*, p. 108
"a very young man": Tyerman & Bennett, *Voyages*, p. 122
"It was about 7": Alexander, *Dr. Baldwin*, p. 163
"sometimes overtasked, chilled": Bingham, *Residence*, p. 140
"They took to their canoe": Doyle, *Makua Laiana*, p. 142
"not a canoe was left": Wilkes, *Narrative*, p. 227
"the sea had been inland": M. Kelly, *Hist. Background*, p. 36
1939 incident: O'Hara, "Outriggering", p. 19.

Post-Contact Canoe Transportation
"On her trip up": *Polynesian*, 22 January 1853

10 CANOE LADDERS

"My heart beats high": N.B. Emerson, *Pele & Hiiaka*, p. 62
"We landed before his house": Menzies, *Hawaii Nei*, p. 178–179
canoe ladders used: Sam Kalalau of Hāna offers that such canoe ladders were once in use in the Hāna district also. For Hāmākua use, see *Thrum*, 1910, p. 100
"After travelling a mile": Ellis, *Narrative*, p. 212
"are much larger": *Thrum*, 1910, p. 99–100
Kahauale'a ramp photograph: in Bishop Museum

11 SURFING

"The spray of surfing": from *"He Mele Inoa no Naihe"*

Ancient Canoe Surfing
"there are many ways": I'i, *Fragments*, p. 135–137
"was also taught": I'i, *Fragments*, p. 133
"Umi excelled in surfing": Kamakau, *Ruling Chiefs*, p. 9
"when the king": Ellis, *Narrative*, p. 280
"what was called *lele wa'a*": I'i, *Fragments*, p. 133
"he was frequently": I'i, *Fragments*, p. 134
"When we got near": Dixon, *Voyage*, p. 123
"landed in a very high": Ellis, *Narrative*, p. 138
"In attempting to land": Doyle, *Makua Laiana*, p. 149
"embarked in a canoe": Corney, *Voyages*, p. 112
"it was very common": Beaglehole, *Cook Journals*, III, p. 281

Surfing Canoe Design
single canoe safer: Portlock, *Voyage*, p. 161

Modern Canoe Surfing
"the ability of the participants": I'i, *Fragments*, p. 137
"when I first came": John Cook, *Reminiscences*, p. 21
"although their good": Wilkes, *Narrative*, p. 44

Big Waves
"One idea that got": J. Kelly, *Surf & Sea*, p. 13–14

12 FISHING

"Arise in the night": Green, *Folktales*, p. 35
"While we were entering": Ledyard, *Journal*, p. 103
"canoes was immense": Arago, *Narrative*, p. 105
"was lined with canoes": M. Kelly, *Survey*, p. 36
"was probably in": Hommon, "Inter-Island Channels," p. 155
number of canoes: Of a small settlement on the west coast of Hawai'i called Kapalaoa, Larry Kimura states that well into the 1900s, "Each family had its own outrigger fishing canoe . . . " (*Kapalaoa Homestead Life*, p. 21). A number of Hawaiiana scholars suggest it very likely that most, if not all, beach-residing Hawaiian families had their own canoe, adding up to a lot of small canoes.
"the importance attached": Young, *Real Hawaii*, p. 115
"most if not all": Hommon, "Inter-Island Channels"; p. 155–156

Characteristics of Fishing Canoes
"wa'a pahoa": Emerson, Kekahuna collection
"name of the canoe": Emerson, Kekahuna collection
other types of fishing canoes: Kahaulelio, "Fishing Lore"
"single canoes": Kamakau, *Works*, p. 72.
"not fewer than 6000": Corney, *Voyages*, p. 111
"The head fisherman": Kamakau, *Works*, p. 62
canoe lengths: Beaglehole, *Cook Journals*, III, p. 282
Samwell estimates: Samwell, "Diary," p. 261
During the late 1850s Varigny observed from a boat he was traveling on off the "coastal areas of the Kohala district . . . rich in fishing grounds . . . [that] the sea was covered with small native canoes . . . nearly all equipped with triangular sails. Each of these craft, so incomparably light that they drew only four or five inches of water, was manned by two Kanakas." De Varigny, *Fourteen Years*, p. 73
"generally built small": Krauss, "Jas Kahoolilihala"
25-foot canoe weighed: La Perouse, *Voyages*, II, p. 39
"low and narrow": Waterhouse, "Deep Sea Fishing," p. 105

Strategies
"his left hand sculled": Kamakau, *Works*, p. 65
"he chewed *kukui*": Kamakau, *Works*, p. 62
kukui nut: Kamakau, *Works*, p. 69
"Kamehameha with the help": Baker, "Canoe Holes," p. 4
"dated from very": Baker, "Canoe Holes," p. 4
"holes which ships putting": Kamakau, *Ruling Chiefs*, p. 205
"Ka-wai-a-ka-pala-hemo": Handy, *Native Planters*, p. 572
"The ocean is rough": Baker, "Canoe Holes," p. 4
in the midst of the *'ahi ko'a:* To this day, boats can occasionally be seen tied off the shore fishing for the still very plentiful *'ahi* and other fish. Some innovative fishermen have even constructed miniature toy sail boats to which they attach a line from a shore based rod and reel. As they pay out a hundred yards or so of line the toy sail boat swings into the sheer line with its baited hook dangling a number of feet below. If a fish should strike the bait, a quick release mechanism frees the toy boat from the line. This is mentioned here to reinforce two things—one, the still excellent fishing in the same area and two, the continued difficulty even today of accessing the fish, though they are very close to shore. Very few people today are confident to the point where they will tie off a boat in the same fashion as the early Hawaiians.
"it is also possible": M. Kelly, *Hist. Background*, p. 26
"the canoe was rowed": Kahaulelio, "Fishing Lore," p. 53
"the canoe is paddled": Fornander, *Collection*, VI, p. 188
"A canoe that pulls seven": Corney, *Voyages*, p. 113
"was very easy": Kahaulelio, "Fishing Lore" p. 9
"the paddlers lost their": Kahaulelio, "Fishing Lore," p. 9
"The *malau* was two": Kahaulelio, "Fishing Lore," p. 10
"to swim about freely": Kahaulelio, "Fishing Lore," p. 13
"the single canoes did not": Kahaulelio, "Fishing Lore," p. 10
"because it involved": Kahaulelio, "Fishing Lore," p. 8
"Sometimes one canoe": Fornander, *Collection*, VI, p. 184
"can be seen a long": Nakuina, "Shark Fishing," p. 14
"if a glow in the water": Titcomb, *Native Use*, p. 107
"The common kind": Nakuina, "Shark Fishing," p. 14
"during the months": Kamakau, *Works*, p. 70
"some fishermen observed": Kahaulelio, "Fishing Lore," p. 17–18
"if one dreamt": Kahaulelio, "Fishing Lore," p. 48
"when the fishing canoes": Menzies, *Hawaii Nei*, p. 177

13 WAR

"you must have": Fornander, *Collection*, p. 34

Peleleu
"There were also a number": Townsend, *Diary*, p. 23
"monstrosities, not belonging": Emerson in Malo, p. 179
"*peleleu* canoes were large": Kamakau, *Ruling Chiefs*, p. 187
Kamehameha's canoe builders: Freycinet reports that at the time of Kamehameha's death, his son Liholiho still "had one hundred and seventy carpenters for canoe construction." *Freycinet*, p. 87
peleleu with rudder: N.B. Emerson, Kekahuna collection
"were excellent craft": Malo, *Hawaiian Antiquities*, p. 174
"Hilo had the largest *koa* trees": Emerson, Kekahuna collection
decked over portion: Malo, *Hawn. Antiquities*, p. 174
"So great was the size": Emerson, Kekahuna collection
numbers of warriors *peleleu* could carry: high load counts come from Fornander, N.B. Emerson, S.M. Kamakau and Inez Ashdown
88-foot-long *peleleu:* Emerson, Kekahuna collection
960 *peleleu:* Fornander, *Collection*, V, p. 690
800 *peleleu:* Kamakau, *Ruling Chiefs*, p. 187
"probably less than twenty": Emerson, Kekahuna collection
List of *peleleu:* compiled from Emerson Kekahuna collection; Malo; Kamakau
"Of the enormous size": Fornander, *Account*, p. 9
wiliwili vessel in Kamehameha's fleet: I'i, p. 105; Kamakau, p. 187; Emerson, Kekahuna collection
"the fleet of *Peleleu* arrived": Emerson, Kekahuna collection
"with the incoming of foreign methods": Emerson, Kekahuna collection
"less numerous than the outrigger": Hommon, "Inter-Island Channels," p. 156
"shown one of his large": Bell, "Log," p. 119
"it is credibly reported": Fornander, *Account*, p. 8–9

Fleets and Battles
"not at all uncommon": Fornander, *Account*, p. 281
"As soon as they decided": Fornander, *Collection*, vol. 5, p. 260
"the canoes on this expedition": Fornander, *Collection*, V, p. 376

"on this journey of Kamalalawalu's": Fornander, *Collection*, V, p. 442
"allowing for exaggeration": Fornander, *Collection*, V, p. 442
"According to Rickman": Hommon, "Inter-Island Channels," p. 156–157
1791 fleet: Ingraham, *Log*, p. 23
Kamehameha's reported threat: Ingraham, *Log*, p. 19
"most formidable army": C. Bishop, *Journal*, p. 141
"1500 war canoes": Boit, John, *Journal of a Voyage Round the Globe*, 16 October, 1795
16,000 warriors: Hommon, "Inter-Island Channels," p. 154
"In February, 1795": Kamakau, *Ruling Chiefs*, p. 171–172
"Towards midnight they put out": Kamakau, *Ruling Chiefs*, p. 173
"most of the decisive battles": Hommon, "Inter-Island Channels," p. 176
"sometimes they engaged in fleets": Ellis, *Narrative* p. 115
"When his forces and fleet": Hommon, "Inter-Island Channels," p. 177
"who were deprived of their lands": Kamakau, *Ruling Chiefs*, p. 78
"embarking their warriors": Kuykendall, *Hawaiian Kingdom*, p. 37
"immediately ordered the carpenter": Meares, *Voyage*, p. 25

Canoe Breakers
"and all were": Buck, *Arts & Crafts*, p. 281
"swung in the powerful grasp": Brigham, *Index*, p. 9
"pohaku wāwāhi wa'a": Pukui & Elbert, *Dictionary*, p. 309

14 RACING CANOES

"Ka'ena speeds along": Emerson, *Pele & Hiiaka*, p. 106
Tahitian experimental canoe: The second place Tahitian club (Maire Nui) always beat the winning club (Te Oropaa) both prior to and after that race, but that day in a Hawaiian canoe it was a distant second.
new specifications: In 1977 the Outrigger Canoe Club built a new, controversial Tahitian-influenced fiberglass canoe which they paddled to victory. This canoe was declared legal under the first specifications, but illegal under those subsequently developed.

Kialoa
descriptions and definitions: Compiled from Emerson, Kekahuna collection; Malo; Kamakau, *Works;* Judd; Pukui & Elbert; Andrews; Buck, *Arts & Crafts;* Degener; and Kalokuokamaile. Emerson also speaks of Kamehameha I, who "sailed away to Keeiiu, Kona, on a six paddled *kioloa*."
"if the canoe": Malo, *Hawn. Antiquities*, p. 292

Design
transitional design: Besides the possible western influences, other Pacific islanders, especially Tahitians, found their way to Hawai'i and could have influenced post-contact canoe designs.
"appear eminently calculated": Ellis, *Narrative*, p. 255–256

Historic Racing Canoes
the *Hanakeoki*: The *Hanakeoki* is still raced today, having been significantly modified to current racing proportions.
the *A*: Dowsett, "*A*," p. 1
criteria changed: Hawaii Canoe Racing Association
"open" division created: Hui Wa'a Surfing and Racing Association

15 CANOE RACING

"Then paddle fiercely": Luomala, *Maui*, p. 92
"There is always one wager": Fornander, *Collection*, p. 128
"The ancient Hawaiians": Malo, *Hawn. Antiquities*, p. 292
"Two or more canoes": Culin, *Hawn. Games*, p. 211
use of sail: Westervelt, "Honolulu Legends"
"gambling was common": I'i, *Fragments*, p. 67
"many people took the opportunity": Fornander, *Collection*, p. 128
"Betting became a pitfall": I'i, *Fragments*, p. 67
"We were made bold": Fornander, *Collection*, IV, p. 300

Early Regattas
"the captains of the whalers": Brown, p. 231
"Honolulu began to organize": Brown, p. 231
"aquatic events were held": Robertson, p. 6
"the regatta in the harbor": *Star-Bulletin*, 1 July–7 July, 1956
"it was during the King's": Robertson, p. 5
"even tiny skipjacks": Brown, p. 233
"fleet of various kinds": Robertson, p. 5
"At the 1879 regatta": Robertson, p. 6
"there is not enough life": Robertson, p. 6
"one of the very few": McKenzie, p. 9
"that a single powerful": Brown, p. 232
"the fortunes of rowing": McKenzie, p. 8

Sail Racing
"every native who could": *Forecast*, July 1952
"wind was poor": *Forecast*, July 1952
"each canoe carried a guest": *Forecast*, February 1953

Pre-Modern Racing
"to have been": *Forecast*, July 1952
"claimed to have been": Dowsett, "*A*," p. 1
"the *haole* crew": *Forecast*, July 1952
"that it was the superiority": Dowsett, "*A*," p. 1
"the *haoles* had": *Forecast*, September 1952
"that they could take": *Forecast*, September 1952
"to be limited to": *Forecast*, September 1952
"if we won we'd get": *Forecast*, September 1958
"in the olden days": *Forecast*, November 1952
"20,000 startled spectators": *Forecast*, September 1952
"Julian Yates' persistent": *Advertiser*, 24 August 1935
"the Hawaiian Jubilee's": *Forecast*, September 1952
"was that the Kona": *Advertiser*, 1 July–7 July 1956

Modern Racing
"various clubs competed": Haworth, "Surf Spray."
"it was apparent": Haworth, "Surf Spray."
"I remember people": *Advertiser*, 28 October, 1979
Perry's comments on weight: Haworth, "Surf Spray."
koa requirements: One experiment that was tried in order to get around the problem of not being able to obtain *koa* logs was building a laminated *koa* canoe. By this method a canoe is entirely formed of individual and easily obtainable blocks of *koa* wood, which are glued together and then taken down to the desired shape—really not a far cry from the plank type construction once seen in canoes throughout Oceania. Kamehameha Schools has one of these, built by Wright Bowman, Sr. and his son. The builders were able to greatly economize on wood by this method, but there were some problems in construction techniques and they prefer building from logs. The HCRA rules say that a laminated *koa* canoe does not qualify to race in the *koa* class, and thus we have probably seen the last of this type of canoe.
HCRA: In the reorganization of the association, the HCRA has become the Oahu Hawaiian Canoe Racing Association (OHCRA).

The Moloka'i–O'ahu Race
"some of their fellow": *Forecast*, November 1952
"under the worst": *Forecast*, November 1952
"sang the 'Hukilau'": *Forecast*, November 1952
"stouthearted older men": *Forecast*, November 1952

Strokes and Strategies
Tahitian stroke: Costa, *Honolulu*, p. 20

16 PETROGLYPHS

"On a Lava plate": N.B. Emerson, *Unwritten Literature*, p. 194
"the canoe petroglyphs": Hommon, "Site Survey," p. 2
"the occurrence of these": Hommon, "Site Survey," p. 2
"many pictures of men": Cox & Stasack, *Hawn. Petroglyphs*, p. 65

17 BURIAL CANOES

"Draw hither": Buck, *Vikings*, p. 282
Burial canoes: Pukui and Elbert note "*Kani ka papa wa'a*, the canoe floor sounds—a poetic expression applied to aged persons just before death as the dead were sometimes laid in canoes which were placed in burial caves." *Pukui & Elbert*, 1965, p. 119.
"towards evening we examined": Ellis, *Narrative*, p. 104
"in former days": Fornander, *Collection*, V, p. 570
"In very ancient times": Kamakau, *Thrum*, 1932, p. 105
"sometimes the bodies": Westervelt, "Burial Caves," p. 149
"their sides which were": Emerson, Kekahuna collection
"a large burial cave": W. Bennett, *Kauai*, p. 100
"at his death": Thrum, "*Heiau* Sites," p. 42
"canoes cut in half": Buck, *Arts & Crafts*, p. 569
"most of the caves": W. Bennett, *Kauai*, p. 26
"has persisted until rather": W. Bennett, *Kauai*, p. 27
"such caves were used": Barrera, p. 111
family caves: Ellis in his *Narrative*, p. 270, states that "sometimes the inhabitants of a village deposited their dead in one large cavern, but in general each family had a distinct sepulchral cave."
"within the caves": Buck, *Arts & Crafts*, p. 573
"the canoe-hull segments": Kirch, *Marine Exploitation*, p. 145
classic prehistoric features: observations by Bishop Museum personnel
"the hull segments": Kirch, *Marine Exploitation*, p. 145
repairing cracked hulls: Degener, *Plants*, p. 75; Kirch, *Marine Exploitation*, p. 148

REFERENCE SECTION

Three Board Canoes

"after the advent of the white man": Judd, "Woodcraft," p. 259
"there are no longer koa canoes": Kuda, "Tramping"

Wa'a to Vat

"kind of ingenuity necessity": Whitman, *Account*, p. 52
"is put into a pit": Campbell, *Voyage*, p. 185
"they had procured an iron pot": Whitman, *Account*, p. 36–37
"it is by no means harsh": Campbell, *Voyage*, p. 186
"to our great regret": Ellis, *Narrative*, p. 196

Tahitian Canoe Racing

"canoe races were not": Moerenhout, *Voyages*, p. 144–145
Tahitian canoe racing: much of the history was gleaned from informants Tutaha Salmon and Gerard Cowan
"sailing canoes have been": Haddon & Hornell, *Canoes*, p. 105
"of going twelve": Haddon & Hornell, *Canoes*, p. 126
"at the present time": Haddon & Hornell, *Canoes*, p. 105

Chapter Additions—Second Edition

The first edition of this book was published in 1981. This second edition is a reprint of the original, with new material supplementing the original text. This new material is on the following pages and is organized to correspond to chapters in the original text. Additionally, the sections on Moloka'i-O'ahu Race Results and Koa Racing Canoes in the Reference Section have been updated. Lastly, two new sections—The Canoe in Oral Traditions and Competitive Paddling Notes—have been added to the Reference Section.

"UNCOMMON HERITAGE"

Origins

Sailing East

Captain Cook, while impressed by the seaworthiness of Polynesian canoes and the Polynesian's ability to navigate without instruments, had some doubts about whether Polynesian canoes could sail directly into the prevailing tradewinds. And yet, based primarily upon the similarity of Pacific Islanders' customs and linguistic evidence, Cook sensed that Polynesians had somehow worked their way eastward across the Pacific. So he asked Tupa'ia, his primary informant in Tahiti, about the matter and got a quick response. "Tupia tells us that during the Months of Novr [November] Decembr [December] and January Westerly Winds with rain prevail & as the inhabitants of the Islands know very well how to make proper use of the winds there will no difficulty arise in Trading or sailing from Island to Islands even tho' they lay in an East & West direction." This was the first recorded indication that Polynesians knew full well about the problems of sailing west to east across Polynesia.

But not until 1986, more than 200 years after Tupa'ia's discussion with Cook, did the *Hōkūle'a* undeniably corroborate Tupa'ia's words. Setting sail on July 7 from Ofu in American Samoa, the *Hōkūle'a* arrived eight and a half days later in Aitutaki in the Cook Islands, 650 miles east-southeast of Ofu. Navigator Nainoa Thompson had successfully exploited a combination of episodic westerlies and tradewinds to forever lay to rest the question about Polynesians sailing into the trades and settling eastern Polynesia from western Polynesia. Extensive research by Nainoa Thompson, Ben Finney, and others, among them meteorologists, revealed that when sailing from west to east, it wasn't so much a matter of rashly "sailing into the prevailing tradewinds," something a western mindset would expect, as it was patiently waiting for episodic westerly winds.

A double-hull canoe such as the *Hōkūle'a* can sail to windward, but typically not much better than 75 degrees off the wind. This modest windward ability makes possible voyages such as from Hawai'i to Tahiti, which involve sailing only slightly into the tradewinds. For a canoe like *Hōkūle'a* to sail directly into the tradewinds, it would have to tack almost four miles for every mile made directly to windward. Thus in the case of the 1,200-mile east-southeast voyage from Samoa to Tahiti, such a canoe would have to sail some 4,800 miles—or more if there were contrary currents. While long voyages directly into the trades might have been possible, it is unlikely that they occurred. The wear and tear on people, plants, animals, and canoe under such sailing conditions would have been extreme and debilitating, not to mention the limited amounts of water and provisions that could be carried.

Polynesians were by all accounts accomplished weather forecasters. They knew that the tradewinds of the South Pacific do not blow unceasingly. Though relatively steady, the trades are regularly interrupted during the Austral summer, particularly in the western part of the South Pacific, by monsoonal-generated westerlies, occasionally even extending into the eastern Pacific. More recently, meteorologists have learned that during years of El Niño, such westerlies become even more common, sometimes blowing for weeks at a time. And, even during the Austral winter, when the trades blow steadiest, there are occasional, if irregular, periods of westerlies. It fact it was during the Austral winter that Nainoa Thompson chose to sail from Samoa for the Cook Islands, opting for the less frequent winter westerlies in order to escape the storms and bad weather that often accompany the summer westerlies.

The colonizing Polynesians, supremely accomplished sailors and navigators, almost surely would have waited for dependable though irregular westerly winds to undertake their exploration of the eastern Pacific. If after a time, worse came to worse and the westerlies ceased and did not return before land was reached, they could turn around, sail back with the trades, and try again.

Voyaging

Hōkūle'a

The canoe, once the most important artifact in Hawaiian and all Oceanic cultures, has returned. The *Hōkūle'a*, a dynamic, living vessel, has literally and spiritually enabled the Hawaiian people to recapture their past while serving as a wayfinder into the future. This canoe is frequently seen as the dominant cultural symbol not only in Hawai'i but in all of Polynesia.

At this writing, the *Hōkūle'a* has sailed more than 36,000 miles and directly touched and enriched the lives of tens of thousands of people. It has established the voyaging canoe as an eminently seaworthy craft, demonstrated that Polynesians could have sailed from west to east with relative ease, and conclusively proven that non-instrument navigation can

Nainoa Thompson, *the first Hawaiian to practice the art of non-instrument navigation in several hundred years, has been the primary leader in the ongoing voyages of the Hōkūleʻa, and the activities of the Polynesian Voyaging Society.*

be as effective as conventional western-style navigation. And the four successful round-trip voyages of the *Hōkūleʻa* between Hawaiʻi and Tahiti suggest that one must take more seriously the voyaging traditions of Moʻikeha and Paʻao, who according to legend sailed between Hawaiʻi and Tahiti in the early centuries of this millennium.

In 1980, for the first time since those legendary 12th and 13th century voyages of Moʻikeha and Paʻao, a Polynesian, Nainoa Thompson, after years of study and practice, navigated a voyaging canoe without benefit of western instruments on a round trip between Hawaiʻi and Tahiti. Not only had he successfully navigated the canoe, but he had shown Hawaiians that with discipline, integrity, and love a contemporary Hawaiian could rejoin, functionally and spiritually, the primal core of Hawaiian culture. Nainoa Thompson, probably more than any Hawaiian since Kamehameha I, has galvanized and inspirited the Hawaiian people, and he has done it so modestly by his ability, in the words of an old adage, "to teach as a learner, to lead as a follower."

So inspirational was the 1980 Hawaiʻi–Tahiti–Hawaiʻi voyage that from 1985 to1987 the Voyage of Rediscovery was undertaken, the most ambitious expedition to date. This two-year, 12,000-mile voyage, more than previous ones, combined scientific and cultural rediscovery. In July 1985 the *Hōkūleʻa* left Hawaiʻi for the Society Islands, sailing first to Tahiti and then to Raʻiatea and Borabora. From there it sailed with the trades to Raratonga in the Cook Islands. The *Hōkūleʻa* left Raratonga on November 21, 1985, for the sixteen and a half day, 1,650-mile voyage to Aotearoa (the modern Maori name for New Zealand). After spending the winter in Aotearoa, the *Hōkūleʻa* sailed north to Tonga and Samoa. On July 7, 1986, the canoe left Ofu, Samoa, for the Cook Islands, landing eight and a half days later in Aitutaki, 650 miles east-southeast of Ofu and 140 miles north of Raratonga. From Aitutaki the canoe sailed again for Raratonga, and from there it departed on August 12 for Tahiti. After nine particularly rough days at sea, the canoe reached Tahiti. As mentioned earlier, this crossing "into the prevailing trades" from Samoa to Tahiti, via the Cook Islands, was of considerable importance, as it demonstrably proved the accessibility by canoe of eastern Polynesia from western Polynesia.

After a long rest in Tahiti the *Hōkūleʻa* left for Rangiroa where it anchored for 20 days hoping that the weather would clear and enable it to visit the Marquesas on its way back to Hawaiʻi. This was not to be, for the canoe was expected back in Hawaiʻi to play a key part in the "Year of the Hawaiian" celebrations. On April 24, 1987, the *Hōkūleʻa* departed Rangiroa for Hawaiʻi on what was to be one of its most difficult legs, supremely challenging Nainoa Thompson's navigational skills. Thompson relates that "By far this is the strangest trip in terms of being so against the average. ... To me, it is the biggest challenge I have ever faced, for a number of reasons. One is the length of the trip; it is the longest voyage so far. Two is the weather: the weather has been so unpredictable that you can't stay on a regular sail plan. Three is that we have had to sail perpendicular to our course line so many times. So, given all that ... [it] is going to be real interesting to see exactly where we end up." Despite those difficulties and the inclement weather, the canoe arrived windward of the islands as planned, reached Hilo 28 days after leaving the South Pacific, and then turned downwind to Kualoa, Oʻahu, to complete the Voyage of Rediscovery.

The fourth major voyage of the *Hōkūleʻa*, dedicated to teaching the people of Hawaiʻi, especially school children, about voyaging traditions and to training a new generation of navigators, sailors, and cultural practitioners, left Hawaiʻi on June 17, 1992. It arrived in Tahiti in a record 29 days. At this writing the canoe is still in Tahiti and departure for Huahine and Raiatea is scheduled for September. In Raiatea, at the *marae* Taputapuatea, is planned a "Gathering of the Navigators," a ceremony honoring navigators from throughout Oceania who are knowledgeable in or relearning the ancient art of wayfinding. From there the canoe will sail to Mauke, and Aitutaki on its way to Raratonga in the Cook Islands for the Festival of Pacific Arts, the theme of which is voyaging. From the Cook Islands, the *Hōkūleʻa* plans to return straight to Hawaiʻi in October.

Another voyaging canoe, the *Hawaiʻi Loa*, is currently under construction. Inspired by the *Hōkūleʻa*, it is distinguished in main part by its being made entirely from natural materials. Its hulls are being carved from single logs; its sails are being made from plaited *hala* and its rigging from natural fibers, primarily sennit. The *Hawaiʻi Loa* will sail in 1994 from the Marquesas to Hawaiʻi, retracing what is generally accepted as the route of the Polynesians that would become the first Hawaiians. Ironically that crossing has not yet been made by the *Hōkūleʻa* on any of its voyages.

Nainoa Thompson sums up the voyages of *Hōkūleʻa*: "I view the last three voyages as segments of recovering our voyaging tradition through research and testing." Of the fourth voyage he comments that "we need to keep working at it to continue to keep the culture alive. I see education as the avenue for cultural survival. ... This canoe is our way of understanding the people of old."

Indeed the *Hōkūleʻa* is the most powerful reminder to the Hawaiian people that their roots are of the epic proportions maintained for so long by chants and traditions. For many Hawaiians the *Hōkūleʻa* has been a medium for reintegrating, the first step in life's longest voyage—the quest to know oneself.

This kiʻi (carved image) on the stern of the *Hōkūleʻa guards the canoe from mishap and misfortune on its voyages.*

"FROM FOREST TO SEA"

Materials

Koa

In old Hawai'i, basic survival required a profound understanding of the ways of nature, both animate and inanimate. With few exceptions, Hawaiians lived in harmony with nature and held deep respect for her bounty. In a Hawaiian's eyes, all forest plants belonged first to the gods, typically Kū and Hina (representing male virility and female fecundity), and secondly to their earthly incarnations, the *ali'i*.

No tree in the forest could be cut without first petitioning the gods; next permission had to be obtained from the appropriate chief, or *ali'i*. Samuel Kamakau notes that *koa* forests in each *ahupua'a* were the property of a chief and could not even be visited, much less harvested from, unless one had been authorized to do so. Sections of interior forest, especially above Kona on the island of Hawai'i, were marked as *kapu*, serving notice that only those authorized by their rank could intrude. Russ Apple notes that "This 'invisible stockade' to mark a specially tabooed area, perhaps to protect trees selected for canoe or temple timber, was indicated as taboo with white flags secured to poles in the forest, and seen by [Capt.] Cook's officers in 1779."

Apple hypothesizes that "the prehistoric and protohistoric Hawaiians tabooed these two abundant forest trees [*'ōhi'a lehua* and *koa*] for the survival and convenience of their ruling class. ... By 1778, to Hawaiians, standing adult *lehua* and *koa* trees, and products made from them, were for the exclusive use of the chiefs." He goes on to say that ruling chiefs kept certain timber-rich *ahupua'a* for their own, though "This did not preclude a high chief from furnishing a ruling chief with a prized standing koa tree from his assigned ahupua'a on a gift or tax payment basis."

Apple feels that given their great prestige and status, as well as their control of land and resources, it was not surprising that the highest Hawaiian chiefs owned the largest canoes. Chiefs of lesser rank, who controlled lesser land areas with fewer or poorer resources, Apple surmises, would have owned proportionately smaller canoes, on down to the working canoes of the fishermen.

Other Woods

Isabella Abbott, a well-known ethnobotanist at the University of Hawaii, has recently published *Lā'au Hawai'i*, in which she writes that "I have found that all the hulls [at the Bishop Museum] were made from koa except one, made from *milo* (the Portia tree, *Thespesia populnea*), a Polynesian-introduced species that, like *koa*, attains great size." This is the only reference to a *milo* canoe of which the author is aware. If canoes were ever made out of *milo*, they would have been extremely rare, for milo rarely attains the height and girth necessary to make even a small canoe. Furthermore, *milo* is highly prone to rotting out in the middle of its trunk.

Russ Apple provides another interesting reference to other woods used for canoes. He reports that "In late historic times, canoes were made from koa as usual but also from the introduced silver oak (*Grevillea robusta*); and in modern times, from these as well as from marine plywood and/or fiberglass."

In a recently published book, *Ni'ihau, The Traditions of a Hawaiian Island,* authors Rerioterai Tava and Moses Keale, Sr., note that "The Niihauans also had a special canoe of a single log polished to a sleek shine. Many of these were sixty feet long, 4½ feet wide, and usually made of pine or redwood." As mentioned in the original text, drift logs from the Pacific Northwest were more commonly found on the shores of Ni'ihau and Kaua'i than any other island.

Tools

The Adze

Noted Hawaiian historian Samuel Kamakau, in an account written for the Hawaiian language newspaper *Ke Au Okoa* of December 9, 1869, indicates that there was an adze quarry at Lae-o-Kalā'au on the island of Moloka'i. Lae-o-Kalā'au, on Lā'au Point, today holds particular interest, for it is at this current-swept Point that paddlers in the annual Moloka'i–O'ahu Canoe Race can make their first change. In the article Kamakau goes on to state that "Hameku and 'Olopu, were the names of the adzes of Hawaii's people before in the very ancient time, and Makilihoahoaaikalani was the large blade/chisel that the canoe(s) were scooped out with, it was also iron." Kamakau also mentions that the shell known as *pūpū makaloa* (a shellfish with long, sharp edges) was "made into an adze ... to groove/strip wood to assemble the canoe." Other early writers also noted the use of "shell adzes," for shaping *ama* of the soft *wiliwili* wood.

Canoe Building

Canoe *Heiau*

Given that the canoe was the most important artifact in Hawaiian culture, that Hawaiian canoes once numbered in the thousands, and that virtually every stage of canoe building and all manner of canoe-related activities were steeped in religious practices and ceremonies, it seems odd that there were found so few canoe-related *heiau* or other canoe-related religious structures. Many other aspects of Hawaiian life, from adze-making to fishing, from agriculture to astronomy, had *heiau* dedicated to them, so why not canoe making and canoeing?

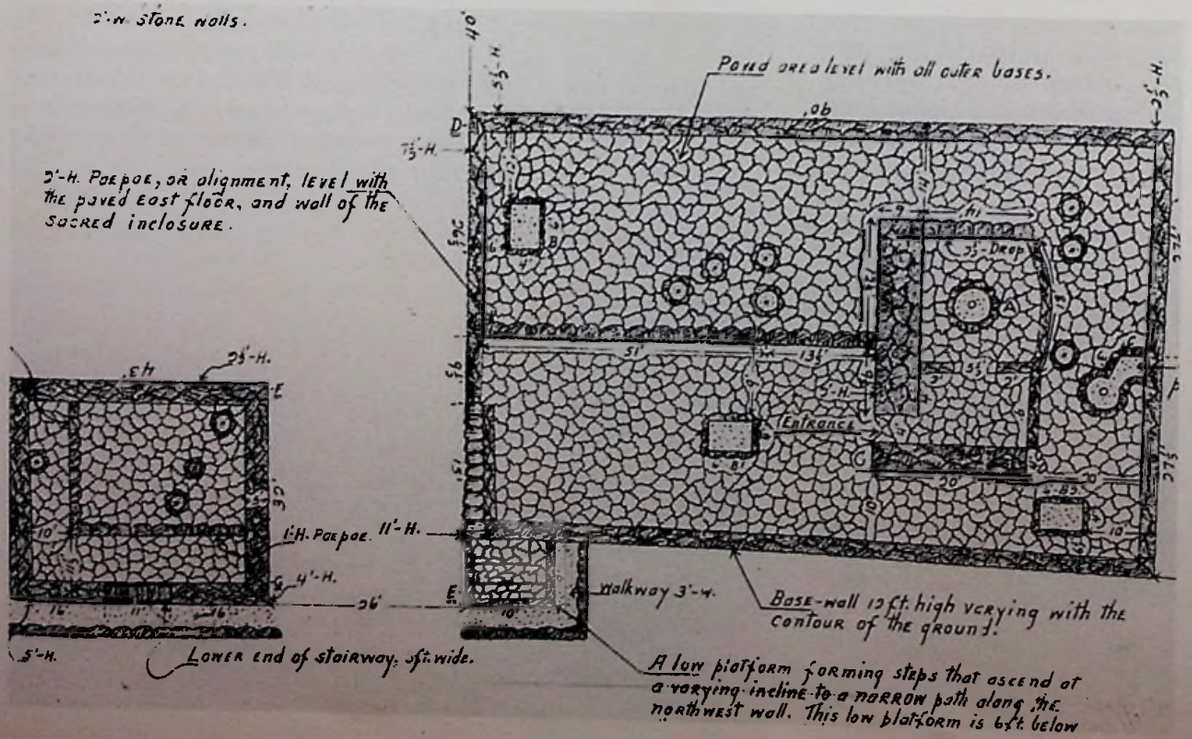
In fact, the author has recently uncovered an obscure but important reference to a *heiau* dedicated to canoe building on the island of Hawai'i. The *heiau*, known as Kealakōwa'a, or sometimes mistakenly as Halehau, was mapped and described in 1953 by Henry Kekahuna, a well-known Hawaiian historian, who conducted interviews with informants in Hawaiian as well as in English. His descriptions are generally considered quite accurate and reliable. Kealakōwa'a *heiau* is located in Kahalu'u, North Kona, on Kuakini Highway, about two and a half miles from the center of Kailua-Kona and about a mile and a half from shore. Kekahuna describes it as follows: "This *heiau*, which includes two other *heiau* structures, is said to have been built by King 'Umi for the performing of canoe-making ceremonies. *Koa* trees were cut in the forest lands of Ka-ala-pu'ali a little over a mile below Piha-pono, where King 'Umi lived while engaged in certain projects, Ka-'opapa-wai, Pu'u-lālāla'au, Hana-paila, and others. Large *koa* trees grew abundantly in olden days from Ka-ala-pu'ali down to the end of the forest belt.

"The old canoe-hauling road, known as Ke-ala-kō-wa'a commenced at Piha-pono, descended just south of the present Holua-loa Post Office and about 100 ft. south of Ke-ala-kō-wa'a Heiau, and ended at the shore by the spring of Pu'u (between the Seymour and Hind properties), where canoes were launched in the surf named Ka Nalu o Pu'u (The Wave of Pu'u).

"Through an error this *heiau* was recently recorded as Hale-hau. The destroyed *heiau* of this name was situated about 250 ft. above, and slightly south of Ke-ala-kō-wa'a Heiau, on the seaward side of the recently abandoned government road.

"The floor areas, now much disturbed, are paved with large and medium sized rocks, and are level with the outer bases. There are four idol-holes in the east floor and three in the south floor. ... [There] was the sacred inclosure where the main deity stood. Only the high priest and chief could enter to perform ceremonial rituals.... Three graves, probably of outstanding priest who were deified ... [and] mound of stones 2'-H. X 4'-W. X 20' L., where offerings were placed."

Kealakōwa'a, about 55 feet wide and 90 feet long, is part of a complex of other important sites that Kekahuna also described. Immediately



Lying a couple of miles south of Kailua-Kona, *the canoe heiau, Kealakōwa'a* **(top)** *can be viewed off of Kuakini Highway next to the Kona Outdoor Circle building.*

The only known canoe heiau, *Kealakōwa'a, to the right of the smaller astronomical heiau, Kilolani. This 1953 sketch by Henry Kekahuna enables one to understand the layout and construction of this structure.*

adjacent are the astronomical *heiau*, Kilolani, and the unnamed "*heiau* of the High Priest." Just a few more feet away is the "House Foundation of the High Priest" *(Kahuahale o ke Kahunapo'o)*, and the "House Foundation Where Seers and Chiefs Held Their Council" *(Ke Kahuahale e Hālāwai ai na Makāula a me na Ali'i)*.

Of particular interest with respect to this last "House Foundation Where Seers and Chiefs Held Their Council" is Note C in Kekahuna's description of this site. He writes, "floor slightly lower than B, paved level with the outer bases with medium-sized 'a'a rocks, with a mound on the north side, one idol-hole on the northeast side, and one on the south side. An open shed stood here, in which were placed models of canoes or other intended projects of construction."

While no reference to the use of a canoe model in construction of a canoe has been seen before, the reader is reminded that Kekahuna was well educated, fluent in Hawaiian, extremely knowledgeable about Hawaiian archaeological sites, and, most importantly, trusted by his informants. His facts and information have rarely been questioned. Thus his "canoe model" reference is likely authentic, and would seem to be consistent with the function of Kealakōwa'a and the other associated sites.

Hauling

Probably no aspect of canoe building in pre-historic times is more underestimated than the task of hauling a rough-hewn canoe log from the forest to the sea. Several additional accounts of canoe hauling, including two written by Hawaiians in the Hawaiian language during the mid to late 1800's, have been found, which shed more light on this unimaginably arduous and dangerous work.

In 1833, missionary Lorenzo Lyons, referred in his journal to a monumental canoe hauling event on the island of Hawai'i: "Most of the people have gone to the mountains after canoes, and will be gone 2 or 3 weeks. Hence we are rather lonely. The Governor must be obeyed whatever else must suffer. A thousand people will probably be employed in drawing five large and heavy canoes from Mauna Kea, to somewhere near the shore, a great work. The man who refuses to engage in it is to have his house burned down." This account documents that as late as the 1830's large-scale canoe building was apparently still going on, at least for the chiefs. And, while the penalty for failure to show up for canoe hauling duty didn't appear to have been as severe as it would have been in pre-contact times, the burning of one's house for being a no-show indicates that chiefs still wielded considerable power.

Two references translated from Hawaiian, one from Samuel Kamakau that was written for the Hawaiian newspaper *Ke Au 'Oko'a* in 1869, and the other from Polani, an informant who probably wrote about the same time for the same newspaper, provide some interesting new details about canoe hauling. Both passages are quoted in their entirety, beginning with the one from Kamakau:

"Men and women when they go inland for the hauling of the canoe, come also hauling very large pigs for ceremony; the day of dragging the large canoe is a celebrated one, and also a festive day indeed. The *pu* [canoe endpieces both fore and aft] of the canoe were kept at a distance by those people learned in protecting it from obstacles, the rocks, the trees, the boggy areas, rock crevices, high cliffs, gaps in the path of travel, steep climbing that must be done slowly; in many of the dangers and problems faced the skill of those who are guarding the canoe is seen like that of the birds soaring high in the sky. If the rope hauling the canoe is severed, and the canoe goes over the cliff it is thought that the canoe will be smashed to little bits; the 'canoe defenders' will be known by their skill in competently traversing the cliffs, and there will be the *pale wa'a* [canoe defender] at the canoe endpiece, where he is perched like a bird.

"And when the 'canoe defender' sees that they are nearing a deep ravine or a very high cliff, the 'canoe defender' positions the canoe until it is secured against his knees and rocks it until it is secured by the hauling rope, this is what the 'canoe defender' is an expert at. Another requirement is that the *kahuna* first appeal to the god and ancestral gods; the canoe that is not prepared in that way, disaster is the result; and if disaster is not met on land, it will be met at sea, as unfortunate accidents. When the canoe reached a flat area, the canoe hauling procession was organized, arranged on each side of the rope, from the front piece of the canoe to the end.

"Then, it is there that the skilled people will inspire by chant, uplifting the dreary mood and thoughts return of carrying out the heavy task, and to bring [everyone] together in carrying out this task as if it were being done by one man, united in spirit as one until the canoe reaches the shore and is put into the canoe shed."

The following is the passage from Polani:

"When it's time to haul the canoe, if it is a canoe for the chiefly class, everyone is commanded, the men, the women and even the children. Pig, dog, fish, and taro is brought upland on the day for hauling. Everyone eats until they are satisfied, then the hauling begins, when the friendly socializing is laid aside. The men are in front of the procession, then the women, then the children, and in the back at the *'umi'umi* are some people. Upon the dragging of the canoe, the inspirator calls out. Pulling as he calls out in song. And that's the way it continues until the canoe emerges at the sea.

"Those who protect, these are some people who are necessary when the canoe reaches a very high cliff where tropic birds fly, a place where those who are dragging the canoe can haul no longer. 'Those who protect' are a very intelligent group of people, and proficient in their profession at observing. A cliff is nothing to them when the canoe arrives at one. If it's 50 fathoms, or 100 fathoms in height, then the intelligence of the 'protectors' will be seen. There are two 'protectors' in front and 1 behind along the side, turning the canoe here and there, until the canoe is turned around, and that is how they turn it around together.

"If it is thought that the canoe will be stuck, they will place their knee on a rock protruberance in the cliff and it is secured. And that is how it is done until the canoe is down. Then the hauling starts again until the canoe emerges at sea, and enters into the canoe shed.

"Canoe hauling of long ago was a lot of fun for the men, women, and children of these eras.

"Within the profession of canoe carving of ancient times, the help from the *'aumakua* in the passing of the canoe through the air along the cliff without being smashed to bits or harmed was clear to everyone."

A last account was recorded by Theodore Kelsey from Hawaiian-speaking informants but was written in English: "Get together the hauling ropes—3 for a small canoe—4 or 5 for a large one. 30 or 40 feet long from *makuu* [knob-like projection at end of the canoe]. A man called a *ka'ili* or *pale waa*, with a short rope about 2 fathoms long—at the *makuu*. His work is to keep the canoe straight while those ahead haul. One man called a *pale waa* not a *ka'ili waa* goes behind. His work is to keep the canoe upright and see everything in order goes right.

"Then the *ka'ili waa* calls out to man behind, *'Kupono mai ka waha o ka waa!'* The man behind then sees that the mouth is straight up. Those ahead now pull. If the *ka'ili waa* sees a dangerous slope *(ihona pali) 'Hoohuli 'ao'ao ka waa.'* The man behind then goes to the side and moves

the stern with his arms. He grasps the edges of the canoe and turns it upright. Taken to *halau*. A large *halau* would have 3 or 4 canoes inside."

It is interesting that the accounts here differ slightly from each other, as do those cited in the original text. Of particular note is how the accounts by Kamakau and Polani speak of using one's knee to gain leverage when a canoe is being maneuvered over a cliff or difficult area, while in Kelsey's account, with a canoe in the same situation, one manhandles the stern of the canoe with one's arms.

Another early account, which involved hauling a log for a mast rather than a canoe, is found in the journal of Isaac Iselin, who visited Hawai'i in 1807. He wrote that he "Went to see the process of getting down the timber for the ship's mast; about three hundred people are dragging it with ropes, from a distance of six to eight miles down steep mountains, over gullies, rocks, and most rugged ground. They are preceded and attended by priests, who utter prayers and songs to help the work. It is altogether a curious sight." While in this instance a solid log, probably of *'ōhi'a*, was being hauled, the hauling process was virtually the same as for a canoe.

Some twenty years later the Reverend Hiram Bingham witnessed another hauling episode. His account described an attempt to salvage the wreck of *Cleopatra's Barge* (or *Ha'aheo 'O Hawai'i*), the private yacht of Kamehameha II, and his description affords an unusually powerful first-hand insight into the dynamics of hauling. Bingham writes "This furnished one of the best specimens of the physical force of the people, which I ever had opportunity to observe for more than twenty years among them—indeed the most striking which I ever saw made by unaided human muscles. They collected from the woods and margins of the river, a large quantity of the bark of the hibiscus *[hau]*, and with their hands without any machinery, made several thousand yards of strong rope, such as is in common use at the islands. Twelve folds of this they made into a cable. Three cables of this kind they prepared for the purpose of dragging up the wreck of the *Cleopatra's Barge* on shore.

"These three cables were then attached to the mainmast of the brig, a few feet above the deck, leading some distance on the shore towards the mountains, nearly parallel to each other. At the sides of these the multitude were arranged as closely as they could conveniently sit or stand together ... the old chieftain, with the natural tones and inflections, instructed them to grasp the ropes firmly, rise together at the signal, and leaning inland, to look and draw straight forward, without looking backwards towards the vessel....

"A man called a *kaukau*, son of a distinguished *kaukau*, whose office it was to rehearse for the encouragement of the drawers, an ancient and popular song, used when a tree for a canoe was to be drawn from the mountains to the shore, rose, and with great rapidity and surprising fluency, commencing with an address to Lono, an ancient god, rehearsed the mythological song....

"The multitude quietly listened some six or eight minutes, at a particular turn or passage in the song indicating the order to march, rose together, and as the song continued with increasing volubility and force, slowly moved forward in silence; and all leaning from the shore, strained their huge ropes, tugging together to heave up the vessel."

Canoe logs apparently were harvested with less and less ritual as the missionary influence grew and new generations went into the forest. In a personal communication with William Thompson, retired ranch manager for McCandless Ranch, Russ Apple reports that "About 1920, mules were first used in Kona, Island of Hawaii, to haul logs down to the shore for canoe making. This labor saving device was substituted for large gangs of ranch hands who had previously spent several days hauling down one log. Two mules did the job in less than a day."

Finishing

Theodore Kelsey, in his unpublished notes on canoe building, provides an unusual reference to finishing a canoe: "When the hull is of proper thickness the canoe is smoothed. First rough *pahoehoe* [lava] is used, then *pohaku ako'ako'a* [coral], then *ana* [pumice], then *lau ulu* [breadfruit leaves] for sand-paper, then *lau ohe* to finish." It is the use of *lau 'ohe*, bamboo leaves, that is of particular interest. With a texture like the finest emery paper, bamboo leaves would have served to buff out the finest scratches, giving the hull a smooth and polished look.

How long did it take Hawaiian canoe builders of old, with their stone, shell, and coral tools, to build a canoe? The answer depends, of course, on how big the canoe was, and how many canoe builders and assistants were working it. Freycinet, who visited Hawai'i in 1819, wrote that "at the time of his father's death Riorio [Liholiho] had one hundred and seventy carpenters for canoe construction." With this many canoe builders working at one time, construction time would have been cut drastically on even the largest canoe. John Whitman, visiting Hawai'i from 1813 to 1815, writes that "The making of a first rate canoe was formerly the work of two or three years." Taking into account the time it took for a green log to cure properly, one to two years, it indeed would have taken that long to make a canoe, no matter how many canoe builders were employed. When a canoe was not being built for a chief or for royalty, typically only one or a couple of canoe builders and assistants worked on it. A single canoe builder and his assistant, working full-time, might have taken six months to a year, depending on the canoe's size, to complete the job. Only a chief or royalty had the power to conscript, or the wealth to support, more than a couple of canoe builders and assistants.

Where were most canoes built? French navigator Auguste Duhaut-Cilly, visiting Hawai'i in 1828, provided an unequivocal reference to the location of most canoe building activity, one which agrees with most other accounts. He noted that "These dug-out canoes are for the most part remarkable for the perfection of the craftsmanship, and must cost the islanders much time and effort. They are not built on Wahou [O'ahu] and all come from Ovaihi [Hawai'i], where large trees are much commoner."

Dutch navigator Jacobus Boelen, who as it happened was visiting Hawai'i the same year as Duhaut-Cilly, provides a quite different picture, however, noting that while on Kaua'i he visited "Quequaheva's [Kaikioewa, governor of Kaua'i] shipyard, which consisted of large sheds where the largest and most beautiful canoes that can be found in the islands were made. We were assured that the island of Atooi [Kaua'i] had always been the principal workshop of the islands in these matters." Somebody must have been misleading Captain Boelen, for while a canoe building industry did exist on Kaua'i, it never approached in size that on the island of Hawai'i, or even that on Maui. One has to wonder just how much and how often Westerners visiting Hawai'i during the late 1700's and early 1800's may have been given less than accurate information.

Painting

Pā'ele, the black compound that Hawaiians used to paint and preserve their hulls was, as noted in the original text, by all accounts extremely effective. Its color-fast properties were exceptional; some reports claimed that the original painting of the hull lasted the life of the canoe. More likely the hull was occasionally repainted. Kelsey provides the only reference to the number of coats applied: "The canoe might be

Filling the seams and cracks of canoes *was sometimes accomplished using the pounded leaves of the hi'aloa plant.*

stained *(paele)* with two or three coats." Hawaiian informant Polani implies that *pā'ele* dried fairly quickly, noting that after the ingredients were mixed, the *pā'ele* was "ready to be spread until its hard." Testimony to the enduring qualities of *pā'ele* as a hull preservative is found in European accounts of its use on canoes through the 1820's, after forty years of exposure to western materials. Apparently, none were as efficacious as *pā'ele.*

Patching

As mentioned in the original text, canoes were extremely valuable possessions and were always well maintained. They were patched until such time as they were simply beyond repair or were rendered unseaworthy. Sewing a crack together was not the only method used for mending a crack to extend a canoe's life. In her classic 1885 volume, *Indigenous Flowers of the Hawaiian Islands*, Isabella Sinclair reports that *hi'aloa (Waltheria americana)* was a plant that "contains a great quantity of gluten, which the natives turned to account in their primitive days, using the pounded leaves for filling the seams and cracks of their canoes." While no other account of such a practice is known, Sinclair was a highly regarded amateur botanist and historian. Such a practice would not be unlike the contemporary use of wood putty to fill the cracks that frequently occur in *koa* canoe hulls.

Consecration

An article attributed to Kalokuokamaile, the famous canoe builder from Kona, states that "The *ailolo* ceremonies [canoe consecration] of the *kahunas* are not all alike. ... If a canoe has had no ceremony performed for it on shore, it can be performed at sea. That is, a *hawae* sea urchin is used. If a *hawae-pohina* (gray-headed *hawae*) is found, all the better. It will be as the name of this sea urchin implies, gray-headed, so will the canoe be gray with age without breaking. Another thing for the *lolo* ceremony in the sea is a *hinalea* fish. That is all I know of for the ceremony in the sea."

Samuel Kamakau, in a December 9, 1869, article in the Hawaiian newspaper *Ke Au Okoa*, recounts another variation on the canoe consecration ceremonies: "a pig and a dog were the sacrificial offering of the canoe, and sweet potato and taro was the food. The pig is the one that roots the ocean; and the dog, the canoe is similar to a dog snapping viciously at the billows of the ocean." Though the use of a pig in a canoe consecration ceremony was apparently almost universal, the reference to a dog as part of the ceremony is unusual, as is the metaphor explaining its use. Later in the same article Kamakau states that "if the *kahuna* conducts the *lolo* ceremony and there was a mistake, then the *kahuna* tells the owner of the canoe to trade the canoe to someone else. The following morning, then the new canoe is launched in the sea and sails into the deep ocean, and meets up with the fleet of fishing canoes and get the most recent fish caught from that canoe fleet. Then it returns agains and beaches; that fish is then offered with prayer for the new canoe, and *limu kala* is obtained and taken to the altar where it is placed (as a *lei*) on the shrine. This is the end of building the canoe." Neither the practice of meeting up with a fleet of canoes and bringing their "most recent" fish caught back to the altar, nor the specific reference to taking *limu kala*, a brown seaweed, to the altar, has been seen before, though the traditions were probably just two of many variations on the consecration ceremony.

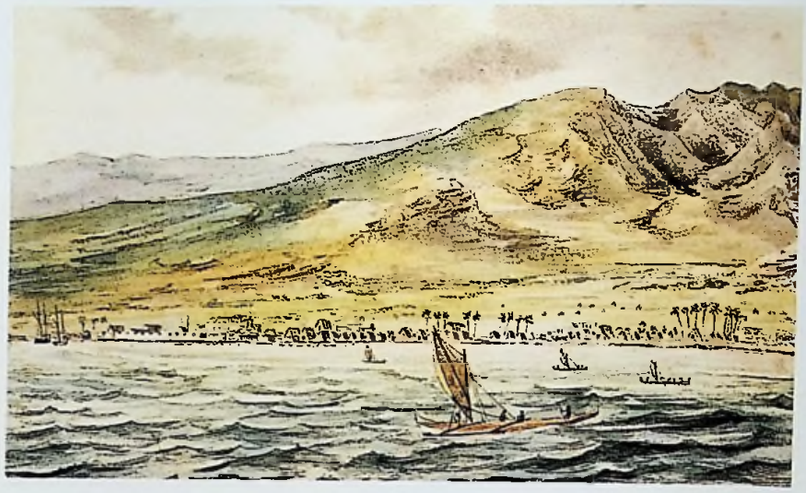
Canoes apparently were always given names. They were typically named after an important incident or for a particular characteristic associated with the canoe, its builder, or its owner. Local place names, names describing localized coastal or marine conditions, and names associated with or handed down from certain families were also used.

Accessories

This rare example of a manu *and lengthy gunnel section carved out of a single piece of wood was pulled out of the mud of a Haena, Kaua'i, wet cave, and now sits in the Bishop Museum.*

Cross Booms *('Iako, Lapauila)*

The *Hōkūle'a* has generated renewed interest in the sailing dynamics of double canoes, and some additional citations have been found that describe the distance that separated the hulls of Hawaiian double-hull canoes. Lorenzo Lyons, who sailed on a double canoe in the early 1830's, wrote: "We arose at 3 AM and departed in a double canoe, a piece of work that displays considerable ingenuity. It consists of two single canoes about 25 feet long. ... The distance between the two [hulls] is about three feet." Midshipman George Gilbert, traveling with Captain Cook on Cook's last voyage, recorded in his journal that "The Small single Canoes here ... are the neatest we have ever seen. Their double ones are some what larger than the others which are fixt parallel at about four feet distance, by three of four spars ...". Ross Cox, who captained a vessel visiting Hawai'i in 1812, commented that "The king and queens came in a large double canoe, which was formed by lashing two canoes together, separated by bars of two and a half feet in length from each other. Each canoe had fourteen chosen men." It is clearly evident from these and pre-



This unusual lashing, *seen in this turn of the century photograph* (left), *is notable for the lack of overlapping.*

viously noted citations that the distance separating double canoe hulls might vary considerably.

A final reference to rigging double canoes is found in the unpublished notes of Theodore Kelsey. Kelsey, like his close friend and associate Henry Kekahuna, could speak Hawaiian fluently, and both were highly regarded for their scholarly and accurate reporting. Kelsey's credentials are stressed here because of the significant sailing and rigging implications of this sole reference. Based upon interviews and discussions Kelsey had with Hawaiians, probably in the late 1920's to early 1930's, he wrote that "*Akea*, main canoe on right in a double-canoe; the canoe on left is *'iama*. The bows were about half a foot closer together than the sterns." The last sentence of this reference is most intriguing. No other reference has been found in any of the literature to "toeing in" the two bows of a double-hull canoe, even though this may have been a common, if not ubiquitous practice. From the standpoint of hydrodynamic engineering, it would make good sense, just as the front end of the *ama* (outrigger) on a single canoe is "toed in" slightly to compensate for the resultant drag of the outrigger.

Lashings *('Aha, Aho)*

In 1990 *Hawaiian Cordage* was published, the first book ever printed on the subject. The author, Catherine Summers, has done a superior job of collecting references to Hawaiian cordage, including that used on canoes. She cites three references to three types of cordage used for sail rigging. One, by J. S. Emerson, states that "the ropes which supported the masts and sails were usually made from *hau* bark which was very abundant and easily obtained." Surgeon William Ellis traveling with Captain Cook, also spoke of *hau* cordage, stating that the Hawaiians' "largest ropes are made of the bark of a small tree *[hau]*, which is very common in the woods. These were so long and well made, that many were purchased for the use of the ships as running rigging, for which purpose they answered very well." Ellis also notes that the Hawaiians made "two kinds of line; one, the size of our whip-cord, which they use as fishing lines. ... The other is made in the same manner as the thongs of whips, and is prodigiously strong: they use it for the purpose of hoisting up the sails in their canoes." Summers feels that this last cordage Ellis describes was probably *olonā*. The last reference she provides for canoe rigging is from Kauwenaole, an early informant of Abraham Fornander, who reported that the line for raising the sail of a canoe was made of braided *'aha*, or coconut sennit. Summers feels that most rigging for canoe sails was made from *'aha* or *olonā*, *hau* being less commonly used. Summers also believes that nearly all lashing for a canoe was of *'aha*. She notes that the *'aha* for lashing was of a flat braid form made of from three to seven plies. The widths of *'aha* braids in the Bishop Museum that were reportedly used for lashing canoes varies from 4.6 to 12.7 mm. For lashing *manu* and *mo'o* (gunnels) to the hulls, the museum has in its collection three-ply braids with widths of 4.6 to 5.4 mm. For lashing *'iako* to the canoe hull, the museum has examples of five- and seven-ply braids with widths ranging from 11.4 to 12.7 mm. Anchor lines for a canoe were most commonly braided *'aha*, though *hau* rope was also reportedly used.

Tava and Keale, in their book on traditional practices of Ni'ihau, also cite *olonā* as rigging material, noting that on Ni'ihau, "Ropes to lash boats [canoes] and tackle for fishing were both made of *olonā*, sennit, *makiukiu*, and sisal, and were unusually strong and well-made."

Sails *(Pe'a)*

Of particular interest to today's sailing canoe enthusiasts is an original field sketch of a typical small sailing canoe made by Webber, the artist traveling with Captain Cook on his third voyage. Acquired by the Bishop Museum in 1990 through the generosity of well-known businessman and legendary athlete Ray Schoenke, this drawing is considered to be quite accurate, making it invaluable in reconstructing the form of the Hawaiian sailing canoe. Not only is it among the earliest sailing canoe renderings done, but it also shows considerable detail. As can be seen in the accompanying photograph, the sail is clearly sewn in horizontal plaited *hala* leaf panels, with a characteristic bunch of feathers trailing from the end of the

Sails of Hawaiian canoes *were often depicted by Westerners. Seen on the opposite page (right) is renowned French naval architect Admiral Paris' 1839 drawing; far left (this page) is Englishman John Webber's 1778 sketch; to its right is an illustration from an 1857 New York newspaper.*

boom. The two *'iako* have a pronounced curvature, keeping them as high as possible over the water; the mast is stepped in the hull, just aft of the forward *'iako,* and is supported by a forestay and three shrouds on each side. Backstays, either permanent or running, are not in evidence, though they were commonly used. Note that there are clearly two sets of two sheet ropes, each set emanating from two different points on the boom. Such a sheet arrangement would allow for shaping the sail to its best aspect. Though it is not known in any other drawings, this configuration makes considerable sense for a Hawaiian crab-claw sail with its typically flexible boom.

William Ellis, the surgeon traveling with Cook, also was a fairly accomplished artist. He too sketched many Hawaiian scenes, one of which is of a double-hull sailing canoe. The original field sketch, as seen in the recently published *Encounters With Paradise,* shows the mast as mounted on the foremost cross boom, with two forestays, one wrapping around the bow of each hull, and four shrouds coming off the mast to the end of each foreboom. Again, no backstays are shown. The sail is clearly gathered about one third the way up the mast, and tied loosely to the mast. This basically immobilized the sail, allowing the canoe to be more easily managed when not underway. The use of four distinct shrouds on each side would seem to indicate the need for fairly substantial rigging, but also perhaps illustrates the limited tensile strength of even multi-ply sennit cordage. Ellis commented of the canoes he sketched that "both [single and double canoes] vary greatly in size, from twelve to sixty feet, and sometimes more...." He goes on to say that "All the double and many of the single ones carry a sail, the form of which is something like those of the Friendly Isles; none have more than one mast." It is interesting to note that some canoes were as small as twelve feet, and that virtually all double canoes he saw were equipped with sail.

Rerioterai Tava and Moses Keale, Sr., in their book *Niihau,* note that on Ni'ihau, "The sail was usually made of woven *makaloa* mat." Besides Emerson's observations cited in the original text, this is the only other reference known of the use of *makaloa* mat for sails. *Makaloa* sedge was plentiful on Ni'ihau, where *hala* was not, understandably making *makaloa* the usual sail material used.

Platform *(Pola)*

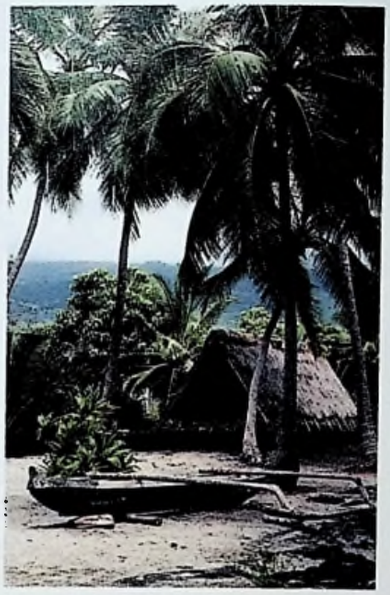
Hawaiian historian John Papa 'I'i, in a March 26, 1870, article in the Hawaiian-language newspaper *Ka Nupepa Kuokoa,* makes an interesting observation on how goods were lashed on a double canoe's platform, and how the entire platform was occasionally removed. He writes, "The sticks of the platform were joined to either side of the stick holding up the mast and the sticks lashed securely in place from front to back so as to protect the bundles of tapa and other wrapped valuables, such as feather capes. They were tied with ropes that were wound around and folded back *(pelu),* so that a single person could unfasten them quickly from front to back. The platform was carried ashore when there was trouble, a battle at sea or various other troubles."

Canoe Sheds *(Hālau Wa'a)*

The coastline between Kawaihae and Māhukona on the west side of the island of Hawai'i has almost no sandy beaches, yet a number of small fishing villages were once located along this shore. Many typical canoe sheds are still in evidence, but a little more unusual are the relatively numerous "paved runways" or stone ramps that were built to compensate for the absence of beaches.

Typically, water-worn stones and then *'ili'ili,* smooth pebbles, were used to provide fill for these ramps. In at least a couple of instances cliffs posed an additional problem, as at Keawe'ula Bay where "the coast is marked by a cliff 20 to 30 feet in height, with water-worn boulders at its base. At the top of this cliff numerous water-worn stones were placed

This Western influenced canoe shed *is evidenced by the lack of rock walls and the increased height of the roof, which allows the hanging of canoes, a practice not known prior to contact.*



In the absence of canoe sheds, *lauhala mats were used to protect a canoe from the sun as this 1850 James Gay Sawkins painting* (above left) *shows.*

This thatched-roof replica of a canoe shed *at Hōnaunau* (above right), *on the Big Island, is representative of how a canoe shed of old might have appeared.*

This interior of a canoe shed *in Hana, Maui* (left), *taken in 1931, is the only known photograph of a traditionally constructed canoe shed in use.*

together to form a ramp which extends inland from the edge of the cliff. This ramp was undoubtedly extended to the waters edge by the construction of a wooden ramp over the boulders below and into the water. This would easily allow for the launching of canoes directly from the top of the cliff to the water." Such "wooden ramps" were also seen at other rocky areas like Kalapana, where beaches are scarce or nonexistent. These ramps should not to be confused with canoe ladders as described in Chapter 10. To work as intended, canoe ladders generally required the presence of fairly substantial coastal surf, a rare occurrence along the Kohala coast.

Down the coast in Kailua-Kona was the canoe shed of Kamehameha I, probably the largest and most extensive to be found and recorded anywhere in the islands. This is not particularly surprising, since Kamehameha I had long favored Kailua as both a domicile and as an important base of naval operations. One of the best descriptions of this canoe shed comes from the 1822 manuscript of Toketa, a Tahitian living in Kailua-Kona. "Friday, Kuakini and I were sitting in the canoe shed called Ka-ʻōpuaua. There are ten canoes in the shed, and four others not yet hewn out. One of them was being worked on by canoe-building experts, former canoe builders of Kamehameha's. Some of the canoes within the shed are watched over by canoe builders from Hilo. These are the old canoes of Kamehameha. Ka-ʻōpuaua shed also was his. The rafters within are good and straight." While this canoe shed was a hybrid, partly western in design and construction, it illustrates the importance that was still attached to maintaining a canoe shed and its contents, even though Kamehameha I, once the owner of the shed and all the canoes, had died four years previously.

Water Gourds *(Hue Wai)*

Wherever one went on a canoe trip of any length, water was one of the most important items to bring. For this purpose, a special type of water gourd, *hue wai,* was used. According to Brigham, this "form of water gourd used in the canoes was called *olowai.* ... [They] were long and almost without necks, that they might be laid in the bottom of the

canoes out of the way." In fact, the elongated shape of *olowai,* particularly with the ever-present netting, would have minimized their tendency to roll around on the bottom of a canoe, as a more rounded conventional-shaped gourds would have done. Brigham continues that for a stopper "the Hawaiians used a *Terebra* shell, a small cachelot tooth, or a neatly folded palm or pandanus leaf fragment." Also, as can be seen in the accompanying photograph, a net of cord, or *'aha,* is found around virtually all the *olowai* that Brigham was able to gather from the Bishop Museum's collection. The cord meshing around an *olowai,* virtually always with a handle, enabled the gourd to be easily retrieved and lashed to some part of the canoe.

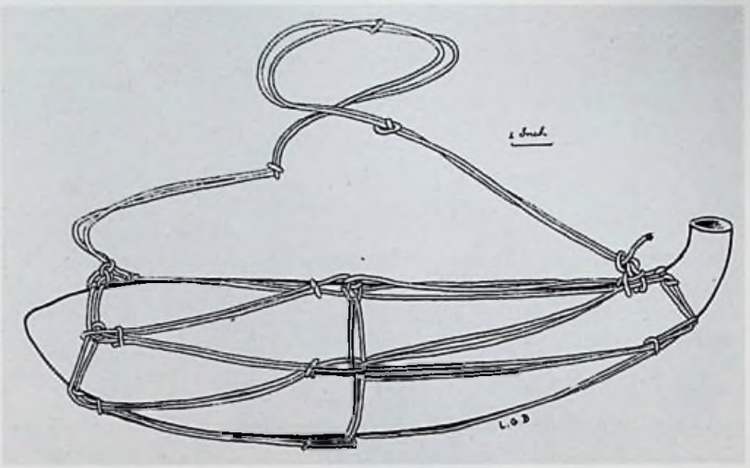
Paddles

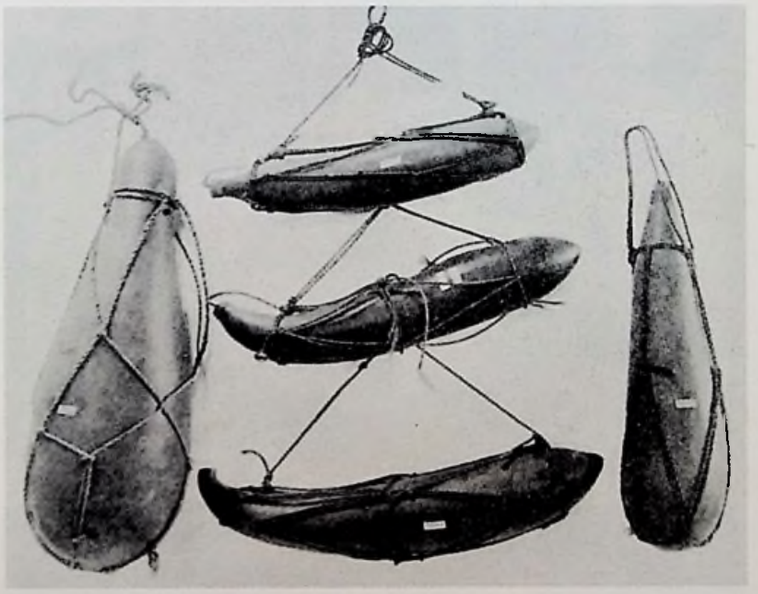
In the early 1980's a paddle was found deep in a cave at the ancient fishing village of Kalāhuipua'a on the island of Hawai'i, now known as the Mauna Lani Resort. This paddle, probably of pre-contact Hawaiian origin, is significant in that it possesses features rarely seen in other surviving examples of traditional Hawaiian paddles. Made from a single piece of *koa,* the blade of the paddle is distinctly elongate (see accompanying photograph). In fact, no other Hawaiian paddle is known to have such a proportionately long ovate blade. Such a long and deep blade would have made an ideal steering paddle—particularly for a good-sized single or double canoe. The depth of the blade in the water and the relatively narrow shape would have afforded maximum steerability.

Another unique aspect of the paddle is a small hole near the top of the shaft, a feature known in only one museum piece currently housed in the Völkerkunde Museum in Vienna. Through this well-worn hole a cord was passed and then tied or wrapped in some fashion around the steersman's wrist, or to some portion of the canoe, to prevent the paddle from being inadvertently swept away and lost. Any contemporary steersman, particularly of a large and heavy sailing canoe, knows how a rough swell may cause his steering paddle to be suddenly dislodged from his grip. Losing a good steering paddle in pre-contact times would today be the equivalent to losing an expensive rudder assembly on a yacht. In the early days of the *Hōkūle'a,* the author can attest to a number of steering paddles being lost before such a safety cord was attached to the paddle.

The Kalāhuipua'a paddle has a long crack extending about one third of its length from the tip of the blade. Again, attesting to the value of a paddle, particularly a good steering one, the crack had been closed and the paddle returned to service by passing a lashing through holes spaced on either side of the crack. The *io* or *'upe,* the thickened projection found on the tip of this and many paddles, did not appear to have done its job of preventing the split.

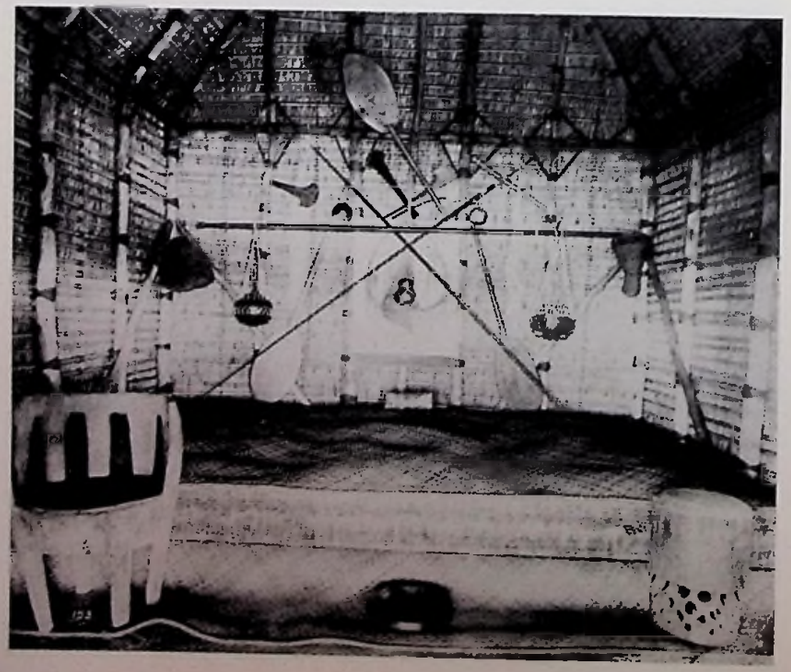
While there is no evidence that Hawaiian paddles were ever carved ornamentally, they were viewed as an attractive form in their own right. Brigham, in his book *The Ancient Hawaiian House,* comments that the





Olowai, ***water gourds for a canoe*** **(top two photos at right),** ***were the canteens for ocean travel in ancient Hawai'i.***

Recently discovered in a cave at Mauna Lani, ***this paddle*** **(right)** ***illustrates how a cracked blade was sewn and includes a hole at the top of the shaft for lashing to the steersman's hand or a part of the canoe.***



"*Alii* had their canoes which were kept in the *halau* or canoe-house, but the paddles were often a part of the house furniture, not infrequently forming decorative devices with the spears which belonged to every chief." In a number of photographs taken of old Hawaiian homes during the late 1800's and even early 1900's, one can see paddles incorporated as part of the wall decor.

Always highly valued, canoe paddles were also occasionally even used by Hawaiians in lieu of money. The Reverend William Alexander wrote from his mission in Hanalei, Kaua'i, during the 1830's that churchgoers, as an offering at Sunday services, would sometimes bring "a kapa

Paddles seen in this 1934 photograph *are considerably larger than those used today* **(above left).** *Left to right: Barbara Thompson, Franklin D. Roosevelt, Jr., Duke Kahanamoku, Louis Kahanamoku, John Roosevelt, Dixie Thompson, Sam Kahanamoku, Lowell Dillingham, David Kahanamoku.*

Collected by Captain Cook, *this paddle* **(above right)** *features superb workmanship, a fairly high polish, an 'upe at the tip of the blade, and a hole at the top of the shaft.*

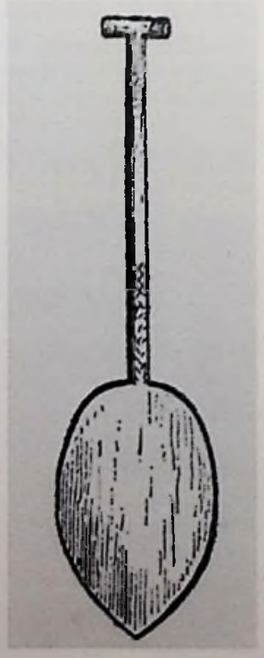
This home of the late 19th century *illustrates the use of Hawaiian paddles as part of the wall decor* **(left).**

An unusual scoop-blade paddle *appears on the right in this 1920 photograph taken at Hōnaunau. In the 1960's scoop blade paddles enjoyed brief popularity for racing.*

cloth, a fish, a canoe paddle, the handle for the spade used in cultivating taro, and very rarely a piece of money." Attesting to both the lack of hard currency at the remote mission as well as the Hawaiians' custom of bartering for goods, Alexander wrote again to the mission station in Honolulu: "I also send you 10 *canoe paddles*, 5 each for Brethren Emerson and Smith. Will you dispose of paddles, if I buy them with books? Some of my people can pay for books in paddles more easily than in anything else. They bear a good price I believe in Honolulu. I have on hand perhaps 50 now."

In a recently translated and published book, *Captain Jacobus Boelen's Narrative of His Visit to Hawaii in 1828*, Captain Boelen wrote, "The paddles of the Sandwich Islanders are broad and strong, and are usually four to five feet long and have an oval-shaped blade, but no crossbar at the top. They are made from the same hard, heavy wood as the canoes, and have no ornamentation or carving. Their weight makes paddling very difficult for those who are not accustomed to them." Of particular interest is Boelen's last sentence in which he speaks from his own experience of just how heavy and cumbersome the Hawaiian paddle was. Other early European observers noted that compared to paddles from other Pacific island cultures, the Hawaiian paddle was heavy, durable, and broad in blade.

An interesting drawing from *The Legends and Myths of Hawaii* by King David Kalākaua, (see accompanying photograph) depicts a clearly T-topped paddle. Published



King Kalākaua's depiction *of a T-topped paddle in his 1888 book about Hawai'i is interesting in that no such paddles are known to exist* **(right).**

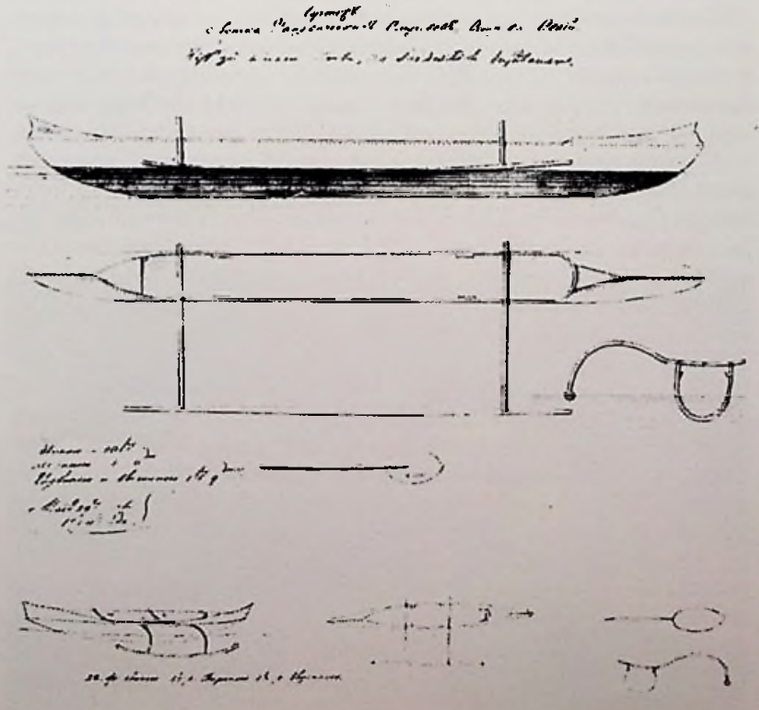
in 1888, and written by no less a Hawaiian authority than Kalākaua, renowned promoter of traditional Hawaiian aquatic activities, the choice of a T-topped paddle to represent a typical Hawaiian paddle of the day poses some interesting questions. As noted in the original text, Choris also figures a T-topped paddle in his 1822 drawing.

Design

Lieutenant E. E. Levenshtern visiting Hawaii in 1804 aboard the Russian vessel *Nadezhda* drew sketches of two different Hawaiian canoes, the details of which are remarkably accurate, given the circumstances and need to work rapidly. For the accompanying sketches Levenshtern gives *figure 1's* canoe dimensions as 20' long, 1'6" in the beam and 1'9" deep. The outrigger by scale appears to be 13' long, rigged some 35" out from the hull. The median bow and stern covers extended back 30–33" from the canoe's extremeties. The dimensions of the second canoe, *figure* 2, are 22' long and 1'6" broad and deep.

Figure 1 *(***below top***). A canoe sketched by E. E. Levenshtern in 1804 showing accurately its form in top and side views with paddle.*

Figure 2 *(***below bottom***). A smaller canoe and paddle sketched by Levenshtern.*



"FORMS AND FUNCTIONS"

Canoeing Skills

Paddling Speed

Today's paddlers, understandably, are more concerned with how fast a canoe is, and how fast they can make it go, than with any other aspect of canoeing. Not infrequently, discussions arise as to how today's paddlers and canoes compare to those of old. Undoubtedly, many Hawaiian canoes from pre- and early post-contact times were fast and their paddlers extraordinarily accomplished—early accounts abound, often noting that Hawaiian paddling canoes were faster than those seen anywhere else in Oceania.

One of the earliest and most specific references to a canoe's speed comes from the journal of George Little, a seaman who visited Hawai'i in 1791. He noted that "on approaching the island, a number of canoes were seen in shore of us, and although the ship was running at the rate of ten knots, yet the canoes kept way with us ... we stood boldly into Karakakooa [Kealakekua] Bay and ... were visited by the king, Tamaamaooa [Kamehameha], who came off escorted by six war canoes, which were lightly constructed, yet they were of great beauty, and, as regards speed, nothing that floats, of the same length, can excel them." At least some of the canoes that Little refers to were probably fitted with sails, but an accompanying image illustrating the scene of his arrival suggests that a number were without sails. Even if sails were present, the winds off Kealakekua (except during *kona* storms), are typically nonexistent or gentle, and could hardly move a canoe along at ten knots.

Captain Jacobus Boelen, visiting Hawai'i in 1828, commented that "The canoes of the Sandwich Islands in general are splendidly designed for speed whether paddled or sailed." Charles de Varigny, the French consul to the Islands from 1855 to 1868 observed that "canoes, loaded with tropical fruits ... were manned by natives whose paddles made their frail craft fly over the water." The iconoclastic traveler Isabella Bird, during her visit to Hawai'i in the early 1870's, traveled down the Kona coast. After passing through a fleet of 27 fishing canoes, she noted that "In calms they [canoes] are paddled, and shoot over the water with great rapidity, but whenever there is any breeze a small sprit-sail is used." She made this observation in the 1870's, which tells us that at least in the Kona area there was still a lot of canoeing activity, that canoeists were as accomplished as ever, and that the traditional-design spritsail was still in use.

Paddling Techniques

As noted above and in the original text, Hawaiians were paddlers *par excellence*. Henry Lyman, son of missionaries David and Sarah Joiner Lyman who were stationed on the island of Hawai'i, commented while on a canoe trip to Lahaina, Maui, in 1847 that on "a commodius old-fashioned double-canoe .... With steady stroke, our experienced crew kept perfect time, ever and anon clapping their paddles in unison against the ribs of the canoes as they changed hands from side to side in obedience to a signal from the steersmen." Of particular interest here is that the steersman called the changes, not one of the paddlers near the front.

James Jackson Jarves, describing a canoe trip he took in 1840, gave an almost identical account. He noted, however, that while paddling, the paddlers were "chanting the while to a tune of olden time, and at every chorus slapping the flat part of their paddles in unison against the sides. ... The echoes from both blow and voice, were powerful, and the effect of the whole not unmusical."

John Papa 'I'i, writing of double canoes, gives a slightly different account of changing, noting that "when one person made a banging sound with his paddle, it was a signal for all to change to the opposite side. If, after two dips of the paddle, the person made another sound with the blade of his paddle, then everyone from prow to stern on both canoes changed again."

Most paddling apparently was done from a sitting position, but there are a couple of accounts of paddling while kneeling, leading one to believe that paddling while kneeling was perhaps not as uncommon as one would think. Both accounts are from the late 1800's, and one was already mentioned in the *Fishing* chapter. The second account comes from Frank Vincent, Jr., who traveled through Hawai'i in the late 1870's. He noted that many canoes were "so narrow that it is just possible for a man to kneel in them, as he is obliged to do while paddling."

As mentioned in the original text, part of the instruction on canoe handling involved learning when it was taboo to go out on a canoe. A half century after Captain Cook these taboos, though still in existence, were changing from the absoluteness of death to a more lenient policy where the taboo could be willfully broken if one were willing to pay a price. One account by missionary Lorenzo Lyons noted in the late 1830's that on "a government working day ... the sailing of a canoe is *tabu*—unless the owner chooses to pay a fine."

Steering and Navigating

As noted in the original text, steersmen of old, when traveling intra-island, almost invariably favored hugging the coastline so closely as to cause numerous writers to comment that they expected to be smashed onto the rocks at any moment. John Chapin, traveling down the Nāpali Coast of the island of Kaua'i in 1915, commented that "The Hawaiians hugged closely to the shore. At times it looked as if the outrigger was about to crash into the jagged, projecting rocks that seemed to rise and sink in the surging water as we splashed by. No matter how deep the indentation in the coast, the kanaka refused the shorter course of going point to point. He paddled as close to the shore as he could comfortably get—uncomfortably close, sometimes." To this day, during a canoe race that follows a coastline a few steersmen, particularly old timers like the legendary Nappy Napoleon will take a course that almost invariably hugs the shore.

In 1813 John Whitman commented that the *ama* of a canoe "is always carried to windward and enables the natives to carry a heavy press of sail by applying the requisite weight to counteract the effect of the wind on the sail. This he does by sitting on the eyaccos *['iako]* as far from the canoe as he finds it necessary to preserve the equilibrium. ... A space is left in the top [of the canoe] where the steersman can sit securely while he performs the several duties of trimming the sail, steering the canoe and bailing out what water may find its way into it."

Almost a hundred years later, in the early 1900's, some Hawaiians were still sailing with as much skill as ever. Lawrence Gay, writing about his memories of Lāna'i and the constant sailing back and forth from Lāna'i to Maui, noted that "Noa Kaopuiki was known for his great skill in keeping the outrigger balanced in the air, even in a fairly rough sea and a twenty-mile trade on port." Today's canoe sailors are slowly relearning many of the skills that were second nature to the canoeists of old Hawai'i. Judging by a good number of swampings, equipment failures, and rescues of canoes in contemporary sailing races, today's sailors still have a long way to go.

Canoe Mishaps

While accounts often speak of the proverbial canoeing and aquatic skills of the early Hawaiians and of the seaworthiness of their canoes, numerous swampings and accidents were reported nonetheless. Overturnings (huli), swampings, and lashing failures, judging by written accounts, were fairly common events, the consequences of which could be serious depending on the circumstances.

Most often, however, a mishap was no problem or even a source of amusement. Urey Lisianskii, a Russian visiting Hawai'i in 1804, noted that "a native craft overturned. The two paddlers responsible for it showed such agility that it was immediately righted." An entry from the "secret" journal of the voyage of the *Racoon* to Hawai'i in 1813 mentioned the paddlers that came out to greet their ship: "They frequently capsised [sic] their Canoes, which they would soon put to rights again, let the Sea be ever so rough. This they did with much good humor and glee, laughing all the time." Captain Charles Barnard, visiting Hawai'i at about the same time as the *Racoon,* made an almost identical observation: "we stood into Carakooa [Kealakekua] Bay. A number of canoes filled with natives came off and circled about the ship, the occupants sporting and amusing themselves. Frequently a canoe would upset, but this, instead of lessening, rather increased the mirth."

A less humorous account is given by Titus Coan, a missionary on the island of Hawai'i during the years 1835 to 1881. "I sometimes took a canoe at the end of my tours to return home by the water. This trip required six to eight hours, and was usually made in the night.

"On three occasions my peril was great. One description will suffice for all; for although the difficulties and escapes were at different points along a precipitous and lofty sea-wall, yet the causes of danger were the same, viz.: stormy winds, raging billows, and want of landing-places.

"About midway between our starting-place and Hilo harbor, we were met by a strong head-wind, with pouring rain and tumultuous waves in a dark midnight. We were half a mile from land, but could hear the roar and see the flashing of the white surf as it dashed against the rocky walls. We could not land, we could not sail, we could not row forward or backward. All we could do was to keep the prow of the canoe to the wind, and bail. Foaming seas dashed against our frail cockleshell, pouring in buckets of brine. Thus we lay about five hours, anxious as they 'who watch for the morning.' At length it dawned; we looked through the misty twilight to the rock-bound shore where 'the waves dashed high.' A few doors of native huts opened and men crawled out.

Canoes often flip, ***especially in rough, open ocean conditions. Today, a nylon cover keeps out most of the water, but of old, a canoe might have been in serious trouble if it overturned in particularly rough seas.***

We called, but no echo came. We made signals of distress. We were seen and numbers came down to the cliffs and gazed at us. We waved our garments for them to come off to our help. They feared, they hesitated. We were opposite the mouth of a roaring river, where the foam of breakers dashed in wild fury. At last four naked men came down from the cliff, plunged into the sea, dived under one towering wave after another, coming out to breathe between the great rolling billows, and thus reached our canoe. Ordering the crew to swim to the land, they took charge of the canoe themselves because they knew the shore. Meanwhile men stood on the high bluffs with kapa cloth in hand to signal to the boat-men when to strike for the mouth of the river. They waited long and watched the tossing waves as they rolled in and thundered upon the shore, and when at last a less furious wave came behind us, the shore men waved the signals and cried out, *"Hoi! Hoi!"* and as the waves lifted the stern of our canoe, all the paddles struck the water, while the steerer kept the canoe straight on her course, and thus mounted on this crested wave as on an ocean chariot, with the feathery foam flying around us, we rode triumphantly into the mouth of the river, where we were received with shouts of gladness by the throng who had gathered to witness our escape. Then two rows of strong men waded into the surf up to their arm-pits to receive our canoe and bear it in triumph to the shore.

"Praising the Lord for His goodness, and thanking the kind natives for their agency in delivering me, I walked the rest of the way home."

Coan was no stranger to canoe trips down the Hāmākua coast, and his observations, known to be quite accurate, are unusual. Because winds generally die down during the evening, night was the preferable time for long-distance intra-island canoe trips, even down relatively unfamiliar coasts. Unusual though, is the cessation of the trip and the calls for help, while the canoe was apparently still operational. In any case, the crew was respectful enough of the ocean conditions (and aware of the potential for even more serious problems) to demure to those familiar with local waters to bring the canoe safely to shore.

Although not common, lashings occasionally came apart. In 1844, members of the missionary Rice family were making a similar trip, though on a double canoe and down the north coast of Maui. In this instance too, "A storm of wind and rain setting in, the lashings of the double canoe were torn apart and a forced landing was made at the first possible inlet." In the November 10, 1849, issue of the newspaper *The Polynesian,* an unnamed sailor recounted a similar incident although in a single canoe: "In the morning, dividing our company, we embarked with two canoes, got through the surf—a proceeding which nearly filled one of them—and found ourselves afloat again on the bosom of a calm, quiet sea. ... We had scarcely completed half our journey when the outrigger of one canoe came off, and our companions were in peril. Fortunately, they reached the lee of an island, where they secured it, for a time, and were able to go on."

A last account comes from the October 3, 1863 edition of the Hawaiian newspaper *Ka Nupepa Kuokoa.* D. Kahaʻulelio writes, "On the 23rd day of September, I went *aku* fishing with my fellow fishermen out in the deep ocean. It seemed to be about seven miles from dry land. That day a large number of canoes gathered in one place. The names of the fishing grounds we were at were Kumanawa and Kalua. It was about one o'clock in the afternoon, according to our guess. All the canoes were occupied with fishing for the *aku* were numerous at the time. The fishing poles were bent over like snares for plovers. After fishing, all the canoes of Lanaʻi returned except our three canoes from Olowalu. The reason for our staying was that our bait was not all used up. Therefore we lingered behind. We had caught ten *aku* fish. About half an hour after the fleet from our place came back we had some *makiawa* and *aku.* The place was filled with sharks. The *makiawa* is a small fish resembling an *opelu* and another name for it is *omaka.* If that is the bait, then the wall is taken down, that is, the canoe will be filled from bow to stern. Because the sharks took all the *makiawa,* we caught very few *aku.* Then we saw black clouds laden with rain directly above Honuaʻula and Kahoʻolawe. Not long after that a gale arose and we began raising our sails to go home. The small canoes of Olowalu went back and we went to Lahaina just back of the wind. We noticed how swiftly we were going. I said to my young companions, when I noticed the prow going downward, 'Push our fish backward.' It was not pushed back but left amidship. There were five of us and we had thirty *aku* in all. Soon after I had spoken, a wave dashed in. When I saw the entrance of the first wave, I swayed the canoe from side to side. In so doing the second wave dashed over. I cried out to all my companions in the canoe, 'Leap out.' None of them leaped. I leaped and then the canoe began to capsize. Then their voices all rose together, 'Alas! We will perish! Alas! We will perish!' Affection for parent, children and all of the relatives possessed us and we sought ways of saving ourselves and floating the canoe. In my mind was a remembrance to call upon God. I was heavy hearted because we were where there was no hope of being saved. Only a fish could live there. There were two old men and three youths. At that time I said to them, 'Let us right our canoe.' They assented. We righted it with two of us at one outrigger stick *(iako)* and two at the other. We pushed the longtitudinal stick *(ama)* downward, the canoe rose up high and when we let go the canoe was righted. The bails of the canoe were blown away by the wind. I broke a gourd used to hold the fishing paraphenalia and used it as a bail."

The point in citing the above accounts and others in the original text is to show that, as skilled as the Hawaiians were in both rigging and handling their canoes, there were unexpected weather developments and there were accidents.

Post-Contact Canoe Transportation

Recreating the epic voyages of ancient Polynesians, particularly those of Hawaiians, has for years held considerable appeal to a wide ranging collection of people. Probably the most unusual voyage ever undertaken in a canoe-type craft was that of Eric de Bischopp and Joseph "Tati" Tatibouet in 1937.

The previous year Tati, father of well-known local hotelier Andre Tatibouet, and Captain Eric de Bischopp had sailed a replica of a Chinese junk from China through much of the South Pacific and up to Hawaiʻi. Half way to Hawaiʻi, the suspicious-looking Chinese junk was boarded by members of the Japanese Navy looking for they knew not what. In the course of searching the vessel, the boarding sailors opened all the canned food on the junk, a fact Tatibouet and de Bischopp did not realize until they were allowed to resume their voyage. The food spoiled, and for the last two to three weeks, Tatibouet and de Bischopp had no food, and very little water. At this point the two made a "soup" of lubricating grease, sea water, and curry powder, the flavor of which they could not recommend. Tati, a consummate survivor, ate rats he found aboard ship, but de Bischopp, who was more squeamish, refused and was left to eat candles. De Bischopp did not fare well on candles, and was in a coma the last week of their trip. The junk eventually reached Kalaupapa on the island of Molokaʻi, where the two intrepid sailors were taken ashore and nursed back to health. The junk was wrecked on the rocks.

Undaunted, Tati and de Bischopp decided to build a double-hull

Two Frenchmen's idea of a double-hull Polynesian voyaging canoe, *the Kaimiloa* (above left), *is seen here sailing off of Diamond Head with Chinese junk-style sails. Amazingly, this 32-foot long vessel was sailed by "Tati" Tatibouet and Eric de Bischopp from Honolulu all the way to Cannes in 1937.*

The hulls of the *Kaimiloa, constructed in a mere nine months on the beach where the 'Ilikai Hotel is today, looked to some like two sampans joined together* (above right).

canoe and recreate some of the sailing feats of the ancient Polynesians. In early 1936, near where the 'Ilikai Hotel stands today, the two Frenchmen began constructing the 32-foot double-hull "canoe" *Kaimiloa,* their idea of a voyaging canoe. In barely nine months, with little money and only self-taught carpentry skills, Tati and de Bischopp finished the *Kaimiloa.* Its hulls, joined by chains and an ingenious system of springs, was described as looking like deformed sampans. Two masts, with sails reinforced "Chinese style" by bamboo, were mounted on the deck between the hulls.

Without a radio or engine, and with only a sextant and chronometer for navigating, the two embarked from Honolulu on March 7, 1937, for Cannes, France. Incredibly, they made it, arriving in Cannes on May 20, 1938, after wintering in Tangier. They had sailed down through the South Pacific, through the Torres Straits, across the Indian Ocean, around the Cape and up the western coast of Africa to Cannes. A strange and daring voyage by a couple of colorful sailors, one of whom (de Bischopp) couldn't even swim!

But not all the unusual ocean journeys were necessarily overseas. The September 2, 1875, edition of the Hawaiian newspaper *Ka Lāhui Hawai'i* attests to the resourcefulness of local Hawaiian canoeists, and the adaptability of the Hawaiian canoe well into the 19th century. D. P. Puniawa writes: "I ask your kind favor, that I relate what I have seen as to the wonder of the canoe, which is as follows: On the 9th day of this August, there was landed a large fine stallion at Haena here, weighing perhaps 200 pounds or more, from Kalalau, on a canoe, with three men, under the direction of Puhauhau with his great skill.

"This was his method of handling the horse: two sticks were fastened to the longitudinal part of the outrigger and the arched stick, and on the short side also was another stick, fastened as in house thatching, over this was spread dry leaves and perhaps dry grass, on which was spread the mat and fastened. They then got the horse on the sand and threw him down and fettered its hoofs well, then, it was lifted by some five or eight men to the place prepared, and fastened it by the head, and hoofs and after-part, and it was brought along by the dark seas and the sheer precipices of Kalalau and landed here at Haena where all the fastenings were cut, then, two men at each arched stick turned the canoe over, and rolled the horse off, when it got up and ran off, without any damage to the canoe. This was a smart man seeking a method of handling an animal without injury. There have been many horses brought to Haena here by this man."

Indeed, canoes were used for transporting all manner of goods. An earlier account on Kaua'i tells of carrying loads of sandalwood to a vessel offshore from the roadstead of Waimea. Peter Corney, a chief officer of the little brig *Columbia,* wrote in 1818, "Our chiefs landed, and were well received by Tamoree [Kaumuali'i]; and the next morning they commenced sending wood on board. About 500 canoes were employed in bringing it off, and by the 25th of March we had the ship quite full."

Canoe Ladders

A canoe ladder allowed launching and landing of canoes along a rocky, cliff-bound coast.

This photograph taken in the early 1900's, *shows a section of the ladder above the ocean. A stored canoe can be seen in the upper left hand corner.*

Surfing

Canoe surfing, so unique to and beloved by Hawaiians of old, continued to be practiced occasionally at least through the early 1800's. In 1828, a visiting Frenchman observed that "They also use canoes for the same type of diversion [as surfing on boards], but in this instance far greater dexterity is required to manage the canoe, for the slightest error in handling the paddle is enough to cause an upset." At about the same time, a missionary, C. S. Stewart, commented that "Riding upon the surf, in a canoe, in a similar manner [as a surfboard], is also a common and favourite amusement."

After the late 1820's there appears to be no further references to canoe surfing until the early 1900's at Waikīkī. With the building of the Moana Hotel in 1901 and the development of other small Waikīkī hotels, tourists slowly began to discover Hawai'i, particularly Waikīkī with its signature beach, surf, and already identifiable and always entertaining "beachboys." According to Grady Timmons in his book, *Waikiki Beachboy*, it was around 1906 that Dude Miller, an already legendary beachboy, first took tourists out to catch waves in a Hawaiian outrigger canoe. It was the beginning of what is to this day probably the most singular, colorful, and memorable activity in which tourists visiting Waikīkī participate. For the past 90 years, the surfing canoe has become more closely identified with Waikīkī Beach, than any other image or activity, enduring testimony to a very special tradition.

War

Peleleu

An interesting reference to war canoes is found in the journal of Toketa, a Tahitian living and writing in 1822 in Kailua, Kona. His journal is thought to be "very likely the first manuscript written in the Hawaiian language by any Polynesian." Kona, on the west side of the island of Hawai'i, is generally thought to have been one of the two major centers for the construction of the war canoes of Kamehameha I. Toketa wrote in May of 1822, three years after Kamehameha's death, of he and Kuakini, governor of Hawai'i Island, sitting in Kamehameha's canoe shed with ten finished canoes and four others not yet completed. He noted that "Some of the canoes within the shed are watched over by canoe builders from Hilo." A month later Toketa wrote that "We polished canoes today. These are old canoes of Kamehameha's. There were eighty of us. The canoe that we polished was a long one, twelve fathoms in length. Kuakini was there also. He called for the work to stop, and we ate first while Pakai went for food for the canoepolishing men. They had hard poi *(pa'i 'ai)* and *aku* fish."

Lord Byron, Commander of H. M. S. *Blonde,* who visited Hawai'i in 1824, furnishes yet another important reference to Hilo, on the east side of the island, as the other major canoe building center, especially for war canoes. He wrote that "the facilities it [Hilo] affords for refitting vessels, render it a place of great importance. Its neighborhood has always been the chief place for constructing the double or war-canoes, of which, however, there are but few, and those are chiefly used on occasions of state." He continues, "The superior advantage of European vessels has, of course, as soon as felt, superseded the use of the war-canoe; and Hido [Hilo] will scarcely lose by the change, for its ingenious artificers have only to turn their industry to the construction of more regular vessels." Note that in 1824, Kamehameha's canoe builders from both

Canoe surfing in Waikīkī *has appealed to tourists for most of this century* (top).

Canoe surfing *has taken on some creative adaptations. This crew, surfing at Makaha* (above)*, have been known to pull off stunts even surpassing Brian Keaulana's standing on the ama.*

The only known 19th century image of canoe surfing *is this painting by James Gay Sawkins near Lahaina, Maui in 1850* (below)*. Hawaiians are the only people known to have surfed in canoes as a form of recreation.*

Hilo and Kona were still an intact and active group, building and maintaining a fleet of war canoes for Governor Kuakini.

Lord Byron's remarks about European vessels replacing war canoes were accurate; in fact, during the early 1800's Hilo, with its numerous canoe builders, became something of a center for the construction of western-style vessels. Francois Peron visiting Hawai'i in 1796 astutely noted that "Kamehameha [I] had wide knowledge of our naval construction. He showed not the least surprise while going over our ship. He asked us clearly and precisely about the different parts of the framework, the masts, and the rigging, and he listened and quickly understood the explanations given him." These were prophetic words for Kamehameha I had already begun strategizing on how he might supplement his war canoes with western naval vessels.

Russian explorer George Henry von Langsdorff who observed Kamehameha I a few years later, wrote that "Tomoom-o [Kamehameha] envinces strength and activity of intellect in all he does. So great has his naval power grown within a little time that, even in 1805, he had fifty vessels under his orders, including cutters, brigs, and even three-masters." Many other European visitors to Hawai'i in the early 1800's commented on the considerable extent of Kamehameha's fleet of western-style vessels and shipworks. Alexander Ross, visiting Hawai'i in the 1840's went to a shoreside facility "where a number of artisans were at work, making ship, sloop, and boat tackling, ropes, blocks, and all the other et ceteras required for his majesty's fleet; while others again, in a wing of the same building, were employed in finishing single and double canoes; the former for pleasure, the latter for commercial purposes."

Emma Metcalf Nakuina, a Hawaiian who grew up on the island, concurs. Writing in 1904, she recalls stories of "large peleleus ... of the chiefs, sixty to a hundred and even a hundred and fifty feet in length, with a depth of from six to twelve and fifteen feet. I remember a pair of double canoes on my father's plantation [Kaupakuea on the Big Island] that were over eighty feet in length. One had been broken in a storm through the unskilled handling of a foreigner. The unbroken mate was used singly, as a lighter to carry sugar from the plantation to schooners or steamers." While Nakuina may have overstated the length of war canoes she never saw, her reputation as a Hawaiian scholar would suggest that her personal observations were likely quite accurate. Too, the fact that the remaining *peleleu* hull was used to lighter sugar indicates that the canoe was a quite substantial craft with considerable carrying capacity.

While most war canoes were built on the Big Island in areas associated with canoe building, an intriguing reference has been found regarding O'ahu. Theodore Kelsey, a noted Hawaiian scholar who interviewed many Hawaiians in their native language, relates an account from an informant named Professor Fred Beckley, husband of Emma Metcalf Nakuina. Beckley commented that on O'ahu it was at "Pa-waa, where war-canoes were assembled. The old site is from where Holloway Memorial Park is, down Ka-la-kaua Ave. on the right, toward Cummin's Junior High School. There was a lagoon there before when the water was way up." This site is roughly at the intersection of King Street and Kalākaua Avenue.

Fleets and Battles

King David Kalakaua in his book, *The Legends and Myths of Hawaii*, provides many references on war canoes and naval fleets. He makes a number of references to the hulls, and sometimes even the sails, of royal canoes used in wartime as being painted red. He also mentions canoes of royalty being painted yellow, particularly when the canoe was

A canoe breaker, *made of rock and coconut fibre, was a very effective weapon during war.*

to be used on a mission of state, or for war. Of one, he specifically notes, "The canoes were brightly painted in alternate lines of black and yellow...". Kalakaua also speaks of the sizes of various war fleets, noting for instance that "Niheu found himself in command of ten thousand warriors and over two thousand canoes." Kalakaua's other references to canoe fleets generally reflect this same ratio of roughly five warriors to each canoe; this indicates, once again, that the vast majority of "war canoes" were typically everyday fishing and utility single canoes temporarily pressed into wartime naval duty.

Lastly, Kalakaua makes one of the very few recorded observations on the logistics of campaigns that involved canoes. "The tents of the chiefs, around which were encamped their respective followers, extended along the shore for more than two miles, while the beach for a greater distance was fringed with canoes, many of the larger painted red and bearing gaudy pennons of stout *kapa*. As plundering had been forbidden, provisions of dried fish, potatoes, cocoanuts, *taro*, and live pigs and fowls had been brought in considerable quantities in extra canoes; but as the duration of the campaign could only be surmised, rolls of *kapa* and matting, shell wreaths, ivory, feather capes, calabashes, mechanical tools, ornaments, and extra arms were also brought, to be fairly exchanged from time to time for such supplies as might be wanted."

Canoe Breakers

While no handle typically was used on Hawaiian canoe breakers, in *Stone Implements and Stone Work of the Ancient Hawaiians,* William Brigham describes a "certain modified form of hammer [where] a flexible cord of coconut fibre was substituted for a handle precisely as the rope handle of the iron ball used at the present time in the athletic exercise of 'throwing the hammer.' Hawaiians used these large and heavy hammers in war to break canoes." Brigham's illustration of such an intact canoe breaker (see accompanying photograph) was drawn, according to Brigham, from "a fine specimen [in the Munich Museum] ... with the rope attached." A single example of such a canoe breaker is in the Bishop Museum collection, though "the knobbed neck to which the rope was plaited has been broken off."

"QUEST FOR SPEED"

Canoe Racing

Sail Racing

In 1987 canoe sailing, specifically competition in contemporary racing canoes rigged with sail, began to enjoy a resurgence of interest. Serious organized canoe sailing races had not been held since the 1930's when they took place at Waikīkī. Today, most canoe sailing races are inter-island. Best known is the Nā Holo Kai Race held each August. This race, beginning at Pōka'ī Bay, O'ahu, and ending at Nawiliwili Harbor, Kaua'i, crosses the Ka'ie'ie Waho Channel. Another popular race is the Ho'omana'o Race, from Maui to O'ahu, traversing three channels.

All canoe sailing races of course are subject to the vagaries of wind conditions, which can cause the cancellation or postponement of a race. The considerable financial investment required to build a canoe sailing rig, the range of skills a crew must master to be competitive, and the costs associated with staging and participating in canoe sailing races have combined to keep the number of people and crews competing in canoe sailing at modest levels to date.

Modern racing in sailing canoes typically involves almost uninterrupted paddling by crew members. In all but the windiest conditions, this supplemental power source enables a sailing canoe to go markedly faster than it could go under sail power alone. Thus strong paddlers can confer a considerable advantage in a sailing canoe race. Numerous sketches and written accounts of Hawaiian canoes under sail from the late 1700's and early 1800's illustrate that paddling while under sail was also standard procedure in old Hawai'i, particularly when sailing on any kind of weath-

Contemporary sail racing *is done today in standard racing canoes adapted to sail. Crossing some of Hawai'i's rough and windy channels, sailing canoes sometime attain speeds of 15 to 20 knots.*

er leg. Freycinet notes in 1813 of Hawaiian canoeists: "Instead of tacking, they prefer to paddle, which for them is indeed much faster."

Pre-Modern Racing

An interesting variation on canoe racing in ancient Hawai'i is mentioned by Lawrence Gay in his book, *True Stories of the Island of Lanai.* "The story that was told by Mrs. Awili Shaw, a Lanai-born resident connected with the old Kealakaa family of Lanai, was about the two Makole Princesses. They were sisters who lived in the vicinity of Naupaka and Honopu gulches, near the pillars of Nanahoa, located a few miles to the north of Dole's Pineapple Harbor at Kaumalapau.

"According to Mrs. Shaw, these two princesses were very fond of canoe races. They usually viewed them from the top of the cliff overlooking the little bay of Honopu, to watch their retainers make preparations for the day's event. The small double canoe was let out with its sails up in the path of the overland trade wind and before the sails disappeared from sight, several big canoes with strong able-bodied crewmen were dispatched in the race toward the small double canoe. The first canoe to retrieve it was considered the winner of the day's event. Mrs. Shaw did not elaborate beyond this point."

Two hulls from such a canoe model can be seen in the photograph on page 35 and are currently housed at the Bishop Museum. While accounts are extremely rare, similar references indicate that this form of canoe racing was occasionally practiced in old Hawai'i.

Modern Racing

After the tremendous growth in outrigger canoe racing in the 1970's, the 1980's saw a leveling off in the total number of active paddlers. Canoe racing organizations in Hawai'i have stabilized under the leadership of HCRA President Michael Tongg, with Hui Wa'a joining HCRA. A dispute over canoe specifications that caused the O'ahu HCRA clubs to boycott Kona's Lili'uokalani distance races, the state's largest, has been put aside. Outrigger Canoe Club has dominated O'ahu and the entire state in most events, with Kai 'Ōpua on the Big Island and Hanalei on Kaua'i holding sway on their respective islands. Hanalei, which won the state championship in 1982, has been the only neighbor island club to do so. The state of Hawaii has been supportive of the sport (though much less so than Tahiti) and has named it the official state team sport, and funded

This Waikīkī canoe regatta *circa 1910* **(top)** *brought out the youngsters in the beach attire of the day, which was required by law.*

Pineapples and pigs *were given to the victorious Senior Men's crew in the 1948 Macfarlane Regatta* **(right).** *Left to right: Tom Arnott, Thad Edstrand, Jimmy Pflueger, Warren Ackerman, Tom O'Brien, Turkey Love.*

major improvements at Ke'ehi Lagoon, the primary O'ahu race site.

One of the developments sparked by the Hawaiian canoe racing tradition has been that many Hawaiian paddlers have branched out into related paddling sports. Most impressive of these have been the Olympic canoe and kayak sports. These have produced a number of paddlers who have competed nationally (Hawai'i now has the strongest junior program in the country) and internationally. The 1992 Olympic team included four paddlers from Hawai'i, including Traci Phillips, a leading American women's kayaker since 1987. Hawaiians have also participated in a number of dragon boat competitions, which originated in Asia.

The Moloka'i-O'ahu Race

The annual men's and women's Moloka'i-to-O'ahu races have prospered and today are the world's most prestigious outrigger distance races, always drawing outstanding international fields. Outrigger Canoe Club's men have upheld Hawai'i's honor, winning six of the last ten races and surpassing Waikīkī Surf Club's 12 total wins with 14. Although providing strong competition at times, no other Hawai'i crew has won since Lanikai did so in 1974. Perennial contenders include the Tahitians, mainland United States paddlers who excel in other paddling sports, and most recently the Australians. On the women's side, Outrigger and Hui Nalu won in the early years, but Newport Beach's Offshore Canoe Club has won the last six races through 1991 and holds the current time record, which, like the men's has fallen sharply in the past decade. Overall participation is up, with record numbers of finishers totalling 58 for the men and 28 for the women in 1991.

The canoe world was saddened by the passing away in May 1992 of A. E. "Toots" Mineville, the founder of the race, who lived to see his dream realized through 40 years of growth.

International Outrigger Racing

During the 1980's outrigger canoe racing expanded considerably in the Pacific and today there is an organized and growing international involvement in the sport. The Tahitians, who played host to Hawaiian paddlers at their Fēte races as early as 1977, provided the impetus by calling meetings at Papeete and Honolulu in 1981. As a result, in April 1982 the International Polynesian Canoe Federation (IPCF) came into being. The founding members were the three main organizations representing the areas and nations in which the sport has been organized: the Federation Francaise de la Piroque Polynesienne (FFPP) from Tahiti, the Hawaii Canoe Racing Association (HCRA) from Hawai'i, and the Kalifornia Outrigger Association (KOA) from California.

The IPCF's primary activity has been to organize international competition. As the annual Moloka'i-to-O'ahu races were already serving as international long-distance championships, the IPCF set out to stage a championship regatta for short-distance racing. The rules incorporated the International Canoe Federation (ICF) distance of 500 meters (the ICF controls the Olympic paddling events), the modern Hawaiian tradition of 180 degree turns around buoys, and the Tahitian single-person and double-hull canoe events. Master and junior divisions were included in the biennial event known as the IPCF World Sprint Championships (Sprints), which bring together hundreds of paddlers. Canoes are standardized (the IPCF has designed an officially designated 6-man hull that will be used in all Sprints from 1992 on) and provided by the host site. Most areas, with the notable exception of Hawai'i , have adopted the IPCF format.

The IPCF has attempted, with some success, to develop the sport in new areas, and it has become affiliated formally and informally, with other canoe racing organizations. Tahiti has been the main center of efforts to spur the sport among Pacific islanders, but funding has been sporadic and generally insufficient to promote and diffuse the sport as fast as would be desirable. The ICF has become familiar with the sport through the attendance of ICF officials at IPCF meetings and competitions and by outrigger exhibition races at the ICF World Championships at Montreal. National outrigger organizations have formed and joined the national paddling organizations affiliated with the ICF; the ultimate goal is to have enough countries participating in outrigger racing to enable it to become an Olympic sport.

The growth of the IPCF can be traced through the Sprints, which were first held at Long Beach Marine Stadium, California, in 1984. Over 400 paddlers from Tahiti, Hawai'i and California competed, and the Tahitians, who paddle with strong bodies and strong organizational, media and governmental support, set a pattern of domination that has held ever since. They hosted the 1986 Sprints at Taaone Beach, Papeete, involving nearly 600 paddlers and new teams from American Samoa, the Cook Islands, Australia and New Caledonia. In 1988, Ke'ehi Lagoon in Honolulu was the venue for 900 participants, adding Fiji, Western Samoa and New Zealand to the areas represented, with New Caledonia (mostly Tahitian people) becoming the first area outside of the founders to win a medal. The 1990 Sprints held at Orakei Basin, Auckland, did not include entries from any new areas, but the gold medal winning Aussie women symbolized the strength which many of the new areas were demonstating. The 1992 Sprints were held at Lake Natoma, Sacramento, California, and added Canada, tiny Wallis-Futuna and a few North American Indian tribes to the list of places having competed at the Sprints. Inclusion of various Polynesian arts, costumes and ceremonies at the Sprints are important reminders of the origins of the sport and give it the traditional flavor it seeks to maintain.

Burial Canoes

While canoe paddles are sometimes found secreted in caves, they are almost always in the absence of other artifacts, and are not known to have been objects typically put in burial caves. However, an intriguing reference is found in the journal of Laura Judd. In 1841, traveling with the Reverend and Mrs. Samuel Ruggles, missionaries stationed at Kohala on the island of Hawai'i, Judd observed a Hawaiian woman rifling burial caves in the cliffs of Kealakekua. Among the items retrieved "were various ... articles, such as ... a canoe paddle, ... all supposed to be useful in the 'spirit land.'" This is the only instance the author is aware of in which a paddle was deposited as one of the artifacts accompanying a canoe burial, though it is not unreasonable to assume that this was not a solitary occasion.

In his book, *The Ancient Hawaiian House,* William Brigham made yet another reference to canoe burials, noting again that they were typically a form of burial reserved for royalty. "Molokai, the often used battle ground of the chiefs of Oahu and Maui, was noted for its cavernous hiding places, and legend tells of many caves where *umekes*, arms and other native treasures are still hidden, the *kahu* or keepers all silent in death. In the solitary valley of Moanui are said to sleep the ancient *Moi* of Molokai, each laid in his canoe ... . Landslides have quite covered the mouth of these royal sepulchres, and only an earthquake more potent than is common on the group is likely to reveal their secrets."

REFERENCE SECTION—SECOND EDITION

The Canoe in Oral Traditions

The canoe born of the land but living in the sea embodied much of the Hawaiian ethos. The single most important artifact in Hawaiian culture, the Hawaiian canoe was a nucleus, a continuum, a key to the culture. With no written language, the traditions and skills surrounding canoes and canoe building and handling were passed down by the spoken word, considered the highest form of cultural expression in Hawai'i. A preeminent art form in its own right, the canoe gave rise to, was the subject of, or was prominently referred to in a number of oral traditions.

Inherent in all Hawaiian oral traditions is the use of kaona, the deeper, hidden meanings of words and phrases, which exemplifies the complexity of the Hawaiian language. Nona Beamer writes that "Only the composer knows the true intent of the words. Sometimes true meanings were deliberately obscured to protect those named in the chants. Meanings might be disguised symbolically, hidden by nature connotations or veiled references." The canoe was at once a functional, spiritual, economic, social, political, mythical, and historical interface between man, the environment, the gods, and the cosmos. In the following section one can see representative examples of the cultural symbolism of the canoe in chants and prayers, proverbs and poetical sayings, metaphors, genealogies, mele and songs, riddles, and the hula.

Proverbs and Poetical Sayings

As might be expected of a culture intimately tied to the ocean environment, canoes and their attendant accessories and activities were often alluded to in proverbs and poetical sayings. Kawena Pukui, scholar and master of the Hawaiian language provides numerous examples of these in her seminal work, *'Ōlelo Noeau*, from which the following are taken:

Aia a kau ka i'a i ka wa'a, mana'o ke ola.
One can think of life after the fish is in the canoe.
Before one feels elated and makes plans he should first secure his "fish."

Anu o 'Ewa i ka i'a hāmau leo e. E hāmau!
'Ewa is made cold by the fish that silences the voice. Hush!
A warning to keep still. First uttered by Hi'iaka to her friend Wahine'oma'o to warn her not to speak to Lohi'au while they were in a canoe near 'Ewa.

'A'ohe 'auwa'a pa'a i ka hālau i ka mālie.
No canoes remain in the sheds in calm weather.
Everybody goes fishing in good weather. Also used when people turn out in great numbers to share in work or play.

'A'ohe e pulu, he wa'a nui.
One will not be wet on a large canoe.
One is safe in the protection of an important person.

'A'ohe hana a Kauhikoa; ua kau ka wa'a i ke 'aki.
Kauhikoa has nothing more to do; his canoe is resting on the block.
His work is all done.

'A'ohe wa'a ho'ohoa o ka lā 'ino.
No canoe is defiant on a stormy day.
It doesn't pay to venture into the face of danger.

'A'ohe make ka wa'a i ka 'ale o waho, aia no i ka 'ale o loko.
A canoe is not swamped by the billows of the ocean, but by the billows near the land.
Trouble often comes from one's own people rather than from outsiders.

E ho'i ka wa'a; mai ho'opa'a aku i ka 'ino.
Make the canoe go back; do not insist on heading into a storm.
A plea not to do something or associate with someone that will lead to serious trouble.

Eia no kāhi koe o ka moamoa.
Here is the only space left, the moamoa.
Said when offering a small space or seat to a friend when every other place is occupied. As Pa'ao was leaving from Kahiki with a canoe filled to capacity, a priest, Makuakaumana, called out, asking to come along. He was offered the only available space—the sharp point at the stern of the canoe, the moamoa.

E kāmau iho i ka hoe a pae aku i ke kula.
Dip in the paddle till you reach the shore.
Keep dipping your finger into the poi until you've had your fill.

E kaupē aku no i ka hoe a kō mai.
Put forward the paddle and draw it back.
Go on with the task that is started and finish it.

E lauhoe mai na wa'a; i ke kā, i ka hoe; i ka hoe, i ke kā; pae aku i ka 'āina.
Everybody paddle the canoes together; bail and paddle, paddle and bail, and the shore is reached.
Pitch in with a will, everybody, and the work is quickly done.

E pane'e ka wa'a oi moe ka 'ale.
Set the canoes moving while the billows are at rest.
Said by Holowae, a kahuna, to suggest that Kalani'ōpu'u return to Hawai'i while there was peace. Later used to stir one to action.

Ha'alele 'ia i muliwa'a.
Left on the very last canoe.
Said of one who is left behind.

Ha'alele koa wa'a i koa kanaka.
The koa canoe has departed leaving the warriors behind.
Said when a canoe goes off and leaves the people behind, either in the water or on land.

Ha'ikū umauma, ha'i kū e!
Follow together, follow shouting!
An expression used by chiefs meaning "Let us launch our canoes and go to war whether the other side is willing or not." This is part of a chant used while transporting newly made canoes from the upland to the sea. A group of men walking abreast carried their burden and shouted this chant.

Hā'ule i ka hope wa'a.
Left in the aft of the canoe.
Said of one who comes last or is tardy.

He ho'okele wa'a no ka lā 'ino.
A canoe steersman for a stormy day.
A courageous person.

He hūpō no ka wa'a pae.
A stupid one belonging to the canoe landing.
Little skill is required to get a canoe out of the water at a landing. Said of one whose knowledge is very shallow and whose skill is practically nil.

He kau auane'i i ka lae 'a'ā.
Watch out lest the canoe land on a rocky reef.
Watch out for trouble.

He kā waiho ho'ohemahema.
A bail left unnoticed.
Said of one who could be of help because of his skill and knowledge but is overlooked, like an unused canoe bail.

He keiki kālai hoe na ka uka o Pu'ukapele.
A paddle-making youth of Pu'ukapele.
A complimentary expression. He who lives in the uplands, where good trees grow, can make good paddles. Pu'ukapele is a place above Waimea Canyon on Kaua'i.

Hele aku 'oe ma'ane'i, he wa'a kanaka; ho'i mai 'oe ma'ō he wa'a akua.
When you go from here, the canoe will contain men; when you return, it will be a ghostly canoe.
Warning to Keouakuahu'ula by his kahuna not to go to meet Kamehameha at Kawaihae. He went anyway and was killed.

Hele 'e ka wa'a.
The speed of a canoe
Said of a fast traveler.

He lō'ihi o 'Ewa; he pali o Nu'uanu; he kula o Kulaokahu'a; he hiki mai koe.
'Ewa is a long way off; Nu'uanu is a cliff; Kulakahu'a is a dry plain; but all will be here before long.
Said of an unkept promise of food, fish, etc. O'ahu was once peopled by evil beings who invited canoe travelers ashore with promises of food and other things. When the travelers asked when these things were coming, this was the reply. When the visitors were fast asleep at night, the evil ones would creep in and kill them.

Hemahema Kahuwā me Waimea.
Kahuwā and Waimea are awkward.
These places are in the uplands, where people are said to be awkward in handling canoes.

He mamo paha na ka po'e o Kahuwā he ma'a i ka hoe ma ke kunihi.
Perhaps they are descendants of the people of Kahuwā who were in the habit of paddling with the edge of the paddle blade.
They are stupid people who never do things right.

He mā'uka'uka hoe hewa.
An uplander, unskilled in wielding the paddle.
Said of an awkward person who blunders along, or of a man who is clumsy in lovemaking.

He moe wa'a.
A canoe dream.
When one dreams of a canoe there will be no luck the next day.

He poʻe hoʻopiha waʻa.
Canoe fillers.
A derogatory remark pertaining to useless people who do nothing to help, like riders in a canoe who wield no paddle, no fishnet, and no pole.

He poʻe koa hoe.
Canoe-paddling warriors.
A disparaging remark about warriors who are not good fighters.

He pōhaku hekau waʻa.
The stone anchor of a canoe.
An indolent person.

He puʻu pale ia lae no ka hoʻokele.
The cape is just something to be passed by the canoeman.
A boast—difficulties are mere trifles to an expert.

He unu ʻoe no ka waʻa pae.
You are a rock for beaching a canoe.
You are worth nothing but to be stepped on.

He waʻa auaneʻi ka ipu e pau ai na pipi me na ʻōpae.
A gourd container is not a canoe to take all of the oysters and shrimps.
The container is not too large and cannot deplete the supply. A reply to one who views with suspicion another's food container, or who balks at sharing what he has.

He waʻa holo honua.
A land-sailing canoe.
A horse, mule, or donkey used for transportation.

He waʻa holo no ka hoʻi, kālai kāpulu ʻia iho.
After all, it is a worthy canoe, but you hewed it so carelessly.
He is a good worker but you have treated him with such thoughtlessness.

Hoʻokāhi ka ʻilau like ana.
Wield the paddles together.
Work together.

Hū hewa i Kapua ka ʻauwaʻa pānānā ʻole.
The fleet of canoes without a compass landed at Kapua by mistake.
Said of one who is off his course, mentally or otherwise. A saying from Kohala.

Huli ka malau, ka ʻiako a ka lawaiʻa.
The malau that serves as an outrigger of the canoe is turned over.
Work is done. The malau is a live-bait carrier attached to the canoe. When the fishing was done the empty malau was turned over.

I nanea no ka holo o ka waʻa i ke akamai o ke ku hoe.
One can enjoy a canoe ride when the paddler is skilled.
A sexual union is successful when the man knows how it is done.

I noho ʻoukou a i pae mai he waʻa o Kahiki-makolena, hopu ʻoukou a paʻa; o ke kahuna ia ʻaʻohe e ʻeha ka ʻili ʻoiai no Kahiki aku ana ka ʻāina.
If sometime in the future a canoe from Kahiki-makolena arrives, grasp and hold fast to it. There is the kahuna for you, and your skins will never more be hurt [in war], for the land will someday be owned by Kahiki.
A prophecy uttered by Kaleikuahulu to Kaʻahumanu and her sisters as he was dying. Foreign priests (missionaries) will come. Accept their teachings.

Kāhana auhā.
Kāhana of the shed.
Said of the natives of Kāhana, who were said to be stingy. Their fish was hidden in the canoe shed rather than shared.

Ka iʻa i māʻona ai ka menehune.
The fish that satisfied the menehune.
Shrimp. A man once rewarded some menehune friends with shrimp after they had made him a canoe.

Ka iʻa pā i ka ihu o ka waʻa a lele.
The fish that touches the prow of the canoe and leaps.
The mālolo, or flying fish.

Ka makani kā ʻAhaʻaha laʻi o Niua.
The peaceful ʻAhaʻaha breeze of Niua that drives in the ʻahaʻaha fish.
The ʻAhaʻaha breeze begins as the Kiliʻoʻopu in Waiheʻe, Maui, before reaching Niua Point in Waiehu. It is a gentle breeze and the sea is calm when it blows. Fishermen launch their canoes and go forth to fish, for that is the time when the ʻahaʻaha fish arrive in schools.

Ka makani kūkulu peʻa nui, he ʻEka.
The ʻEka, the wind that sets up the big sails.
When the ʻEka wind blew in Kona, Hawaiʻi, the fishermen sailed out to the fishing grounds.

Ka manu kāhea i ka waʻa e holo.
The bird that calls to the canoe to sail.
Said of the kioea (stilt), whose early morning call was often a signal to canoemen to be ready to fish or travel.

Kau ʻino na waʻa o Kaʻaluʻalu.
The canoes hasten ashore at Kaʻaluʻalu.
Said of those who hurry away from the scene of trouble. Kaʻaluʻalu is a beach in Kaʻū, Hawaiʻi, where fishermen hastened away from Halaʻea after unloading their fish onto his canoe.

Kau ka peʻa, holo ka waʻa!
Up go the sails; away goes the canoe!
Said humorously of one who dresses up and goes out for a gay time.

Ka ulu koa i kai o Oneawa.
The koa grove down at Oneawa.
From the legend of Hiʻiaka. Canoes are sometimes referred to as the koa grove at sea, for canoes in ancient times were made of koa.

Ke ʻEka, makani hoʻolale waʻa o na Kona.
The ʻEka breeze of Kona that calls to the canoemen to sally forth to fish.
Refers to Kona, Hawaiʻi.

Kihe ka ihu i ka ʻale.
One who sneezes when the spray from the surf rises at the bow of the canoe.
Said of one who braves danger with indifference.

Kilua ka poʻe waʻa.
The canoe paddlers all paddle shoreward.
Said of no luck in fishing.

Kioea hoʻolale waʻa.
The kioea, who calls the canoes to sally forth [to fish].
A Molokaʻi saying.

Kō ke au ia Halaʻea.
The current carried Halaʻea away.
Said of one who goes out and forgets to return. Halaʻea was a chief of Kaʻū who was so selfish that he demanded every fish caught by the fishermen. After years of going without fish, the fishermen rebelled. One day, the whole fleet went to the fishing grounds outside of Kalae and did not return. The chief wanted the catch and ordered a servant to go and ask for it. The servant refused, and in anger the chief went himself. When he asked for the fish the whole fleet turned the prows of their canoe shoreward. One by one the fishermen unloaded their fish onto the chief's canoe. The canoe began to sink under the weight of the fish, and the chief cried out to the men to stop. They refused. The chief, his canoe, and his fish were swept out on the current and never seen again. This current, which comes from the east and flows out to sea at Kalae, is known as Ke au o Halaʻea.

Komo mai kau māpuna hoe.
Put in your dip of the paddle.
Pitch in.

Ku a mālōʻeloʻe, lālau na lima i ka hoe nui me ka hoe iki.
Stand up straight; reach for the big and little paddle.
Said to young people—be prepared to weather whatever comes your way.

Ku ke ʻehu o na wahi ʻauwaʻa liʻiliʻi.
How the spray dashes up before the fleet of little canoes.
An expression originating in the game kōnane. Trifling things are as dust to experts. Used in a chant of ʻAukelenui-a-Iku.

Laulaha ka ʻai a ke ʻahi.
The ʻahi fish takes the hook in swarms.
Said when the sea is full of canoes fishing for ʻahi. Also said of a successful business—customers come in swarms.

Lona kau lani.
A block on which the royal [canoe] rested.
A chief whose sire was higher than that of his mother.

Lonalona ka moana i ka ʻauwaʻa lawaiʻa.
The ocean is thickly dotted with fishing canoes.
Said when a large number of people are spread over a wide area for work or fun, like a very large picnic group.

Maluna mai nei au o ka waʻa kaulua, he ʻumi ihu.
I came on a double canoe with ten prows.
I walked. The "double canoes" are one's two feet and the "ten prows" are his toes.

Molokaʻi koʻo lāʻau.
Molokaʻi of the canoe-poler.
The reef at the southern shore of Molokaʻi extends out as far as one-half mile in some places. At low tide the water is no more than eight feet deep. Because it is so shallow, the people could propel their canoes with poles.

Nakaka ka puaʻa, nahā ka waʻa; aukāhi ka puaʻa mānalo ka waʻa.
The pig cracks, the canoe breaks; perfect the pig, safe the canoe.
Whenever a new canoe was launched, a pig was baked as an offering to the gods. If the skin of the roasted pig cracked, misfortune would come to the canoe; but if it cooked to perfection the canoe would last a long time.

Nalowale i ke ʻehu o ke kai.
Lost in the sea sprays.
Said of one who disappears from sight to avoid coming in contact with others, like a canoe that speeds away and raises sprays so that it can't be seen.

No Kula ia poʻe ke hoe hewa nei.
To Kula belong the people who are such poor paddlers.
Kula, Maui, people are ignorant. Also, never mind the talk of fools.

Oʻahu maka ʻewaʻewa.
Oʻahu of the averted eyes.
This saying began with Hiʻiaka, who asked two of her kinsmen on Oʻahu for a canoe to take her to Kauaʻi. They gave her a broken one, which she and her companion mended with no help from the men. In disgust, she called them Oʻahu maka ʻewaʻewa. After that, Oʻahu was said to have the least friendly people of all the islands.

O ke alelo ka hoe uli of ka ʻōlelo a ka waha.
The tongue is the steering paddle of the words uttered by the mouth.
Advice to heed the tongue lest it speak words that offend.

O ke ku hoe akamai no ia, he piʻipiʻi kai ʻole ma ka ʻaoʻao.
That is the way of a skilled paddler—the sea does not wash in on the sides.
Said of a deft lover.

O Kula i ka hoe hewa.
Kula of the ignorant canoe-paddlers.
Said of Kula, Maui, whose people did not know how to paddle canoes because they were uplanders.

Ola aku la ka ʻāina kaha, ua pua ka lehua i kai.
Life has come to the kaha lands for the lehua blooms are seen at sea.
"Kaha lands" refers to Kekaha, Kona, Hawaiʻi. When the season for deep-sea fishing arrived, the canoes of the expert fishermen were seen going and coming.

ʻŌlapa ka hoe a ka lawaiʻa, he ʻino.
Difficult to handle is the paddle of the fisherman in a storm.
Said of one struggling against a difficult situation. First uttered by Pele in a chant about the winds of Kauaʻi.

Paʻa ʻia iho i ka hoe uli i ʻole e ikā i ke koʻa.
Hold the steering paddle steady to keep from striking the rock.
Hold on; don't let yourself get into trouble.

Paʻakiki kānaka o Kauaʻi.
Tough are the men of Kauaʻi.
Oʻahu was once inhabited by supernatural beings who ate people. They would extend their hospitality by day, but at night they would eat their sleeping guests. A canoe came from Kauaʻi one day, and among the passengers was a man who was distrustful of the Oahuans. When the other men went to sleep, he dug a hole under the wall, crept into it, pulled a mat over himself, and waited. Late at night he listened as the hosts came and ate his companions. After the evil beings were gone, he hurried to the canoe and sailed home. He told his friends, and together they made wooden images, hid them in the canoe, and sailed for Oʻahu, where they were welcomed. That night the images were put inside the house, while the men hid outside. When the hosts came around to eat the visitors, they bit into the hard wooden images. The Kauaʻi men burned the house, thus ending the evil on Oʻahu.

Pae ka waʻa i Kaʻena.
The canoe lands at Kaʻena.
Wrath. A play on ʻena (red-hot) in Kaʻena.

Pae mai la ka waʻa i ka ʻāina.
The canoe has come ashore.
Hunger is satisfied; or, one has arrived hither.

Peʻe kua o Kaʻulahaimalama; o Kekuhaupiʻo ka makua; hilinaʻi aʻe i ka pale kai, kālele moku aʻe mahope.
Kaʻulahaimalama is secretive; Kekuhaupiʻo (Stands-leaning) is her father; she leans against the canoe side and rests against the back of the canoe.
Said of one who tries to conceal the true offender by pretending to know nothing.

Pohāpohā ka ihu o ka waʻa i ka ʻale o ka Mumuku.
The prow of the canoe is slapped by the billows in the Mumuku gale.
Said of a person buffeted by circumstances or of one who has received many blows by the fist.

Ua ʻelepaio ʻia ka waʻa.
The ʻelepaio has [marked] the canoe [log].
There is an indication of failure. Canoe makers of old watched the movements of the ʻelepaio bird whenever a koa tree was hewed down to be made into a canoe. Should the bird peck at the wood, it was useless to work on that log, for it would not prove seaworthy.

Ua pae ka waʻa i Nānāwale.
The canoe landed at Nānāwale.
Said of disappointment. To dream of a canoe is a sign of bad luck. A play on nānā-wale (merely look [around at nothing]).

Chants and Prayers

Every aspect of Hawaiian life was spoken to in prayers and chants. Nona Beamer writes of chanting as "an extension of speaking that originated as a means of communicating with the gods." The canoe, a major link between the Hawaiian and their ocean world, was often the subject of prayers and chants. June Gutmanis notes that "The first of the prayers for a canoe may be said as much as a generation before it is to be built when a *kahuna kalai waʻa* (canoe building *kahuna*) visits the upper forest checking the growth of *koa* trees. There he prays to the various gods of the forest and canoe building, reminding them of their ties to man and asking their care of the trees until they are to be made into canoes." J. S. Emerson, in unpublished notes at the Bishop Museum, records an ancient "Canoe Maker's Prayer":

CANOE MAKER'S PRAYER

The handle of the adz came from the forest,
The blade of the adz from a pit,
There the adz of humuula stone was hewn.
The voice of the adz is heard resounding
As it chops away in the forest.
The alahee wood is the adz of the upland
The o-le shell is the adz of the shore.
The most sacred adz is the kahuna
Who steps forward alone
With a sacred garment for Kanaloa.
He hews and fells a log for a canoe,
Shapes the opening with a scoop adz,
A canoe indeed for a kahuna.
It was he who fell it, he who shaped it beautifully,
The adzes work together toward the prow,
Scooping together at the stern.
Ku-pulupulu scoops the chips out of his canoe,
Kualana-wao cuts out the shape of his canoe.
Lea dwells in the uplands,
While Mokuhalii overs (the work) on the canoe.

Many other excellent examples of canoe-related chants and prayers can be found in June Gutmanis' book, *Na Pule Kahiko.*

Genealogies

In Samuel Kamakau's book, *Ruling Chiefs of Hawaiʻi*, it is noted that "when a favorite child has a canoe or house or any new object of value constructed a chant is composed in its honor in praise of the chief for whom it is made." Kamakaua records the use of canoe building as a metaphor in a genealogical chant for Keka'ulu'ohi, a favored chiefess: "the names of [the chiefs of Kauaʻi and Oʻahu] are mentioned as appointed to various offices according to the occupations of their ancestors; for example, Kalai-mamahu' and Ka-lani-hele-mai-iluna-ka-moku were the ones to prepare the adz for hewing the canoe, and they carried the adz and cut the canoe. Boki was the chief priest to cut off the branches and to hollow out the opening of the canoe; Kamehameha was the priest to finish off the inside and make the keel straight. Ka-ʻahu-manu was the priestess to draw the canoe to the lowlands and into the canoe house; Ke-aliʻi-maikaʻi was the priest to put the parts together; Ulu-maheihei, Ka-iki-o-ʻewa, Koahou, Ka-welo-o-ka-lani Koa-kanu, Na-ihe, Kalai-moku, Ka-hekili Keʻe-au-moku, Ka-lua-i-Konahele, and all the other chiefs were to prepare and fasten the cords, and Kau-kuna Kahekili was to offer the prayer to bless the canoe. Kamehameha was the leading *kahuna*, Poke the prayer, Kane-ʻaha-kini the god, Ku-kaili-moku the sacred name of Ke-ka-ulu-ohi ..."

Hula

The canoe and canoe-related themes appear in many *hula* and chants. Dorothy Barrere describes a *Hula Hoe* (canoe paddling dance), danced on the islands of Kauaʻi and Oʻahu. "The dancer either sat or stood up and sometimes alternated in the same dance. A paddle was held in the hand and wielded just as one would on a canoe, rowing, holding the handle of the paddle under the arm for a rest, turning the canoe about, and so on, the motion depending on the context of the chant. This was a group dance and when done in unison, was beautiful to behold." Barrere recounts one of the old *mele* used in the *Hula Hoe:*

KAPAE MOKU

The island groups lie close together
Stretching out from east to west
Lie these island groups.
The Nuuhiwa group lies in a row,
Intermingled with those of Holani
(He) leaves Nuuhiwa and goes to Borabora
And circles each island
Hilaualeʻa was the astronomer.
The islands were separated,
Each cut off by Kahai's fish line
(Thus did) Kukanaloa traverse these islands.
The land, the islands were separated,
Cut apart by Kanaloa
Long may he live!

Barrere recounts that a *Hula Hoe* was often introduced by a *Pule Hoe*, a "prayer for guidance to the right spot in the well known fishing ground ... Once arrived at the fishing ground the position of the canoe must be sighted absolutely by certain points; otherwise no fish appear." She records the *Pule Hoe* used as:

My canoe-shed is at Maka-noni,
(The canoe) goes to the fishing ground at Pohakuloa,
The prow of my canoe (must) turn toward Iole-au
(a small hill),
The stern toward the open sea.

Riddles

The Hawaiians, ever playful and creative with their language, sometimes communicated in riddles. Henry P. Judd recorded numerous riddles, some of which involved canoe-related themes:

Aina i ka hope o ka waa.
Land at the stern of the canoe.
Answer: Kamomoa, Puna. The *momoa* is the part of a canoe that unites the *moo* (gunwale), and the *manu* (upward projecting pieces.)

Ekueku ka ihu o ka waa liilii i ka waa nui. Heaha ka inoa o ka waa liilii?
The bow of the little canoe roots into the large canoe, what is the name of the small canoe?
Answer: The *aulima* (small stick used in making fire.)

Kuu wahi manu, ma ka waha kona pepeiao.
My little bird, whose ear is at its mouth.
Answer: The pieces on the two ends of the canoe. The ear is the projection inside a canoe.

String Figures

Hawaiians devised many sources of entertainment, one of the more inventive of which was the pastime of making string figures. Canoe-related string figures typically evoked the image of a canoe in various situations. These string figures were usually either inspired by or the inspiration for different chants or riddles. Illustrations and descriptions of these string figures may be found in Lyle Dickey's book, *String Figures From Hawaii.*

Competitive Paddling Notes

by Jody Denbeau

To be part of a crew paddling a Hawaiian canoe at full speed is an unforgettable feeling that few are privileged to experience. The maximum sustained speed of a canoe depends upon a complex set of factors involving the crew members, their equipment, and the ocean. Where crew members are concerned, the speed of a canoe is a function of timing, the stroke rate, the length of the draw or pull, and the force applied during the draw phase. For a crew to attain the greatest possible speed in a canoe, three factors must be considered: strength, endurance, and technique.

Strength training must begin long before the canoe season starts. Most professional strength coaches recommend a weight-training program four to six months before specific training begins. Once the desired level of strength is attained, an athlete may moderate his or her strength workouts, but should keep up at least a twice-a-week schedule to maintain the strength level that has been built up; as the competitive season progresses, however, it is better to spend more time in the canoe and less in the weight room. While a paddler can develop a certain level of strength by working out in a canoe, Tom Conner, one of Hawai'i's more successful coaches, feels that "If you want to get strong, go to a gym and lift weights. Putting an automobile tire on the front of a canoe to increase drag and hence help to develop a crew's power only teaches them how to paddle slowly and contributes little to the speed of the boat."

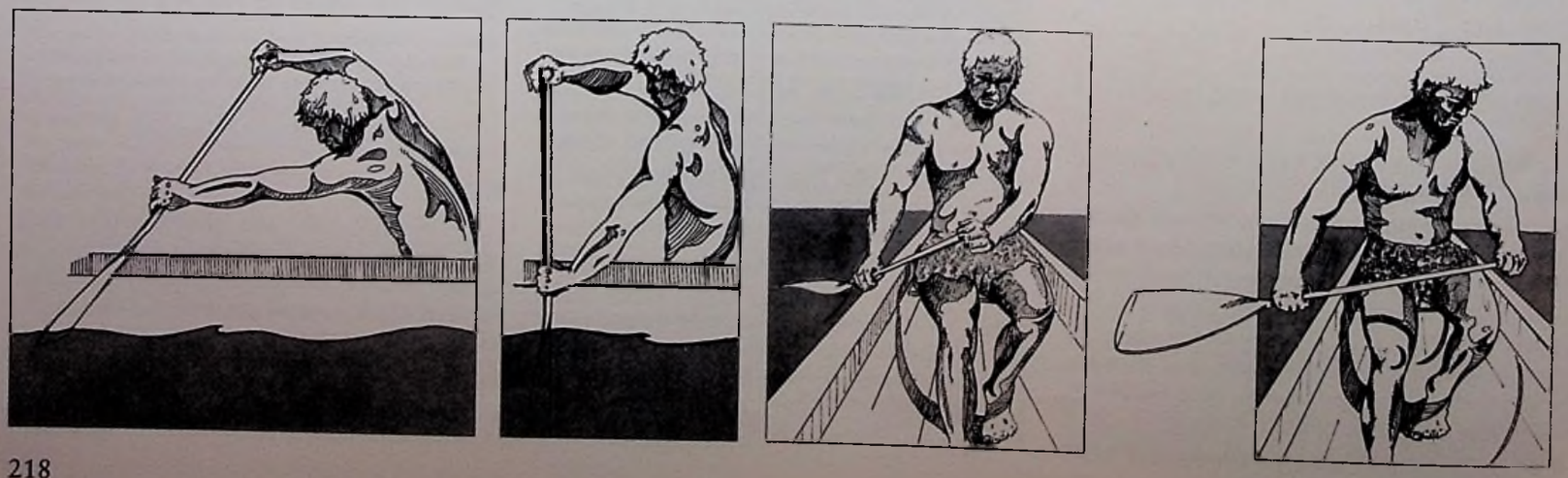
Endurance is determined by frequency, intensity, and the time spent training. Intensity, the most important component of the equation, can be self-monitored easily by checking one's pulse rate immediately after exertion. By working with norms adjusted for differences in sex and age, a paddler can learn about his or her fitness level in general and determine the intensity level for a particular workout. A 1977 psychological study showed that people believed they were exerting the same amount of physical effort in an individual situation as they did when performing in a group; in fact, tests showed that in a group situation they exerted 20 to 25 percent less effort than they did when performing individually. Thus, it would seem that the use of a single canoe or kayak for part of the training regimen would increase training gains. It also points out that a coach or steersman should single out individual paddlers when offering praise or criticism.

A helpful tool in monitoring crew intensity during training is a knotmeter, an inexpensive device easily attached to a canoe that gives instant and continuous hull speed. It eliminates much of the guesswork involved in selecting the fastest combinations and helps a crew focus on the proper level of intensity in its training workouts. Generally coaches determine speed by checking the time it takes a crew to cover a known distance. The use of a knotmeter is an important addition to this time-distance method, allowing a crew to become more consistent in its speed over a given distance.

Technique in outrigger racing means primarily the execution of the paddling stroke, which can be broken into four phases: rotation and reach, entry or catch, pull or draw, and release. The rotation and reach phase has evolved over the last two decades from the Hawaiian emphasis on reach to the Tahitian "sit up with minimum movement" technique to the current conventional wisdom of shoulder, torso, and waist rotation introduced by mainland paddlers.

While there may be some differences of opinion among coaches about the most effective canoe paddling techniques, there is almost universal agreement (backed by Olympic kayak studies) that the most important part of the stroke is applying maximum power at the catch. While it is often perceived that paddlers are paddling effectively by hitting the front part of the stroke, in reality the slower crews are putting their maximum effort towards the middle part of the stroke and missing the importance of the catch.

Illustrated below are four phases of the paddling stroke. *From left to right, entry, pull, release, and rotation. Illustrations by Michael Stirling-Field.*



Steve Scott, coach of the successful Outrigger Canoe Club, has described the process in which the catch leads into the pull as "like the winding of a spring. The shoulders rotate, there is slight bending at the waist, the arms extend and the paddle is sliced into the water. At this critical entry point, the body uncoils and maximum power is applied." Throughout the draw phase, the bottom hand should make a level pull along the side of the canoe and should not describe a circular motion.

Consistently overlooked is the release phase of the stroke sequence. Once a paddle has reached a paddler's waist, it is time to begin to release the paddle from the water. There are two distinct styles of exiting the paddle from the water. One is to pull the paddle nearly straight forward to the point of entry. The other style, which is typically associated with Tahitians, is to slice the blade away from the canoe, bringing the top arm down across the gunnel, and sweeping the feathered blade forward in an arc. The latter technique is generally considered more restful, offers less resistance into the wind, and is similar to the slower and longer "Hawaiian stroke" used prior to the Tahitian influence. Variations on this technique are employed by the majority of paddlers. Most paddles in use today are shaped like an airplane wing, enabling them to be "flown" out of the water with a clean motion that carries very little water. This also keeps the hull of the canoe from digging into the water, thereby avoiding increased wetted surface and drag.

Studies of world-class runners have shown the need for increased emphasis on speed workouts in the training regime. Successful canoe paddlers usually incorporate short speed workouts of four to six minutes duration at maximum effort followed by intervals of slow paddling. While each new season begins with the best of intentions, there are few shortcuts or secrets to achieving succcess as a team. Crews that are consistently winners have diligently prepared themselves for competition by engaging in well-organized and scientifically designed practice sessions. Their success does not stem from some new secret weapon or from luck; in fact, most teams believe that the more they practice correctly, the luckier they get, and the faster they make the canoe go.

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to the Second Edition

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"In the morning": Clark, p. 151-152
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Other Voyages
"I ask your kind favor": Puniawa

11 SURFING

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Peleleu
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"Some of the canoes": Barrere and Sahlins, p. 29
"We polished": Barrere and Sahlins, p. 31
"the facilities it affords": Byron, p. 192-193
"large peleleus": Nakuina, p. 13
"Pa-waa": Kelsey, Hawaiian Collection.
"Kamehameha had wide knowledge": Peron, p. 3
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Canoe Breakers
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15 CANOE RACING

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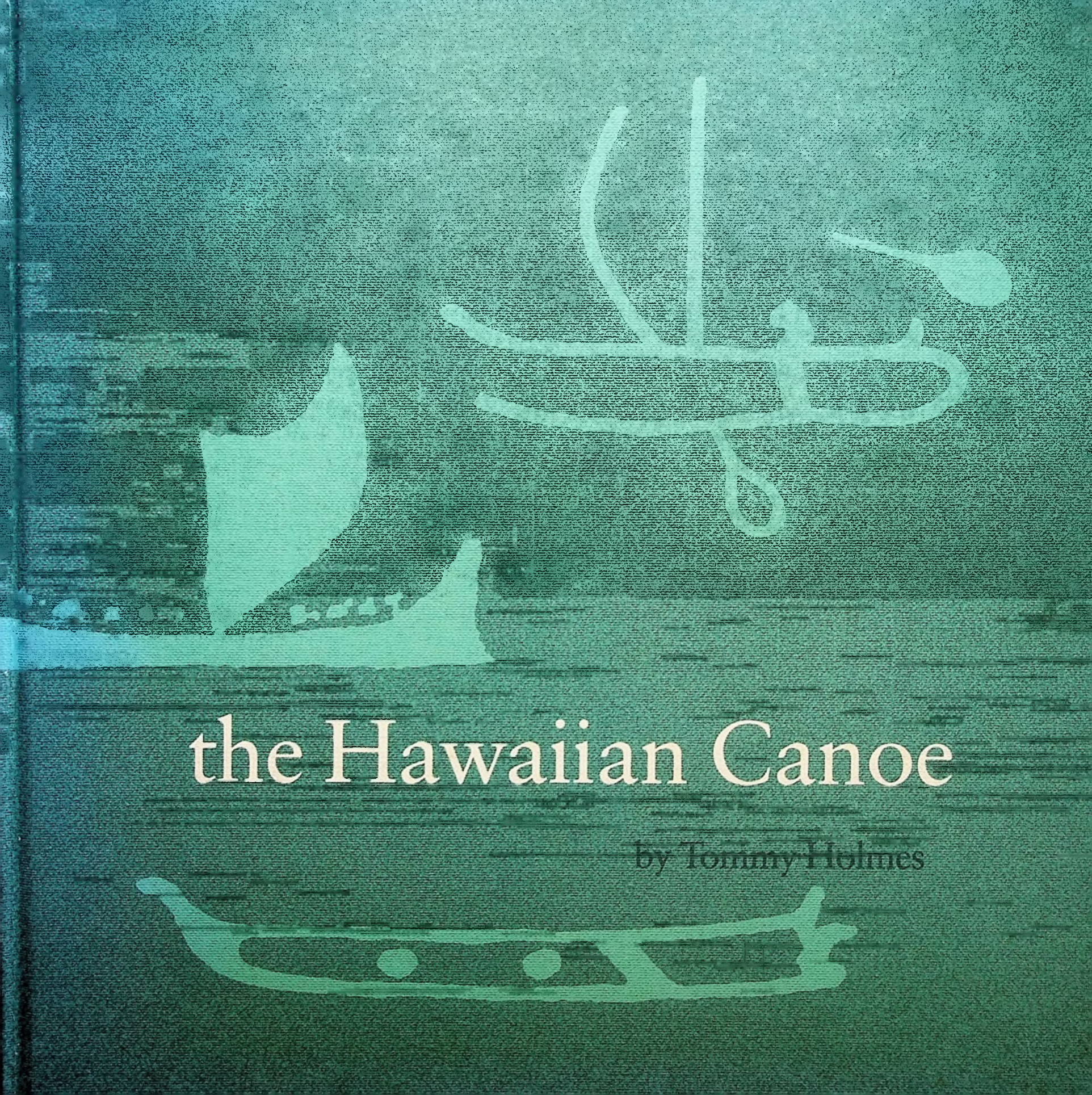

the Hawaiian Canoe

by Tommy Holmes