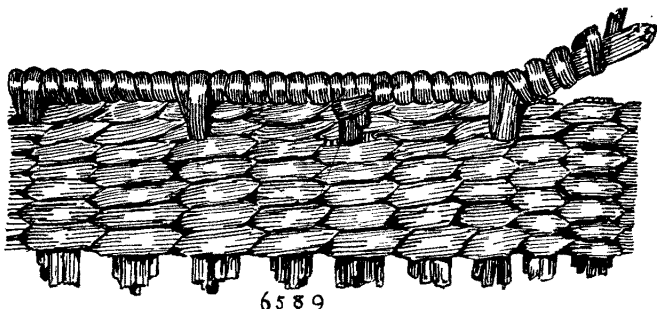


2 twists, 19 rounds; 2 twists, 17 rounds; 2 twists, 17 rounds on the bilge; 2 twists, 18 rounds; 2 twists, 12 rounds; 7 twists to centre. The cover rim has one rod and the binding strip attaches it to the two succeeding twists, by the sixth and seventh round some go over both twists, others over only one. Then come 12 rounds, 2 twists on the edge of cover; 12 rounds, 2 twists; 14 rounds, 2 twists; 11 rounds, 2 twists;



6589
FIG. 61. EDGE OF BASKET NO. 6589.

6 rounds, 4 twists to centre. The label which came with this specimen reads as follows: "This was originally the property of Mrs. Coan, of Hilo, Hawaii, but it has been in use in the family of Mrs. S. N. Castle, of Honolulu, for over fifty-five years, and is given by her to Mr. Brigham for the Bishop Museum."

No. 6942. Diameter at bilge 18 in., at rim 12 in., height (without cover) 9.5 in. The rim is composed of five small rods bound and attached in a way similar to those in the two preceding specimens, but with less regularity. The sequence is 2 twists, 10 rounds; 2 twists, 20 rounds; 2 twists, 15 rounds; 2 twists, 15 rounds on the bilge; 2 twists, 13 rounds; 2 twists, 15 rounds; 3 twists, 11 rounds; 8 twists to centre; no cover extant. The outside has been painted all over a lead color, but the inside is fresh and unstained. Specimen from the curious old stone house at Kailua, Hawaii, built by Reverend Asa Thurston (arrived 1820), and was used by the Thurston family there and elsewhere for seventy-five years.

These three are the only surviving specimens belonging to this class of ieie baskets that are known to the writer. The length of time these have been in use is remarkable, and shows the great strength and durability of the material. The three are of the same general pattern, and might have been made by the same hand; the perfection of the work seems to show that there must have been many made before such skill could have been acquired.

The next class comprises the fine baskets woven over wooden umeke or gourd calabashes or bottles, and several very fine specimens are in the Bishop Museum. Exactly how these were made I cannot say, and the technic must be gathered from the specimens, for in the early days of my explorations on this group I never saw any such baskets, and have not been able to learn much about them from the present generation of natives. It seems to have been the only basket figured and noticed by the early explorers, and Freycinet makes a curious mistake in the material used. It seems worth while to quote his account:

"On fait avec la feuille du ti, quelques ouvrages dans le goût de ceux de nos vanniers, mais peut-être mieux finis; les uns sont d'une seule teinte; les autres, tels que les casques, les éventails, les panniens, le clissage des calabasses où l'on serre les effets précieux, &c., sont nuancés de couleurs diverses. Ces ouvrages, confiés aussi à la main délicate des femmes, offrent des formes et dimensions très-variées."¹⁷

What the French Commander took for the leaves of the ti (ki, *Cordyline terminalis*) was afterward named for him *Freycinetia*, and the figures given in Freycinet's report leave no doubt that the baskets we are now considering were the ones referred to in the quotation. As he says, these hinaï poepoe were used as receptacles for their greatest treasures, and we know that when the breakage of the interior umeke or calabash deprives these baskets of their waterproof character and they fall to baser uses they will still serve for many years as fish baskets, or for other purposes. Demijons and carboys, hard receptacles covered with basket work by more civilized people, are only fit for destruction when the inner part is damaged! Figs. 62, 65 and Plate IX give fair representations of the best of these hinaï poepoe, and the following list of those in the Museum will explain the illustrations:

No. 3890 (Plate IX) measures, as figured, 21.5 in. high with cover; greatest diameter 9.2 in. The inside wooden (kou) umeke measures 13.2 in. in depth (internal), and 5.7 in. at the mouth. The cover is of the same material and has 6 in. and 6.7 in. internal measurement. The outer basketry comes to within three-quarters of an inch of the top of the umeke, and is finished off by a braid which does not project beyond the general surface; a net of oloná is attached below the fourth round. The cover has a rim like the baskets of the first class, but smaller, and in both the weaving is close and varied only by reversing.

¹⁷ Freycinet, Voyage autour du monde, 1817-20, II, p. 613.

3890

3889

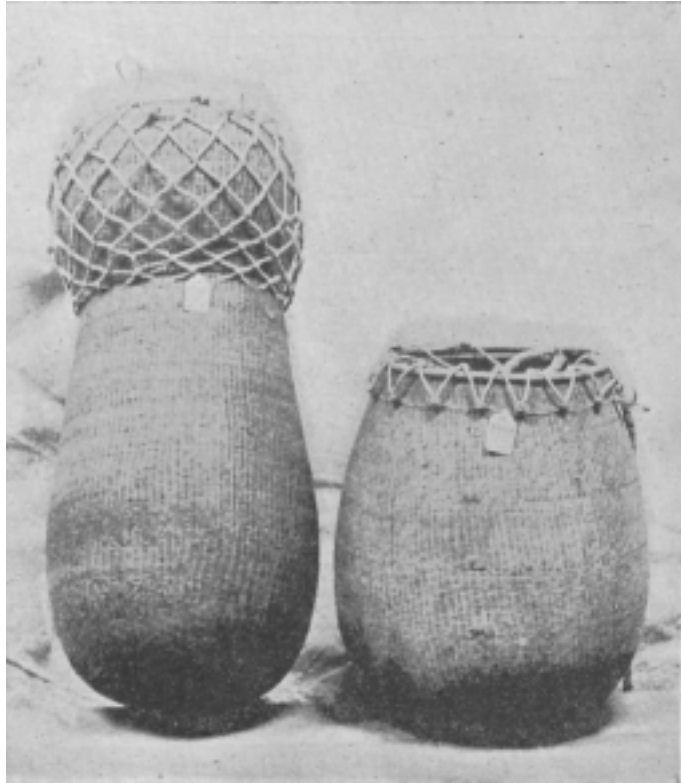


FIG. 62. HINAÏ POEPOE.

No. 1405 (Fig. 65) measures 28 in. high and 13.5 in. at the greatest diameter. The interior is a gourd 23 in. deep and 5.2 in. at neck. The strands are three-ply in cover of which the gourd is lost.

No. 3889 (Pl. IX) has a wooden umeke as well shown in Fig. 63; there is no cover; height 12.5 in., while the umeke measures inside 10.5 in., with a diameter of 6.5 in. at neck. The beautiful and close weave at the neck is shown in the figure.



FIG. 63. MOUTH OF HINAI POEPOE NO. 3889.

No. 1403 (Pl. IX) is 25 in. high and 16 in. in diameter: cover empty: both baskets neatly finished at ends by braid.

No. 1406 has no cover; is 14.5 in. high, 13.5 in. in diameter, and contains a gourd; closely woven around the rim.

No. 1550 (Fig. 65) is remarkably long and originally covered a wooden umeke which was broken many years ago, and for more than a score of years the basket has been used as a receptacle for fish. It is 36 in. long,—the longest known. The base shows an unusual beginning for these bas-

kets (Fig. 64). The variations in the bands are shown in Pl. VI and, in part, in Fig. 65.

No. 3890 (Pl. IX) is woven around wooden umeke, in body and cover; height 22 in., diameter 9 in. Best in collection.

No. 1409 (Pl. VIII) is one of the flat calabash baskets, 12 in. high and 18 in. in diameter. As this is the only one of this flat form and has no cover, it is difficult to say what that part consisted of, but it was probably a flat basket work disk, and the basket was used for the preservation of some choice feather cape or lei.

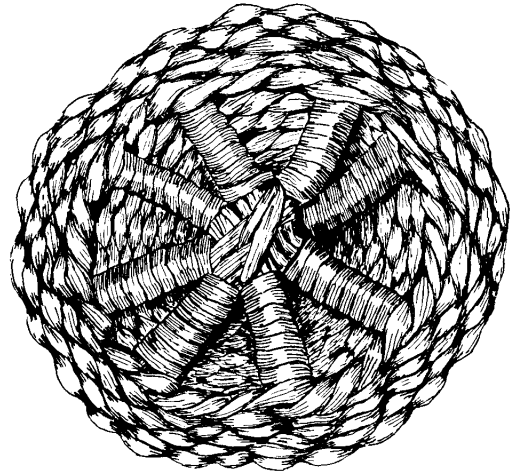
No. 7705 has a diameter of 16 in. and is 27.5 in. high. It is woven on a gourd, but the cover is now empty and the whole is contained in a koko or net used for such purposes.

No. 3844 has lost its internal umeke or gourd. The weaving is much like that in Class I, within which it would be included but for its shape. Height 24 in., diameter 14 in. It has heavy cord loops to secure the cover.

No. 1404 has a height of 16.5 in., and a diameter of 9.5 in.; gourds in basket and in cover; the general finish very good, the weave being in a continuous spiral from beginning to the rim. There are six black bands on the basket and five on the cover; the net for the cover is of oloná (Pl. IX).

In all this class of baskets the work is far above the average of Hawaiian, or indeed Pacific, basket making; the weave is exceedingly close and regular, and the form is peculiar to this group, but most closely resembling certain Hawaiian containers made for holding fish lines, but of wood and gourd without any basketry.

We now come to another class where the workmanship is far inferior, although the general form still reminds us of the fine hinai poepoe. The material, ieie, is the same, but the strips are either used unsplit or carelessly combined. In some an attempt to imitate the older and better work seems present; in others the product is a coarser basket without any enclosed container. The basket becomes suitable for holding fish or any coarse or dirty objects without having to wait until the inner gourd or umeke is broken. The list is not a long one.



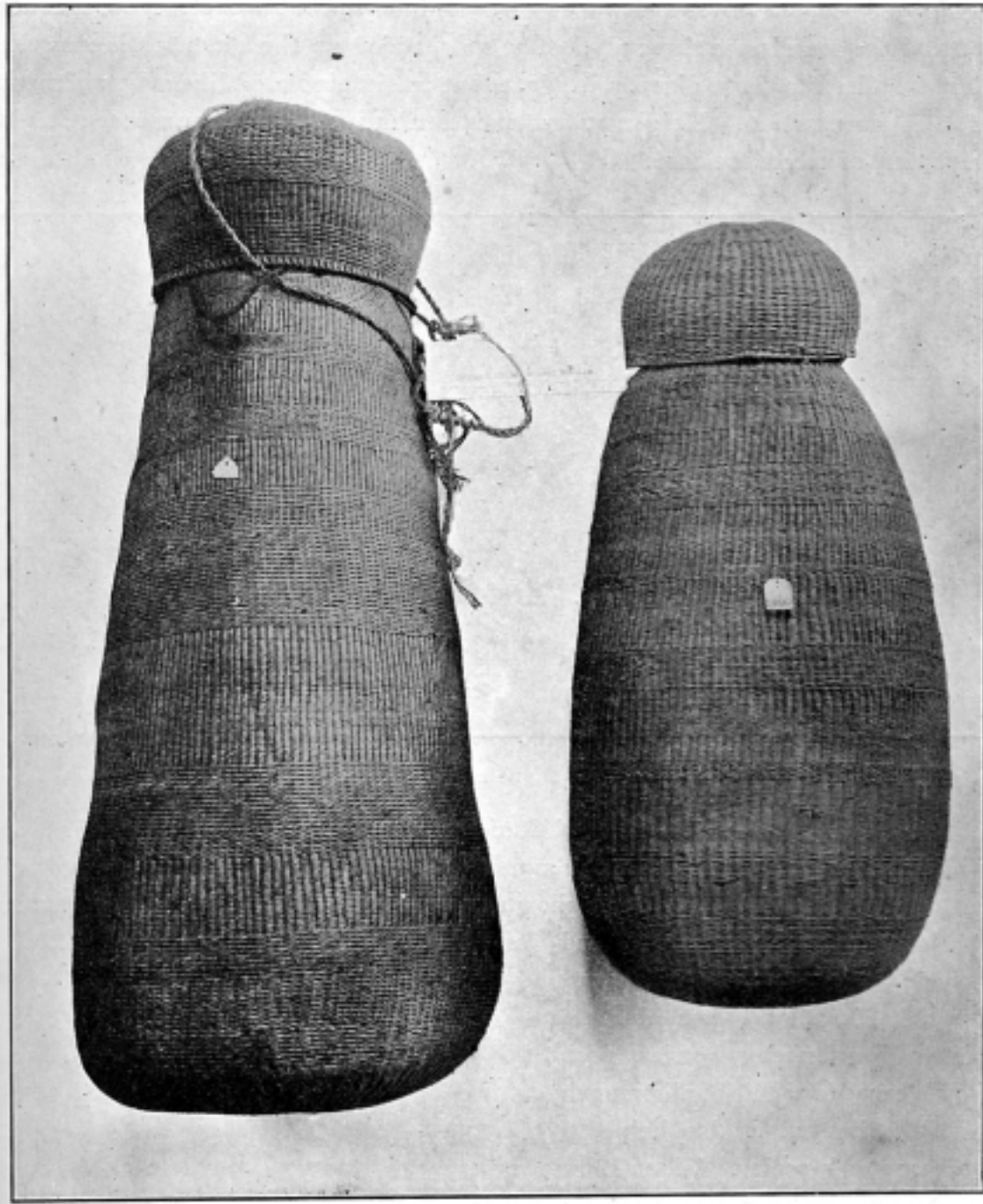
1550.

FIG. 64. BOTTOM OF BASKET NO. 1550.

No. 1407 is a very modern attempt to imitate the fine work of the old Hawaiians, and, apparently has never been used. Two gourds are employed for foundation, and the basketry is of the coarsest two-ply weave over single rods of the same material; it has much the same appearance as the common demijohn wicker work. Height, with cover, 19 in., diameter 13 in.; net of coco fibre cord. The ieie strips have not been halved; they have only a small portion removed, and the strip is of course less pliable.

No. 4050 is a modern basket finished much as the last, but independent of gourd or umeke, and with a flat top. Height, with cover, 12 in., diameter 10.5 in. Fig. 66.

No. 1408 is of the same general form as the preceding, but is of greater age. It has apparently been woven without any interior vessel, and with Nos. 4050 and 3845 might be put in Class III for convenience of classification. The workmanship is by no means so fine as in Class I, but is better than in No. 4050. Height, without cover, 13 in., diameter 11 in. The rims of both basket and cover are made exactly like that figured in No. 6589, and the latter is secured by a single coco fibre cord ex-



1550 FIG. 65. HAWAIIAN HINAI POEPOE. 1405

tending from its centre to the encircling net of the basket, this net being made partly of oloná, partly of coco fibre. Central specimen in Fig. 66.

No. 3845 is like the last specimen, as may be seen in Fig. 66, but is much smaller, and in place of the usual net to fasten the cover in place, has two loops of cord knotted through the sides, which serve also for handles.

No. 3887 has no cover and was made as an independent basket; the rim is neatly braided and the rounds are three-ply. The rods, added as the diameter increases, are not always spliced to those already in place, but are interpolated like a V, making two rods for each insertion. Height 17 in., diameter 14 in. Has been mended in places with a "darn" of coco fibre cord.

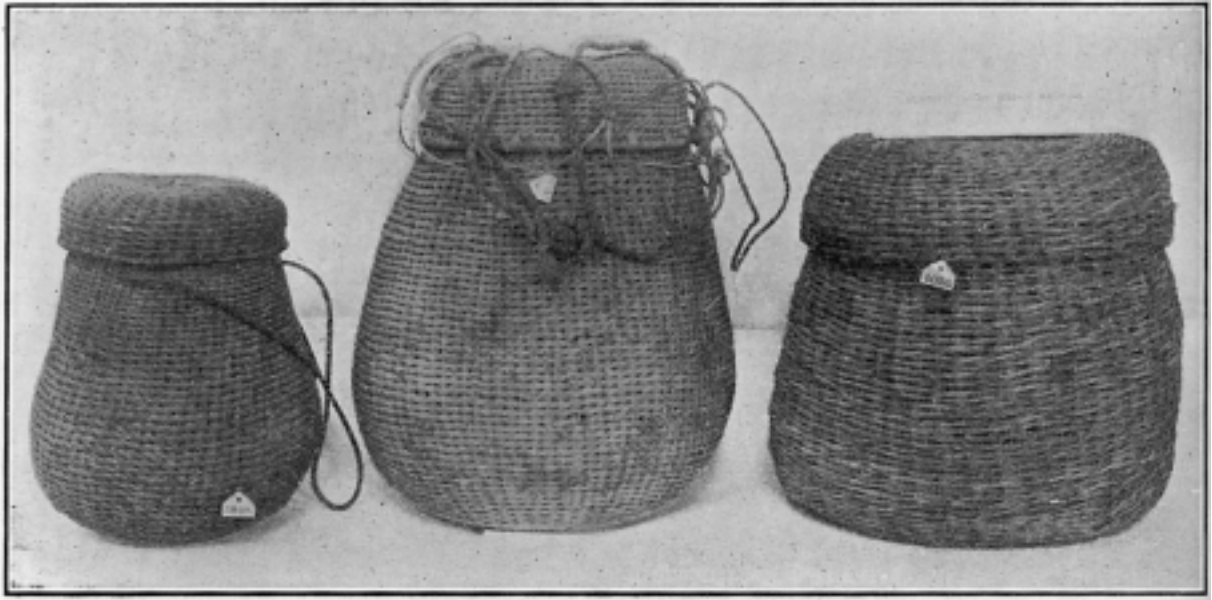
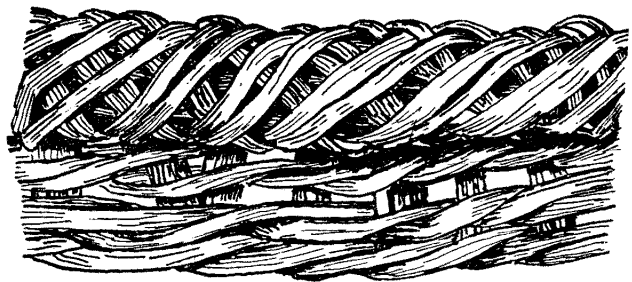


FIG. 66. GROUP OF FLAT-TOPPED HAWAIIAN BASKETS.

No. 3843 is similar to the last, but of coarser workmanship; the rounds are still three-ply, and the rims both of basket and cover are of a number of strips intertwined around the bent ends of the rods, as shown in Fig. 67. Height 17 in., diameter 12 in.

Not only umeke and corresponding gourds were covered with basketry by the old Hawaiians, but also the huewai or gourd water bottles, probably in all cases for additional strength; but with the huewai it also helped to keep the contents cooler. When I first saw the following specimen I was inclined to think the natives in modern times had copied the wicker-covered glass bottles used as perfume bottles or pocket flasks by the foreigners, but I am assured by old Hawaiians that their people made such water bottles in ancient times.



3843.

FIG. 67. RIM OF BASKET NO. 3843.

No. 5350 is a huewai or water bottle of gourd covered with a closely-woven

three-ply spiral band, alternately brown and black. There are two braided ears on opposite sides of the spring of the neck, to which are still attached the remains of a square braid cord; the cap or capsule is of the same work.

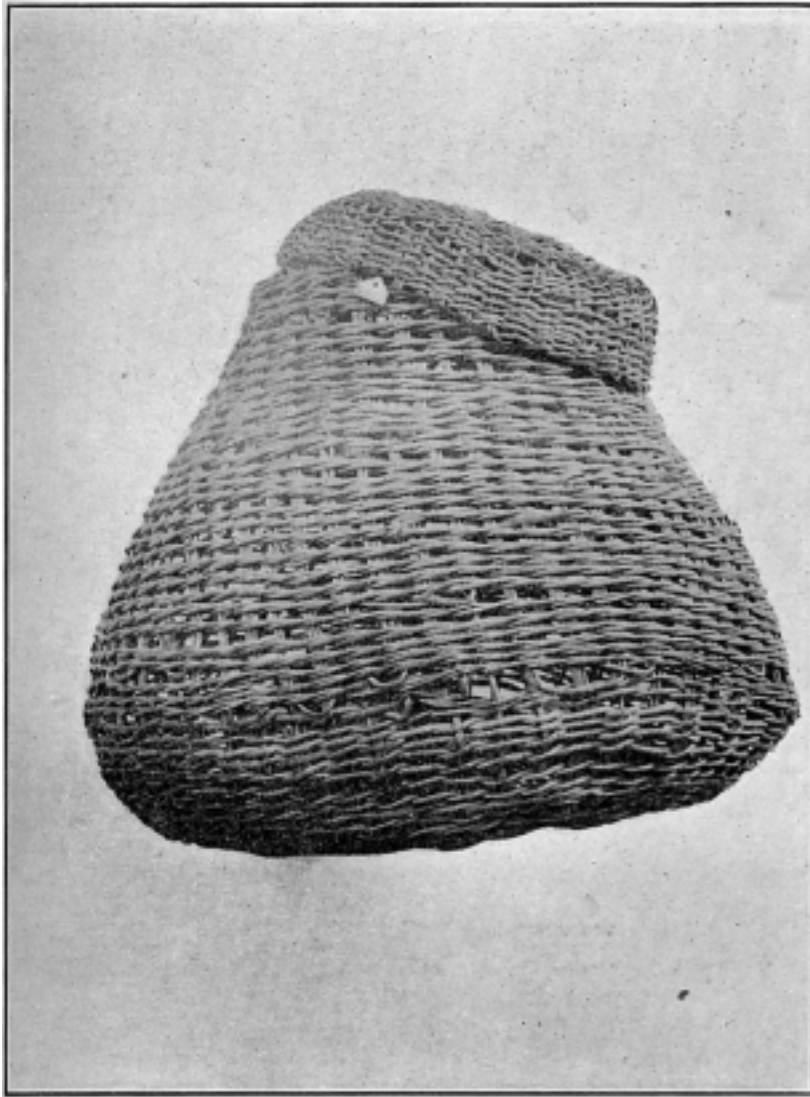


FIG. 68. HAWAIIAN FISH BASKET, NO. 3842.

no longer fit for their original purpose, but the specimen here figured was made for fish and not for anything else.

No. 3842 is a fish basket with a height of 17 in., with cover, and a diameter of 19 in. The weave is three-ply on the basket, and two-ply on the cover, and there are no handles nor fastenings for the cover. See Figs. 68 and 69.

These baskets were common and seem better suited to their purpose than those of woven pandanus leaves already described, and they are both stronger and more durable,

We come now to an entirely different kind of basket, both in shape and in purpose, although there is, it is true, some likeness in shape to the beautiful baskets of Class I. Its shape and weave is sufficiently shown in the figures to dispense with any particular description. A people depending, as did the Hawaiians, on fish for food would naturally have developed their basketry in that line, and we shall briefly touch upon the common forms, leaving a fuller description of their actual use for the chapter on Hawaiian Fisheries. Many of the baskets that have been described have been used for fish when

but, perhaps on account of their use, they are not often found in collections, as the old ones become very dirty and fishy. Hawaiian fish traps were sometimes made of ieie, sometimes of other vines, but generally of iwaiwa or fern stem, and have been described under that division. The curious shrimp baskets deserve notice here, and Plate IV may be consulted for their general appearance and construction. As that plate shows, they vary considerably in size, and in recent times the vendors of curiosities have introduced immense ones to serve for hall decorations or umbrella holders. The scale on the plate is sufficient guide to the size of those figured. Nos. 7681 and 7682 are of a more common size. It should be added that these baskets are used to catch the shrimps, and not to store them.

Idols and Helmets.

—Another extensive use of ieie strips and rods is found in the manufacture of images of the gods, and helmets. Of the former, huge simulacra were constructed, none of which are now known to exist, although

in the early days of the American Mission (1820-1835) some large specimens remained at Kailua, Hawaii, and it is quite possible others were concealed in caves which may

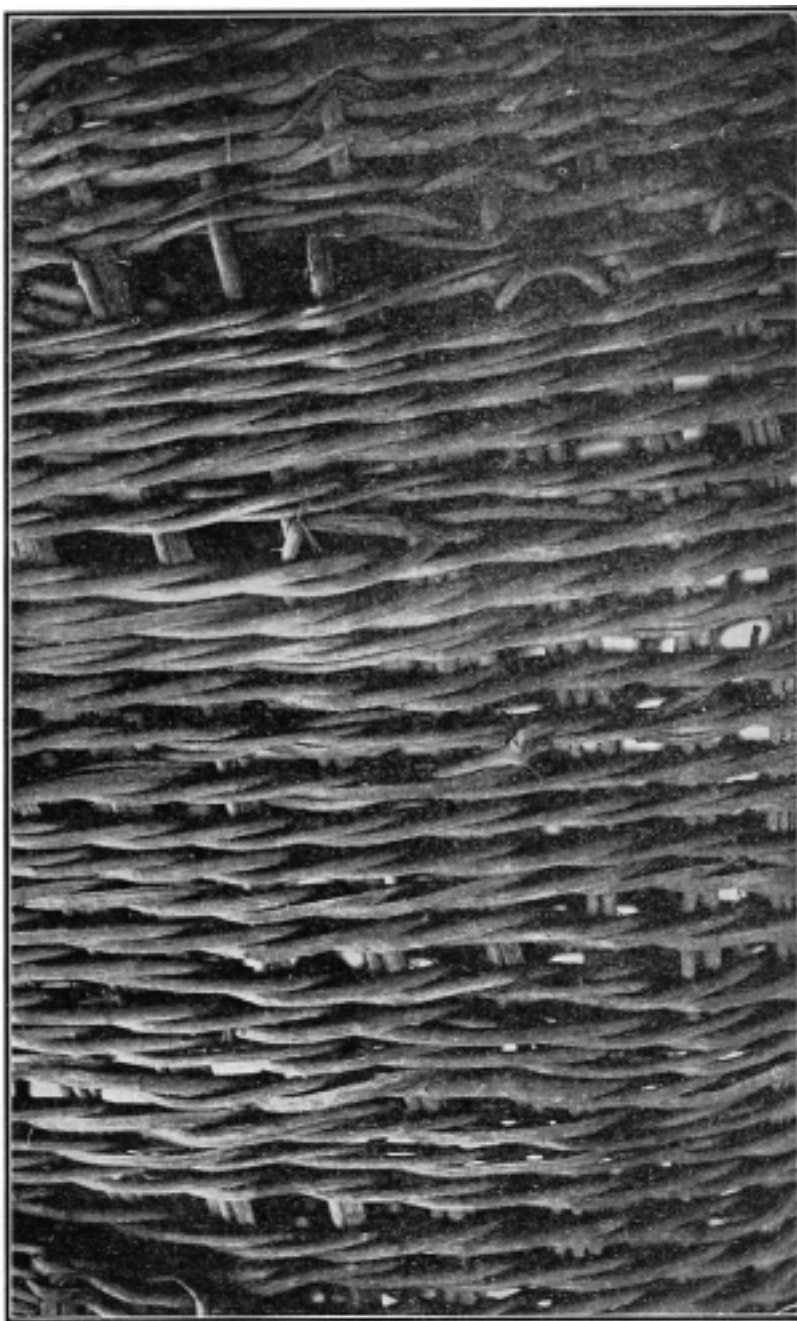


FIG. 69. ENLARGED PORTION OF NO. 3842.

still preserve them. The late King Kalakaua described to me such images he claimed

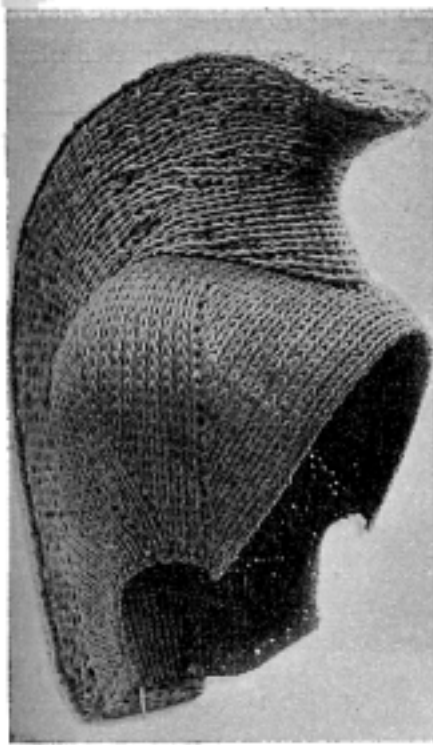


FIG. 70. WICKER WORK HELMET.

to have seen in a cave in the cliff above Kealakekua Bay. There are still in existence, however, a number of smaller images, notably those of the war god Kukailimoku, some of which have been figured and described in the first volume of these Memoirs. These consisted of a head and neck of ieie basket work, often very neatly made, which was covered with a closely fitting net of oloná fibre, to which were attached the red, yellow and black feathers which distinguished the god.

The helmets of the ancient chiefs are even more widely distributed through the principal museums of Europe and America. Some of these are made in a comparatively rough manner, as the wicker work was to be covered with feathers, while others were finished specimens of basket work. Illustrations of both classes have been given in the Memoir on Ancient Hawaiian Feather Work,¹⁸ and Figs. 70 and 71 may here repeat examples of them for convenience. The first, Fig. 70, which is in the Australian Museum, Sydney, N. S. W., was once covered with feathers, and is made firmly of a braided structure ingeniously adapted to the irregular shape of the helmet. The other, Fig. 71, was beautifully woven in the manner of the best baskets and was worn without the feathery decoration. Others, apparently intended to remain featherless, are in Berlin, London, Paris and Cambridge, Mass. I have not examined all the substructures of the feather helmets figured (*loc. cit.*), but as all in this Museum are of the same material I infer that it was generally used for these images and helmets.

Fern Stems.—Although among the Hawaiians fern stems were not in common use, they served for small and ornamental

¹⁸ Memoirs B. P. Bishop Museum, Vol. I. No. 1.

to have seen in a cave in the cliff above Kealakekua Bay. There are still in existence, however, a number of smaller images, notably those of the war god Kukailimoku, some of which have been figured and described in the first volume of these Memoirs. These consisted of a head and neck of ieie basket work, often very neatly made, which was covered with a closely fitting net of oloná fibre, to which were attached the red, yellow and black feathers which distinguished the god.

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FIG. 71. HELMET OF IEIE.

baskets, as at the present day. Three ferns bore the general name *iwaiwa*,¹⁹ *Asplenium Adiantum-nigrum*, *Pteris decipiens* and *Adiantum capillus Veneris*; all of these having smooth dark-colored stipes varying in color from dark brown through purple to black. A material not very flexible (except when soaked), but glossy and durable.

In the days when Honolulu was a rendezvous for whalers in the Pacific a fashion was introduced among the Hawaiians that must have borrowed from methods used long before, so that in describing it the mere curiosity of the result yields wholly to the suggestion of a manufacture of fern-stem basketry, of which no other remains are extant. The hats for women, still made in fancy form, do not suggest any ancient origin. Captains of



FIG. 72. HAWAIIAN FERN-STEM HAT.

whalers almost invariably had on board their vessels at least one silk hat, not always of the latest block, which they were accustomed to wear ashore on public or important occasions, and these absurd and uncomfortable head-dresses, which fashion imposed upon the white man, roused great admiration in the breast of his dusky imitator. Wives or sweethearts soon fashioned the respectable imitation (it was in the days of the early missionaries), which is shown in Fig. 72. Fern stems and horse hair are the components, and it was certainly better fitted to withstand tropical rains than its silken prototype. The particular specimen figured, now in the Bishop Museum, was

¹⁹ Andrews gives the definition "He mea ulu e like me ke palaa, ua ulana pa ia me ka papale maun."

given to the Rev. Rufus Anderson, D.D., Secretary of the American Board of Commissioners for Foreign Missions at the time of his visit to these Islands in 1863. About the same time I saw in the streets of Honolulu a powerfully built native clad only in such a hat and his scanty malo. To the present day the Hawaiians show a respect

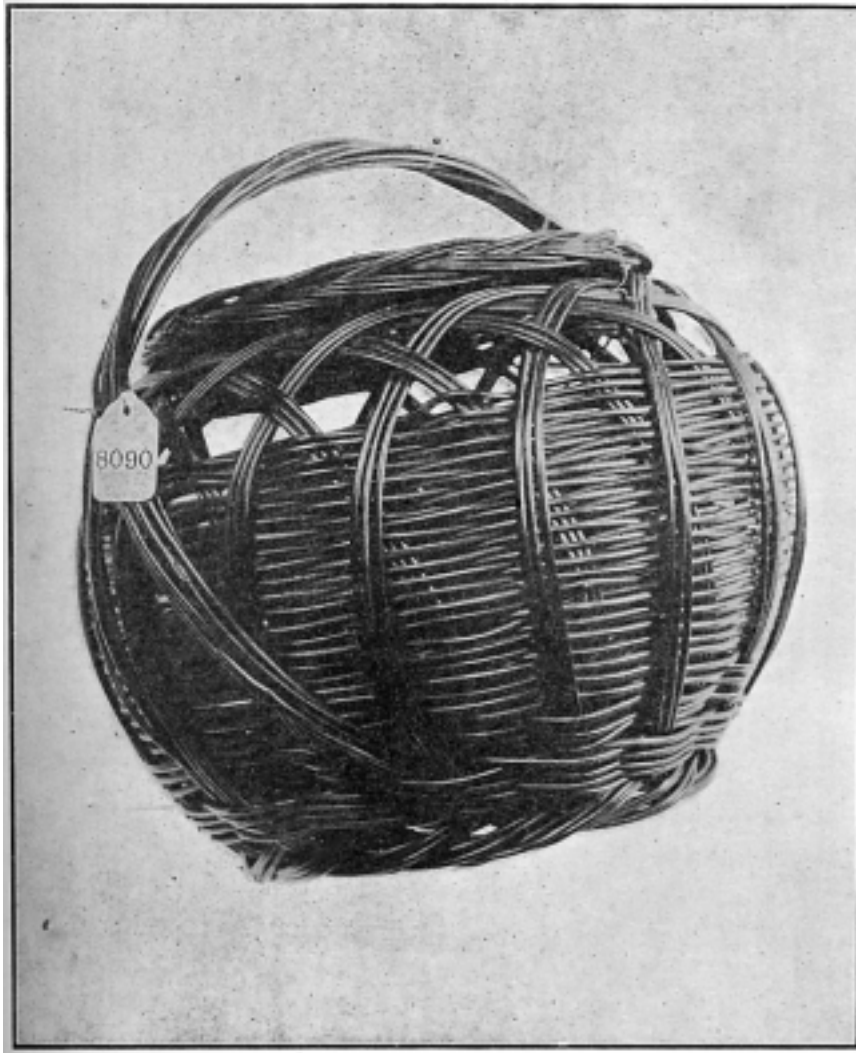


FIG. 73. MODERN JAPANESE FERN-STEM BASKET.

ward more use was made of fern stems, especially for fish traps and baskets, as they are not readily rotted in water. In New Zealand are made fine eel traps (*Hinaki*) and baskets in which to keep fish alive (*Whakarapa*), both shown in Fig. 74. These are made of *mengemenge* fern (*Lygodium articulatum*) a twining fern with stems of great length. The genus is found as far away as New England. The stipe of the *Heruheru* fern (*Todea (Leptopteris) superba*) is said²⁰ to be used in the manufacture of combs,

²⁰A. Hamilton, Maori Art, p. 302.

for this form of hat, although now selecting the imported variety. The specimen illustrated weighs 10.5 ounces.

In the Museum collection is No. 8090, shown in Fig. 73, a graceful modern basket made for sale rather than for use. It is Japanese, but was brought by two old natives, known to me for many years as dealers in mats and baskets, with the assurance that it was made by Hawaiians. On their statement the figure was inserted and remains as a warning to collectors of basketry.

On the other groups to the south-

Heru, but the stipita of this splendid fern are very short, seldom exceeding three inches in length, and, however fit for the teeth of combs, not suited for weaving baskets.

Whakarapa.

Hinaki.

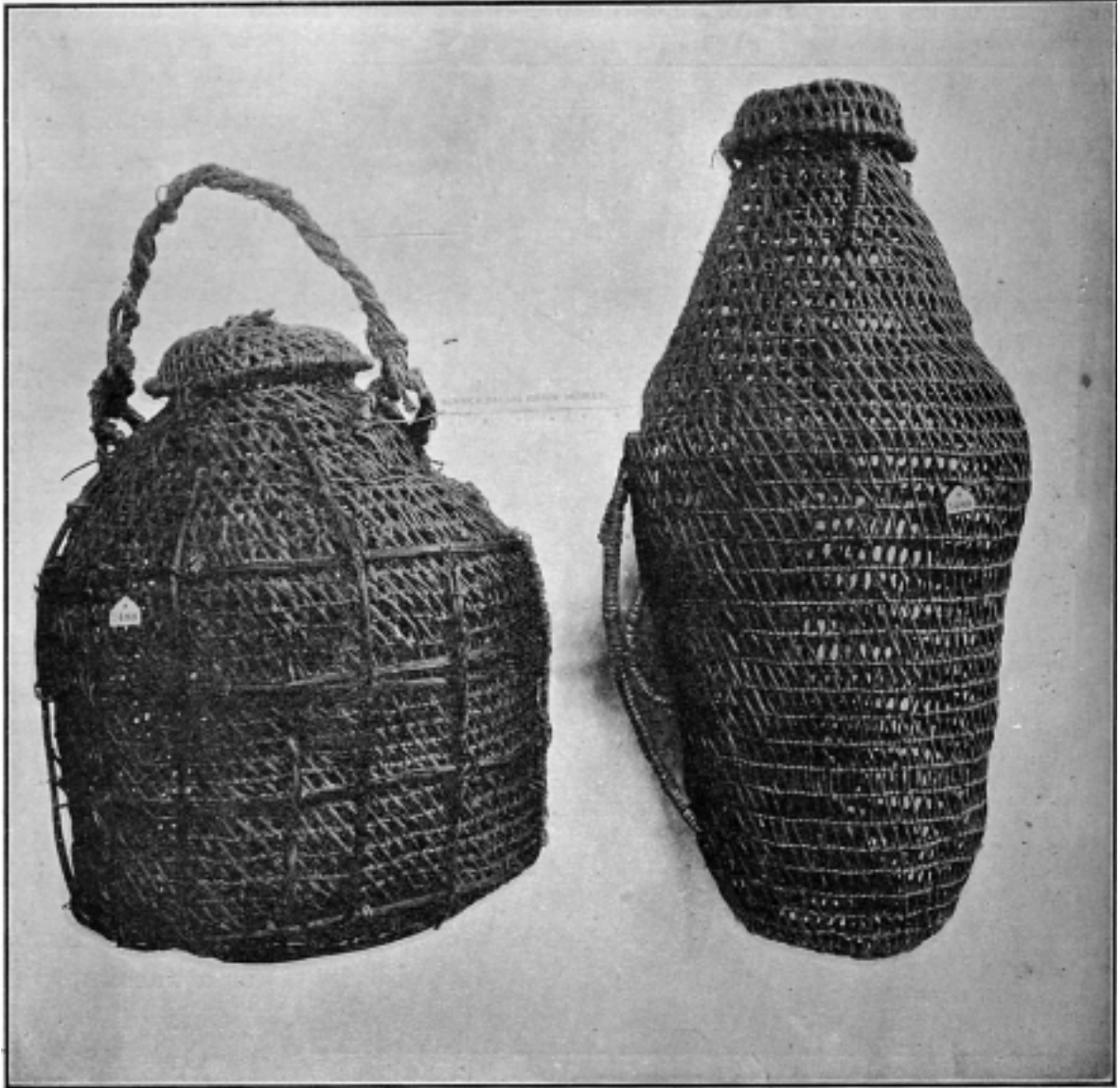


FIG. 74. WHAKARAPA AND HINAKI, NEW ZEALAND FISH BASKETS.

The illustration shows that as specimens of basketry both the Hinaki (compare Hawaiian *Hinai* basket) and Whakarapa are well and strongly made. The handle of the latter is of a form unusual in this region and resembles the bail of a pail. In the Hinaki one long handle extends nearly the length of one side, strengthened in the middle; while two smaller ones are at the lesser end and 90° from the main handle; the cover is hinged and has a loop to fasten it, and the entrance for the eels is at the larger end.

No. 6954 is a very large fish trap made of the same material, measuring 48 in. in length, and 24 in. in diameter. It has three loops on each side near the smaller end. When wet it may be folded flat, although very stiff and firm when dry. The exquisite braid work of the Solomon Islanders has generally been described as of fern, and has even been attributed to a species of *Gleichenia*, but we have in the Museum specimens of a grass from which this attractive work is made, so we must defer farther notice of this to succeeding pages, where the grass manufactures take their turn.

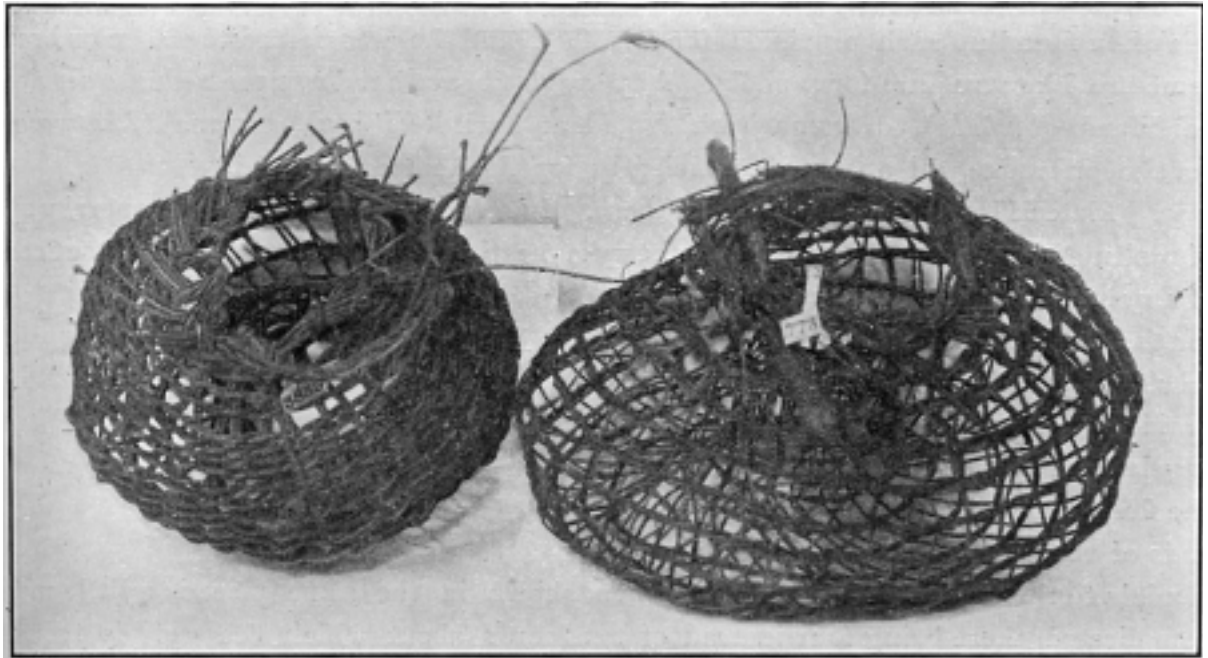


FIG. 75. HAWAIIAN FERN-STEM FISH TRAPS.

So far as is known the old Hawaiians made nothing of fern stems of such great size as the Maori hinaki; indeed they had no fern stems to compare with the *Lygodium* of New Zealand, but they made similar traps of the much shorter Hawaiian ferns. Two of these are shown in the figure, and I am informed that such traps were much used in ancient times; and while sometimes made of other material, as at the present day, the fern was much preferred, and considered more durable. It is quite possible that the dark color of the fern gives some advantage to the fisherman.

Hawaiian Sandals=Na Kamaa Maole.—Necessity must, in very primitive times, have given birth to the invention of sandals in a country where volcanoes often spread lava streams of most extreme roughness across the paths until for miles a surface is formed that not even the hoofs of a horse can stand. Few who have not dissected the foot of a man accustomed to go barefoot can have any idea of the exceeding

toughness of such a man's sole; but as little can one who has not walked over it appreciate the sharp roughness of a stream of Hawaiian *aa*, the roughest form of lava. The toughest soled native needs some artificial protection for his feet. In climbing Mauna Loa, the largest of the Hawaiian volcanic mountains, in 1864, the author wore out three sets of rawhide sandals used as protection to stout walking shoes, and only occasional beds of *aa* were encountered. No one could travel around the island of Hawaii, near the coast, without meeting many miles of this rough road. Where a permanent path was needed smooth beach pebbles were laid for footway, but on occasional journeys one often found no such provision for his feet, and he was forced to weave or braid some mat-like structure for sandals. Any tough fibre at hand was pressed into service; pandanus (*lauhala*), dracæna (*la'i ki*), hau bark (*ili hau*), banana (*lau maia*), poaaha or waoke, all answered sufficiently for the temporary need.

Plate III shows examples of all these. In structure there were two general ways of plaiting the hastily constructed basketry: one, the simplest, consisted of a stout cord of any suitable material formed into a loop for the toes and over and between the parallel sides formed by the cords the leaves were braided or entwined, the tougher stems being left for the under surface, as shown in the first example on Plate III. The loose ends of the looped cord served to bind the sandals to the ankle.



FIG. 76. PLAN OF SANDAL.

The third specimen shown in the same plate is a little more complicated, there being four instead of two cords about which the weft is twined. Fig. 76 shows this more clearly, the loops work in opposite directions and when pulled draw the substance of the sandal together. When waoke or maia was used a very comfortable and serviceable foot support resulted: such are used even now by the white man as well as by the Hawaiian when walking much on the rough coral reefs.

Of the sandals in the Bishop Museum at this writing the following list will fairly show the comparative frequency of the material used:

- 4535. Sandals of lauhala, dry but without special preparation.
- 4537. Sandals of lauhala.
- 4538. Sandals of poaaha or partly beaten waoke, rectangular in shape.
- 4539. Sandals of poaaha, thick and tough.
- 4540. Sandals of banana leaf stem. These are always rectangular.
- 4541. Sandals of banana leaf stem with ili hau cords.
- 4542. Sandals of malina (American aloe).
- 4543. Sandals of hau bark = ili hau (*Paritium tiliaceum*).

4544. Sandals of lai ki (*Cordyline terminalis*).
 4545. Sandals of lai ki for a child.
 4546. Sandals of lai ki, stout and coarse.
 4547. Sandals of lai ki, well braided.
 4548. Sandals of lai ki, from the Queen Emma collection.
 4549. Sandals of malina or aloe.
 5107. Sandals of poaaha or partly beaten waoke (*Broussonetia papyrifera*).
 8986. Sandals of lai ki.
 8987. Sandals of lai ki.
 8988. Sandals of lai ki.
 8989. Sandals of lai ki.
 8990. Sandals of hau bark = ili hau.

No other covering for the feet than these sandals were known to the Hawaiians before the advent of foreigners. Although they had the pig I do not know that they ever used pigskin for making sandals, not even after they had seen the pigskin-soled grass slippers of the Chinese, who were early immigrants, Vancouver finding, only fourteen years after the death of Cook, many of these orientals in the country.

Niihau or Makaloa Mats.—In describing the Hawaiian baskets of ieie mention was made of another notable manufacture of these islands, one which is now fast passing to the region of lost arts where the ieie baskets have gone. A few old women still make the mats from the sedge which grows commonly enough along shores and in brackish marshes. It was chiefly on the little island of Niihau that the makaloa mats were made, although the sedge (*Cyperus laevigatus*) grows on Oahu and other islands of the group, and it is claimed that those with colored figures (*Na moena pawehe*) were not made elsewhere. Exact information is hard to obtain on such matters, but certainly Niihau, populous enough in olden time, was the chief factory and gave name to the fabric. This was doubtless the mat noticed with admiration by early voyagers, of which mention has been already made.

The preparation of the sedge was simple, but only while the plant was young could the finest mats be woven, so that the time of working on these was limited to a few months each year, and the people had not learned the method of procuring a succession of crops. The weaving of the mat was begun, as shown clearly in Plate X, and the leaves added as needed. In comparing this figure with that of the pandanus mat, Fig. 54, the great difference in the length of the staple will be noted. As with the hala, the leaves dried over a fire were whiter, and in the case of the makaloa these were called *olala*; it was the favorite kind of leaf used, except perhaps for the large

floor coverings. The red figures are formed from the lower portion of the stem, which is naturally colored; but while this color is fairly durable, it turns a dirty brown on long exposure to the light. The fresh color, both of the olala and the red figures, is well shown on Plate XVI. These figures are an embroidery and do not show on the reverse. The patterns used are very simple geometric ones that do not present the variety shown in the decorated Hawaiian kapa, but the nature of the texture kept these within narrow bounds. Even on kapa, where the surface admits of any form, we seldom find

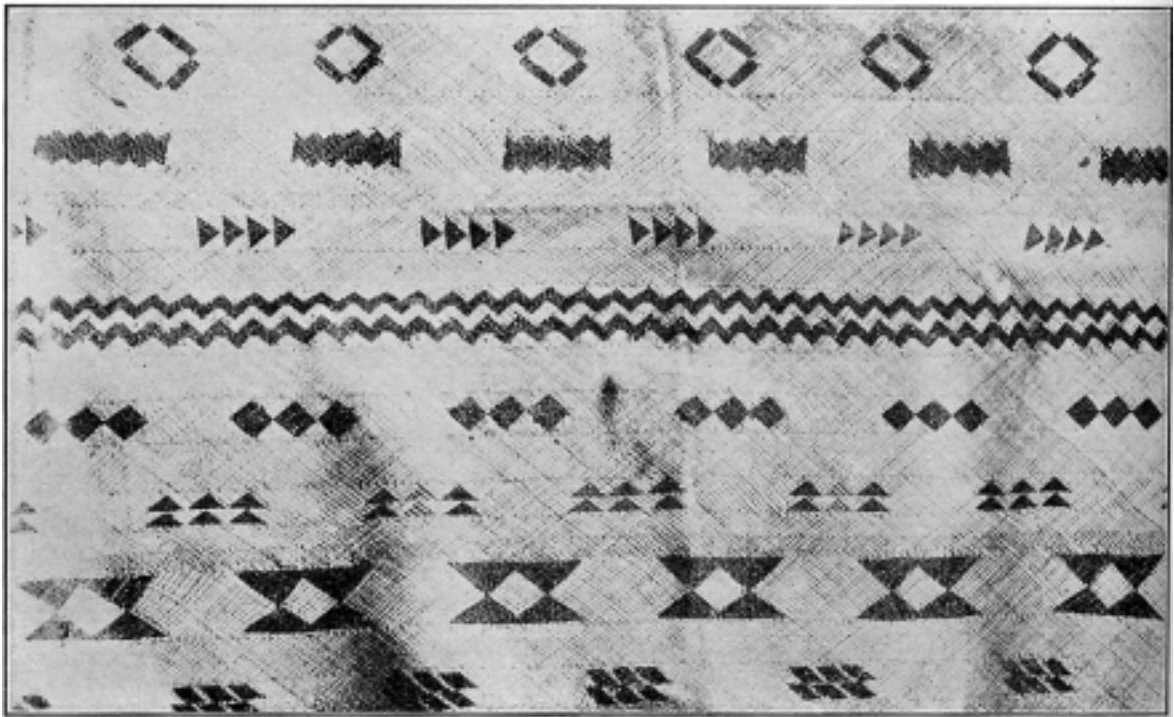


FIG. 77. NIHAU MAKALOA MAT.

the attempt to represent natural objects; almost always it was ornamentation composed of triangles, rhombs, squares and lines. All these patterns had names, and I have been at some pains to preserve these which will be found in the illustrations (Figs. 77-81, and Pls. XI-XIII, and XVI). Not only did the weaver use these external decorations, but in the very weave she used her fancy in a way seldom found in the hala mats, and some mats are a series of stripes, each of a different weave. These fancy stripes sometimes alternate with those of a plain weave, and on these latter were generally embroidered the red figures. One mat in this collection, No. 10,072, recently made, shows not only nearly all the usual figures but is woven in nearly all the known styles, including fancy twills. The names of the patterns are as follows:

Keekee. Bent, zigzag; a favorite form, reminding one of the Egyptian hieroglyph for water. Fig. 78.

Olowahia. A saw; this is also a favorite design. Fig. 79.

Kuhanu. Breath of Ku (the god of war). Fig. 79. (Second and fourth band.)

Humuuniki. Squares joined. Fig. 80. (Central band.)

Papaula. Red row. Fig. 80. (Second band from bottom.)

Puakala. Rough, like the leaf of the *Argemone*. Fig. 80. (Bottom band.)

Hale = house. Fig. 81.

Nene = geese flying. Fig. 81.

Papa konane = checkers.

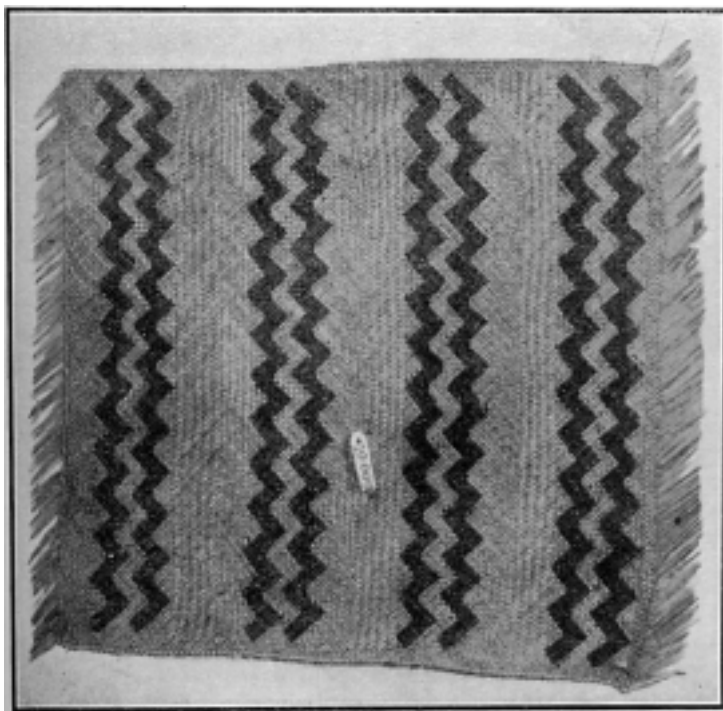


FIG. 78. KEEKKE PATTERN.

80, 83b): the last was greatly used as a central dotting. The combination of triangles and squares, of which the distinctive name is not known (that is, they are not found in my note book of forty years ago) may be seen in Fig. 83, where the numbers there given are used in the descriptive list of the mats given below. After the islanders had learned to read, under the instruction of the American missionaries, the use of letters of the alphabet became common both in tatuing and mat decorating, and mats somewhat resembling the samplers of our grandmothers' days were woven. It soon became common to write affectionate greeting on mats intended as presents to friends, and I have seen a number of these. On sleeping mats I have seen embroidered the inscription "*Kuu ipo, kuu lei, kuu milimili e*" (My darling, my crown, my thing to be gazed upon). It is often difficult to decipher these mat inscriptions, as the technic prevents the use of

curves, and the individual letters were of strange forms, and, like the ancient Greek inscriptions, there was not that separation between the words that a modern reader demands

The largest mat in this Museum is No. 2574—30.5 ft. long and 14.5 ft. wide but it is not of the finest weave (11 to inch); combinations of four squares and of eight triangles alternate over the surface.

The smallest makaloa mat is No. 2601, a malo or waist band worn by a chief; it is about 9 in. wide and 6 ft. long, and of a fineness of 20 to inch. Another very ancient makaloa malo, No. 2600, from Queen Emma's collection, is said to be the identical malo worn by the Moi Liloa when he met Akahikameainoa, and which after-

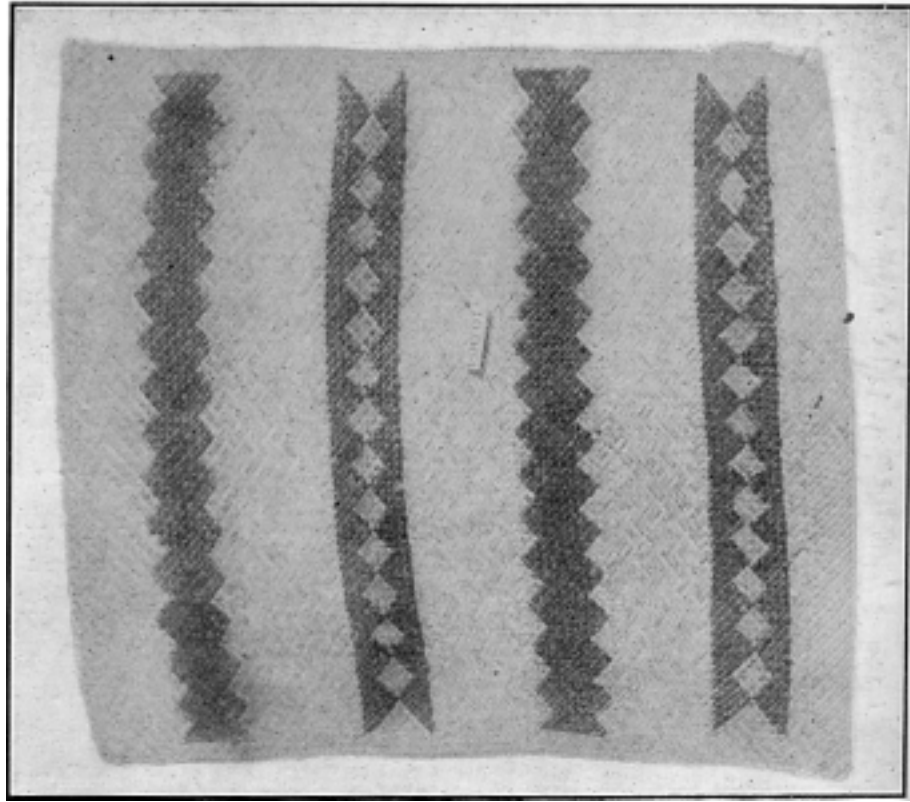


FIG. 79. OLOWAHIA AND KAHANU PATTERNS.

ward became the token of the paternity of his son, the famous Umi.²¹ It is a complete ruin, only being kept together in part by cementing to cloth, but the weave is very fine (31-34 grasses to the inch). The finest mat in this Museum is of great size (20×10.5 ft.), and has 17 grasses to the inch; it is as flexible as cloth, although more than a century old, and it was worn as a cloak or toga by Kamehameha the Conqueror, from whom it came to his descendant, Mrs. Bishop. Unfortunately it has been badly damaged by worms, a reminder that these mats quickly perish in this way if not carefully guarded, and perhaps the finest known collection of these mats was lately destroyed here by the negligence of the owner.

By comparing this with the fine pandanus mat from Samoa it will be seen that the choice production of the southern island is finer, but it is woven from narrow

²¹J. Remy: Contributions of a Venerable Savage to the Ancient History of the Hawaiian Islands, Boston 1868, p. 18.

portions of leaf, while the makaloa of the Hawaiian is from the entire stem. It seems worth while to place in tabular form the principal mats in the Museum collection, that the great range of size, if nothing else, may be seen at a glance, and this collection is large enough to furnish specimens of all known varieties of this nearly obsolete mat. First I place the plain or unfigured mats (*pakea*) whether of uniform weave or varied with twills or other fancy weaving.

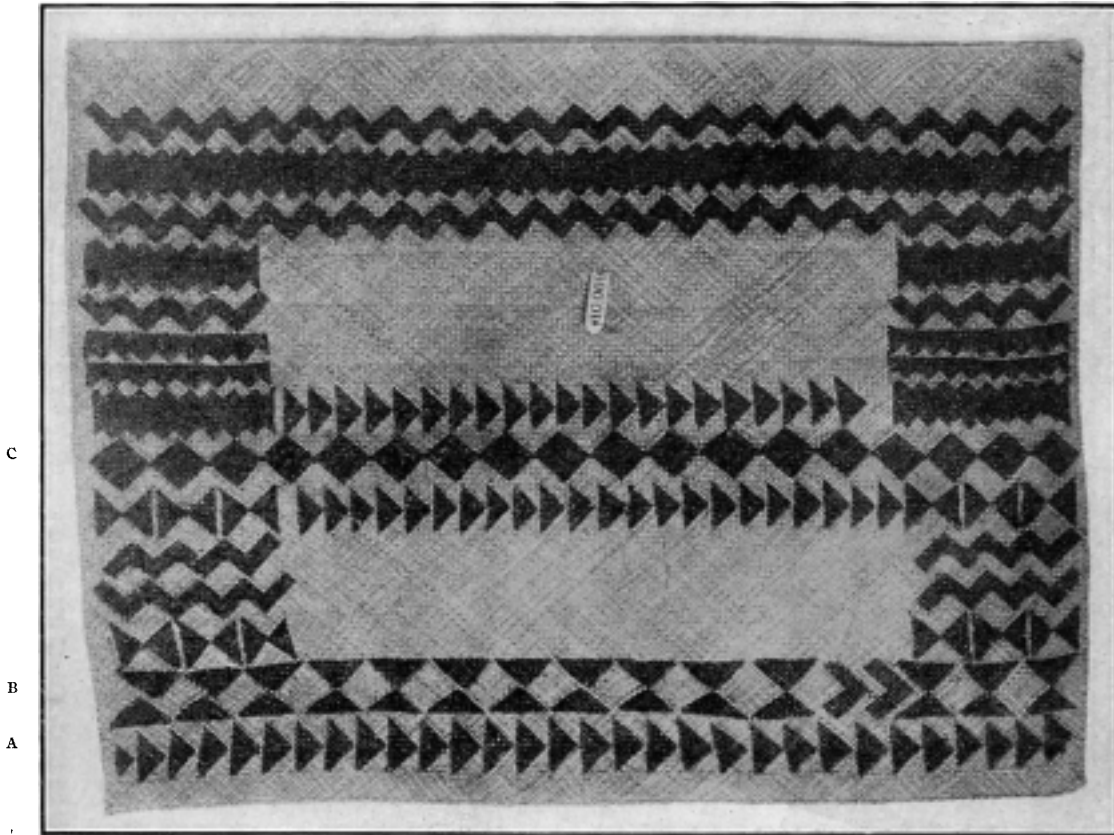


FIG. 80. PUAKALA (A), PAPAULA (B), HUMUNIKI (C).

PLAIN MAKALOA MATS IN THE BISHOP MUSEUM.

2550. 14.3 ft.×9.5 ft. Carpet for floor or large hikiee.
 2551. 10 ft.×7 ft.
 2552. 10 ft.×7.5 ft.
 2553. 12.2 ft.×6.5 ft. Very old.
 2587. 9.7 ft.×6.5 ft.
 2588. 20 ft.×10.5 ft.—17 to inch. Belonged to Kamehameha I about 1780(?).
 2589. 7 ft.×4.5 ft.
 2590. 6.5 ft.×5 ft. From Queen Emma's collection.

7650. 8.2 ft.×7 ft.—9-11 to inch. Finely woven in many patterns.
 7718. 11.5 ft.×9.5 ft.
 2601. 5.9 ft.×0.5 ft.—20 to inch. Chief's malo or waist covering.

MOENA MAKALOA PAWEHE IN THE BISHOP MUSEUM.

2554. 18.5 ft.×9.5 ft. Serrated longitudinal stripes. Leleiohoku collection. Fig. 83L.
 2555. 7.5 ft.×7.2 ft. Keekee, olowahia and other stripes.
 2556. 9.5 ft.×7.5 ft.

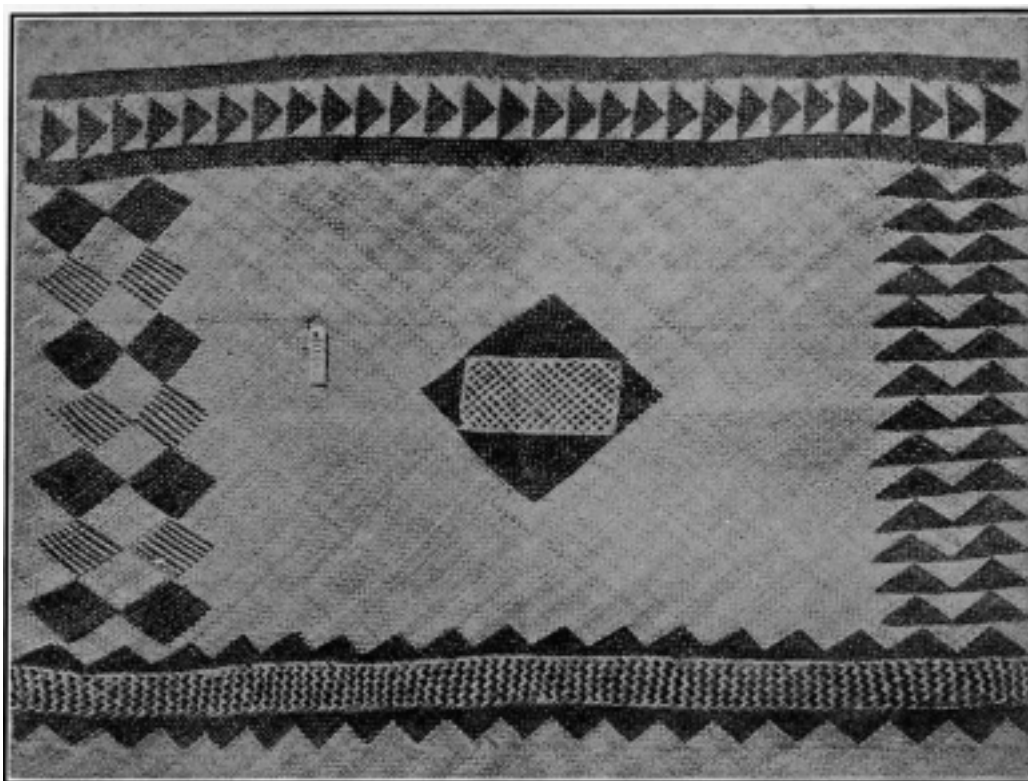


FIG. 81. MAT PATTERNS.

2557. 24 ft.×13 ft.—10 to inch. Broad and narrow long stripes. Given by Kekau-
 onohi to Queen Emma's mother.
 2558. 15 ft.×10.5 ft. Triangles variously arranged; border around all.
 2559. 10.6 ft.×10.6 ft. Triangles in pairs all over. Fig. 83G.
 2560. 7.7 ft.×6.5 ft. Compound triangles, rhombs and squares. Fig. 83B.
 2561. 26 ft.×15.5 ft.
 2562. 7.9 ft.×6.7 ft. Broad, compound bands.
 2563. 13.5 ft.×11 ft. Papa konane all over. Fig. 83F.
 2564. 9 ft.×6 ft. Weave plain and fancy; former triangles, olowahia, papaula, squares.
 2565. 9.2 ft.×7.5 ft. Border of squares touching by angles. Fig. 83F.
 2566. 27.6 ft.×13.5 ft. Triangles, rhombs and squares.

2567. 15.5 in.×7.7 ft. Keekee and four triangles apposed in pairs by points.
 2568. 9.5 ft.×6.2 ft. Keekee, nene, plain double stripes and Fig. 83H.
 2569. 9.2 ft.×6.7 ft. Broad stripes interrupted by rhombs and zigzags.
 2570. 7 ft.×6 ft. Lettered all over, but the rude letters almost faded out.
 2571. 7 ft.×6 ft. Stripes and keekee

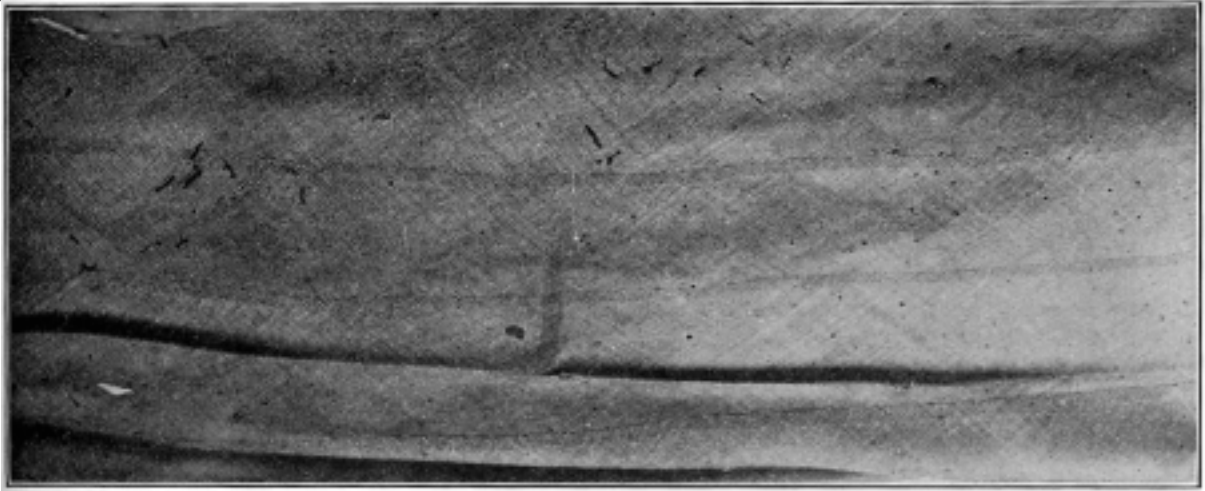


FIG. 82. MAT BELONGING TO KAMEHAMEHA I.

2772. 9 ft.×5.5 ft.
 2573. 10 ft.×6 ft.
 2574. 30.5 ft.×14.5 ft.—11 to inch.
 2575. 11 ft.×9 ft.

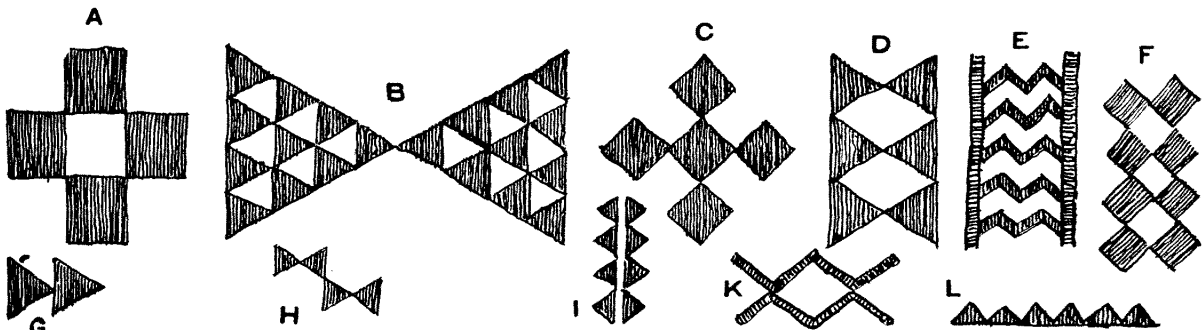


FIG. 83. MAT DESIGNS.

2576. 11.9 ft.×7.5 ft.—10 to inch. Keekee and olowahia in short stripes.
 2577. 10.5 ft.×7.5 ft.—11 to inch.
 2578. 8.5 ft.×6.5 ft.
 2579. 11 ft.×7.5 ft.
 2593. 10 ft.×7 ft.
 6878. 9.3 ft.×6.7 ft. Keekee and olowahia stripes.
 10,072. 9.2 ft.×6.7 ft.
 6633. 8.5 ft.×6.5 ft.—12 to inch. Triangles, squares, etc.
 6634. 9.2 ft.×6 ft.—9 to inch. Stripes and raised bands.

Coarser mats were made from akaakai (*Scirpus lacustris*) of which abundance is found in the marshes around Honolulu. These were used as mats for temporary purposes, or sometimes for the lower layers of the hikiee bed, but they were not durable and the surface was soon destroyed. The following are examples from the Museum collection.

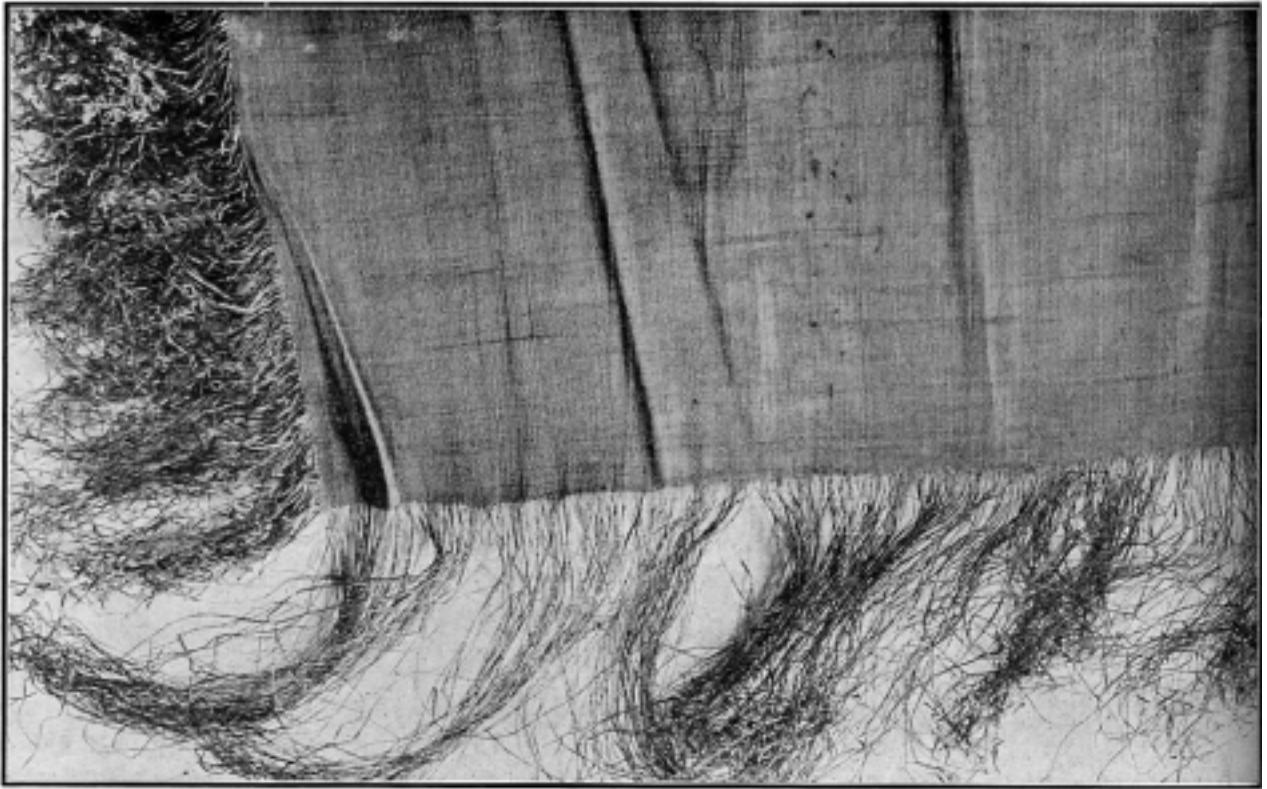


FIG. 84. GRASS MAT.

MOENA AKAAKAI IN THE BISHOP MUSEUM.

2584.	5 ft. × 2.5 ft.	2596.	20 ft. × 10 ft.
2585.	6 ft. × 6 ft.	2597.	9.5 ft. × 7 ft.
2594.	10 ft. × 8 ft.	6635.	11.6 ft. × 9.3 ft.—7 to inch. Heavy floor mat.
2595.	8.7 ft. × 7 ft.		

Grass Baskets are not much in evidence as an Hawaiian product, but in the Bishop Museum is a very pretty basket from Maloelab (Calvert's Id.) in the Marshall group, No. 3347 in Pl. I. This is said to have been produced in 1849 and has been somewhat of a puzzle as to its constituents. It is small, height 4.7 in., diameter 3.2 in., and the bottom is a close ordinary weave of a dark brown grass which also is

gathered into vertical rods and horizontal coils, these two elements forming a trellis not interwoven but the vertical rods are all outside and the horizontal rings all inside; over this trellis runs a sewing strip in four colors, straw, chocolate, white and yellow. These various colored strips seem to be split straw, but I have not definite knowledge of them or of the dyes used. The ornamental bands are shown in the plate, the dark is always chocolate; the interior of the upper band is half straw and half white, of the lower band, yellow. The vertical rods are closed in at the rim by a braid which conceals the ends. The interior is rough where the ends show: there is no handle nor cover.

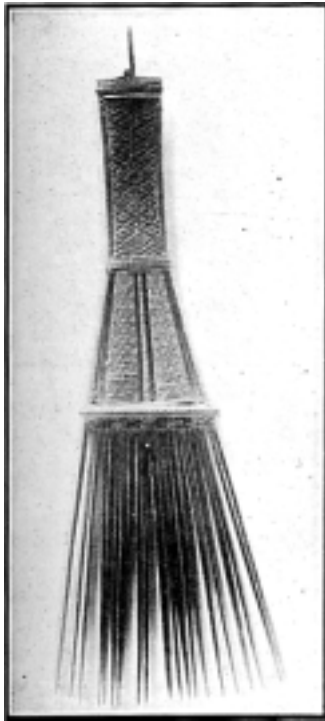


FIG. 85. COMB OF PALM WOOD AND GRASS BRAID.

Solomon Islands Grass Work.—Although authors have stated that the beautiful braids of black, red and yellow material that the Solomon Islanders are so fond of using to adorn their choice spears, clubs and, in curious company, their combs, was from the stem of a species of fern (*Gleichenia*),²² it now seems settled that it is a grass, species unknown, that is used. We have in the Bishop Museum a parcel (No. 8287) of the dyed grass used in this work brought from Bougainville by our collector. The native name is *latile*, and it seems to have a semi-sacred nature for it is used to form amulets, and perhaps hence its appropriate use in choice spears and clubs. It is said to be dyed with lime and the root of a certain tree (*Morinda?*). The dyed grass averages 27 inches long, and the leaves on stem split readily showing a considerable rough fibre beneath the smooth surface.

Although the clubs and spears show a great deal of fine work, I am inclined to give the palm to a comb in this Museum, No. 1941, shown in Fig. 85. This is made of the usual palm splints (not whalebone as mentioned by some authors), and of a form well known in collections. This particular specimen was collected on Bougainville fifty years ago and is 7.5 in. long. The design is alike on both sides, but in the narrow portion of the handle the colors yellow and black are reversed on the side not figured. The two bars of the lower portion are red embroidered with yellow. The braid at the base and around the upper and middle portion is brown. The illustration unfortunately can give no adequate idea of the color and the beautifully exact and appropriate design. Another specimen (No. 6329) is smaller (6 in.), and although made on a plan similar to the preceding shows signs of deterioration in the workmanship: it was collected in 1903.

²²Ling Roth, Spears and other articles from the Solomon Ids. Archives Intern. d'Ethnologie, xi, 154.

One of the fine spears in the Solomons collection has twenty-four bands of woven red and yellow covering, separated by plain circumferential bands and exhibiting perhaps six or seven different designs. An implement called a "chief's wand or sceptre" has ten of such woven bands. The weaving on the clubs of lenticular section is very exact and tense or it would soon get loose on the tapering body, unless, as sometimes seems to be the case, it is cemented on. Spears with carved head inlaid with pearl shell often have a narrow band of this finely woven covering.

Bambu Work.—We may now return to Hawaiian matters. Modern fans are often made of split bambu which affords thin laminae separating much as does the paper birch bark of our northern regions. These strips, of varying width and length according to the use intended, are very beautiful and the fans made from them (which

are perhaps much less beautiful than the bambu strips of which they are constructed) are shown in Plate XV, where Nos. 19, 22-24, in the lower part of the plate, are of this material. The brilliant white is often contrasted with the outer skin of the black banana. A golden brown fern stem is also used in these fans for color effects. The banana is shown in No. 19, and the fern in No. 7.

Sugar Cane.—An uncommon but very beautiful material for braids used in hat making is found in the sugar cane. This grass was found on these islands by the early voyagers, but so far as I am aware its use in basketry is modern. The strips are very glossy and become, by age or exposure to the sun, a golden brown. Cane leaves have long been used for thatching the native houses, but are less easily worked and much less durable than the common pili grass.

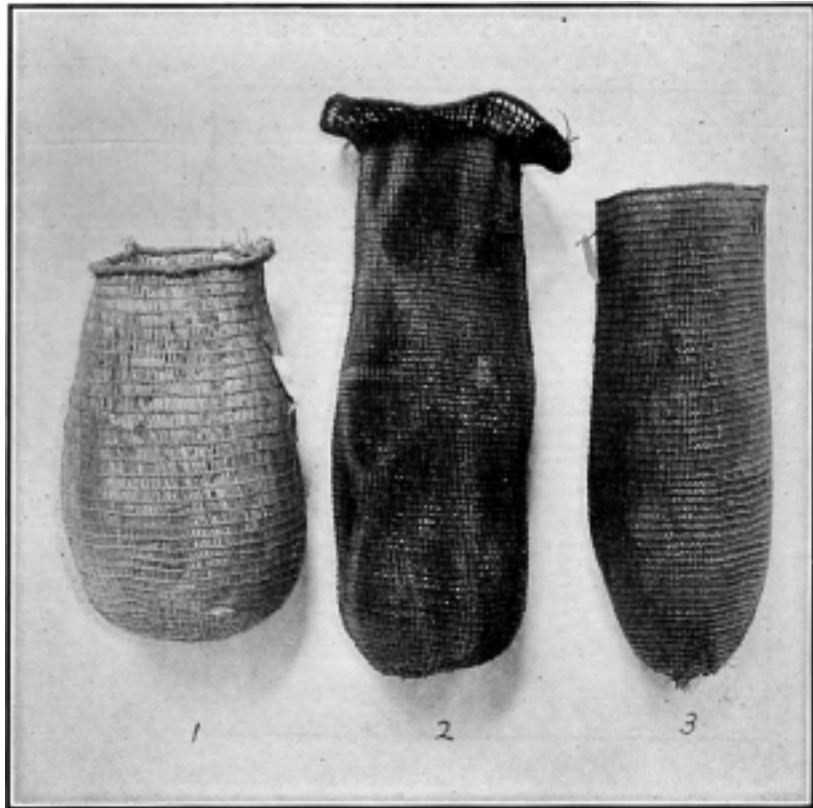


FIG. 86. BASKETS FROM NORTHERN AUSTRALIA.

Australian Baskets.—All through this account of Hawaiian basket and mat weaving illustrations have been drawn from other Polynesian sources, nor has that been the limit, for Micronesian and Papuan sources have also been freely taxed in order that perchance the geographical origin of certain forms or methods might be indicated: and for this it seems as important to show the work of tribes within the Pacific area, even when that work appears widely divergent from that forming the basis of this treatise. If we had a fairly complete collection of Pacific basketry, such as this



FIG. 87. COILED BASKET IN THE AUSTRALIAN MUSEUM.

Museum is striving to gather, much might be gleaned of the traces of ancient intercourse, if not of common origin, of the tribes whose descendants are now verging toward extinction on the islands of the Pacific. This would be truer of baskets than of mats, for the latter have always been deemed of greater value as property, and have always been favorite objects of barter or of plunder. Reference has already been made to the care bestowed by the old Samoans on their choice mats and the great length of time during which they have been preserved. The baskets seem to have been made under a less favoring star, and however useful, however ornamental they may have been, they certainly have not stood so high in the estimation of their makers or owners as have the mats. Perhaps enough of the human has clung to them from the busy fingers of their makers to impart to the senseless intertwined and knotted strips the usual human lot, where the quietly *useful* people are, when dead, soon forgotten, while the brazen warriors or the astute politicians are preserved in marble or bronze or *aere perennius* in the pages of history.

The coiled form of basket, so common among the Amerinds, is also found sporadically in the Pacific regions, as at Fiji, New Britain, New Guinea, and here in Australia. All the Australian coiled baskets that have come to my notice are knotted coiled, that is, the thread that unites the adjoining circles of the coil are knotted between the coils, as shown plainly in Fig. 87, or perhaps better in the specimen in this Museum given in Fig. 88. In all the foundation of the coil is some small fibre or grass, to which I am unable to give a name, and the connecting thread has much the appearance of rattan, and is perhaps from some vine allied to the *Calamus*. The best

description of these and other Australian baskets is found in R. Brough Smith's *Aborigines of Victoria*,²³ and in the account of certain decorated baskets by R. Etheridge in the *Archives internationales d'Éthnographie*.²⁴

In the specimen in this Museum (Fig. 88) the shape varies a little from that shown in Fig. 87, which is more like that figured by Smith. Here the diameter is 10 in., height

6 in., with a handle of *Eucalyptus* fibre (*Eucalyptus obliqua*) network. The native name in Gippsland is *Minni-gnal-ok*. This old form is now scarce, as the native women make them with many modifications to sell to whites. This basket is strong and elastic but not finely made. A peculiar form of coiled basket is shown in Fig. 89. This was formerly common among natives of South Australia but now rarely seen. Eyre says that in one part of South Australia this basket is called *Pool-la-da-noo-Ko*.²⁵ Two are in this Museum; the one figured, No. 1916, is 8 in. in diameter, and is decorated by spiral stitching; the other is of the same diameter but has a neck of three coils, and is also decorated by red stitching. In both the handle is formed by a continuation of the coil. As to the material, Smith says that both *Poa australis* and *Xerotes longifolia* were used for basket



FIG. 88. COILED BASKET FROM GIPPSLAND.

making. In Fig. 89 is also shown a common form of basket of which two are in this

²³ R. Brough Smith, *The Aborigines of Victoria*. Melbourne, 1878, vol. i, p. 345.

²⁴ *Archives internationales d'Éthnographie*, xii, p. 1. On the Ornamentation of some North Australian "Dilly Baskets." A study in Australian Aboriginal Decorative Art, by R. Etheridge, Junr., Curator Australian Museum, Sydney. Mr. Etheridge has also described the manufacture of baskets in the *Macleay Memorial*, vol. Linn. So. N. S. Wales, 1893, pp. 247 and 249.

²⁵ *Aborigines of Victoria*, p. 345.

Museum. In the one figured, No. 7430, from Queensland, the weave is quite open, and the basket at the mouth measures 8.5 in., is 12 in. high, and 14 in. between the points.

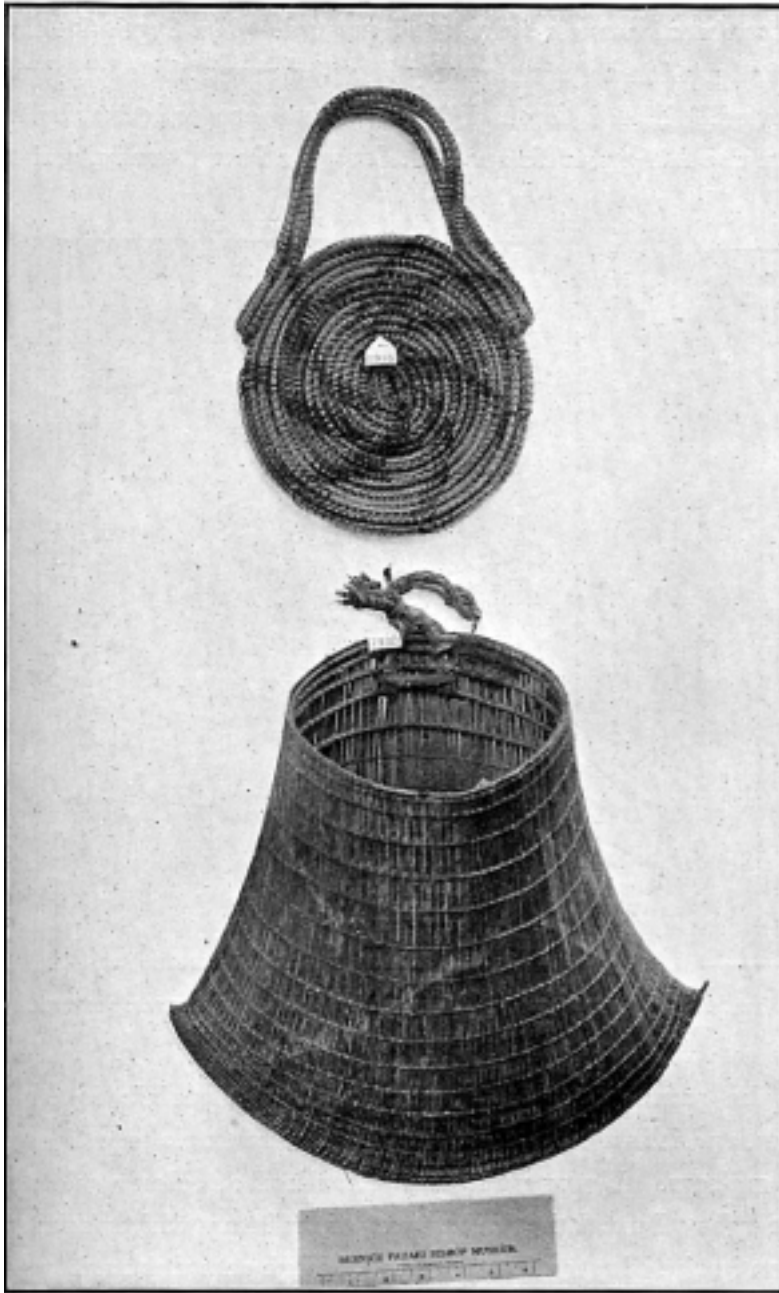


FIG. 89. AUSTRALIAN BASKETS.

The handle, attached to one side only, is of white strip long enough to go over the shoulder. The other specimen is larger, measuring 10 in. at the mouth, 14 in. high, 16 in. from point to point. In both the handle is securely fastened to three of the regular ribs and to an additional rib inserted for strengthening this attachment and extending only half around the basket.

The choicest of all the Australian baskets are those known as "Dilly Baskets" and used to carry the small tools and treasures of the owner. Three are figured in Fig. 86 and another in Fig. 90. Seldom of large size, they sometimes are very small; in one figured by Etheridge (*loc. cit.*, p. 5) the length is only 6.7 in., and the mouth only 1 in. in diameter. This little basket was decorated by first coating the entire surface with Indian red pigment and then with lighter red, white and yellow, the orna-

mentation was completed. The Australian Museum possesses this gem of Australian basketry. Of the three dilly baskets shown in Fig. 86, the first, No. 8741, is 9.5 in. long, and 5.5 in. in diameter. The structure is loose but strong, of a grass-like fibre

and this particular variety is often much larger, as shown in a specimen in this Museum, No. 8740, unfinished, which measures 18 in. long by 14 in. in diameter. The second specimen, No. 8750, measures 13 in. in length by 5 in. at the neck, and 7 in. through the collar. It is decorated with white lines on a dark red ground. No. 8756, the third in the figure, measures 12 in. long, with a diameter of 5 in.; the original decoration of red zigzags is nearly obliterated. These three dilly baskets were collected by Mr. Harry Stockdale, of Sydney, in the Alligator River District near Port Darwin, and are



FIG. 90. DECORATED DILLY BASKET.

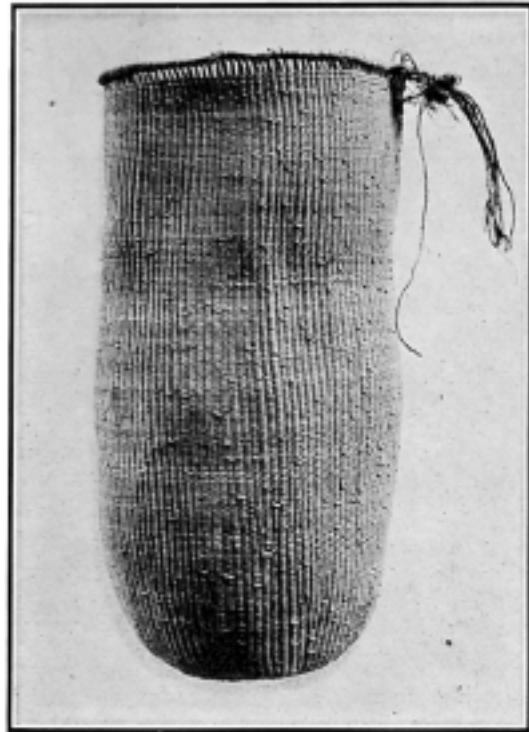


FIG. 91. PLAIN DILLY BASKET, AUSTRALIAN MUSEUM.

now in this Museum. From the same district, also from Mr. Stockdale's collection, No. 8755 comes to this Museum, and it is a choice specimen of the most elaborate decoration of the Australian basket makers. Unfortunately the method of coloring does not prove lasting, and the pigment rubs off much in the manner of ordinary whitewash; still in this specimen, as may be seen in the illustration, Fig. 90, enough remains to show that the skill of the decorator was above the ordinary. The decoration does not extend quite around the basket and is divided into five zones, the upper one composed of one horizontal and a number of vertical white lines; below this seven vertical lines, rather shorter than the last, flanked by two rosettes and what seems to be a hunting scene. Then comes a corroboree in which the male figures are quite distinct; then a band of confused figures,

and the curved base of the basket has a row of white squares, then a zigzag line below which are other triangles and dots. The basket is closely woven and of good form.

It does not seem to have been figured by Mr. Etheridge, whose familiarity with all forms of Australian decoration might have explained more clearly the designs. A more complete description of this important basket is as follows:

No. 8755. Length 14 in., diameter 5 in., rounded bottom. Upper rim sewed with stout twisted cord: surface divided into seven zones by double raised bands; painted dull red, on which ground are black and white designs which extend over more than one-third of the circumference, and there are indications of other marks on the side worn next the body now undecipherable. Upper zone narrow and plain; second has 14 vertical white stripes and rosettes at each end of the series; third has 7 similar stripes, but shorter, and with rosettes at each end; fourth has what seem to be hieroglyphics(?); fifth has a corroboree with 5 male figures; sixth has confused marks, unintelligible; seventh has 7 rectangles forming a zigzag with a figure in the midst resembling a three-barred



FIG. 92. KETE OF HARAKAKE FIBRE.

gate, triangular spots within lower angles of band which extends two-thirds of the circumference; 5 square spots above the band and the same number below, this zone ending in 5 concentric rings. Inside of basket unpainted; carried by five cords attached in two places on one side of the rim.

A plain dilly basket in the Australian Museum is shown in Fig. 91 by the kindness of Mr. Etheridge. It has a rather flatter base than the others, and the rim is slightly detached from the filling.

New Zealand Kete.—The so-called “flax” of New Zealand (*Phormium tenax* Forst., native *Harakake*) is one of the most important commercial fibres of the Pacific region. This liliaceous plant, of which the observant old Maori distinguished fifty or sixty varieties, and the botanists note two species, grows wild over a vast extent of marshy land in New Zealand, and the traveler through the North Island sees the plant with its tall flower stems on every side. Indeed on landing at Auckland one sees bale upon bale of the attractive looking fibre awaiting shipment. It is unnecessary here to go into the commercial preparation of the fibre for several full accounts of this are accessible,²⁶ and we need only present some of the products made from this raw material in the line of our present study.

Kapa or bark cloth made of felted fibre was useless in the cool and wet climate of New Zealand, and the Polynesian immigrants must soon have devised a way to utilize a fibre as beautiful as it is tenacious and durable. It is often stated in books on New Zealand that no implement or machine can clean the fibre with the perfection of that very primitive tool a Maori thumbnail, and while this is true in a sense it must be acknowledged that modern machinery certainly turns out a very fine product.

It would be very interesting to go more fully into an examination of the weaving of the wonderful cloaks, of which extraordinary examples are in this and other museums, but this has been well done by Mr. Hamilton, now Director of the Wellington Museum (*loc. cit.*, p. 271), and his illustrations show the perfection to which the native manufacture attained. There was no loom, but the pegs (*turuturu-parawai*) which held the web for the webster during weaving were often grotesquely carved. I have, however, thought best to give some examples of the *kete*, kits or satchels, in this weaving as they illustrate the work as well perhaps as the more elaborate cloaks. Fig. 92 shows two of these, the upper one, No. 5819, is of bleached fibre mingled with a portion dyed yellow (with a *Coprosma*?). The weave is very simple and effective, as can readily be seen in the illustration. In some remarkably fine and costly ones that I found in the Taranaki district the weaver had introduced the beautiful cone of



FIG. 93. MAORI SACHELS.

²⁶ Elsdon Best, *The Art of Whare pora Maori flax weaving*: Trans. N. Z. Institute, xxxii. A. Hamilton, *Maori Art*, quotes largely from Mr. Best's essay. See also the Reports of the New Zealand Flax Commission. Sir James Hector, *Phormium tenax*, 1892.

Mt. Egmont in a triangle as easily recognized as the innumerable representations of Fujiyama in Japanese decoration. In the lower example in the same illustration, No. 1590, the white and glistening fringe admirably sets off the black body of the kete, through which are woven patterns of the Maori tribal tatauing, and these patterns are not less interesting for their coincidence with many of those embroidered into their makaloa mats by the Hawaiian women as shown in Fig. 83. It may simply mean that a triangle is an easy figure for the technic of the mat, but the resemblance is there



FIG. 94. MAORI BAST SACHEL.

between the ancient decorative forms of the two Polynesian families now at diagonally opposite parts of the Pacific.

Many pages might be devoted to a description of the various ways in which the long flat leaf of the *Phormium* is used in garments waterproof and ornamental, of which this Museum has a fine collection, but these are not strictly either mat

or basket work, and we must pass to the use of the leaf in basketry where it takes the place of the pandanus of warmer climates. Fig. 93 shows several of these and they are still made of every size and variously decorated. The larger ones in the illustration, Nos. 7585-86, are woven inside out from the bottom and then turned, leaving a rough seam within. No. 7588 is, I think, made of Nikau palm. The two small satchels are woven without the bottom seam. The handles of all except the bottom one are of harakake fibre; of that the handle is of twisted leaf. The leaves of the so-called cabbage-palm (a *Cordyline*) are also used in making these satchels and for other similar purposes, but they are not so flexible as the harakake leaves.

It is not only the leaves but the flower stems that are useful in Maori mat work, for the panels between the sculptured slabs in the carved houses of the Maori are made of these cylindrical sticks combined in great variety.²⁷ This is due either to alternations of color in the sticks, or depends on the arrangement of the strips that bind these together. New Zealand is often described as a group possessing a wonderful

²⁷Hamilton, *loc. cit.*, p. 86, Pl. xiii. These panels were called *tukutuku*.

variety of woods both useful and ornamental, and I am tempted to give a single example of what might be regarded as a refined "splint" basket. Fig. 94 shows No. 6562 which is simply woven of the bast of *autetaranga* (*Pimelea arenaria*). It is light and perhaps flimsy, but none the less artistic and attractive even as a mere ornament.

Fibre Mats.—Passing again from the Hawaiian group, where mats of fibre were not made, to Samoa, a group so closely allied to the Hawaiian in language, customs and physical form, we find the fibre of the bast of the *fau* (Samoan *fau*, Hawaiian *hau* = *hibiscus*) used for fine mats which were greatly valued. The Hawaiians knew the *hau* and used its fibre for many textile purposes, but did not reduce it to its con-

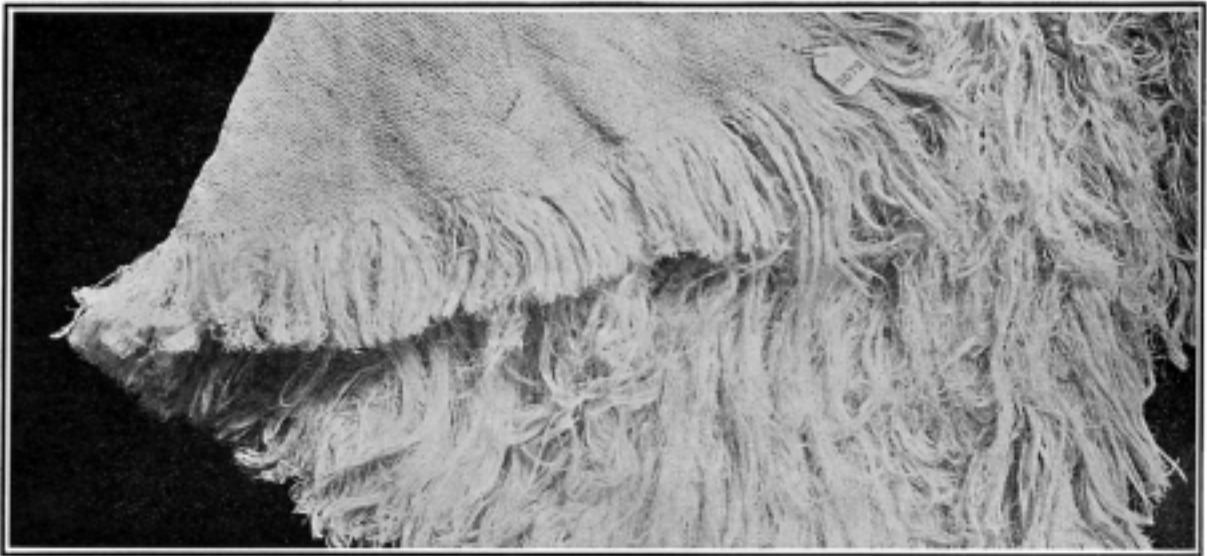


FIG. 95. IE SINA, SAMOA.

stituent fibres, a process well known to their southern brethren. Far to the west of these Polynesian groups the people of Micronesia, as we shall see presently, made great use of the hibiscus bast divided into fine strips, although not made into threads as in Samoa. On the latter group the *ie sina* were woven by hand, without implements, and while sometimes made of the unbleached bast strips, as No. 2193, in this Museum, they were usually of fine thread made by pounding the bast and then bleaching the fibre until it is as white as well cleaned banana fibre. In No. 2186 the finished mat is dyed with ochre or some other dye producing a red-brown color.

Not only were these mats of comparatively fine weave, but their substance was more than doubled by a nap or pile put on after the mat was woven by passing a parcel of the fibres with a full turn about a mesh of the mat at suitable intervals, and these can be pulled out only by loosening the loop formed about the mesh; pulling on the ends only tightens the hold on the mat. The length of this nap was variable, but in

No. 3570 it is seven inches, and the resultant mat looks like a sort of vegetable fur, as may be seen in Fig. 95, and like fur would make fairly warm and comfortable garments. For presents these mats were greatly valued, but their use in the curious "Tokens of Virginity" custom adds especial interest to the ethnologist, and it is not uncommon to find them stained with human blood. Of those in this Museum the following list shows size and fineness:—

SAMOAN IE SINA IN THE BISHOP MUSEUM.

2193. 4 ft. × 3 ft.—9 to inch. Unbleached, unheckled bast.
 2185. 5 ft. × 3 ft.—17 to inch. White, fine fibre.
 3570. 6.1 ft. × 4.2 ft.—11 to inch. White, fine fibre.
 3571. 5.7 ft. × 3.7 ft.—9 to inch. White, fine fibre, coarser weave.
 3572. 6.7 ft. × 3.5 ft.—13–18 to inch. White, fine fibre, repaired.
 2186. 4.7 ft. × 3 ft.—10 to inch. Dyed, fine fibre.

The weave is so loose that it is easy to increase the width at the expense of the length, so that the measurements are approximate only.

Loom-woven Mats.—From the Gilbert Islands on the east to Guam on the west we find a rude but efficient loom for weaving fine mats, while throughout Polynesia no looms are used, and deft fingers must plait together the strands of whatever material to form a mat. With leaf strips or grass stems this is not very difficult, but with fine flexible threads the difficulty is increased, and the finer the thread the greater need of some mechanical assistance which the loom bars, however simple, and the shuttle afford. Two types of weaving apparatus are found in this region, one which is a loom in all its features, from which can readily be traced the more complicated forms of the modern textile art, and a specimen from Ruk in the Caroline Islands is shown in Fig. 96; the other, which, so far as I am aware, is confined to the island of Kusaie, is a very different contrivance, and although I have two specimens in the Museum before me, I cannot understand fully its working, nor have I been able to gather from those who have visited Kusaie any intelligible facts regarding its employment, and of this type Fig. 98 presents an example. Under ordinary circumstances one should be able, when he has the tools used and the finished product, as in the present case, to connect the two, but in this I have failed, and the Masters Finsch, Kubary and Parkinson, who have explored that region with ethnological skill, have failed to help me. The latter gives a full and interesting account of the first loom,²⁸ and from his account I shall take the liberty of quoting all that may explain more fully the loom before us and its work. It is interesting to find that on this island of Ontong Java, which was named by Tasman in

²⁸Nachtrage zur Ethnographie der Ongtong-Java-Inseln, B. Parkinson: Archives Internat. d'Ethnographie, xi, p. 207. In a note on p. 242, a figure is given to show the horizontal position in which this loom is used.

1643, although previously seen by Mendaña, the inhabitants appear to be of Polynesian origin (and the figure of the weaver referred to in the note is strongly Polynesian), and the men are the websters, while in Polynesia proper the mat weaving is the women's work. Here then is a Polynesian family who have adopted the loom of their neighbors without alteration or improvement, and the question not unnaturally arises how it is that none of the other tribes did the same thing, if they all entered the Pacific through the western gate?

In all these simple looms the warp-beams are two sticks of equal and suitable length called *o*. In the simplest form in this Museum these

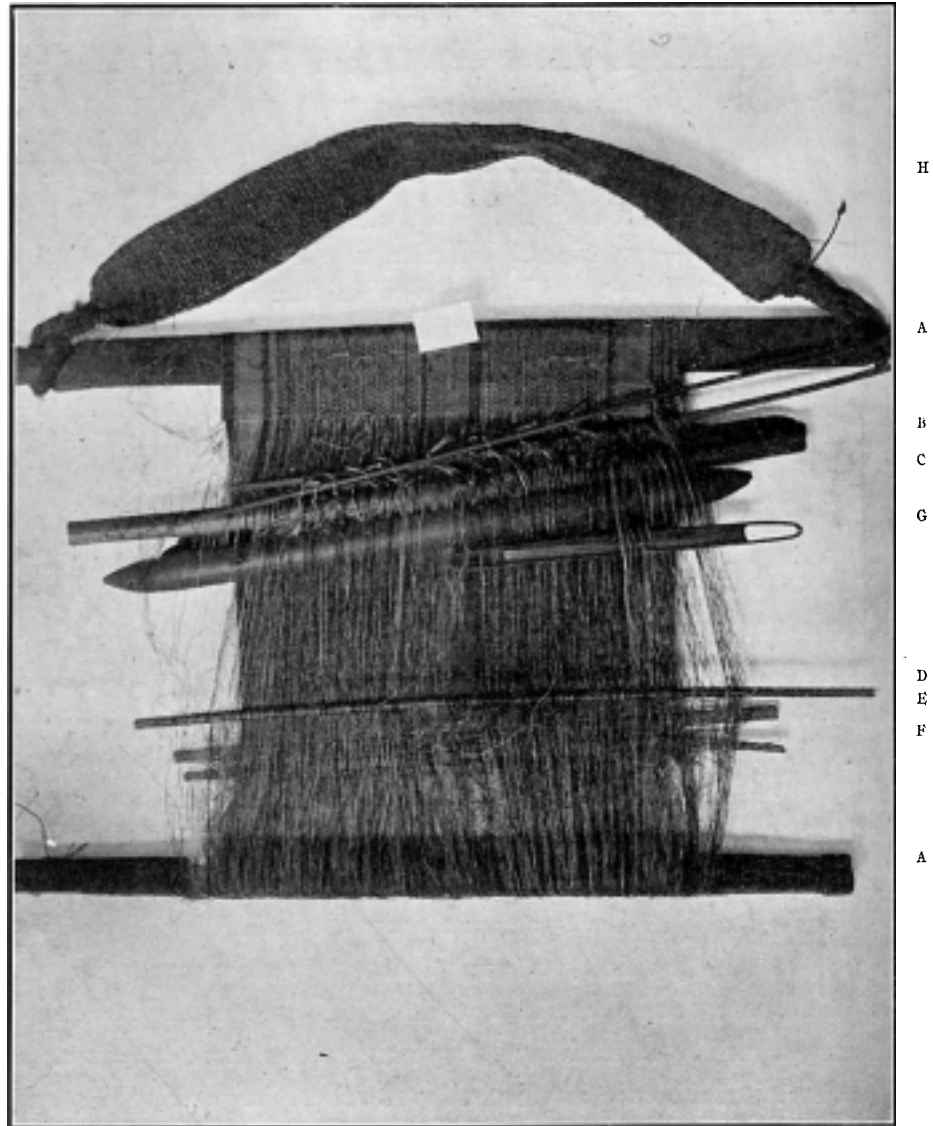


FIG. 96. LOOM FROM CAROLINE ISLANDS.

are lengths of the light and smooth stem of some large palm leaf, but in the better one figured they are of heavy wood cut with some care and knobbed at the ends (Fig. 96, A). The widest of these seldom exceed three feet, and those of Santa Cruz are hardly a third of that length. Around these pass the longitudinal fibres or warp; these are continuous and slide on the beam. The length of the warp determines the length of the mat, and the number of warp threads its width. The beams armed with the warp are stretched in a horizontal position, one being held by cords passed around a post or

tree, and the other by a belt or sling (H) which passes behind the back of the weaver, who is seated on the ground, so that he can easily regulate the tension on the warp. There was no yarn beam and cloth beam as in American and European looms of higher development; the whole fabric, warp and completed mat, was free to move over both beams like an endless apron. A similar arrangement is found in the Zūñi loom.²⁹ The slings are called *ku'u*. Next the weaver are two bambu sticks, about an inch wide, called *api* (B), thrust through the warp, so as to separate this into an upper and under layer. This would be sufficient in the simplest loom, but usually a rude heddle or harness, *ua*, (the sticks next the upper beam in the figure), consisting of a thin stick with a continuous cord looped along its length, and through these loops every other thread is passed before the loom is set up. In more complicated looms there are often many of these heddles through which varying portions of the warp pass and which are lifted at suitable intervals by machinery. In our present loom this motion is by hand, and it operates to "form a shed" by raising alternate threads from their neighbors far enough to allow the shuttle, *si'ia* (G), on which the filling or woof, *ogo si'ia*, is wound, to be thrust between the two layers from right or left. When the shuttle has passed, the third process comes into play,—the thread left in the shed (lay) is beaten up with a lathe or batten (D). Often the shed is formed, as in the loom from Ontong Java, by a sword-shaped strip of wood, *laga*, which the weaver holds in his right hand and therewith separates the layers of the warp so that the shuttle can easily slip through, and also serves to press the last thread of the woof close to the preceding one. This cycle constantly repeated completes the weaving. Of course the threads that were lifted for the first passage of the shuttle with the woof are depressed for the next passage, or, what amounts to the same thing, the others are lifted by being passed through another harness. When the shuttle is emptied of filling another is substituted, and the junction of threads is made by a neat knot precisely as in the more complicated loom of modern factories.

That my readers may have the full benefit of the German description, I give here the important portion of Mr. Parkinson's account:—

Die einzelnen Theile des Webeapparats auf Ontong-Java folgen in nachstehender Anordnung. Die Kettenfäden (*Hau*) sind um zwei runde Hölzer geschlungen, welche etwas länger sind als die Breite der herzustellenden Matte. Diese beiden Hölzer werden *O* genannt. Das ein wird mittelst einer Schlinge oder eines Bandes, an beide Enden des *O* verbunden, an einen Pfosten befestigt; das andere Holz hat ein ebensolches Band, welches der auf dem Boden sitzende Weber um die Taille legt, wodurch er es in seiner Macht hat die Kettenfäden straff anzuziehen; diese Schlingen werden *Ku'u* genannt. Dem Weber zunächst sind zwei etwa 2-3 cM. breite Bambusstäbchen (*Api*) durch die Kettenfäden geschoben, so dass sie diese in eine obere und in eine untere Lage trennen. Dan folgt ein dünner Stock (*Ka'o*) an dem, durch eine fortlaufende Fadenschlinge (*U'a*), die untere Kettenlage befestigt ist, so dass, wenn das Stöckchen gehoben wird, die untere Kettenlage über die

²⁹ Otis T. Mason. A Primitive Frame for Weaving Narrow Fabrics. U. S. Nat. Mus., 1899, p. 492.
MEMOIRS B. P. B. MUSEUM, VOL. II, No. 1.—7.

öbere gehoben wird, und man dann das Schiffchen (*Si'ia*) mit dem Einschlagfaden (*Oao si'ia*) von rechts oder links hindurch stecken kann. Hinter dem *Ka'o* folgt ein ziemlich dicker Holzstab, manchmal auch ein dickes Stück Bambusrohr (*Porogu*) welches die Kette trennt und mit dem *Ka'o* zusammen dazu dient, die Kettenschichten abwechselnd zu heben und zu senken. Nach dem *Porogu* folgen abermals Zwei schmale *Api* wie zu Anfang. Zu dem Webeapparat gehört ferner noch ein schwertartiges Instrument (*Laga*) welches der Weber in der rechten Hand hält und damit die Kettenfäden trennt so dass er das Schiffchen bequem durchschieben kann, ferner auch um damit durchgeschobenen Einschlagfaden fest an die vorhergehenden anzudrücken.

Die Herstellung der Kette erfolgt nun folgendenmassen. Die einzelnen Theile des Apparates werden theils in den Fussboden der Hütte fest eingesteckt, theils von Gehilfen in Position gehalten. Zunächst schlägt man in den Fussboden die zwei *O* fest ein, etwas weiter aus einander, als die Hälfte der Länge der herzustellenden Matte beträgt; manchmal nimmt man statt der *O* auch zwei dickere Stöcke und ersetzt sie später durch die *O*. Von unten anfangend legt man nun den Faden um diese Stäbe, schiebt aber zugleich die übrigen Theile des Apparats mit hinein, nämlich die vier *Api* (je zwei), den *Kao* und den *Porogu*: der *Kao* wird gewöhnlich auch in den Fussboden eingeschlagen, die übrigen Theile von Gehilfen festgehalten. Der Faden wird nun so umgelegt dass er abwechselnd über oder unter den *Api* und dem *Porogu* läuft, wodurch die Kette in zwei Lagen getrennt erhalten bleibt.

Höchst sinnreich ist nun die Anordnung wodurch bewirkt wird, das man die untere Kettenlage abwechselnd über die öbere heben und darunter senken kann. Dies wird bewirkt durch den dicken Stab *Porogu* und das Stäbchen *Ka'o* mit den Schleifen *U'a*. Alle Kettenfäden laufen unter dem Stab *Ka'o* fort, jeder Zweite Kettenfäden wird durch eine lose Schlinge an den *Ka'o* befestigt, so dass der Weber es in seiner Macht hat durch Heben des *Ka'o* die untere Kettenschicht über die öbere zu heben. Der Weber setzt sich auf den Fussboden und spannt die Kettenfäden wie oben beschrieben an. Ihm zunächst liegen die beiden schmalen Latten *Api* die an beiden Enden durch einen Faden mit einander verbunden sind. Er fasst nun mit der einen Hand, den Stab *Ka'o* und hebt denselben, wodurch die untere Kettenlage über die öbere empor gehoben wird, nun steckt er das breite, dünne und sehr glatte Schwert, *Laga*, eurch die entstandene öbere und entere Schicht und dreht dasselbe um, so dass die Kanten nach oben und unten stehen, nun schiebt er das Schiffchen mit dem Einschlagfaden durch, legt das Schwert flach und schlägt den Faden leise, an worauf er das Schwert herauszieht. Jetzt schiebt er den *Porogu* etwas von sich ab, ebenso den *Ka'o* wodurch er bewirkt dass die frühere obere Kettenlage die untere wird; das Schwert wird wieder durchgesteckt, ebenso das Schiffchen, und der Einschlagfaden angetrieben, *Porogu* und *Ka'o* schiebt der Weber nun an sich heran, hebt den *Ka'o* so dass die Kettenlage wieder nach oben kommt und auf diese Weise geht es nun fort bis die Matte fertig ist. Ein geschickter Weber kann in drei bis vier Arbeitstagen, jeden von Sonnenaufgang bis Mittag gerechnet, eine, Weibermatte fertig stellen.

By arranging the warp threads of different colors longitudinal bands were formed, and by varying the color of the filling on the shuttle transverse stripes were produced; the former were more common. Twills or other fancy patterns could be introduced by increasing the number of harnesses or by raising, instead of alternate threads, two, three or more adjacent ones. This loom gave opportunity for decorative weaves that were early discovered, and some of the results on the mats of the Carolines used as women's dresses are shown in Fig. 97.

Both hibiscus and banana fibre were used in this mat weaving, as may be seen in the list of mats in this Museum given below. There are specimens of the same pattern in hibiscus from Guam and the Gilbert Ids., and if we did not know they were made in both places it would be easy to imagine their transport as merchandise for



FIG. 97. MATS OF BANANA FIBRE, CAROLINE ISLANDS.

barter from one group to the other. Of the finer banana mats we have specimens from Ruk in the Carolines, Santa Cruz in the New Hebrides, and Niue. The Santa Cruz mats are remarkably well made and tastefully decorated, and are sometimes narrow and long, with pleats and tufts for additional ornament. The beauty and durability of these banana woven mats are so marked that it is surprising that a trade to foreign countries has not been developed. I do not know what the condition of the native manufacture may be at present: perhaps, like so many good things of Pacific art, they have passed by to give place to the cheap calico that civilization has brought upon the islands.

The Tol.—Besides the loom just mentioned, the people of Kusaie in the Caroline Islands have another contrivance, by no means an orthodox loom, but still a

“webstuhl,” as our German friends might call it. To begin with, the writer must again confess he has never seen the instrument used, nor has got any intelligible information from any one who has, and in saying this he would disclaim any intention to speak disrespectfully of the little machine or of the intelligence of those

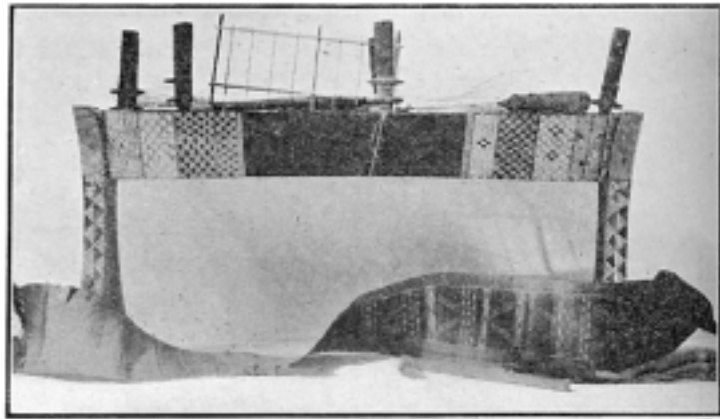


FIG. 98. FRAME FOR TOL WEAVING.

who would have enlightened him, if possible: it is simply in apology for not handing on in these pages some intelligible explanation of its working habits. The machine, as will be seen from Fig. 98, is a biped with a long straight body, on top of which are inserted loosely certain pegs, around which are wound threads of banana fibre colored to suit the work in hand. Other spools of this fibre are at hand, if we can dignify a mere length of bambu, around which the thread is wound, with the name of spool. Then there is a frame which may possibly serve as the harness in an ordinary loom; there are shuttles of good form, and battens of considerable weight to drive home the woof or filling, and there are clam shells to serve as scissors. The threads, whether for the warp or woof, are of well cleaned banana fibre dyed in various colors, and in lengths of about five feet. To obtain the continuous length of thread these are neatly tied together by a double and almost invisible knot.

I have given the machinery, and I am forced to give the result without the intermediate processes. There are two of these “looms” in this Museum, differing in size and ornamentation, but each provided with the same attachments, and it is a subject

of regret that there is not with either machine a partly finished girdle or tol. Apparently they are used exclusively for weaving the tol or girdle worn in former times

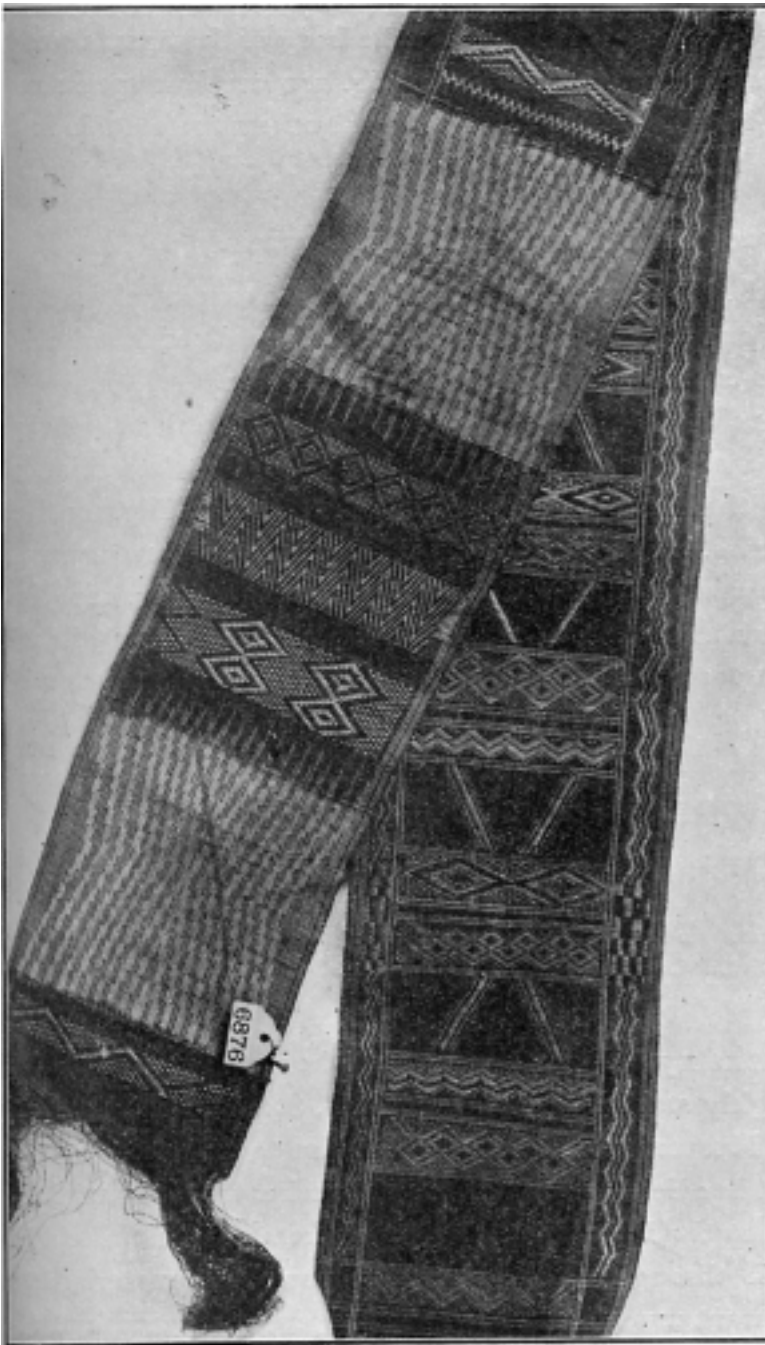


FIG. 99. TOL OF COMPLICATED PATTERN.

by a man over his malo or waistcloth, and also for a similar but rather wider garment formerly worn by women. With both sexes the style of garment has yielded to the unpicturesque but cheaper garments of the foreign missionary or trader, and the manufacture has gone through the various stages of degradation that an obsolescent fabric always travels. When the native webster obtained from the foreign source worsted, he adulterated the banana fibre with the far less durable wool, and at the same time, or later, adopted the cheap foreign dyes. The old specimens, both of the tol and of the female dress or apron, show original and simple patterns, apparently of western (to them) origin.

When we examine the fabric we find that, taking first the warp, this seldom exceeds six feet; in this the pattern is altered by tying together suitable lengths of

the desired colors, and in this case the pattern is alike on both sides of the weave. Another way was also used, the common one of sinking the colored thread beneath others at intervals, and this was generally used in the transverse patterns, formed by the wool,

the frame in some way facilitating the passage of the shuttle under any desired number of threads of the warp. The terminal fringe which is always found on at least one end, generally on both, if of a different color is tied to the warp threads, thread by thread. Unluckily the black dye used generally for the body of the aprons rots the fibre, and few old specimens are entirely perfect. In Fig. 100 are four specimens of this work, the first on the left being an apron in black; the others are old tols in red. The following list of those in the Museum will show the size, fineness and pattern.

LIST OF CAROLINE ISLANDS TOLS AND APRONS.

7842. 5.2 ft.×8 in.—58 to inch. Black apron from Kusaie. Ornamental portion in brown, red, black; 14 in. long at one end; at the other three yellowish stripes, one central of two strands, two lateral of one each. Fig. 100, No. 1.
6621. 6.1 ft.×4.8 in.—76 to inch. Tol from Ponape. Red, with double border of yellowish strands along each edge; ornamental end 16 in. of red, yellow, black; at other end 14 in. of yellow with seven single or double black strands. Fig. 100, No. 2.
6620. 5.6 ft.×4.5 in.—70 to inch. Tol from Ponape. Red, with seven transverse bands of yellow designs woven through, not alike on both sides. Fig. 100, No. 3.
6619. 5.4 ft.×4.5 in.—60 to inch. Tol from Ponape. Red, with borders of darker red and yellow and transverse bands woven through; end design alike on both sides. Fig. 100, No. 4.
6876. 5.5 ft.×4 in.—82 to inch. Tol from Ruk. Decoration in red, yellow, black. Fig. 99. A portion is rolled up and bound, to pass between thighs.
8799. 4.3 ft.×2.7 in.—58 to inch. Tol. Red and yellow, with nine transverse bands, all different.
6626. 5.5 ft.×4 in.—56 to inch. Tol from Ruk. Red, with yellow; longitudinal and transverse stripes coarsely embroidered with scarlet worsted.

Summary of the Basketry.—Before considering the net work of the Hawaiians, which has been so thoroughly studied by Mr. John F. G. Stokes, Curator of Polynesian Ethnology in the Bishop Museum, that I have asked him to prepare the portion of this memoir relating to that handicraft, we may draw together the information we have been able to collect about the Hawaiian mats and baskets, and institute a brief comparison with similar work throughout the Pacific, although the material at our disposal is not sufficient to warrant much theorizing as to origin or relationship.

We find that the old Hawaiians made a basket (both Hinai ieie and Hinai ieie poepoe) much superior in workmanship and durability to any others made in the region under consideration; and these do not closely resemble the basketry of nations or tribes bordering on the Pacific. The Samoans made baskets of very different form, and no

known specimens of their work are related to the Hawaiian baskets or could have served as prototypes. The Fijian and Micronesian baskets are closely related and show an occidental (to them)

origin. The baskets of Australia are peculiar in form rather than material, and could not be mistaken by a student of basketry for those of any other country. The Solomon Islanders and New Hebrideans make baskets of mat-like consistency, quite unlike the Hawaiian, but also make genuine baskets of considerable perfection. The New Zealanders make baskets of a still different type, but their kete or satchels remind one of the satchels made by the Fijians and Gilbert Islanders, in shape, although not at all in material. It is difficult to see that Hawaii has taught other groups, or has in the least been influenced by their work. Even where the same material has been used, as in the case of pandanus leaf, the resulting baskets are of quite different forms. Even

the baskets used for fish traps, when made in both countries from fern stems, differ in shape in Hawaii and New Zealand. The Samoan fish trap made of coconut roots is, it is true, not unlike the Hawaiian fern stem fish trap.

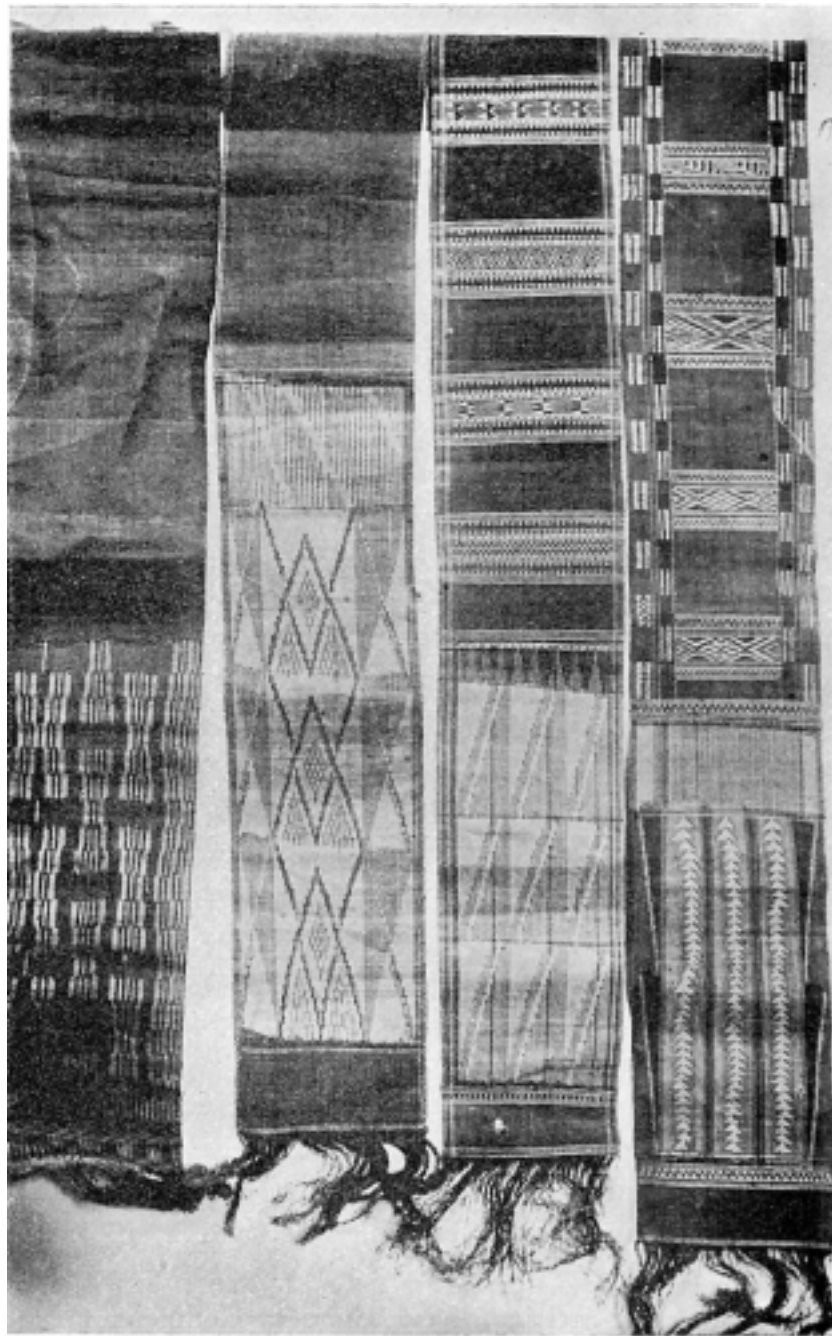


FIG. 100. APRONS AND TOLS.

All through this region the baskets, with the exception of the rude coco leaf frails, differ sufficiently from those of other countries besides differing among themselves. Generally speaking there are few forms which could advantageously be adopted by other countries, or be made articles of commerce. Like the peoples who made them, and whose wants they doubtless supplied well enough, they seem to be passing off the stage, and most of them have become even now material for museums.

With mats the case is somewhat different. Wherever on the Pacific islands the pandanus grows its leaves were used for mats, and were prepared much in the same way, to be woven in the same manner, into mats hardly differing among the groups. We can go beyond the Pacific region and find the same mats wherever we find the pandanus, but when we rise above the plain coarse mat we find more or less differentiation in the finer work. Then the material accessible, as in the case of the basket, influences the form, and we have seen by illustration that it is by no means difficult to distinguish, in most cases, the place of manufacture.

While Hawaii leads in the manufacture of baskets (in the olden time), and has produced most durable mats in the makaloa class, Hawaiian mat work cannot rank with the Micronesian fibre mats, nor perhaps with the fine mats of the Samoans. Maori mats were much more artificially made than those of the southeastern Pacific islanders: Tonga alone held a good place in the mat making industry after Samoa. In the northwest, the Solomon Islanders and the New Hebrideans were more noted for their basket work than for mats; and in New Guinea, so far as I am aware, neither mats nor baskets were notable. It is probable that the bags of netting, for which New Guinea is to be credited, took the place of baskets.

We have seen that the partial use of mats for dress was general throughout the Pacific, although only in New Zealand did the mat become the most important part of one's dress, for there the cool wet climate compelled more covering from the weather than on the tropical islands of the rest of Polynesia, where the more pliant kapa became the most important material for clothing.

Note may be made that while the universal form of pandanus mat showed little variation throughout eastern and central Polynesia, on the western islands of the region there are curious adaptations of the material unknown to their eastern neighbors. These have mostly been figured, and it will be seen that they are of rather primitive character.

Mats were articles of exchange or commerce far more than ever baskets were, and hence we find them wherever the adventurous canoes of the early voyagers touched shore; and while this fact has made it more difficult to distinguish the origin of some mats, the material being everywhere the same, it has tended on the other hand to preserve mats rather than baskets of former times in our museums, for as common articles

of barter they were brought everywhere to the early European and American explorers of this ocean, and being portable were brought home.

No dates can be assigned to any of the methods used or patterns produced in Pacific basketry, nor can it be declared which branch of the Polynesian family originated or taught any especial manufacture either of basket or mat. Legends are merely indications with little or no historic value.

The study of both mats and baskets of the Pacific is far from complete, and if it were possible to make larger and broader collections, much that is interesting and also valuable would be brought to light. In all branches of basketry pertaining to our region this Museum is constantly making collections, but at present only the Hawaiian division seems fairly complete.

Hawaiian Nets and Netting. By JOHN F. G. STOKES, Curator
of Polynesian Ethnology in the Bishop Museum.

AS WITH most, if not all, primitive races, the Hawaiians had a knowledge of the art of netting which they had brought to a high standard of excellence before the general influx of the foreigners. They had even gone so far as knitting, making a very complicated knot without tools. If mat making evolved the loom, then netting was the forerunner of lace making, but the natives' art had not reached this point.

Nature has been bountiful to these people in its supply of raw material for their cord, giving them the fibrous husk of the coconut, the sedge *ahuawa* (*Cyperus laevigatus*), and the bast fibres of the *hau* (*Paritium tiliaceum*), *waoke* (*Broussonetia papyrifera*), and, most valuable of all, *oloná* (*Touchardia latifolia*), which is very strong, light and durable. In addition to the foregoing, several grasses were pressed into service for braiding into ropes for house building. And human-like, discontented with much, or perhaps pandering to the love of ornamentation, or, it may be—let us allow for higher sentiments—wishing to keep in memory dear friends, human hair was frequently braided or twisted into patterns in many of their ornaments. In more modern times, horsehair has been spun and used with other cord in some of the *koko puupuu*.

The preparation of the coir was simple, merely requiring the separation of the fibres of the husk, and, when spun or braided into cord, was highly esteemed for the lashing of canoe outriggers on account of its presumed durability in salt water. For fish nets it was seldom used, not being as strong nor as pliable as the more favored

oloná, but for the koko it was applicable and used extensively as well as for the cordings attached to certain gourd vessels. Coir would be prepared, twisted and worked into a koko in the same day. This was no doubt necessary, as the fibres, when dry, are very stiff and would be difficult to twist into the close meshes of some of the nettings in which coir is found.

Ahuawa, common on the banks of the taro ponds, was prepared by drawing the freshly plucked stem between two rounded sticks tightly compressed for the purpose of removing the juices, and heckling, and then spinning the fresh fibre into cord for the koko. This fibre was also used for tying on the thatch to the grass house.

The hau, waoke and oloná were prepared similarly, being partly macerated in running water and scraped with a piece of pearl shell or turtle rib.³⁰ This would be a process of a few days.

The waoke, used so largely in the manufacture of *kapa*, was restricted in cord to the making of koko and ornamental rope. The filaments are soft, clinging, and of only moderate length, and while thus well suited for bark cloth they would not last in such fabric as fish net.

The hau, a hard fibre, had employment as heavy rope mainly, but rarely in fish netting or koko, while the oloná was the best used material for fishing lines and nets, also occasionally finding its way into the better class koko.

The grasses were braided with little or no preparation, the work being done while the material was green. The spinning of cord, *hilo*, was always done on the bare thigh by women, the native terms for the process being *hoaha* for coir and *hoaho* for other cords. Men generally attended to the braiding.

³⁰ Memoirs B. P. Bishop Museum, Vol. I, p. 50, fig. 43.

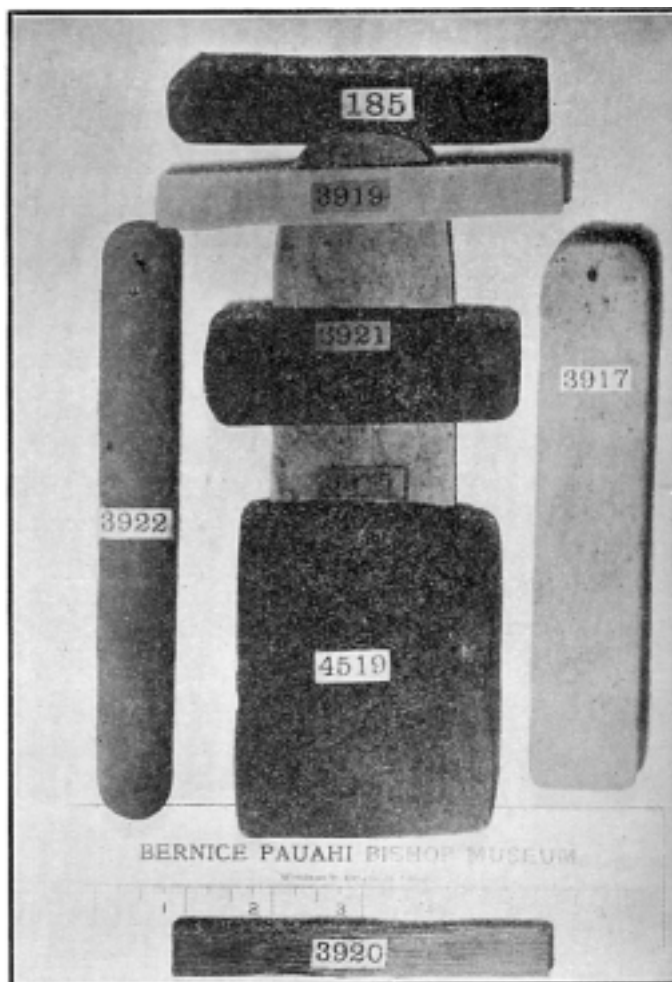


FIG. 101. MESH GAUGES.

The tools used were, the mesh stick or gauge (Fig. 101) and the shuttle (Fig. 102), made of whale ivory and rib, human and quadruped bone, tortoise shell, wood or bambu.

The gauge, *haha*, is a short, thin, flat implement of varying widths. In describing a net, the native put his fingers into the *maka* or mesh, and if the first finger filled the space, the mesh was *makahi*; if three fingers were needed, then the mesh was

makolu, etc. For sizes between, the words *oene* or *oa* were added to the name of the smaller mesh. The following is a table prepared for the writer by a native fisherman, with the sizes approximated:

Nae,	$\frac{1}{4}$ in.
Nukunukuaua,	$\frac{1}{2}$ in.
Makahi, ³¹	1 in.
Makahi oene,	$1\frac{1}{2}$ in.
Malua,	2 in.
Malua oa,	$2\frac{1}{2}$ in.
Makolu,	3 in.
Makolu oa,	$3\frac{1}{2}$ in.
Maha,	4 in.
Mahaē,	4 in. and upwards.
Malewa,	7 in. and upwards.



FIG. 102. SHUTTLES.

of which was cut away to admit the cord. The shank of this is round in cross section and diminishes toward the middle, making a more effective tool than that with the flattened or grooved shank, for the native implement allowing of a cylindrical winding could pass more cord through a given mesh. The natives were always very careful when filling their shuttles, passing the cord straight up and down along the shank, then winding on one side crossing the cord and repeating on the other, to attain the cylindrical form.

The other form, *kioe*, better known as a net mender, is a round stick of wood about one-third of an inch in diameter and six inches long. The stick for about one-

³¹Contraction for *maka*, and the numerals *akahi*, *alua*, *akolu* and *aha*. The enclitic *e* on *mahaē* means other, or another. The names *maha* and *malewa* do not seem to be generally known among the natives.

third of its length has been cut down, leaving a shoulder, and tapered to a blunt point (Fig. 103, A). There are two specimens in a loan collection in the Museum which are exceptional, having the butt only one-third the total length (Fig. 103, B). To fill this style of needle, two half hitches were passed around the tapered end and a loop made around the fingers of the hand holding the tool, as shown in the same figure. For very fine nets a *niao*, piece of the midrib of a coconut leaf, was substituted for this form.

In making the large-meshed, coarse nets for sharks or turtle, neither shuttle nor mesh stick was generally resorted to. The cord was wound over the hand and elbow for several turns, the hank thus formed doubled and wound with the rest of the cord until a pear-shaped ball was made. The cord could then be drawn from the inside through the point of the ball, which retained its shape until expended. The cord in this form took the place of a shuttle, while the spacing was roughly done by the hand. A similar winding, but more spherical, was in vogue for the fishing lines.

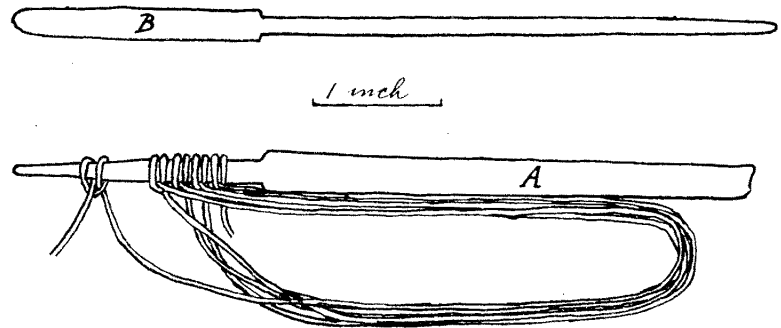


FIG. 103. NET-MENDERS.

For fastening two nets together temporarily, there was a needle of bone or wood with an eye towards the end. The needle and line were merely run through the opposing meshes and the nets thus drawn together. A similar needle was also used for sewing the top sheet of kapa to those beneath. Frequently when fishing it was necessary to join two nets below the water, for which purpose this needle or the net-mender was requisitioned, but native fishermen have told the writer that the quickest and simplest way was to dive down and tie the ends with split stems of the *ki* leaf (*Cordyline terminalis*).

In Fig. 102 are shown three specimens, Nos. 176, 5177 and 5178, which certainly do not owe their origin to Hawaiian hands. The native mind is a peculiar one in regard to specimens of former arts. Any implement a man in his childhood had seen his father use is looked upon in later years as very ancient indeed, and is honestly believed by him to have belonged in succession to his forbears far down in the misty flights of time. This impression of the writer was not entirely gathered from observation of the natives bringing specimens for sale to the Museum. When articles were so offered, the natives almost always claimed that such were used by or in the possession of Kamehameha the Great, with the mistaken idea of securing a higher price.

They were right in their contention, though they had perhaps forgotten that their grandfathers admitted that the king owned the heavens and the earth, the sky and the sea and all therein contained.

Specimen No. 176 was purchased by an antiquarian collector, of good repute, as a Hawaiian shuttle, and with it came the following interesting history:

“Made of the shinbone of Kuliakalanaia, an expert fisherman of Kohala, Hawaii. He was also a man without hair on his limbs. For these reasons his bones were wanted for fish hooks, etc., and he was therefore murdered for his bones. Lualauoho, an aipuupuu of Kamakahaie, secured the inner bone of the right leg as his share of the spoil. From it he made this ka [hia], tatting shuttle, which he very greatly prized on account of the good luck it brought his nets. On his death it passed to his son Kama who was also an aipuupuu of the same chief. Kama died at Hoopuloa, April 10, 1886, over a hundred years old, the wealthiest native in Kona, when this ka was left to his grandson G. L. Walia Kealiikuli, who resold it February 12, 1887.”

That such a value was set on implements of human bone was entirely correct, and there is little doubt in the writer's mind that the last native possessor believed the history submitted; but on finding the material to be ivory and referring a sketch of it to Professor O. T. Mason, that gentleman pronounced it an “Eskimo netting needle.” A comparison with shuttles figured in Nelson's work on “The Eskimo About Bering Strait”³² will confirm this. From about 1837 until a few decades ago the Hawaiian Islands were the wintering quarters for the whaling fleet operating off the coast of Alaska and in the Bering Sea, and with it many native seamen shipped for the summer cruise.

The other specimens, Nos. 5177 and 5178 were acquired in part of the collection of the late Queen Emma labelled “Ivory tools for netting koko and ieie baskets.” They were shown to several of the older natives, and while some did not recognize them, others claimed them to be Hawaiian implements but were not familiar with their uses. Each specimen consists of two pieces: the larger is a slightly curved implement with the outer arc notched at the butt end, smooth, rounded and decreasing in thickness until the sharp point is reached: on the inner side, from the point to the first barb, is a knife edge; from the first to the second barb, and from the second for about one-quarter the length it is curved, smooth and rounded, the remainder being straight and plane. About one-quarter the length from the butt end is a rectangular hole. This was identified by Professor Mason from a sketch as the side prong of a Hudson Bay spear point; and, since Nelson reports a similar one from St. Lawrence Island,³³ these specimens no doubt reached Bering Strait through trade and by the same means the native sailors acquired them and brought them here. The smaller implements are somewhat similar to the marlinspikes used in netting and figured in the same paper from Cape Nome,³⁴ and each implement is provided with the spur-like projection mentioned therein.

³² Eighteenth Annual Report of the Bureau of American Ethnology, pl. lxxiii.

³³ Pages 149 and 150, fig. 42 (8), of the same work.

³⁴ Page 193, pl. lxxii, figs. 19 and 20 of the same work.

There are four long clumsy shuttles made of pine in the Museum's collections, used by natives, averaging about 13 inches long. The shafts of these are rounded, and the points of the eyes thick and square. In each, 2.5 in. from an end, is inlaid a small piece of lead. They are certainly not Hawaiian, and the locality of their origin is not at present known to the writer.

Doubt has also arisen concerning the origin of some of the gauges, for the native mesh stick was very thin, seldom or never thicker than one-tenth of an inch, and No. 3917 (Fig. 101) is over .3 in. thick. However, the characteristics of Hawaiian mesh sticks are not strong enough for fully satisfactory identification. Specimen No. 3915 was at one time 4.8 in. longer, and from the end of it No. 3916 has been sawn or cut off, as certain marks on the two specimens testify, and used separately. Probably No. 3919 came from the same source. The total length of the original specimen, 12 inches, must have made a very awkward gauge for use.

The following is a list of Hawaiian netting tools in the Museum:—

GAUGES.—HAHA.

- 185. Tortoise shell. Length 4.2, width .98 inches.
- 3915. Whale rib. Length 7.2, width 2.1 in.
- 3916. Whale rib. Length 4.8, width .8 to 1.1 in.
- 3917. Whale rib. Length 6.2, width 1.3 in. Very thick.
- 3918. Bone, human(?). Length 3.6, width .9 in. Rather thick, edges lightly and evenly serrated.
- 3919. Whale rib. Length 4.5, width .6 in.
- 3920. Bambu. Length 4.2, width .6 in.
- 3921. Tortoise shell. Length 3.5, width 1.2 to 1.3 in.
- 3922. Tortoise shell. Length 6.8, width .85 in.
- 4519. Tortoise shell. Length 3.8, width 2.9 in.
- 6795. Naio(?) wood (*Myoporum sandvicense*). Length 5.5, width 1.1 to 1.3 in.
- 9033. Tortoise shell. Length 2.9, width .5 in.
- 9034. Tortoise shell. Length 4.3, width .88 to .98 in.
- 9035. Tortoise shell. Length 4.2, width 1.2 in.
- L 183. Tortoise shell. Length 3.2, width 1 in.
- L 184. Tortoise shell. Length 3.4, width 1.25 in.

SHUTTLES.—HIA.

- 176. Walrus tusk. Length 8.8 in. Originally Eskimo.
- 4470. Whale rib. Length 5.8 in.
- 4471. Whale rib. Length 5.6 in. Very narrow.
- 4520. Kauila wood (*Alphitonia excelsa*). Length 10 in.
- 4521. Kauila wood. Length 6.3 in.
- 4522. Bambu. Length 8.2 in.

4523. Naio. Length 6.3 in.
 4524. Kauila. Length 7.2 in.
 4525. Bone, human(?). Length 5.1 in.
 4526. Pine. Length 12.8 in. Not originally Hawaiian.
 4527. Pine. Length 12.8 in. Not originally Hawaiian.
 4528. Pine. Length 12.9 in. Not originally Hawaiian.
 4529. Pine. Length 13 in. Not originally Hawaiian.
 6793. Naio. Length 6.4 in. One eye broken.
 9030. Kauila. Length 5.3 in.
 9031. Naio. Length 5.3 in.
 9032. Naio. Length 4.9 in.
 L 179. Kauila. Length 6.7 in.
 L 180. Kauila. Length 7 in.
 L 181. Kauila. Length 5.6 in.
 L 182. Kauila. Length 7.9 in.

NET-MENDERS.—KIOE.

9036. Wood. Length 5.6 in., of point 1.8 in.
 9037. Wood. Length 5.7 in., of point 2 in.
 9038. Wood. Length 5.8 in., of point 1.9 in.
 9039. Wood. Length 5.9 in., of point 2.1 in.
 9040. Wood. Length 6 in., of point 2.2 in.
 9041. Wood. Length 6.2 in., of point 2.4 in.
 9042. Wood. Length 6.45 in., of point 2.25 in.
 9043. Wood. Length 6.55 in., of point 2.2 in.
 9044. Wood. Length 6.6 in., of point 2.3 in.
 9045. Wood. Length 6.65 in., of point 2.2 in.
 9046. Wood. Length 6.6 in., of point 2.15 in.
 9047. Wood. Length 6.9 in., of point 2.4 in.
 9048. Wood. Length 7.2 in., of point 2.3 in.
 L 380. Wood. Length 10.2 in., of point 7.3 in.
 L 381. Wood. Length 6 in., of point 1.8 in.
 L 382. Wood. Length 6.1 in., of point 4.1 in. (Fig. 103, B.)
 L 383. Wood. Length 5.6 in., of point 1.7 in.
 L 178. Wood. (1) Length 5.9 in., of point 1.5 in.; (2) length 5.9 in., of point 1.8 in.;
 (3) length 5.9 in., of point 1.8 in.; (4) length 5.9 in., of point 1.9 in.; (5) length
 6.1 in., of point 1.8 in.; (6) length 6.5 in., of point 1.9 in.

Hawaiian nettings can be almost as conveniently classified by their use as by their appearance, and in this article two main divisions will be considered, the bag or netting surrounding a utensil for the purpose of carrying, and the fabric similar to that known as fish net.

Netted bags include the koko or detachable net used to carry or suspend the *umeke*, wooden or gourd bowls containing food or clothing (Figs. 104 and 105), and the cord permanently attached to various gourd utensils as a means of fastening a handle thereto, generally known by the name of the cord, *aha* (Figs. 106 and 107).

Koko.—The koko is a bag, of cord netted or knitted, in the shape, when suspended, of an inverted hemisphere superposed by an elongate cone. In technique it was divided into three parts, Fig. 108, the first, following the order of the work, being *piko*=navel, beginning, *kumu*=root, or *hoomaka*=starting place. The term *poaha* has been applied to this part, and many of the piko when completed would be large enough to act as a poaha. The latter was a ring of rope or bound pandanus leaves, placed on the ground, on which the rounded bottom of the umeke would rest. The second or main part was often referred to as koko, but there was a technical word, *hanai*, to represent it;³⁵ the word *opu*=belly, any swelling surface, was also used for this part. The third, called *kakai* or *alihi*, was a cord interlooped, Fig. 113, with or knotted, Figs. 114 and 115, to the outer edge of the hanai in two series. The names kakai and alihi seem to have been used as frequently for the suspending cords of the koko, but since the name alihi is also used for the head and foot ropes of the fishing nets, it might be better to retain the name kakai for the koko. Each series was bound in the middle (ultimately the top) by a single smooth winding, and sometimes by half hitches, to make a *pu* (handle), and into these pu was the end of the *auamo*, bearing stick, thrust to carry the load, Fig. 153. The auamo, or *aumaka*, is a stick of hard heavy wood, generally *kauila* (*Alphitonia excelsa*), about six feet long and borne across the shoulder, Fig. 109; the ends drop a little below the middle and are either notched or neatly carved to hold the kakai, Fig. 153. For protection of food against animals, the koko was suspended from a wooden hook, *kilou*,³⁶ attached to the ridgepole of the hut, or from a crossbar shaped like a canoe and notched around the edges; this implement was called *oleole*³⁷ or *haka*, and was placed on the top of a pole set in the ground.

The work of making koko was done by one of the *kahu* or body servants of the alii. Frequently a kahu well skilled in such arts was in the service of the king, who, to show favor to his friends, would place the skill of the kahu at their disposal. Another source of manufacture was the common people, who brought great numbers of koko to the alii in payment of taxes, and after the best had been selected by the chief and his friends, the poor ones might return to the commoner.

Since this essay is intended to place on record this part of the natives' art now forgotten, and the usefulness of which has entirely ceased, and also to give a catalogue:

³⁵ Lorrin Andrews, A Dictionary of the Hawaiian Language. Honolulu, 1865.

³⁶ Edge-Partington and Heape: Eth. Album of Pacific Ids., Vol. III, Pl. XV, No. 1.

³⁷ Ibid., Nos. 2 and 3.

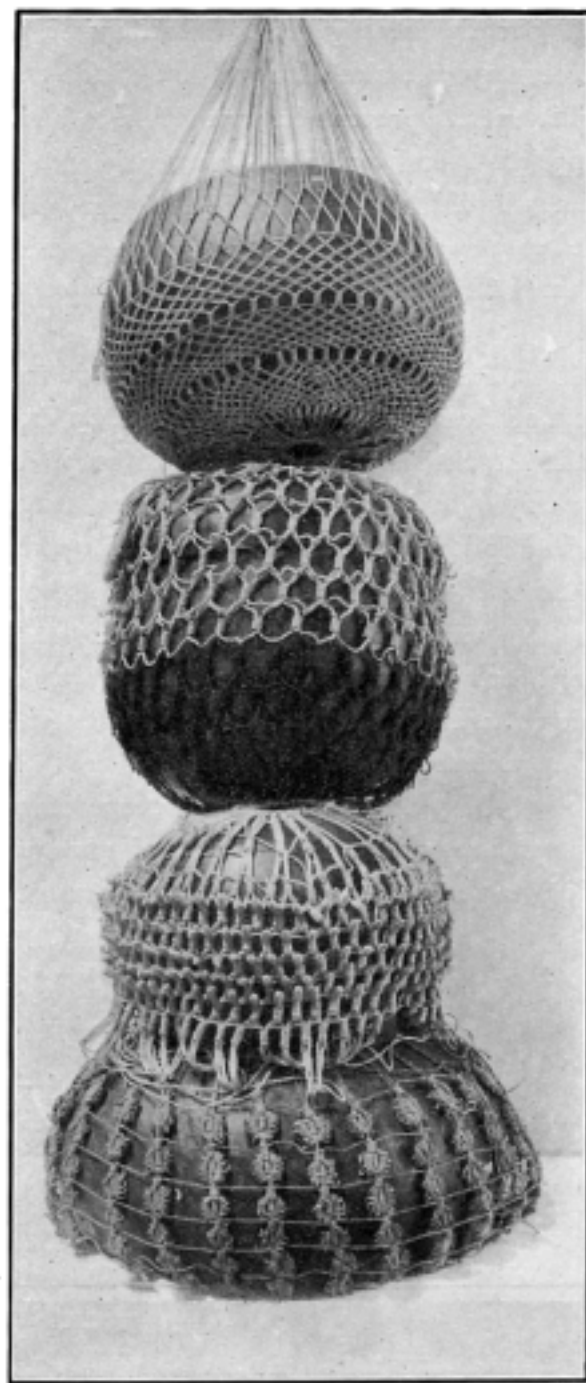
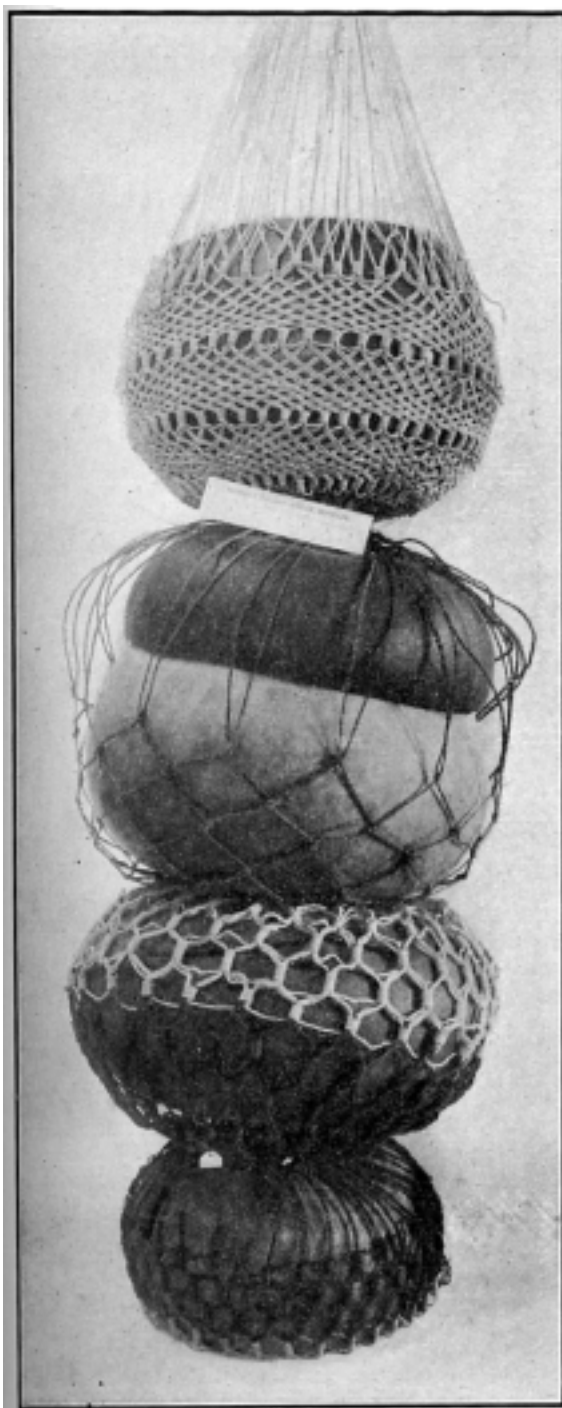


FIG. 104.

- a.* Koko puupuu, Hanai E.
- b.* Koko pualu, Hanai A.
- c.* Koko puupuu, Hanai D.
- d.* Koko puupuu, Hanai D.

FIG. 105.

- a.* Koko puupuu, Hanai E.
- b.* Koko puupuu, Hanai D.
- c.* Koko puupuu, Hanai G.
- d.* Koko puupuu, Hanai K.

of what is now available in this Museum to students of ethnology, greater attention has perhaps been given to detail than a general description would call for. It has been necessary to make a liberal use of the native names, which at the present day are liable to be inaccurately applied. And again it has been found that sometimes in different islands of the group one name may be employed for different articles, and dissimilar names for the same thing.

Piko.—The piko is a ring of cord at the bottom of the koko, attached to which, by loops, knots or half hitches, is a row or circle of loops on which the hanai is begun. The habitual position of natives when doing all such work was sitting on the ground, with one leg over the other and the upper foot projecting slightly. From the big toe of this foot the cord was stretched, and the diagrams of the technique herein have been drawn as if in the same position, unless specially mentioned.

Of piko, there were observed fourteen forms in specimens obtainable, and in the following descriptions of the modes of operation the arrow heads point towards the shuttle or ball of cord.

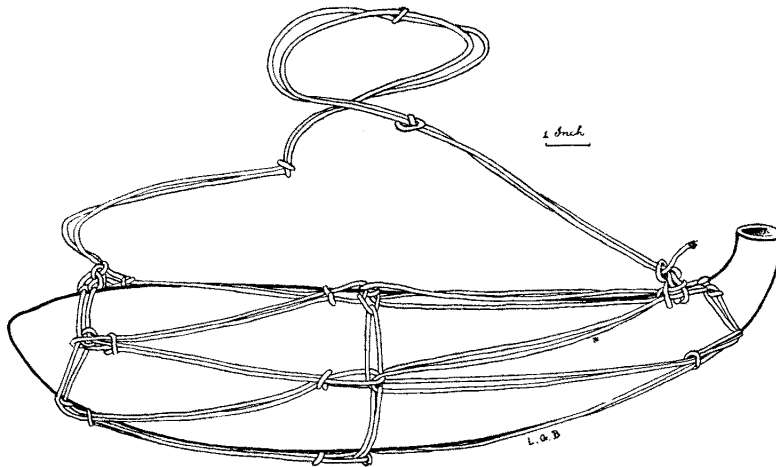


FIG. 107. OLOWAI. GOURD WATER BOTTLE FOR CANOE.

at *d*. The loops (from 6 to 12) are formed in this manner and completed by the return cord *e* making a knot with *a* at *f*. The work from this point is part of the hanai.

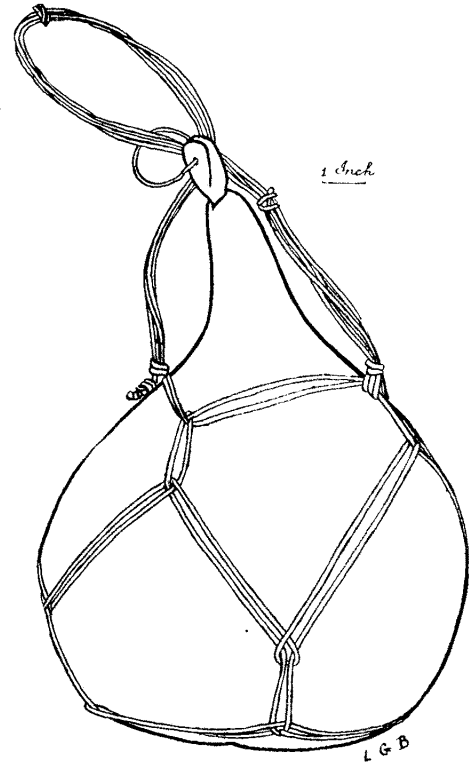


FIG. 106. HUEWAI. GOURD WATER BOTTLE.

PIKO A (Figs. 110 and 111).—A piece of cord is first knotted into a ring with the loose ends closely severed. In the first figure, at the point *b* the shuttle is passed over and under the ring, over the free end of the cord *a*, under and over the ring and back through the loop along *a*. At *c* a simple knot is tied on *a* and the half hitches at *b* are repeated at *b'* leaving a loop

This is Piko A in its simplest form, and in the second figure a variation is shown where the shuttle cord, after tying at *b*, makes a different knot with *a* at *c*, the details of which are shown at *c'*. All the knots at *c* are tied similarly to *c'*, and at *c''* the order of tying is merely reversed. The return cord *e* knots with *a* at *f* as shown.

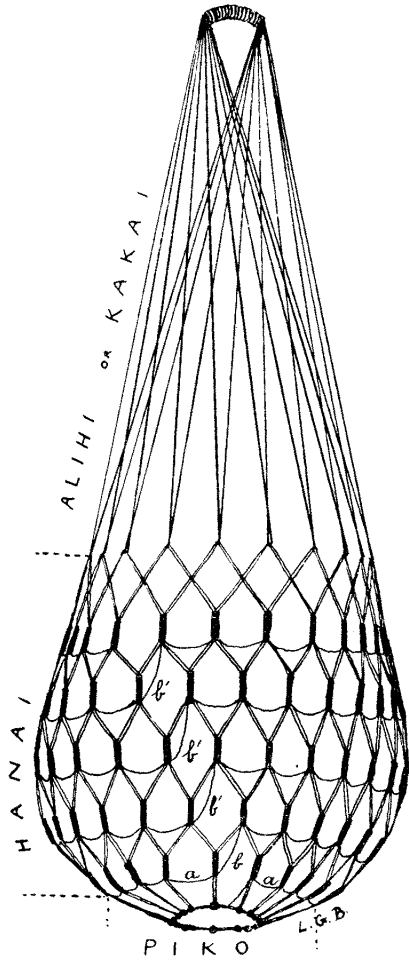


FIG. 108. KOKO PUUPU.

PIKO B (Fig. 112) is as in Piko A as far as *c* where the shuttle cord is knotted simply, thus leaving a loop, through which the loop *d* is passed. Then the shuttle is run twice round the loop *c*, and back through the two loops thus made. This knot is the same as a fisherman's knot with a double turn. Piko B differs from the former in that an additional loop *d* is added to each knotted loop *c*.

PIKO C (Fig. 114).—A simpler form than the following piko. In this the cord is twice looped, and the free end *b* passed under the shuttle cord *a* and around *a* and *c*. The loop *d* is left and the free end knotted around the base of the loop, thus fastening the ring. The shuttle is then sent around the ring at *f*, when the process of the first knot at *e* is repeated reversed.

PIKO D (Fig. 116).—A double ring being made, the free end is passed over the shuttle cord, under the other ring cord and back over the shuttle cord, following which a half hitch is made around the ring and the knot at *b* completed, Diag. 1. Then, Diag. 2, three loops are made through the ring at *d*, the shuttle return-

ing at *c* and being sent around the loops and cord *a* three times and through the loops thus formed. The knot at *h*, Diag. 3, is thus made, and the cord *f* carried to the next point *g* on the ring, where the last described knot is repeated.

PIKO E (Figs. 117 and 118).—In the samples examined, a double ring was made, with the free end *a*, Diag. 1, Fig. 117, passing under the shuttle cord *d* and over the middle cord *b*. Then, Diag. 2, *a* is looped, passed through the ring at *b* and knotted simply to itself at *c'*, looped again and a fisherman's knot with two turns around the part of the ring at *b*. This process results in the knot at *h*, Fig. 118. Then the shuttle cord *d*, after tying at *c''*, continues, as *ff*, the work of the piko, which is complete when *f* joins the free end at *i* and begins the hanai as *f'*. This piko in principle is

the same as the previous two, but the compression of the ring at the four points gives a very different effect.

The five foregoing piko were all made with the shuttle and attached to netted hanai. They were, too, more often used in the koko pualu than in the koko puupuu.

PIKO F (Figs. 119 to 122) was found to be the most common in the koko puupuu, and this and the following styles were made from cord on a ball, not a shuttle, and were attached to the knitted hanai. Four methods of forming the ring in this piko are illustrated in Fig. 119. Diagram 1 shows the end cord *a* looped and tied with the ball cord, forming *b*. Then the ball cord is looped at *g*, passed under *b* at *c* and through the loop *g* at *d*; or, a half hitch is formed and slipped over *b*, following which the ball is passed around *b* at *e*, the loop *f* passed through *e d* and the ball carried round *b* to the next point. In Diagram 2 the cord is bent at *b* and the ball cord carried round the end cord *a* at *c* and the loop *f* made as before. In the next diagram, a slip knot is tied to the end cord *a* at *d*, whence the loops *f*, etc., are formed as usual. The loops of the piko in these three diagrams continue along *b* until the piko is of the requisite size, when the end cord *a* is passed through the end of the loop *b*, knotted or twisted and concealed, as also in Diagram 4, in the first knot of the hanai. In Diagram 4 a double ring is made and the ball cord wound once around the end cord *a* at *b*, and the loop *f* proceeded with as before; the cord *a* is left free to enlarge or decrease the ring during the work. The appearance of Piko F is shown, obverse side in Fig. 120, and reverse side in Fig. 121. In this piko and some of those following, the end cord *a* after being attached to *b* is sometimes wound around the bases of the outer loops *f* once or twice for ornamental effect. Fig. 122 shows Piko F with the end cord run twice around the loops.



FIG. 109. NATIVE WITH AUAMO OR BEARING STICK.

PIKO G (Fig. 123) is shown with a quadrupled cord forming the ring. After doubling the cord twice, the ball cord is tied with a simple knot around *c* and *a* at *e*, and leaving a loop at *f*, two half hitches are run around or slipped over *b* and *d* as shown at *g*, *h* and *j*. In the specimen figured the ring was joined by passing *b* and *d* through *c* and tying *a* to the latter. Then the loops *b* and *d* together were used for the first knot of the hanai.

PIKO H (Fig. 124).—After being looped at *b* and tied at *c*, two half hitches are taken around the base of *b* leaving a loop at *d*. Then the ball cord is passed behind and around *b* (see *f*) and the loop *g* slipped through the loop thus made. At *h*, the last loop of the piko, an additional half hitch is slipped over *b* after the loop has been made.

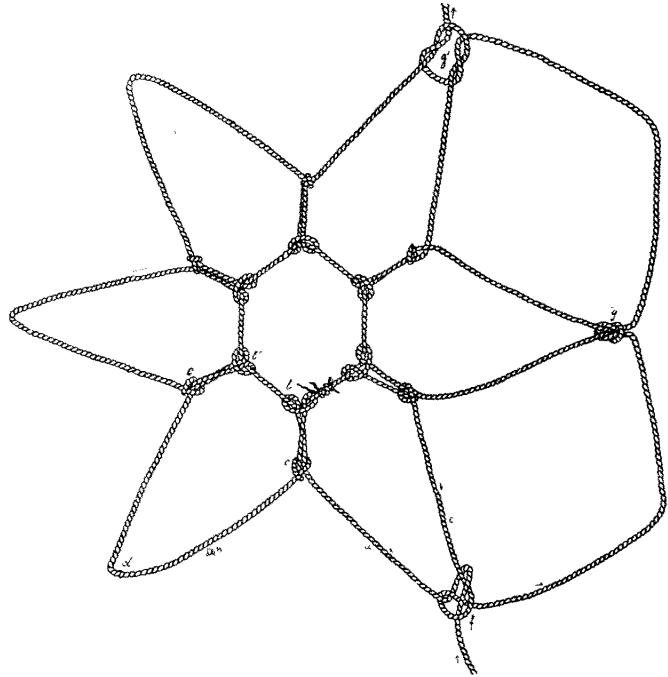


FIG. 110. PIKO A, HANAI C.

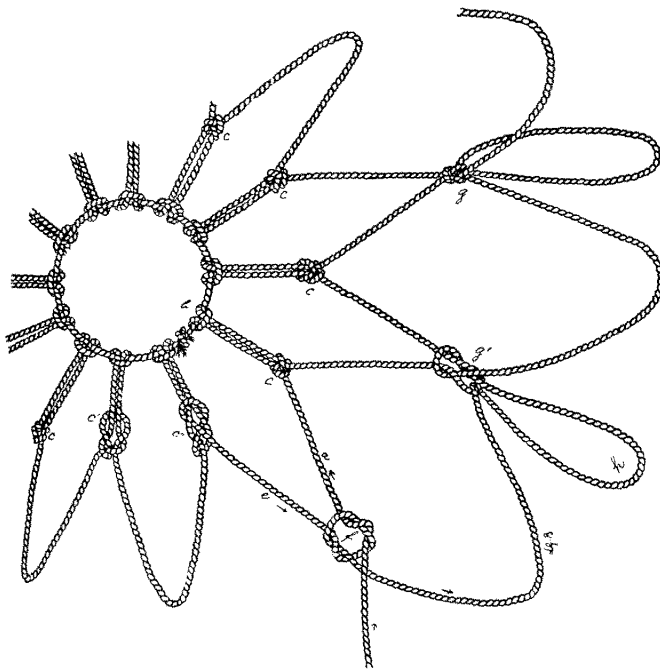


FIG. 111. PIKO A, HANAI C.

PIKO J (Figs. 125 and 126) is simpler than F and one step further on than H. In the specimen taken as an example and figured, Fig. 125, the piko could have been as easily made with one piece of cord, by running *y* on as *a*, as with two. A detached cord is bent double at *z*. Then the ball cord is passed around *x* and *y* and over the free end *a*, to begin the work, and back under *x* and *y*. Following this a loop is made (see *d*), twisted round and slipped through the loop *b* thus left, and the work continued with the ball cord *e*. In the example figured, the ring was joined by passing *x* through *z* and

tying with *y*, when *x* and *y* were concealed in the first hanai knot. Fig. 126 has the end cord wound once around the base of the loops as referred to in the paragraph on Piko F.

PIKO K (Fig. 127).—This is similar in construction to the last, but with the outer loops far apart, and the spaces on the ring between wound with the ball cord. In Diagram 1 the cord has been doubled, leaving a loop at *b*. Then the ball cord is looped at *c* and at *d*, the latter being passed around *a* and through *c*, and drawn taut. The ball cord is tightly wound around the bend of *b* for several turns and two loops formed, the second being passed under *b* and through the first. Diagram 2 shows the method of fastening the ring, which being done, the ball cord *e* and end cord *a* are combined to make the first knot of the hanai. This piko consists of from fifteen to thirty loops, and is generally very large in diameter.

PIKO L (Fig. 128).—A triple ring is made by doubling the end cord at *b* over the ball cord *a* and running the former twice around, Diag. 1. Then the end cord *c* is wound round *b* once and the cords of the ring for about one-quarter its circumference, and is passed back and forth through the ring to form the loops *o o*, Diag. 2; after the last turn *e* this cord is wound four

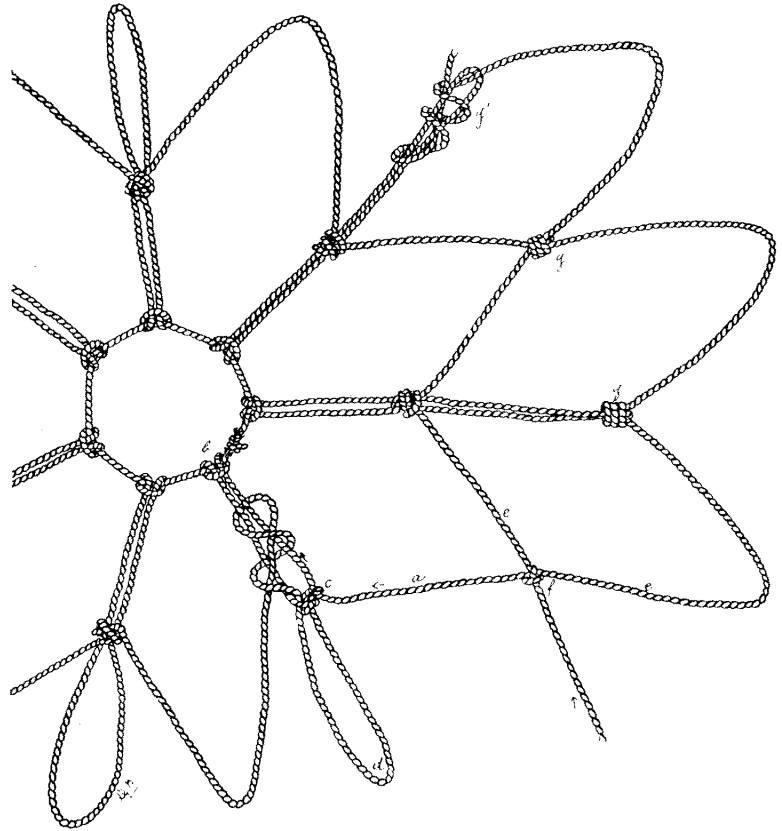


FIG. 122. PIKO B, HANAI B.

times around the bases of *o o*, Diag. 3, passed through the windings *m* and around the cords of the ring at *f* and the winding on the ring continued at *g*. It is probable that the piko in the specimen examined was made with a shuttle or a small ball of cord in addition to the large ball, for the amount of this end cord is considerable. Then the ball cord *a* is looped three times, the bends being doubled over *b* (making six loops at *p p*) and bound with four half hitches by *a* to make the knot at *k*. The base of one of the loops of *p* is pulled out at *l*, the ball passed through the bight and *l* closed by drawing on *p p*. The end cord *h* returning from the circuit is then bound over *k* with half hitches and concealed in the hanai which the ball cord *a* commences with one of the loops of *p*.

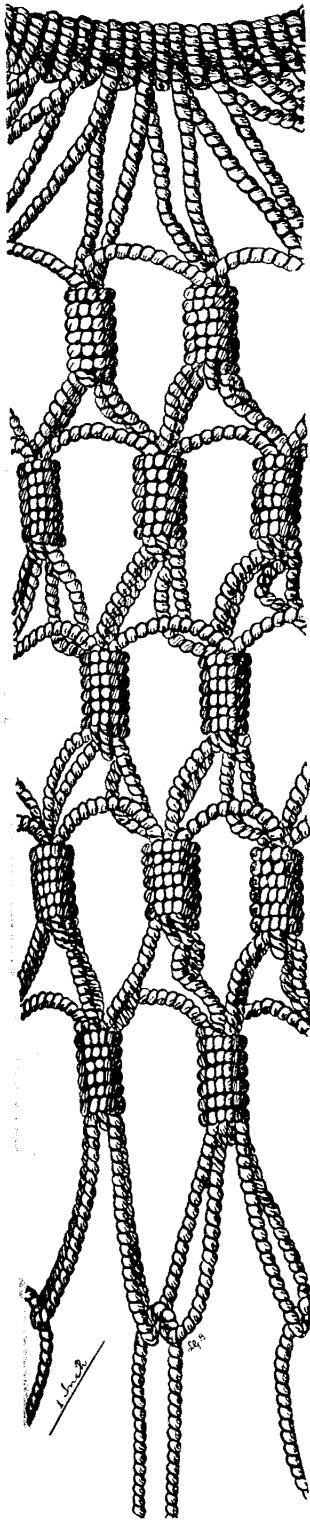


FIG. 113. HANAI D.

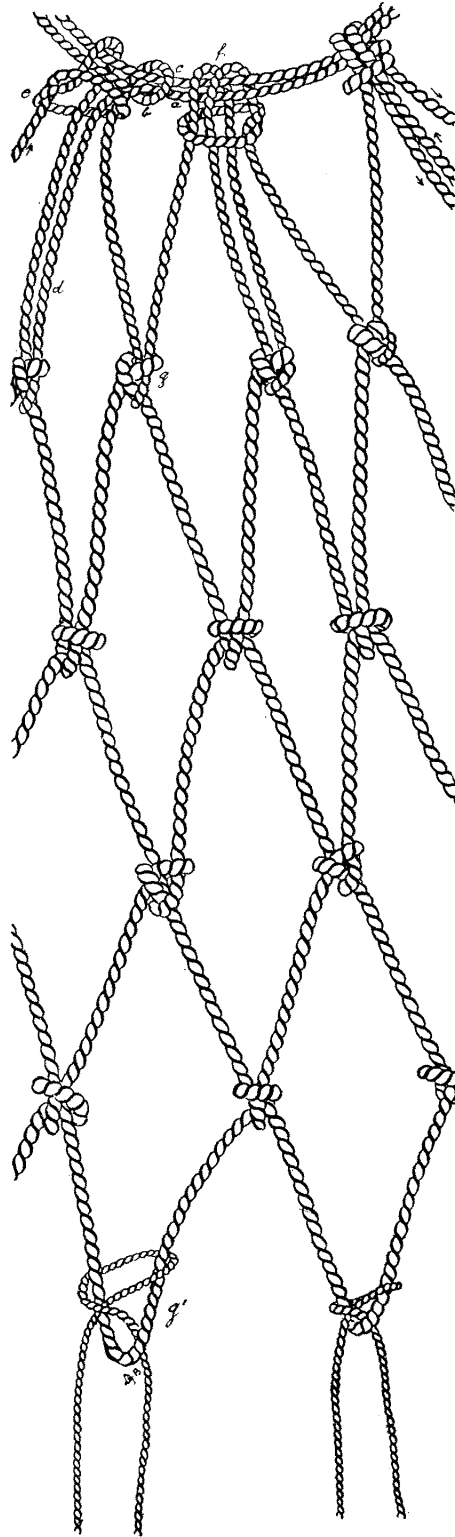


FIG. 114. PIKO C. HANAI A.

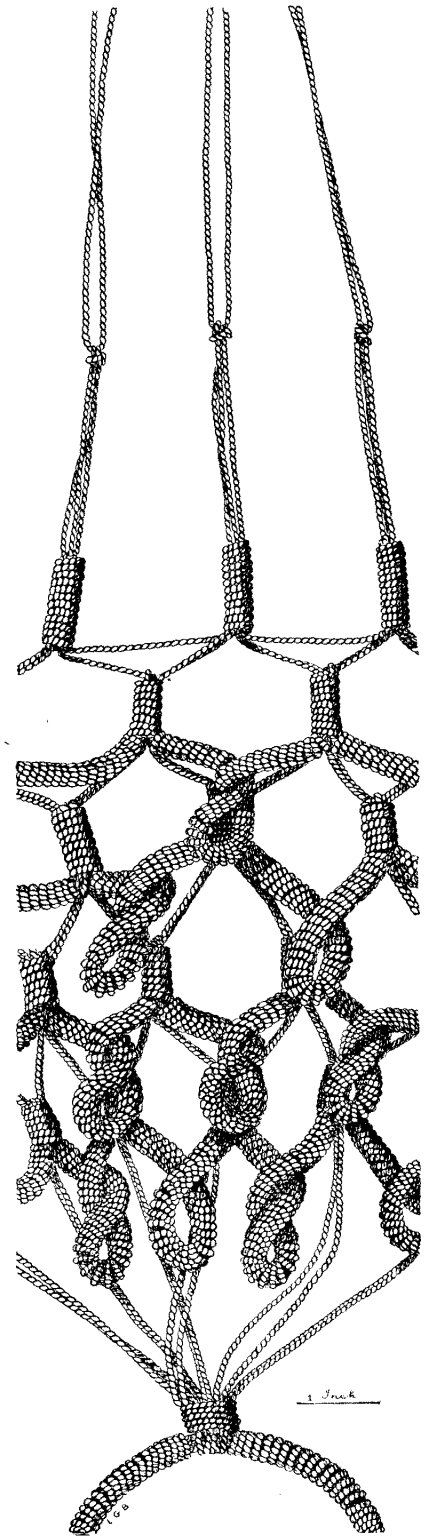


FIG. 115. HANAI F.

PIKO M (Fig. 129).—With the end cord *a* the slip knot *a b c* is made. Then a loop *d* of the ball cord is slipped through *c* and the ball passed once around the base of *c* at *e* leaving a loop at *f*. Through *f* another loop *g* is passed, the ball cord return-

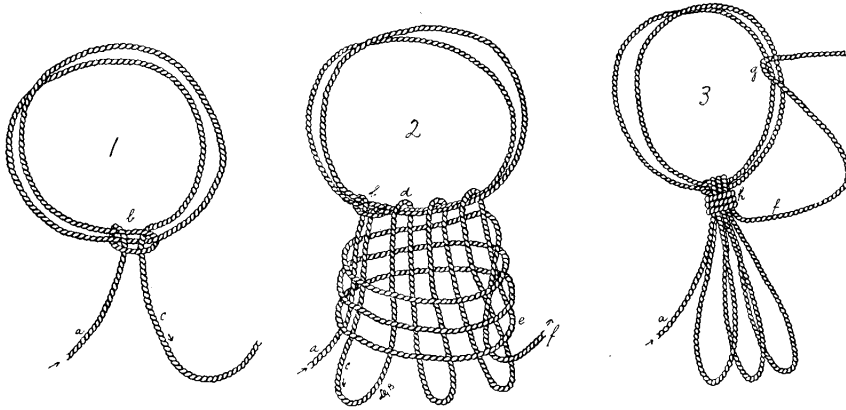


FIG. 116. PIKO D.

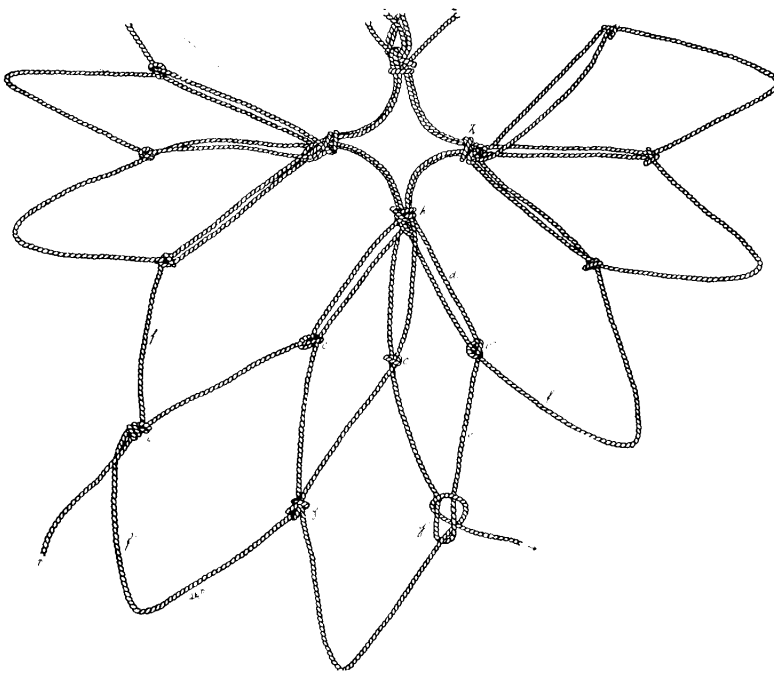
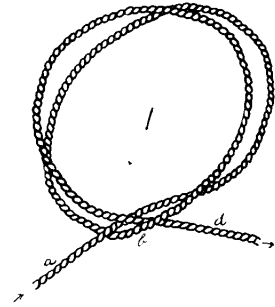


FIG. 118. PIKO E, HANAI A.

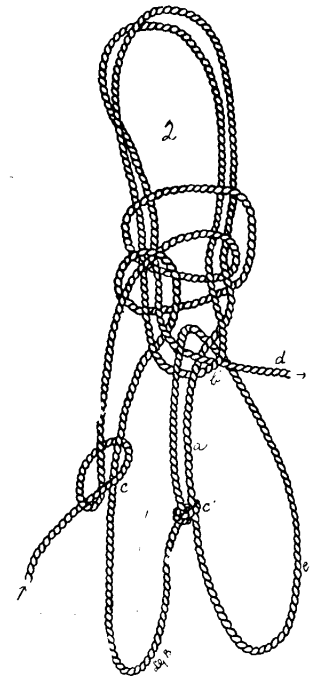


FIG. 117. PIKO E.

ing at *j*, with which *h* is made similarly to *d*. The appearance of the piko completed is given from *j* to *k*, and strongly suggests crochet.

PIKO N (Figs. 130 and 131).—Now, if in Piko M, the cord *e* were wound around *c* twice or more, it would represent Piko N. To commence this piko, a slip knot is made, *b c d*, and the ball cord *f* wound round the end cord *a* at *e* from two to ten times as wanted; then a loop *g* of the ball cord is pushed through the windings, re-

turning at *j*. This knot can be and probably was made in a simpler way. With the ball cord *j* looped through *g* at *h*, the loop *l* is made leaving a large slack at *m* and *n*; then this slack is tightly wound around *g* and *l* the required number of times, the balance of the slack being taken in by drawing on *l*. Reference should be made to the knot in Hanai D in Fig. 137.

PIKO O (Figs. 132 and 133).—In Diagram 1, after doubling the cord at *g* make the loops *b*, *d* and *f* with the ball cord, leaving enough slack. Then lay the ball cord *e* along the bends of the loops and wind the slack *c* a few times around the whole. Then loop the cord *a* *g* at *h* and continue winding with *c*. When the slack of *c* is

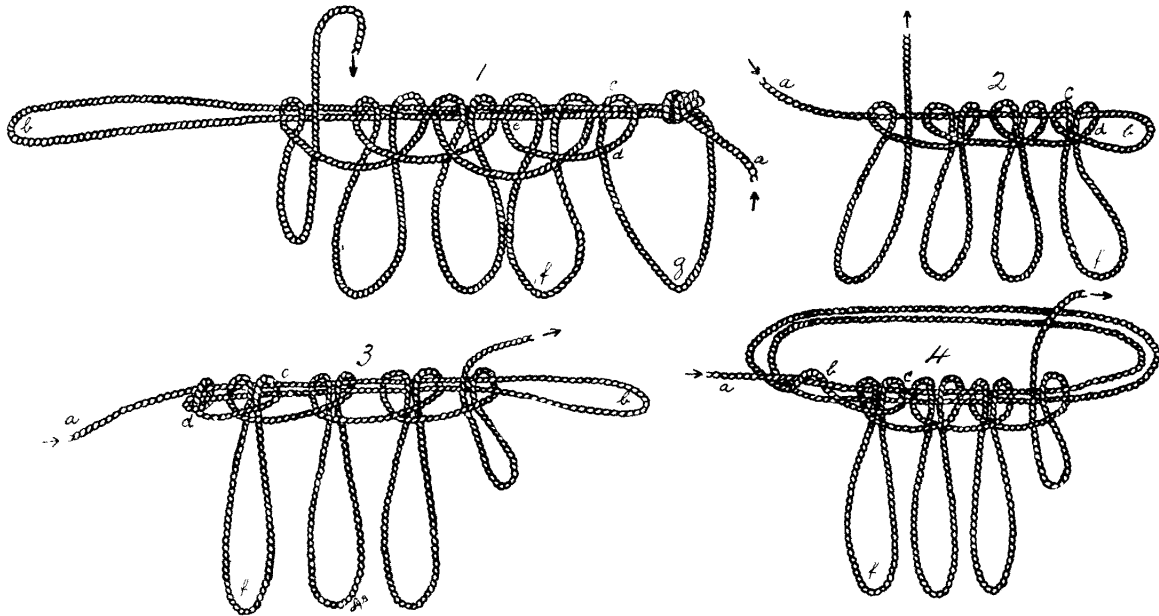


FIG. 119. PIKO F.

taken up by *e*, the knot *x*, Diag. 2, will serve to begin the piko, and the details of the regular knot are shown in the same diagram. *X* being completed, with the ball cord *e* pass the loop *b'* through *d* leaving slack at *h'*, and over *b'* lay *e'* and the loop *d'*, leaving another slack at *c'*. Then *c'* is bound around all the cords on a level with *d*, and as the binding proceeds, the slack *h'* is divided into two loops, *h' h'*, Diag. 3, and held in place by *c'*. Sometimes the ball cord *e'* is not laid along *d'*, but is carried forward outside *j*. In such cases this piko differs from Piko N only in the additional loops *h' h'* projecting from the side. Fig. 132 was drawn with the details in an upright position. Fig. 133 shows this piko, which in the specimen photographed was small.

Hanai.—The hanai begins where the last loop of the piko was made.

HANAI A (Figs. 114 and 118).—This is the simple fisherman's knot, known by natives as *ka*, *umii*, etc., as shown by *g g'* in the figures.

HANAI B (Fig. 112) is the fisherman's knot with one or more extra windings around the engaged loop, as at g and g' .

In some of the koko puupuu the knots of both Hanai A and B are used as in Fig. 134. Fig. 135 is a specimen of koko puupuu with Hanai B.

HANAI C (Figs. 110, 111 and 136).—This is the square or reef knot, *makili*, g, g' , Fig. 110. Sometimes in beginning a large hanai, additional loops h , Fig. 111, were run on to the loops of the piko for the purpose of enlarging the periphery of the hanai.

Fig. 136 shows the specimen from which Piko D, Fig. 116, was illustrated. This was a particularly well made and finished netting used as an *eke*. On completion of the piko the shuttle cord k was looped at n (without tying to the free end a) and knotted to the piko loop p and so carried round the circuit to l . The cord l was then looped and the rows of the hanai completed, the work travelling boustrophedon. To join the ends of the rows, the shuttle cord m is brought back from the outer edge of the hanai by knotting from side to side until tied with a to k at r .

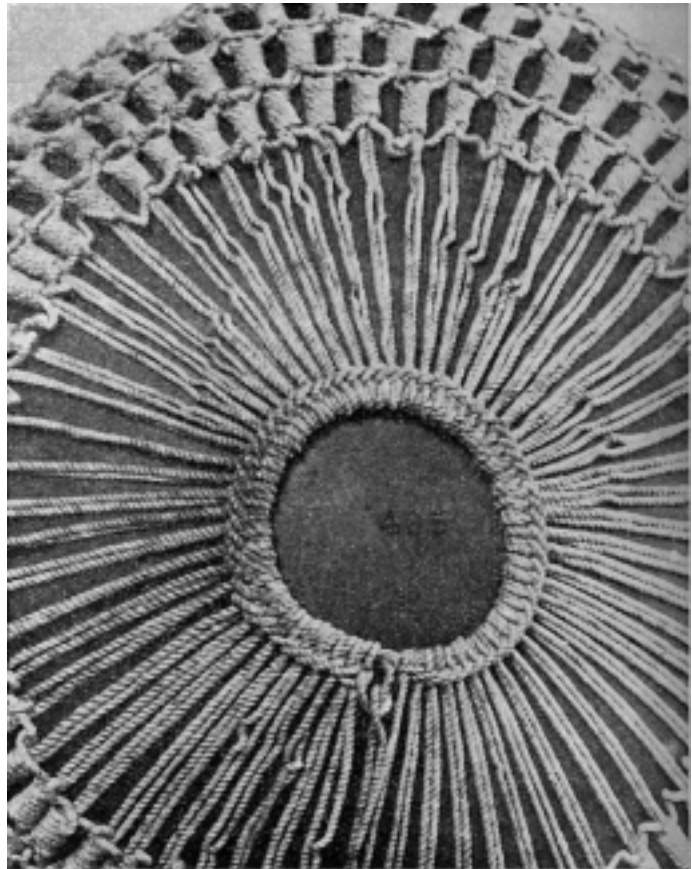


FIG. 120. PIKO F, OBLVERSE.

The three foregoing styles represent the netted hanai, which have the ends of the rows joined in the manner just described, or else by the free end a netted from side to side towards the outer edge.

HANAI D (Figs. 137, 113 and 133).—The principle of this, the basal knot of all the knitted koko, has already been partially illustrated in Piko M, N and O, but since it is so generally used, fuller details of its technique in the hanai are given in Fig. 137. The loops xx are those of the piko, and f is the completed knot of Hanai D, known to the natives as *puu*. In Diagram 1, the ball cord a is looped b through the next piko loop, and, Diagrams 2 and 3, the slack c being left, the loop d is bent and placed under b . Then c is wound round b, d and the bight of x and the slack taken

up by *d* and *e*. In knitting the succeeding row of the hanai, the nearest loops of adjacent puu of the first row are placed together and bound by the outer knots. Sometimes when the mesh of the hanai is intended to be large, two loops of the piko are combined in one puu. And occasionally, but only with the closely knitted koko of coir, the hanai commences with but few puu near the piko, Fig. 133, and the number is doubled by using each loop of the puu of the inner row as a base for that in the

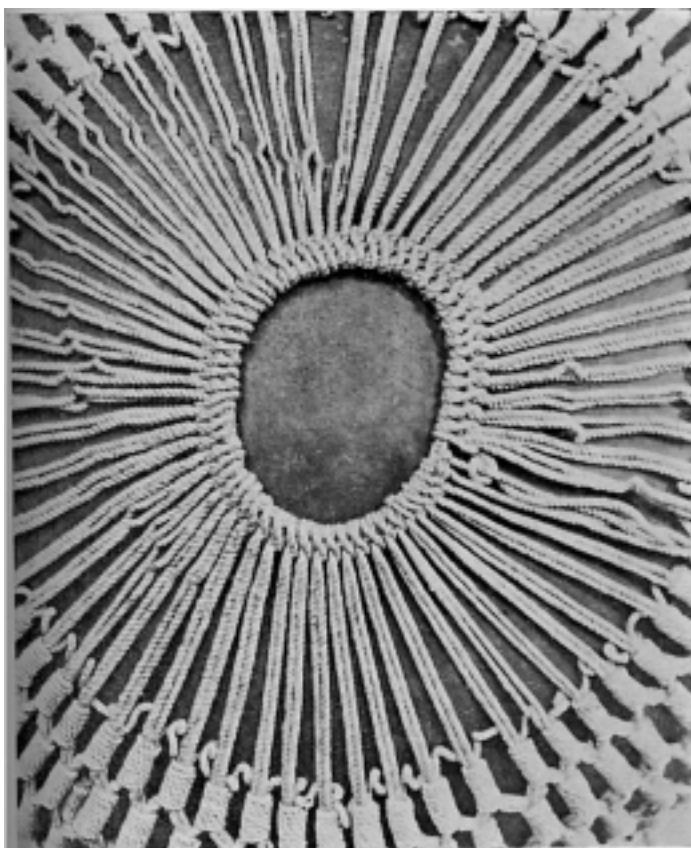


FIG. 121. PIKO F, REVERSE.

outer. In the figure the number of puu in the second, third and sixth rows have been successively doubled.

The work of the knitted koko was directed either continually to the right, or to the left, or had the alternating rows in each direction; there seems to have been no set rule, but one circuit was always completed before the next began, in which respect it differed from that in the netting. The knitted knot can at once be detected by the cord hanging from and connecting the bases of each puu (see *a* in Figs. 108 and 137). When one row was finished, the ball cord *b*, *b'*, Fig. 108, was carried up with the loop of the last knot to begin the row above.

HANAI E (Figs. 138, 104 *a*, and 105 *a*).—This is the same as Hanai D, except that the outer loops are interlaced before the ends are bound together with the puu.

HANAI F (Figs. 139 and 115).—Before completing the puu, the ball cord *e*, Fig. 139, is looped *g* through the slack *c*, which is taken in as usual. Then round the bends of *g* the ball cord *h* is very tightly wound, finishing at *k*, Diagram 2. Then the bight of *g* is placed on that of *x* and the loop *l* on the ball cord run through *x* and *g*, after which the puu is repeated. A koko of this style, unique in the collection, is illustrated in Fig. 115 in its suspended position.

HANAI G (Figs. 140, 141, 131 and 105 *c*).—This hanai, in addition to the puu of Hanai D, has from one to three knobs constructed like the puu, attached to the base. Fig. 105 *c*, shows this hanai in inverted position with one knob attached, and Fig. 131 the same style with the three knobs, in which case the name of the koko was koko puupuu *huihui*. Following the completion of the puu, Fig. 140, the ball cord *e* is looped *g* around the connecting cord *a* and the puu repeated (*o*, Diag. 3) the loops *g* and *j* being drawn flush with the wound cord. This is followed by a similar puu, *p* and *r*, on the bends of *x*. Diagram 4 shows the under side of the huihui. In Fig. 141 the puu *o*, *p* and *r* are all made around *x* and *a*. It has been observed that if the mesh of the koko is small, the rows of knots alternate with the styles of Hanai D and G.

HANAI H (Figs. 142 to 144).—This hanai has from one to three puu looped around the puu of Hanai D. The method is similar to that in Figs. 140 and 141, but the loop *j* is allowed to project slightly from the puu *o*. In Fig. 142, the puu *p* is attached to the base of *o* and the loop *n* allowed to protrude. Then *n* is passed through *j*, slipped over *b*

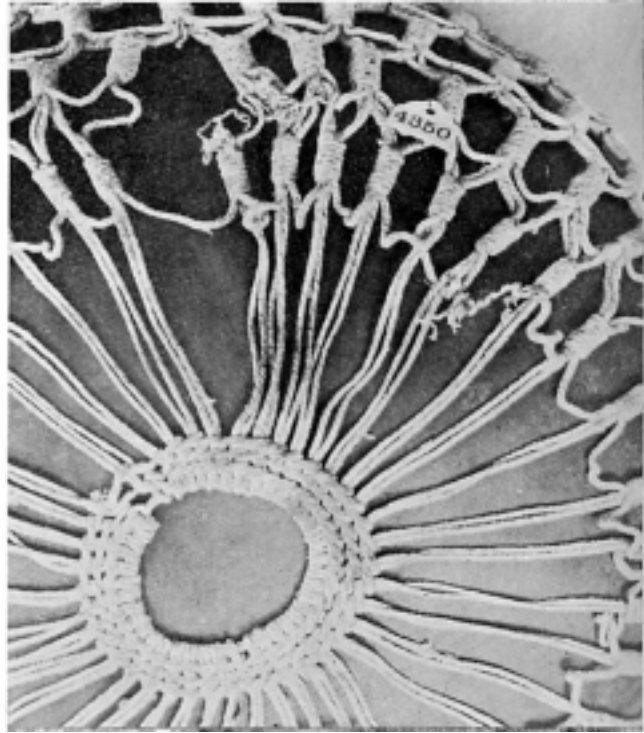


FIG. 122. PIKO F.

and *d* and drawn tightly around the base of *b* and *d* by the ball cord *m*. Fig. 143 shows a koko with the piko half of the hanai, coir and style D, and the kakai half, waoke and variations of Hanai H. In Fig. 144 is given an illustration of the outer rows of a koko in suspended position, the body of which is of Hanai H as shown in the lower knots, and the upper edge of Hanai J.

HANAI J (Figs. 144 and 145).—It is probable that koko exist which are made entirely like the upper row of that in Fig. 144, though there are none in the Museum. In Fig. 145, Diag. 1, after the puu *f* is complete, the ball cord is looped, *g*, and passed around *x* and *a*, and a series of half hitches are slipped over *g*. As the half hitches approach the loops *b* and *d*, the latter are each included in a half hitch in turn. Diagram 3 shows the reverse side. When attaching the bight of *g*, Diag. 2, the ball cord

is looped at *j* leaving a slack at *l*, the loops *g* and *j* bound together by one turn and the binding continued around the whole as with the puu.

HANAI K (Figs. 146 and 105 *d*).—This follows J as far as the loop *h*, which does not encircle *x* and *a* (Diag. 1, Fig. 146). Then two half hitches are slipped over *g* and drawn tight, a loop left and two more half hitches added. Diagrams 1 and 2 were drawn from the reverse side, and Diagram 3 from the obverse. As *g* passes between *b* and *d*, one of the loops on *g* is run around *d*. To complete the knot, *h* is laid on *x*, and *g* and another loop *j* added, when the whole is bound together in the usual way with the slack *l*. In this hanai (see Fig. 105 *d*, with the koko inverted), the knots in the succeeding row are placed directly in front of those of the previous one, while the loops *b* and *d* of one puu are not separated as in all the other hanai.

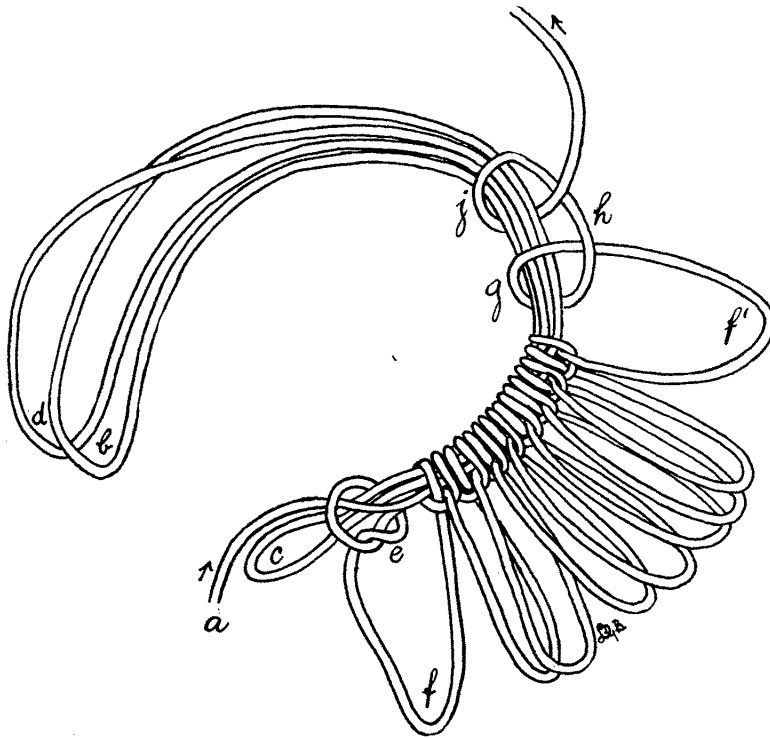


FIG. 123. PIKO G.

was constructed so as to leave four circular spaces reaching from top to bottom. The pillars of the body were made with the puu of Hanai D very closely knitted and the ends of the rows finished with the puu of Hanai G. Each pillar was completed before the next was begun. The rows are fourteen puu wide at the piko, decreasing to three at the middle and increasing to thirteen at the outer edge. As the work proceeded, the ends of the rows were embroidered with two additional puu as in Hanai G on one side and one puu on the other, and a row of such puu was attached to the connecting cords of the last row on the pillar. The cord is then at the outer edge of the hanai and is brought to the piko by intertwining with the puu on the side of the pillar last mentioned, and an additional puu knitted to the end of each row. The last pillar being made, a row of simple puu is run around connecting the outer edges of the hanai.

HANAI M (Fig. 148).—This is really an elaborate form of piko finished with a single undulating row of puu. The koko is shown in Fig. 148 in an inverted position, and

HANAI L (Fig. 147).—This hanai shown in the figure in suspended position

is unique in the collection. When suspended, it has the appearance of an arcade with the flooring angularly channelled. The first step in making this koko was the construction of an arch in the same manner as Piko F, the loops on the pillars being very short and on the arch of various lengths. Inside the arc, to stiffen it, was placed a piece of coir. The six arches complete (probably in separate pieces), the pillars were joined by running fine double cords alternately through the small loops of the opposing sides. Then a row of twelve long puu was attached, one puu to the base of each of the original pillars, and joined together in pairs by a row of six short puu. The basal cords, the arches and pillars having been included in the long and short puu, were incorporated with other loose ends in a piko roughly made after the style of Piko N. To the outer edge was added a row of Hanai D, which made it ready for the kakai.

Kakai.—The strings of the kakai were gathered together at the pu by two methods. In all the better class koko and many of those used by the common people, the pu was evenly and smoothly wound with the end

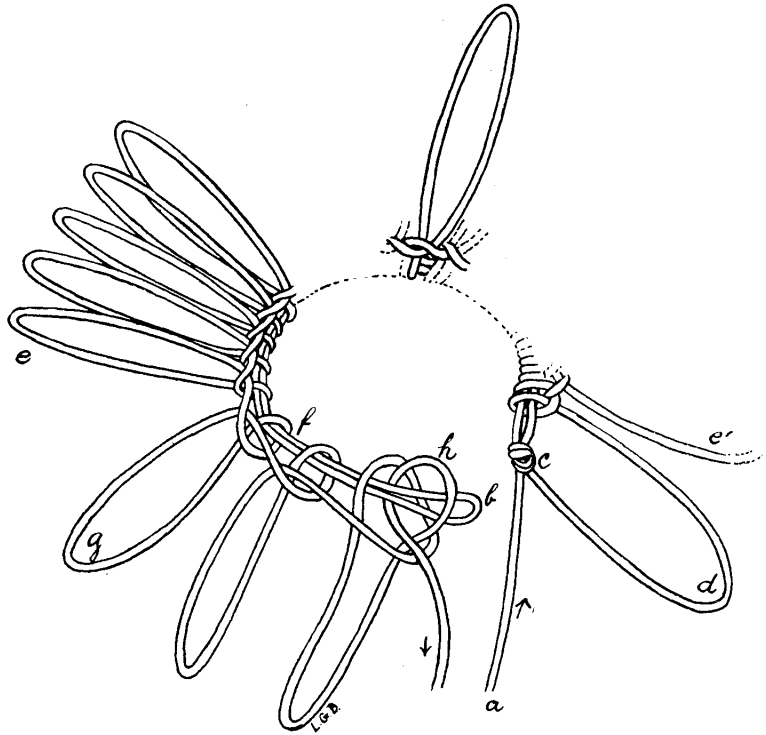


FIG. 124. PIKO H.

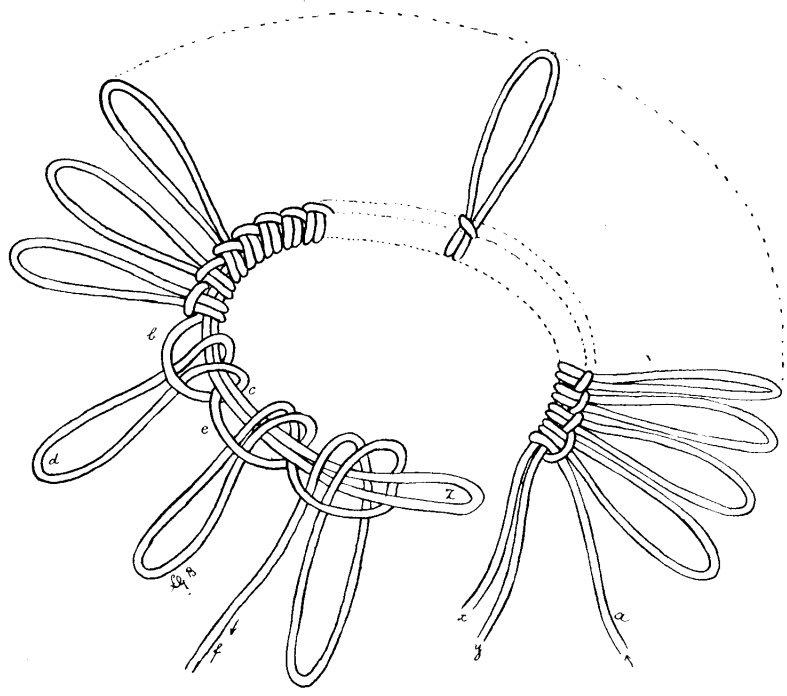


FIG. 125. PIKO J.

of the cord, which winding was termed *uo*, Fig. 153. With the *pu uo*, the *kakai* was as a rule divided into two series of strings, and was rarely gathered together as one *pu*; this latter condition most frequently occurred with the commoners' *koko*, when the *pu* was composed of half hitches, termed *lino*. It was somewhat awkward to take out the *umeke* from a *koko* with a single *pu*, the only opening being between the strings of the *kakai*, but all the *koko* of this kind were of coir and most of them around the large bowl-shaped gourds for transporting water, so it is quite probable that it was not intended to remove them often. In length the *kakai* was about equal to the *hanai* and

piko combined, inclining if anything to be slightly shorter.

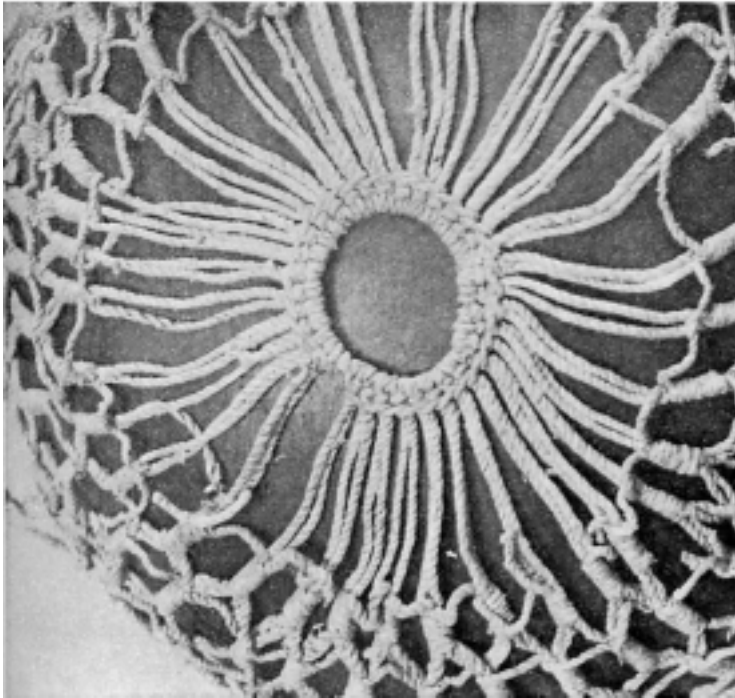


FIG. 126. PIKO J.

There is a remarkable form of netted bag in the Museum, No. 4454, Fig. 149, the material and workmanship of which is not recognized as Hawaiian by any native who has seen it. It was in the late Hawaiian Government Museum, and came to the Bishop Museum as a Hawaiian *koko* with the rest of the collection, but the curator of the former institution can give no information, and consequently none of its history

is available. However, an old native claims to have seen some such nets in the time of Kamehameha V (1863-1872), when they were considered foreign. The material has the appearance of jute, dyed an indistinct blue-green on the surface, but there are sure signs that the cord was not made by machinery. It differs from the Hawaiian *koko* in having been made from a number of cords, and these cords diverge from a *piko* filled in with matted string suggestive of the plaiting in straw hats (*a*, Fig. 149). Another point of difference is the four separated handles in which the cords of the *hanai* are incorporated, each handle (*b*) being a square braid of twelve strands. The technique, Fig. 150, is the same as observed in the simpler portions of macramé work, and also the netting or basket of fern stems around certain Japanese flower vases. Another bag, No. 4455, is

made in the shape of a koko with the hanai of black wool netted as in Fig. 150, and a kakai of heavy cord similar to that in No. 4454.

The koko were divided into two classes by the Hawaiians: the koko puupuu, the property of the chiefly class, *alii*, and the koko pualu, used by the *makaainana* or

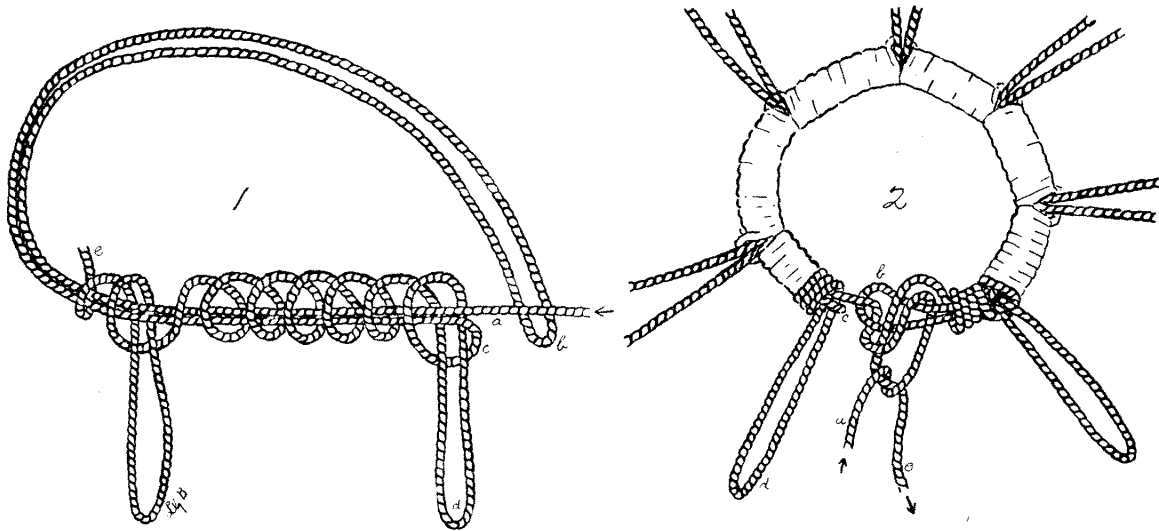


FIG. 127. PIKO K.

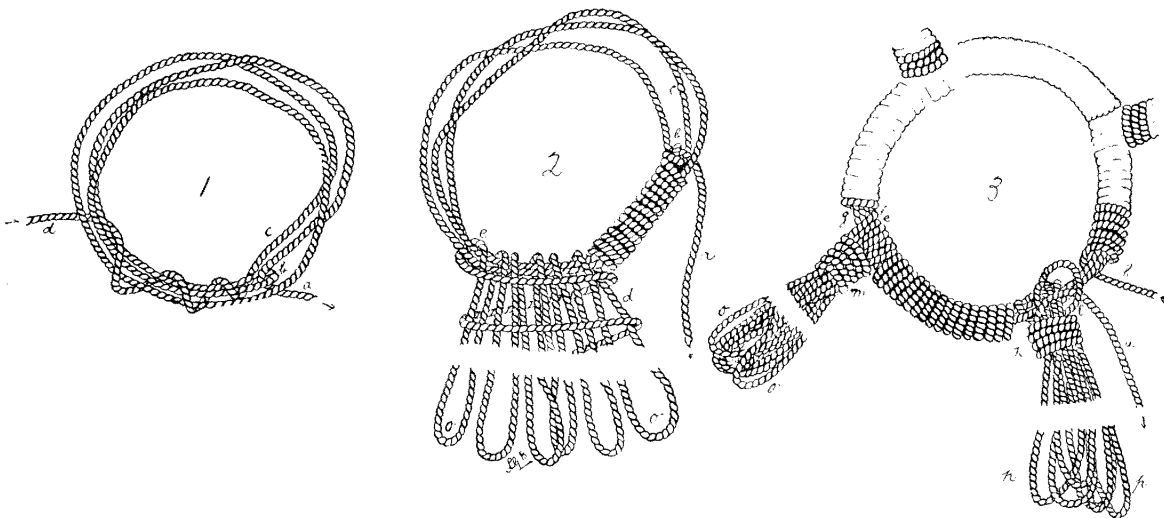


FIG. 128. PIKO L.

plebeians. Mechanically there was no difference between the koko pualu and some of the koko puupuu, but those of the chiefs were always recognized as being better made, more elaborate and of superior cord.

Koko Pualu.—The koko pualu was a plain netted bag, made of coir, hau or ahuawa, Figs. 104 *b*, 114. The term pualu was little used to designate this class. The material most generally employed in making the koko pualu was coir, and a coir koko