The Maori Craft of Netting.

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Plates 105–114.

INTRODUCTION.

IN Polynesia the ancestors of the Maori depended largely upon fish to augment their food-supplies. In spite of the larger land area of New Zealand, there were no indigenous mammals, with the exception of two kinds of bat. These were not large or numerous enough to be of any food value. The dog, which the Maori brought with him, was eaten, but, the supply being limited, it served only as a luxury for people of rank. The rat, which also accompanied the immigrants, multiplied on the berries and roots of the forest. It was trapped, preserved in its own fat, and esteemed as a delicacy. Owing to its size, however, it was of little importance, quantitatively, in the dietary of the people. The pig, known in Polynesia, never reached New Zealand until the coming of Captain Cook. Though the forests, lakes, lagoons, and outlying islets teemed with bird-life that supplied their quota to the neolithic larder, it was the fish of the sea, rivers, lakes, and streams that provided the Maori with the greater portion of his flesh foods. Thus we find the population mainly established along the sea-coast, with extensions up the river-valleys and around the shores of the larger lakes.

The methods of procuring fish were based upon the careful observations of generations of fishermen, who studied the habits, food-supplies, and seasons of the various fish frequenting the waters that formed an important part of the tribal territory. To the Maori the area covered by a lake or river was as important for food-producing purposes as fertile strips that were unsubmerged by water. On the coast, the value of his domain did not cease at high-water mark, but extended to the sands, rocks, reefs, and far-out submerged feeding-grounds where the finny Children of Tangaroa assembled in their appropriate seasons. The times of their movements and migrations to feed or spawn were well known, and influenced method and invention. Always the Maori caught for the cooking-oven and the storehouse. Though he felt the fisherman's thrill in making a good catch, it was always as a means to an end, and not the wasteful end itself, as is so often the case with his European neighbour.

The indiscriminate dropping of a baited line in the hope of hooking anything that came along is rightly regarded by the Maori as the action of a *kuware*—a person devoid of practical sense. The European solar calendar, whilst utilized in many directions, seems to be but little used as a guide as to when various fish are both plentiful and in good condition. The Maori unwritten lunar calendar marked the seasons of appropriate food-supplies on land, or in water, whether salt or fresh. The rains of

autumnal March sent the eels migrating down the rivers and streams on their way to the deep-sea spawning-grounds. The white flowers of the *manuka* and the yellow gold of the *kowhai* conveyed definite information to those who could read. The luxuriant growth of the *kohuwai* seaweed brought the well-conditioned *kehe* up the rocky channels of the favoured reefs. Thus from Nature's calendar the neolithic fishermen received their orders as to what traps, nets, or hooks to select, and what spot to seek on inland river, coastal reef, or deep-sea fishing-ground. The careless leaving to chance marks the degradation of barbaric culture and the advent of a higher civilization.

Scope of Article.

Fish were caught with hook and line, seine-nets, a variety of smaller nets, and with various kinds of traps. Different methods exist amongst the various tribes owing to local conditions. In this article the smaller nets are dealt with, and the large seine-nets avoided for the time being.

Locality.

These notes were mostly gathered from the Ngati-Porou Tribe of the east coast of the North Island. Their territory extends from north of Gisborne to Lotin Point. Owing to the kindness of the Hon. A. T. Ngata, M.P., a party from the Dominion Museum, consisting of Messrs. Elsdon Best, J. McDonald, and J. C. Andersen, made an ethnological expedition to the district in 1923. The Ngati-Porou people extended hospitality and gave every assistance in supplying information. I had the good fortune to be in the district at the time, and to be able to assist the expedition in compiling these notes. Many of them were gathered at Waiomatatini and Rangitukia, in the Waiapu Valley, and at Te Araroa, on the coast. In addition, previous notes obtained from the Whanau-Apanui Tribe, who occupy the neighbouring stretch of coast in the Bay of Plenty, have been made use of. Though descended from the "Mata-atua" canoe, the Whanau-Apanui are related by blood to the Ngati-Porou, and have a similar culture. This stretch of coast, extending from north of Gisborne to Hawaii, a few miles from Opotiki, is characterized by reefs which attract a large variety of fish. The deep sea also teems with fish. Hence the district is rich in fishing-material.

NETTING-MATERIAL.

Phormium tenax (*Harakeke;* New Zealand Flax).—The suitability and ease of preparation of the *Phormium tenax* made it unnecessary to use other fibrous material for nets. For some types of net the dressed fibre was used. Two-ply strands of scraped fibre (*muka*, or *whitau*) were twisted into neat cords on the bare thigh. The usual material, however, consisted of narrow strips from leaves of undressed flax. The Maori craftsman, in netting as in other crafts, took a pride in his work, and gave of his very best in careful detail as well as in manipulative dexterity. Skilled netters selected not only a particular kind of flax, but took great care in picking particular leaves. The thickness and consistency of the blades were tested by feeling with the fingers before they were cut. They were then hung up inside a shed for a couple of days before use. They were thus partly dried without being too hard, and the netting-knots did not loosen, as would

happen if freshly-cut flax were used. The blade was split with the thumb-nail into strips from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. in width. Even strips of the same consistency in the leaf were necessary to ensure good, even netting. The thick, stiff butt end of the flax-blades being discarded left the individual strips from 3 ft. to 4 ft. long. No further preparation was needed with the strips. A requisite supply of strips were split off the flax-blades, the free edges and midrib being, of course, discarded. The strips were placed in a heap beside the netter, the butt ends being towards him.

For the framework, hoops, and handles of the nets the following were usually used :—

Rhipogonum scandens (*Kareao* or *Pirita;* Supplejack).—This is a climbing creeper, and makes ideal hoops for bag-nets. It is easily split, and makes an arched handle for crayfish-nets. Split lengths also make elastic spreaders for the *torehe* trap.

Leptospermum scoparium (Manuka).—This shrub produces long, tough poles, which form excellent handles for scoop-nets and the bag-net known as *tutoko.* Poles of *manuka* are also used to make the framework of the trap-net for the *kehe* fish.

Phyllocladus trichomanoides (*Toatoa* or *Tanekaha ;* Celery-topped Pine).—This grows into a large tree, but when young supplies excellent poles, used as handles in scoop-nets for *kehe* and fishing-rods for *warehou.*

Aristotelia racemosa (*Makomako ;* Wineberry).—Poles from this tree are also used as handles, but, whilst it is lighter than the previous two, it is more liable to break.

Dysoxylum spectabile (*Kohekohe ;* Maori Cedar).—Long poles are used as a framework in the *kehe* trap-net.

(NOTE.—In further references to these plants the Maori name will be used.)

TECHNIQUE OF MAORI NETTING (*TA KUPENGA*).

The generic name for any kind of net is *kupenga,* and the process of netting *ta.* Thus we have *ta kupenga,* net-making. The various kinds of nets have their individual names, which may be a distinct word or a descriptive word added to *kupenga.* The Maori used no netting-needle. As most of the nets were made with short strips from the undressed blade, the work proceeded quickly enough, and there was no incentive to use a needle. Wooden mesh-gauges, called *papa,* were used, but in the East Coast district the fingers of the left hand were usually used instead of the mechanical gauge. As the actual technique of these smaller nets is very similar, the general technique of making a bag-net will be dealt with first, and then the various kinds, with their differences. The making of nets and fish-traps was the occupation of men, just as plaiting and weaving was that of women.

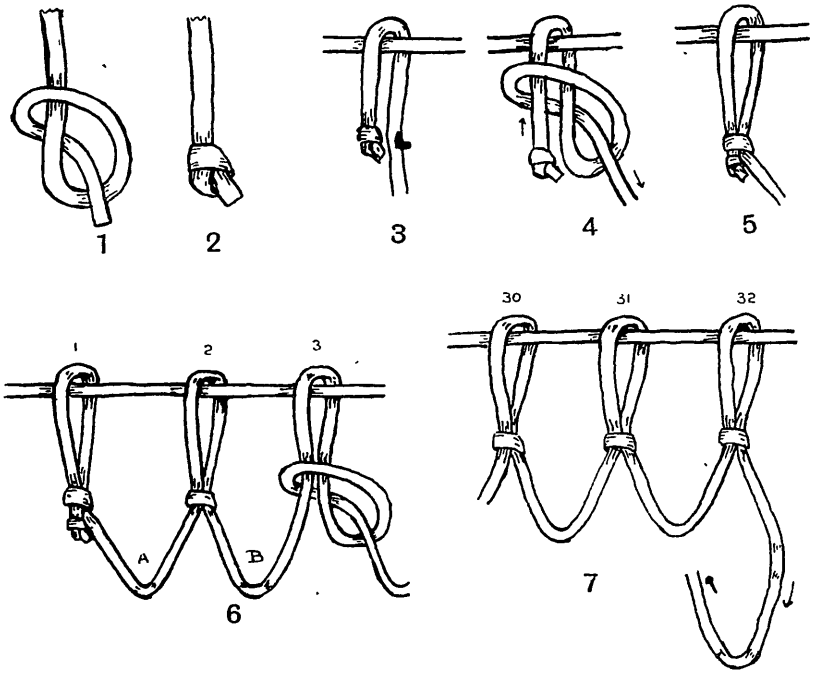
SUPPORTING-STRAND (NGAKAU).

All circular bag- or funnel-shaped nets are commenced on a loop or supporting-strand, called a *ngakau.* A strip of green flax about 2 ft. or more long is knotted together at the ends to form a large loop. This is stretched over the foot or great toe of the netter, who sits on the ground with a bundle of strips of flax beside him. In commencing a net, the first step is to set up the required number of loops on the supporting-strand. In the district under review there are four methods of setting up the loops to commence a net.

Methods of Commencement.

(1.) *The Closed-loop Commencement.*

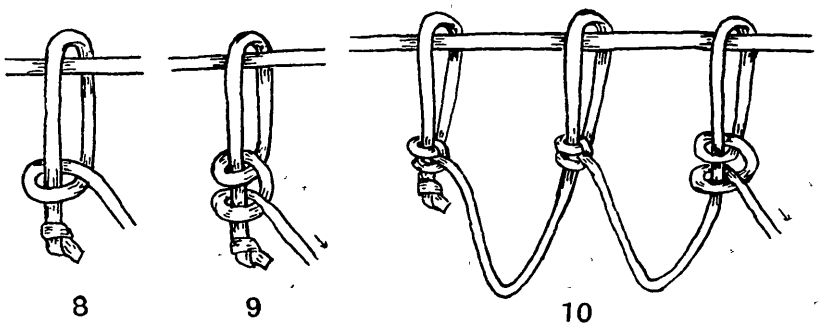
A strip of flax is taken up and knotted at the butt end with a simple overhand knot (figs. 1, 2). The butt end of the strip is looped over the supporting-strand and the knotted end brought down about 1 in. below it (fig. 3). The double strip is held together at the knot with the left hand. With the right hand the free part of the strip is looped to the right, passed over both strands to the left, passed under both and brought up through the bight or loop on the right (fig. 4). This is drawn tight, and the first closed loop is made (fig. 5). It will be seen that this is but a repetition of the overhand knot, differing only in the knot being made over two strands



Figs. 1–7.—Closed-loop commencement, with overhand knots.

instead of one as in fig. 1. The free end of the netting-strip is passed over the supporting-strand and the middle finger of the left hand hooked under the large loop formed. By pulling with this finger the size of the loop is gauged. If drawn too large the free end of the strip is pulled with the right hand to reduce the size. Thus by pressure with the left middle finger and pulling with the right hand the size of the loop is adjusted. The left thumb and forefinger now come across and grasp the ascending and descending parts of the netting-strip 1 in. below the supporting-strand. Keeping the two together, the right hand makes a bight to the right, passes over both limbs, back under and up through the bight—or, in other words, makes a second overhand knot. This is drawn tight, and the second closed loop is completed (fig. 6). Reference to the figure shows that from the two short closed loops

made round the supporting-strand a larger open loop, A, depends. These larger loops are important, as it is to their lower points that the next row of real meshes will be attached by the true netting-knot. The shorter closed loops (fig. 6, 1–2) are made so as to set up these longer loops on the supporting-strand. It is important to have them, as well as the upper closed loops, of even size. On commencing the third closed loop the left forefinger is slipped under the completed lower loop A, and when the netting-strip is carried over the supporting-strand the left middle finger is inserted under the new lower loop B. The middle finger pulls until the loop B is of the same length as A. The left forefinger is slipped out of loop A, and with the thumb grasps the double strand, 3, 1 in. below the supporting-strand, whilst the right hand makes the overhand knot. In this way the third closed loop, 3, is formed and the second lower loop, B. The process is continued in this manner until the requisite number of closed loops are made, thirty-two being a convenient number for the smaller bag-nets. With thirty-two closed loops there will be thirty-one lower loops; but when the net comes to be joined at the end of the process a thirty-second longer loop will be formed between the first and last closed loops.



FIGS. 8–10.—Closed-loop commencement, with clove hitches.

The netting works from left to right along the supporting-strand, and ever the left forefinger slips along into the completed lower loop and the middle finger gauges the new loop. The middle finger may be used in the completed loop and the new loop gauged with the ring-finger. In this case the forefinger is free to come over and hold the double strip for the closed upper loop ere the overhand knot is tied. The thirty-second closed loop having been made, the set is complete. The netting-strip now turns back to commence the second row on the lower points of the lower loops (fig. 7).

As a variation to this method, in the Te Kaha district the upper closed loops are tied with a clove hitch instead of an overhand knot. The process is quite simple. The netting-strip having been looped over the supporting-strand, the double strip is brought together 1 in. below and held together as before with the left forefinger and thumb. The free part of the strip is passed over the ascending limb to the left, brought back under it and between the limbs to form the half-hitch, as in fig. 8. A similar half-hitch is made immediately below the first, and a clove hitch results, as in fig. 9. This is continued throughout (fig. 10). The advantage is that when drawn tight a clove hitch will not slip like an overhand knot. The overhand knot, however, is made more quickly; and in this commencement any slight slipping does not matter much.

In the figures, the closed loops on the supporting-strand are shown as spaced apart for the sake of clearness. In actual netting the work lies horizontally, and from pulling on the loops to gauge their size the loops are stretched and crowded close together on the supporting-strand (see Plate 105, fig. 2).

(2.) *The Clove-hitch Commencement.*

In the variation of the previous method the closed loops are made with a clove hitch. In this method the closed loops are not used, but the large loops are fixed directly to the supporting-strand by a series of clove hitches. The only name I could get for a clove hitch was *here poito taruke* (the tie of the float of the crayfish-pot). The floats of *houama* (*Entelea arborescens*) are tied with this knot to the long rope marking where the crayfish-pot (*taruke*) has been put down.

The netting-strip is passed round the supporting-strand, brought over the ascending strip from the left, looped over the supporting-strand again on the right, and the free end of the strip brought up through the loop, as

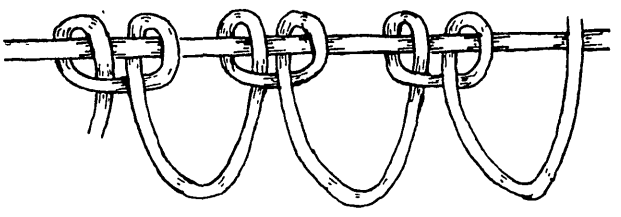


Fig. 11.—Clove-hitch commencement.

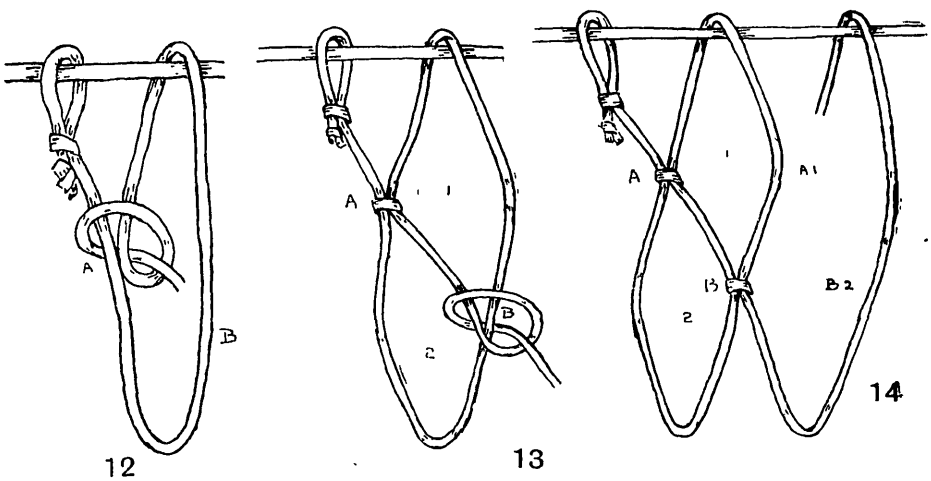
in fig. 11. In this manner the loops are attached directly to the supporting-strand. The loops between the clove hitches are gauged as before with the left fingers. The required number of loops are set up, and then the netting proceeds as in method (1). When the net is completed the supporting-strand is cut and removed. This releases the clove hitches, which open out to form the free upper angles of the first row of meshes.

(3.) *The Double-mesh Commencement.*

The butt-end of the first netting-strip is fixed to the supporting-strand by a closed loop with an overhand knot, as in fig. 5. The netting-strip is then looped over the supporting-strand, and the loop pulled with the left middle finger until it is judged long enough to make two full meshes. Keeping the netting-strip taut with the right hand, bring it against the left *limb* of the loop at the lower end of the upper third at the point A in fig. 12. Grasp the two elements at this point with the left thumb and forefinger, and with the right hand make an overhand knot as in the closed-loop commencement. Still keeping the loop stretched with the left middle finger, bring the netting-strip against the right limb of the loop at the lower end of the middle third at the point B in fig. 13. Again tie an overhand knot, and the long loop is divided into two complete meshes—1 and 2 in fig. 14. The netting-strip is again carried over the supporting-strand and the tip of the left ring-finger is inserted under the new loop. The left middle finger, still hooked in the lower part of mesh 2, stretches the original first loop, whilst the ring-finger pulls on the new loop

until the lower ends of both coincide. The netting-strip is brought against the left limb of the loop—*i.e.*, against the side of mesh 1 at A1, on the same level as point A, and an overhand knot is made. This strip is then carried down against the right limb of the loop at B2 on the same level as B, and an overhand knot made. The second loop is thus divided into two complete meshes. This process is continued until the requisite number of meshes have been set up on the supporting-strand.

This is a quick, easy way of commencing a net: When the first long loop is stretched, divide it with the eye into three equal parts. The first knot is tied at the junction of the upper two parts, and the second at the



FIGS. 12–14.—Double-mesh commencement.

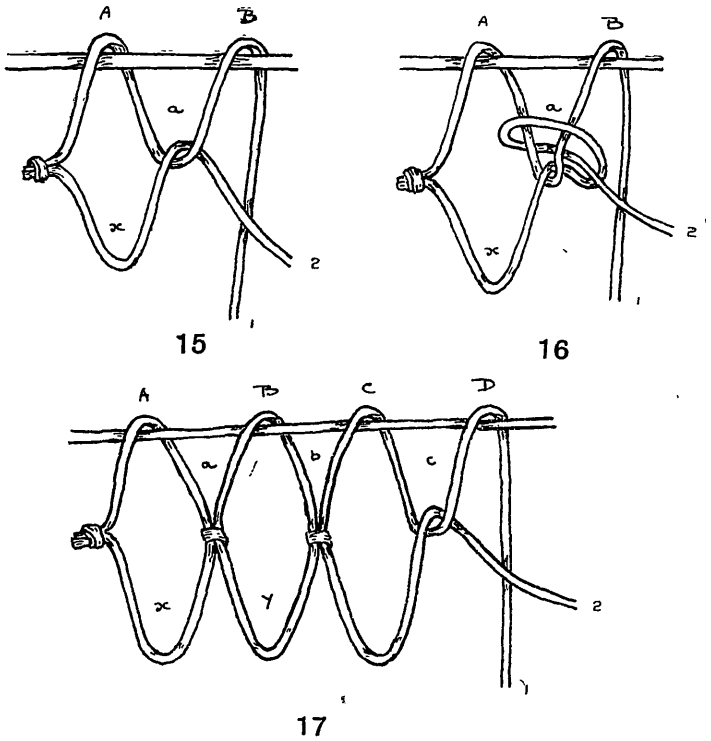
junction of the lower two. This ensures meshes of even size. In the subsequent long loops see that the lower ends are brought to the same level, and keep the same lines of knots, A and B, accurately on their respective levels. By attention to these details an even mesh will be maintained throughout.

(4.) *The Double-strip Commencement.*

This method was shown me by Iehu Nukunuku, of Waiapu, one of the very few surviving musicians who can play the Maori flute. I had mastered the above three methods, and was confident that I had exhausted all local methods of commencement. Whilst practising the closed-loop method one early morning, the dreamy gaze of the musician idly swept my way. Suddenly his eyes became alert. "Ah," said he, treating me politely as a master-craftsman, "You commence that way!" "Yes," I affirmed, with the conscious pride of one who has missed nothing. "Oh," said he, "I do it this way." Thereupon he picked up two strips of flax, knotted the butt ends together, and demonstrated the double-strip commencement shown in the accompanying figures.

In fig. 15, the upper strip, 1, is looped over the supporting-strand at A and looped again at B. The lower strip, 2, is passed over the loop between A and B. The mesh so formed, *x*, is stretched to the right size by the left middle finger, the free end of strip 1 is held with the right hand, and the

free end of strip 2 is held with the left thumb and forefinger. The two strips are pulled or slackened until the mesh x is of the right size. The part where the two strips cross is seized with the left thumb and forefinger, and the right makes a netting-knot with strip 2, as in fig. 16. This completes the first mesh, x. Strip 1 is now carried over the supporting-strand at C (fig. 17). It picks up strip 2 in the loop. Inserting the left ring-finger in the loop y, and manipulating the two strips with the other available fingers of the two hands, the two loops b and y are gauged to correspond in size to a and x. The free end of strip 1 is then twisted round the left little finger to keep loop b in position. The point where strip 2 crosses the lower part of loop b is seized with the left thumb and forefinger, and the released right hand ties strip 2 in a netting-knot at this point. The netting-knot will be described in the next paragraph. This procedure is carried on. When the upper loop is gauged, strip 1 is kept taut by twisting it round the



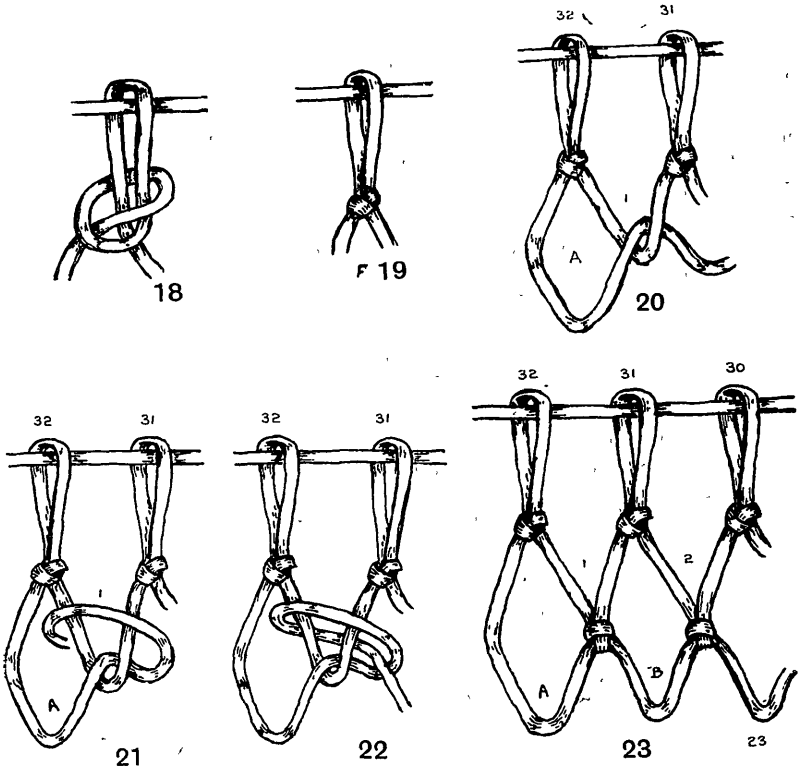
FIGS. 15–17.—Double-strip commencement.

left little finger. This releases the right hand, which now takes the free end of strip 2 from the left forefinger and thumb. The lower loop is now gauged with the left ring-finger, the left middle finger keeping the previously-completed mesh stretched so as to give the lower level for the new lower loop. This being gauged, the released left forefinger and thumb seize the crossing of the two strips, whilst the right hand makes the netting-knot with strip 2. Strip 1 is then released from the left little finger and looped over the supporting-strand, and the same process continued. In this method

a single row of complete meshes is attached directly to the supporting-strand. The method is awkward, and is worse than it reads. Practice makes perfect, no doubt, and in the fingers of Iehu Nukunuku it appeared neat and easy. I had asked my previous informants if there were any other methods, and had been assured that there were none to their knowledge. Possibly if one practised in the early morning with aged musicians or craftsmen looking on, other methods or variations might be resurrected. Therefore it were better to put on record what methods we have than wait for others that we know not of.

THE NETTING-KNOT.

Taking the closed-loop commencement already described, we have seen that after the thirty-second loop has been made in the supporting-strand the second row is commenced with the netting-knot. As all netting must



FIGS. 18–23.—The netting-knot.

be worked from left to right, the supporting-strand is turned on the foot or toe, or simply twisted, so as to bring the last (or thirty-second) loop to the left. Figs. 18 and 19 show the back of the overhand knots on the closed loops. The netting-strip, after the tying of the thirty-second closed loop, is brought down and then passed over the open loop, 1, between the closed loop 32 and 31. A full-sized mesh is gauged by pulling with the left middle

finger as in fig. 20, A. The lower part of loop 1 is seized between the left thumb and forefinger, and the netting-strip where it crosses is pinched, as it were, between the two limbs of the loop. This is held securely so as to maintain the size of the mesh whilst the netting-knot is made with the right hand. The right hand makes a bight to the right with the netting-strip (fig. 21). The strip is then carried over both limbs of loop 1, passed behind them, and brought up through the bight (fig. 22). The left hand continues its hold until the knot is drawn taut and the netting-knot is completed (fig. 23). See also Plate 105, fig. 2.

The movements of the netting-strip are thus similar to those in the closed-loop commencement—a loop or bight to the right, over, under, and up through the bight. The difference is that in one case the netting-strip, being turned back on itself, forms an overhand knot, and in the other case, through being made over a loop, it results in the netting-knot. The netting-knot is similar to the weaver's knot, but is tied in a different way. The Maori netting-knot is the same as the usual European one except that in the latter the netting-cord is passed through the loop from below and the bight is made to the left. This is the opposite to the Maori method, but the results are the same.

The first full mesh being completed, the netting-strip is carried over the next loop, and the resulting loop is gauged with the left ring-finger to the same lower level as the first completed mesh, which is still stretched by the left middle finger. The netting-knot is made as described above, and completes a second full-sized mesh. So the process goes on, the half-loops, as it were, completing the lower halves of full-sized meshes, whilst the intervals provide the upper halves for the meshes of the next row. At the end the supporting-strand is turned, and the next row commenced with a full-sized mesh from the left. Owing to the turning of the supporting-strand, the commencing full-sized meshes are alternately at either end or side of the piece of netting. Furthermore, except for the first and last rows of meshes, each mesh has a knot at each of its four angles. The alternate commencing mesh has only three knots, and the outer sides are free. This is important, as we shall see later.

Owing to the turning of the work at the end of each row, one set of alternate rows of knots will show the front aspect of the knots, whilst the other set will show the back.

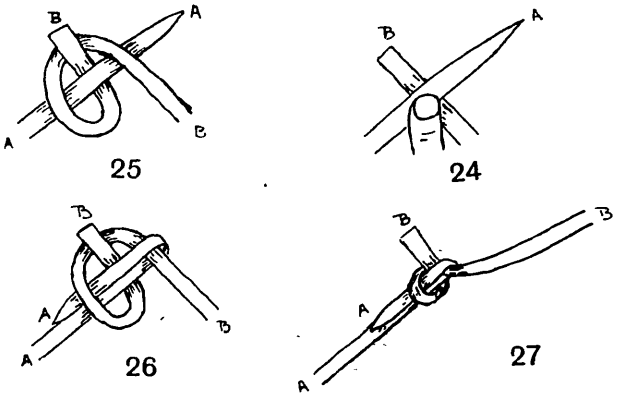
Joining the Netting-strips.

The netting-strips are in short lengths, owing to the thick butt part of the blade having been discarded. When the tip ends of the strips begin to thin off, a new strip is added to maintain the even appearance as well as the strength of the net. There are two methods of adding the netting-strips :—

(1.) *Knotting the Strips together.*

When the netting-strip becomes too short to complete the next mesh the butt-end of a fresh strip is knotted to it. The two may be placed together and an overhand knot tied with them both. The usual knot, however, is the weaver's knot, for which I could get no Maori name. It is the common knot used by the Maori in joining two strips together. As it is made in a quick, neat way, the following details are given : The butt end of the additional strip is crossed under the end of the shortening-strip.

The crossing is held in position with the left thumb and forefinger, the thumb being above (fig. 24). The free part of the new strip, B, is looped over the thumb-nail, passed under its own projecting butt-end, and back over the old strip, A, as in fig. 25. The end of the old strip, A, is doubled back over

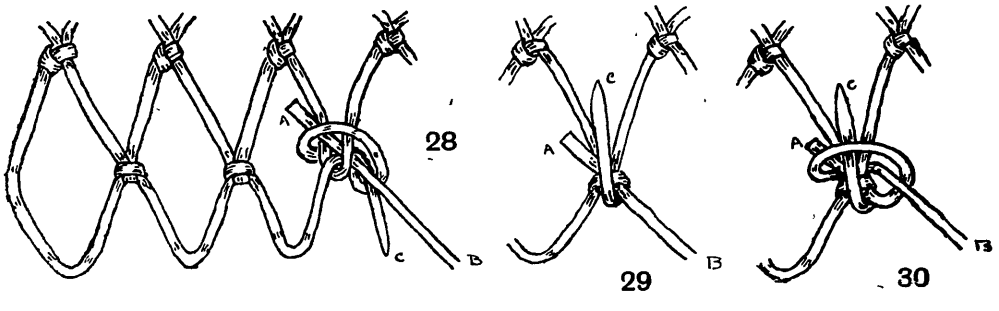


FIGS. 24–27.—Joining netting-strip with weaver's knot.

B and held down on itself with the left thumb (fig. 26). Holding the doubled-back strip, A, firmly with the left finger and thumb, the new strip, B, is pulled, and the loop tightened into the knot shown in fig. 27.

(2.) *Joining at a Netting-knot.*

This method is the better of the two. With the shortening-strip the last netting-knot is not drawn taut. The butt end of the fresh strip is pushed through the loose knot and between the two limbs of the upper mesh loop, as in A, B, fig. 28. The end of the old strip, C, is pulled tight to close the loose knot, and is then bent upwards (fig. 29). The fresh strip



FIGS. 28–30.—Joining netting-strip with netting-knot.

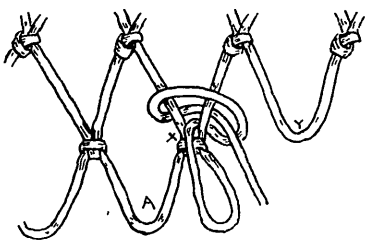
now makes a bight on the right, as in the usual netting-knot, passes over the two limbs of the upper-mesh loop, the doubled-up end of the old strip, C, and its own butt end, A, passes back under and up through the bight (fig. 30). It is drawn tight and the two ends trimmed off. In this process two netting-knots have been made.

Additional Meshes (Mata Torea).

In the making of bag or scoop nets the bottom of the net is usually smaller than the diameter of the opening. In the East Coast area this is done by adding meshes to various rows as the work proceeds. This means that the thirty-two meshes set up on the supporting-strand will ultimately be at the bottom of the net, whilst the addition of, say, sixteen new meshes will give the lowest row forty-eight meshes to form the opening of the net. These extra meshes are called *mata torea*—*mata* being the term used for mesh. The *mata torea* are added in two ways :—

(1.) *Complete Mesh.*

In this method, when it is desired to add a new mesh, instead of the netting-strip going on to the next loop it simply adds a small mesh to the knot just made. Thus in fig. 31, after making the netting-knot at X instead of going on immediately to the loop Y, the strip is carried over the same loop upon which the knot has just been tied at X. This loop is gauged with the left ring-finger to bring the lower end to the same level as the previous loop, A. The new loop itself is small, but this is immaterial so long as the lower level is the same. The strip now makes a bight to the right, passes



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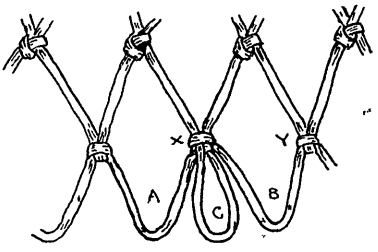

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Figs. 31, 32.—Additional meshes.

over both limbs of the loop, and comes up from behind through the bight to complete the ordinary netting-knot as shown in the figure. The netting-strip now passes on to the next loop (fig. 32).

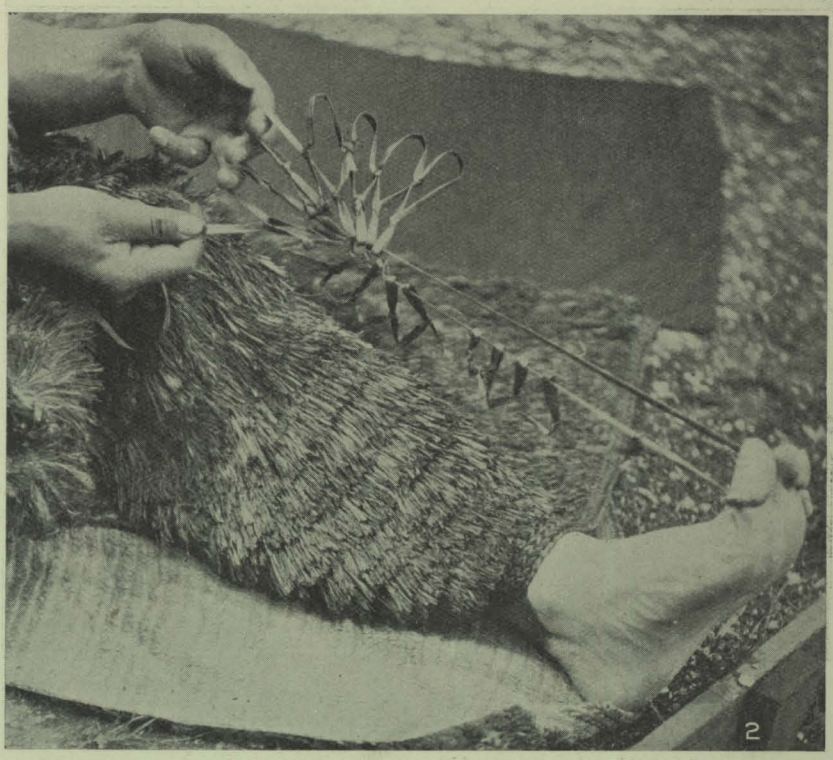
The result is that an extra loop, C, has been inserted between the usual loops, A and B. When the next row is being made, instead of one mesh being made between A and B, two will be formed. One will be made between A and C, and the other between C and B. The row is thus increased by one mesh.

(2.) *Two Half-meshes.*

This method presents a much neater appearance than the former one. In fig. 33, instead of carrying the netting-strip from the loop A to the loop B to make one complete mesh, as in the ordinary routine, this mesh-space is divided up into two. The strip, after making the netting-knot at A, is carried up over the netting-knot of the row above at X. The loop formed is gauged to the same level as the previous loop. The strip is carried down to the level of the lower ends of the loops of the last row at A, B. At this point, Y, the ascending and descending limbs of the netting-strip are held with the left finger and thumb whilst an overhand

[*J. McDonald, photo.*

FIG. 1.—Scoop-net for *kahawai:* beach at mouth of Waiapu River. (See p. 620.)



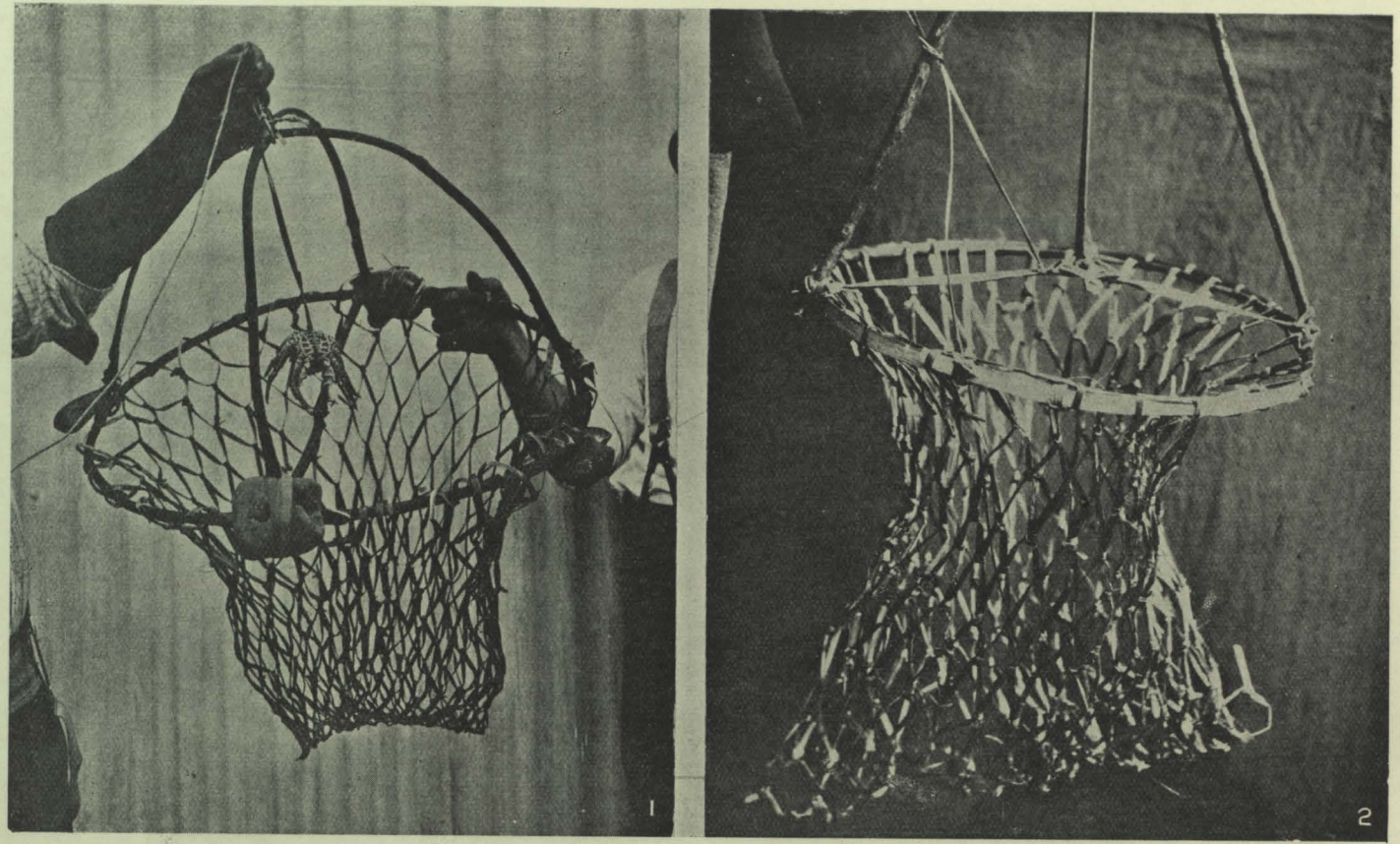
[*W. R. Reynolds, photo.*

FIG. 2.—Net-commencement: closed loops on supporting stand; author gauging mesh.

Face p. 608,]

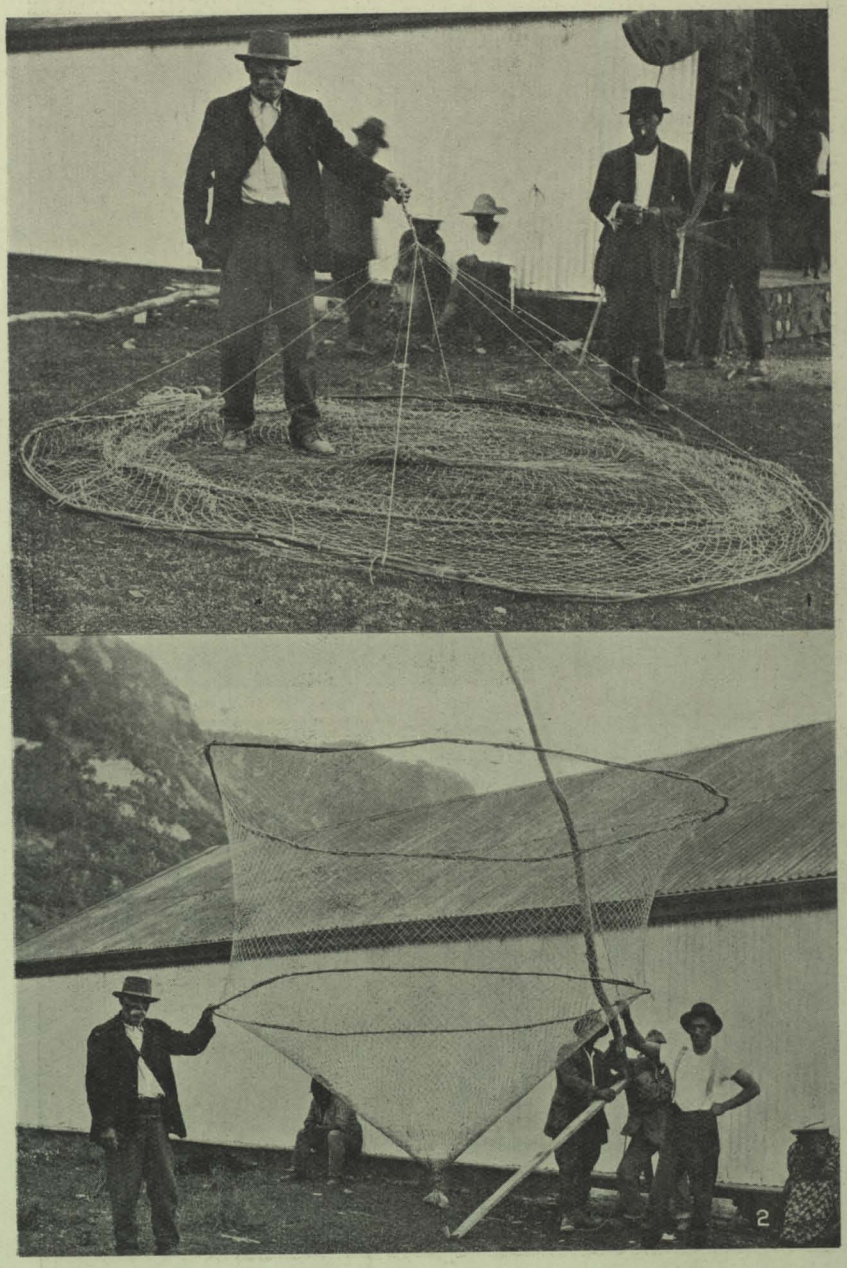
[*J. McDonald, photo.*

FIG. 1.—Scoop-net for *kehe*: note *au*, for threading fish, in right hand. (See p. 612.)
FIG. 2.—*Kehe* fishers on Whareponga beach: in pairs—one with net, the other with *kōkō* pole. (See p. 616.)



[*J. McDonald, photo.*

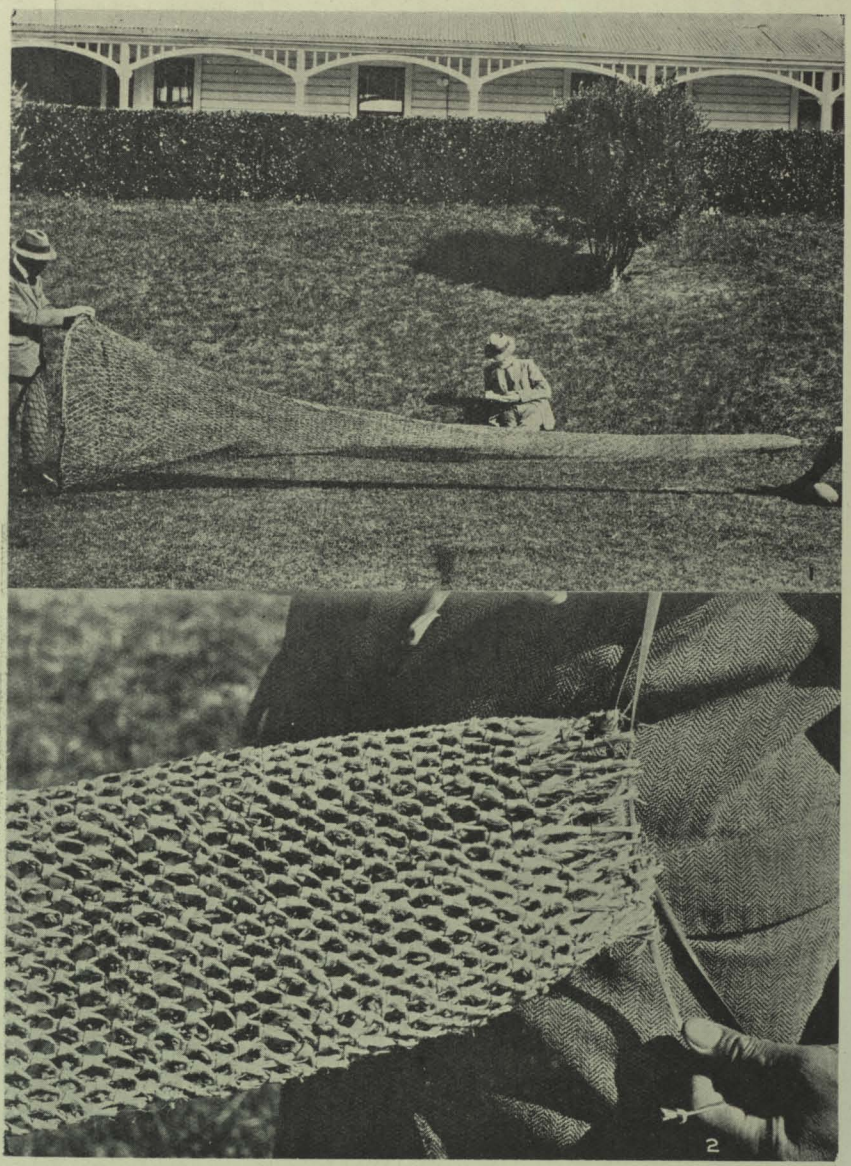
FIG. 1.—Bag-net for crayfish : crab shows bait-site. (See p. 626.)
FIG. 2.—Bag-net with forked handle for *tangahangaha*. (See p. 630.)



[J. McDonald, photo.

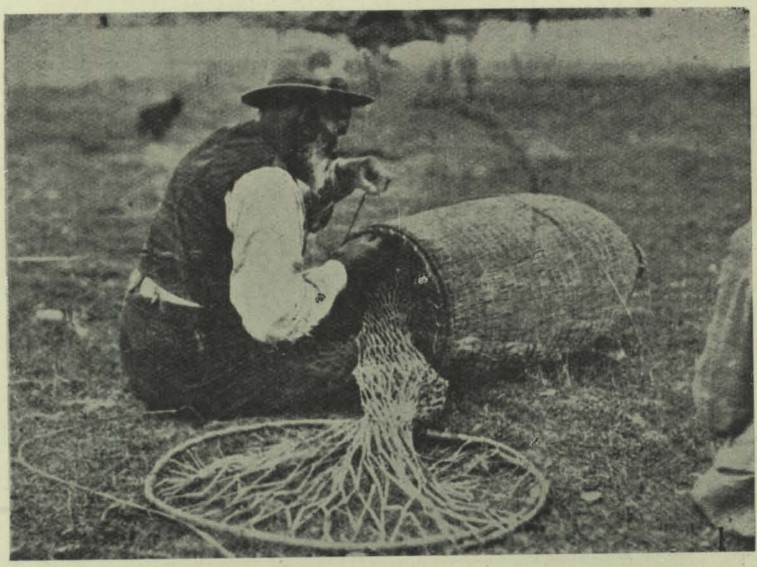
FIG. 1.—*Matarau* net: upper eight radiating lines support the hoop; lower four are for bait. (See p. 632.)

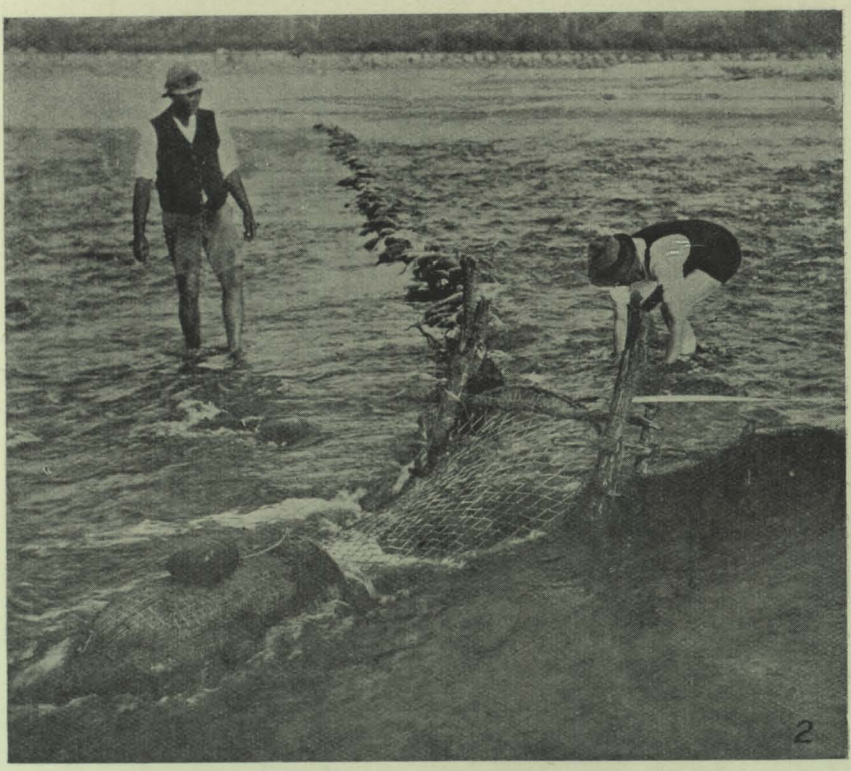
FIG. 2.—Large *matarau* net for *maomao*, used off Lotin Point. (See p.. 631)



[*J. McDonald, photo.*

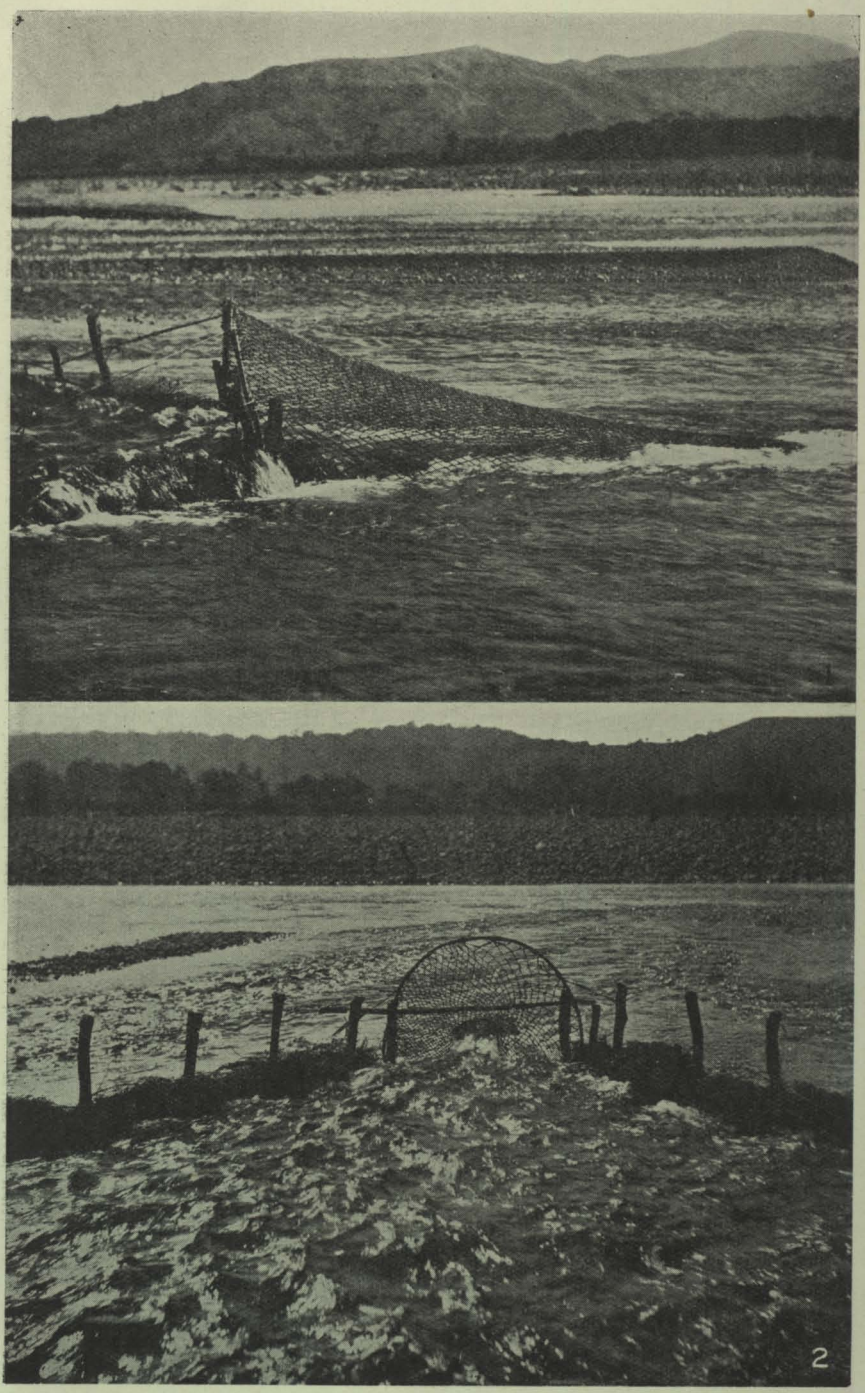
FIG. 1.—*Hinaki purangi :* trap and leading-net in one. (See p. 640.)
FIG. 2.—*Hinaki purangi :* small end where net is commenced. Loop of flax tied when net is set, and untied to extract catch. (See p. 641.)





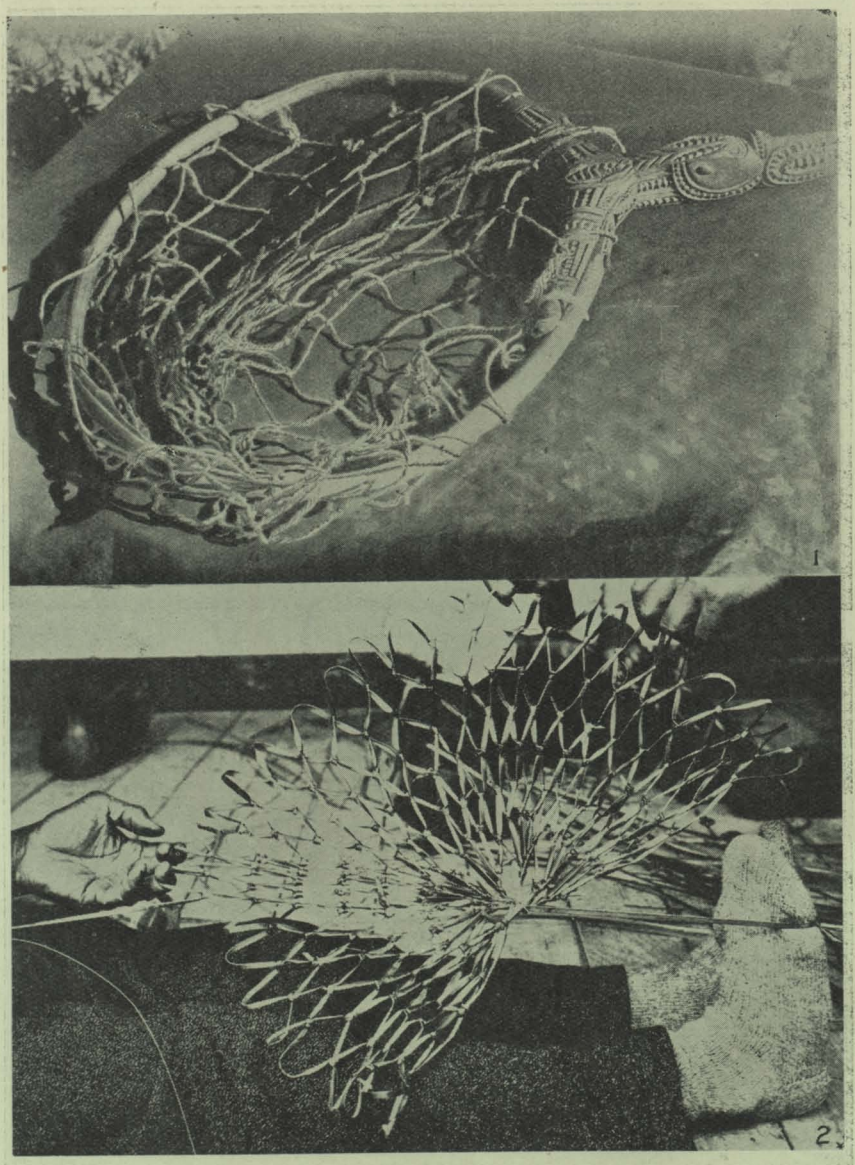
[*J. McDonald, photo.*

FIG. 1.—Attaching a leading-net to an eel-trap (*hinaki*). (See p. 639.)
FIG. 2.—*Hinaki* with leading-net set in weir, Waiapu River. (See p. 642.)



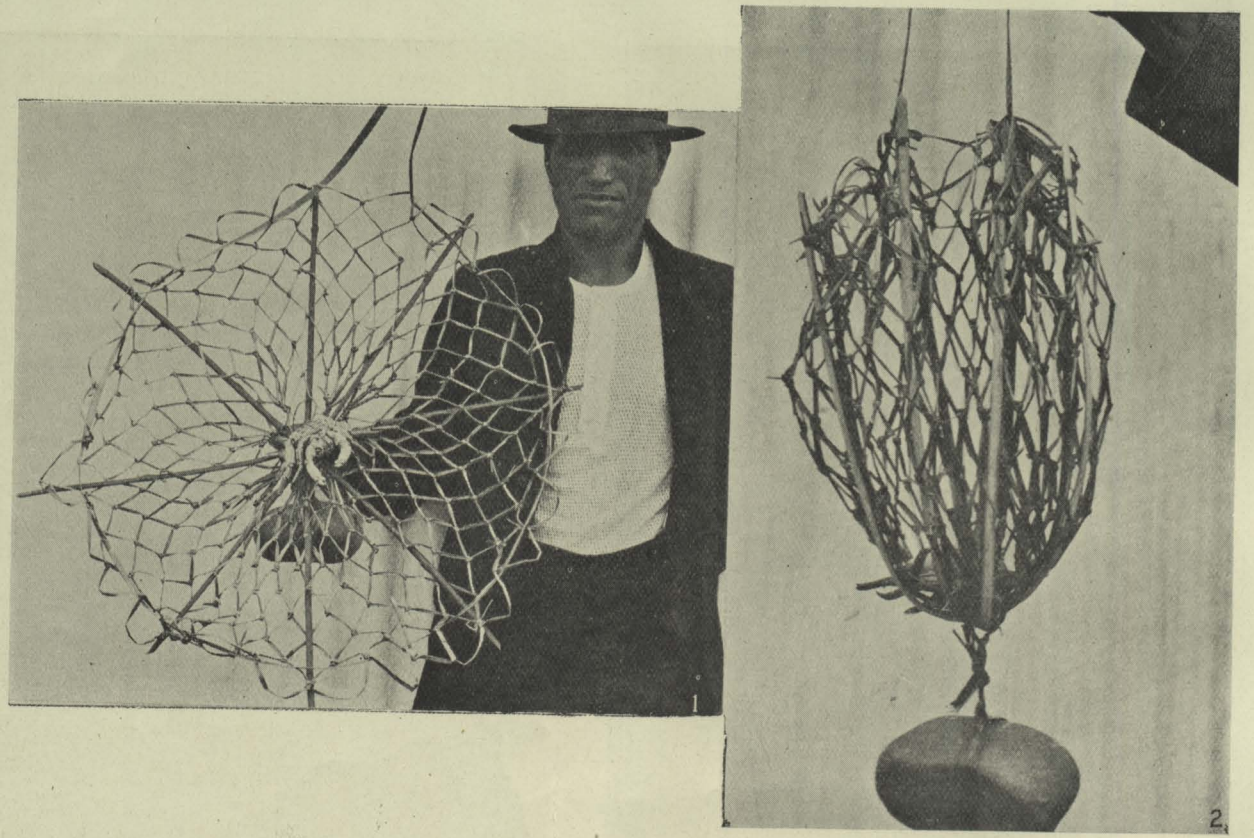
[*J. McDonald, photo.*

FIG. 1.—Side view of *hinaki purangi*, set in Waiapu River. (See p. 641.)
FIG. 2.—Looking down into above *hinaki purangi*. Note brushwood arms of weir. (See p. 641.)



[*J. McDonald, photo.*

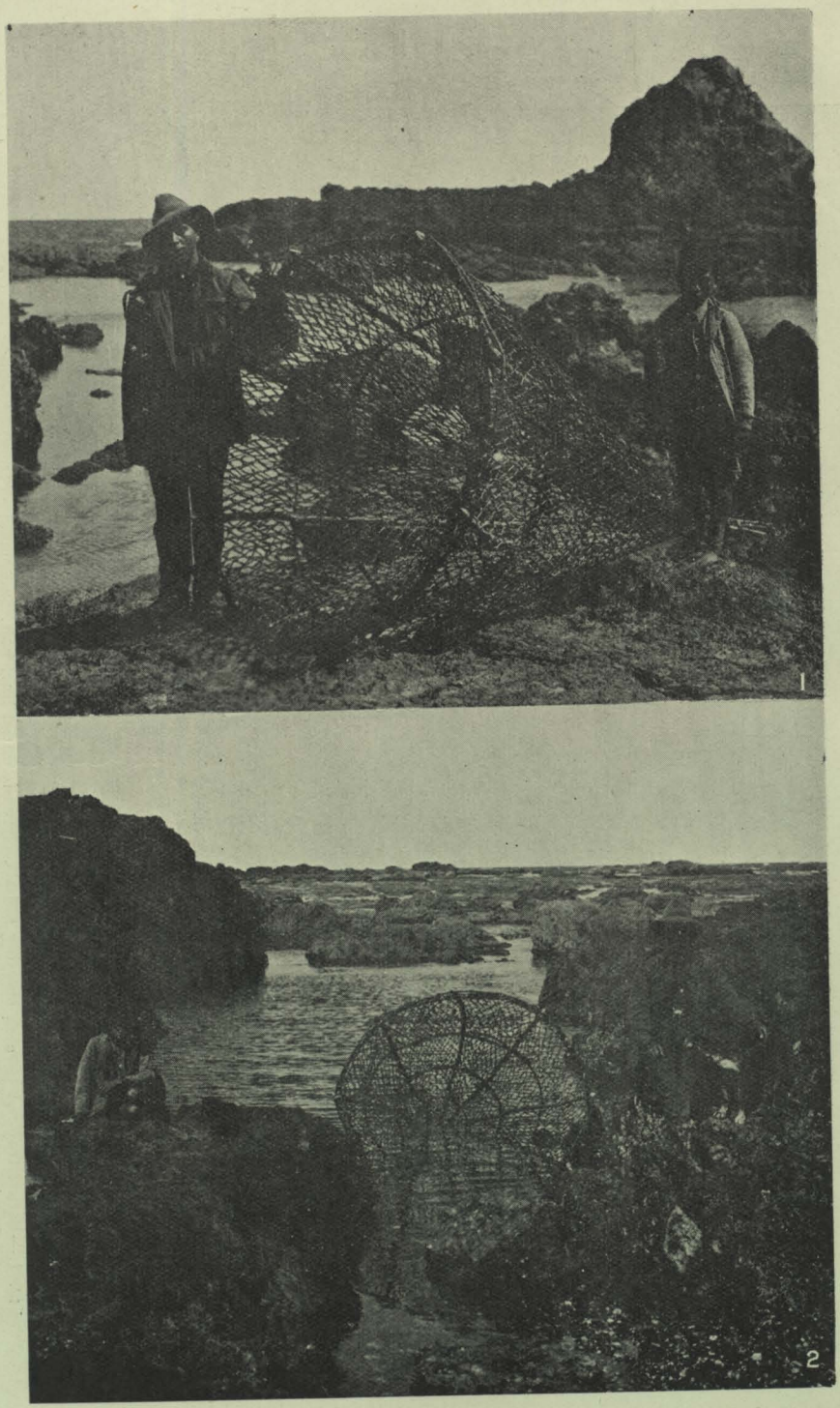
FIG. 1.—Landing-net for *warehou*. (See p. 623.)
FIG. 2.—*Torehe* net being made: supporting strand over foot; gauging-mesh on left. (See p. 643.)



[*J. McDonald, photo.*

Fig. 1.—Baited trap-net (*torehe*), showing radials, circumferential line, bait, and sinker at back. Locality, Te Araroa. (See p. 642.)
Fig. 2.—*Torehe* net closed by pulling line : sinker gives the counter-pull. (See pp. 645–646.)

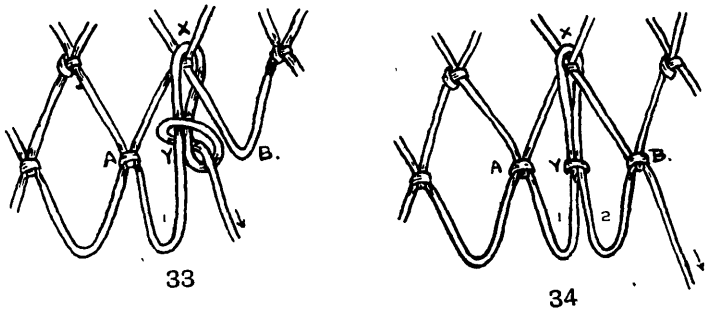
Follows Plate 112.]



[*Rev. Canon Pahewa, photo.*

Haua, or *hinaki kehe*. Locality, Te Kaha. (See p. 635.)

knot is made over both, as in the closed-loop commencement. The netting-strip is now looped over the next mesh, B, and after gauging the loop to the same level as mesh 1 the ordinary netting-knot is made at B. This completes the mesh 2 in fig. 34. Thus two meshes, 1 and 2, have taken the place between A and B that by the routine method would have been occupied by one mesh, and the row is thus increased by one.



FIGS. 33, 34.—Additional mesh (second method).

JOINING THE SIDES.

When the net has been made deep enough, the next stage is to close up the sides by joining the marginal meshes together. If the netting is removed from the supporting-strand, stretched, and laid out flat, a four-sided figure is produced. The upper (commencing) and lower borders are parallel, but owing to the introduction of additional meshes the lower border is much longer. The upper border commenced with, say, thirty-two loops or meshes, and the lower ended with perhaps forty-eight meshes. The side borders therefore diverged downwards and outwards, but, owing to the loops being made of the same size and the netting-knots thus kept to the same levels, the number of meshes on the side borders is exactly the same. When the side borders are placed close together, parallel with each other, the lines of knots coincide. As a matter of fact, the netting is kept on the supporting-strand when the last row is completed. The two side edges are twisted round on the looped supporting-strand until the two sides lie parallel, as in fig. 35, where the two free edges, bounded above by the closed loops 32 and 1, are shown running down the middle of the figure.

It will be noted in the figure that each mesh is defined by four knots, except the meshes at the side (*i.e.*, each side of the middle gap in the figure) and the bottom. These have a free margin without the fourth knot. In the two side edges these meshes with a free margin have been caused by the netting-strip making a full mesh as it turned at the end of a row to knot back on the loops of the completed row. Thus the netting-strip, on completing the thirty-second supporting-loop, ended at *a*. To go back, it formed the full mesh A, and completed the second row of knots at *b*. It now formed the full mesh B and completed the third row of knots at *c*. The full mesh C was formed and the fourth row of knots completed at *d*. Then followed the full mesh D, the fifth row of knots finishing at *e*, the full mesh E, the sixth row of knots finishing at *f*, the full mesh F, and the seventh row of knots finishing at *g*. The free end of the netting-strip is marked NS.

All that has now to be done is to carry on with the netting-strip and put in a fourth knot on the marginal meshes, F, E, D, C, B, and A, in the order named. The procedure is simple. The left fore and ring fingers are inserted in the two lowest marginal meshes, J and F, and drawn taut. The netting-strip NS from the last knot *g* is looped over the left middle finger and drawn taut so that the new loop G will coincide with the lower margins of J and F. The strip is placed against the middle part of the free or unknotted margin of the mesh F, held together by the freed left fore-finger and thumb, and an overhand knot made, as in the closed-loop commencement. It is the last knot of the seventh row, puts the fourth knot on the mesh F, and adds the new mesh G. From here the strip is carried across to the unknotted margin of E, and then in turn to D, C, B, A, and is finally knotted at the point Z on the first closed loop, 1. This is the only right way in which the net could be closed.

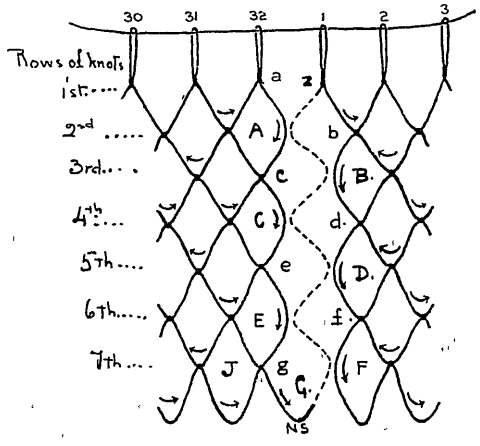


FIG. 35.—Joining of sides, indicated by zigzag dotted line.

We set out to get thirty-two meshes on the supporting-strand by putting thirty-two closed loops on it, but this only made thirty-one loops between them. The closure between the mid-point of A and Z, besides closing the net, adds the thirty-second loop, and all the way down the netting-strip not only completes the lines of knots, but completes the meshes. In pulling upon the lower marginal meshes, the point on the long, free, unknotted sides of the meshes brought beside the knot on the opposite side denotes clearly where the netting-strip is to be tied. Thus in the stretched meshes the knot *g* will be against the point where the new knot should be made. Similarly, in crossing from side to side, the length of the netting-strip between the knots corresponds to the length of the flax between the other netting-knots—namely, one side or one-fourth of a mesh. To sum up: the side meshes with only three knots have had the fourth knot put on by the netting-strip taking them in turn on either side. The lines of meshes are completed, and the net joined at the sides.

Our net, which at the end of the first stage was a rectangular figure, has now been converted into a funnel-shaped net with both ends open.

CLOSING THE BOTTOM OF THE NET.

The last stage in completing the bag-net is closing the smaller of the two openings of the funnel-shaped net. This, as we have seen, is the part that was commenced on the supporting-strand. The top part thus becomes the bottom. The closing is done in two ways:—

(1.) *Temporary Closure by Tying.*

In some nets it is an advantage to close the bottom of the net temporarily, in order that the catch of fish may be removed through it. This is especially the case in long or deep nets. For these nets the closed-loop commencement is preferred. The supporting-strand on which the closed loops have been set up is then simply drawn taut and tied with a knot which can readily be unfastened. This is seen in the end of the *hinaki purangi* (Plate 109, fig. 2), where the strand has been untied and the closed loops spread along it to show up the end of the net. It is also shown in the *matarau* and *haua* nets, which are dealt with later.

(2.) *Permanent Closure by Netting.*

When the commencement has been made with the clove hitch, double mesh, or double strand, the smaller opening to be closed consists of a marginal row of ordinary meshes. The method in closing is practically the same as that of closing the side edges, except that it is usual to use the netting-knot instead of the overhand knot or clove hitch. The supporting-strand is removed from the smaller end, and the other end hooked over the big toe by one of the meshes. A strip of flax is knotted at the butt end, and then fixed by the netting-knot to the mid-point of the marginal edge of any one of the sixteen circumferential meshes. It is best to take the one farthest away when the net is stretched. In fig. 36 this selected mesh is numbered 1, and the closing-strip shown by a broken line. From the first mesh, 1, the strip is taken to the mid-point of the neighbouring mesh on the left, 2, and then to the mesh on the other side of the first mesh —namely, 16. From now on the figure shows the netting-strip going from side to side until the last mesh, 9, is tied. In this way the opening is closed by stretching the net and bringing the sides of the opening together.

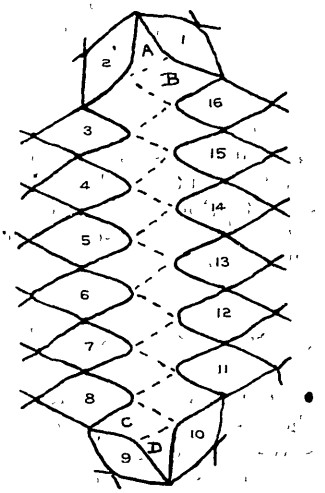


FIG. 36.—Closing bottom of bag-net.

The netting-strip between the free points of the meshes should be of the same length as between the knots on the meshes—*i.e.*, one-quarter of a mesh. In making the netting-knot on the free points of the marginal meshes the two side knots of the mesh should come together when the netting-strip is pulled. This exactly bisects the marginal half of the mesh. In this manner neat work is done, and the joining really adds two rows

of meshes of the same size as the others. They have all got four sides, and form perfect lozenges, except the first and last meshes made. When the netting-strip passed from mesh 1 to 2 it cut off a three-sided mesh, A. When the strip crossed from 2 to 16 it completed a four-sided normal mesh, B. These normal meshes are continued until the strip makes its last crossing from 10 to 9, when it completes a normal mesh, C, and cuts off the last three-sided mesh, D. These three-sided meshes form two corners, as it were, at each end of the closing-line at the bottom.

VARIETIES OF NETS.

For purposes of description we may divide the nets of the region under discussion into four classes :—

A. Scoop-nets: These are unbaited, have a rigid wooden handle, and are worked sideways.

B. Bag-nets: These are baited, and sunk by stone sinkers or a rigid handle. They are drawn up vertically by a cord or handle, when the fish make their presence known by pulling at the bait.

C. Set trap-nets: These are left in streams or channels without bait, and depend upon position and the current to effect the capture of fish, which, owing to the make of the net or the force of the water, cannot escape.

D. Baited trap-net: This is a baited trap which requires the personal attention of the fisherman.

A. Scoop-nets.

These nets are usually referred to as *korapa*, but the term *korapa* is particularly associated with a landing-net. The ordinary European landing-net for trout would be rightly termed a *korapa* in Maori. The net used on Lake Rotorua to lower under a fern-bundle in catching crayfish is called a *korapa*. In this series there are three varieties—for (1) *kehe*, (2) *kahawai*, (3) *warehou*.

KEHE.

(1.) *Scoop-nets for* Kehe (Haplodactylus meandratus (*Richardson*)); *Granite-trout*).

Kehe are very plentiful along the rocky shores of the East Coast and the eastern part of the Bay of Plenty. They feed on smaller forms of seaweed which grow in rocky channels and rocks close to the shore. Their movements are influenced by the seasonal growth of these marine algae. Thus seasons, tides, and local conditions as regards rocks and channels have influenced the form of scoop-net and the method of catching. There are three forms of scoop-net, and seven methods of catching.

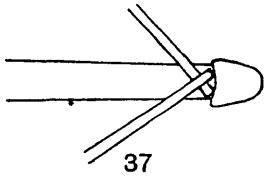
(*a.*) *Kupenga koko kehe.*—An example of this variety is shown in Plate 106, fig. 1. It is being held by Hemi Whangapirita, of Whareponga, who supplied much of the information under this heading. It consists of a long handle, hoop, net, and a circumferential cord which attaches the net to the hoop.

The handle, called *tango*, is made from a pole of *toatoa* 9 ft. to 10 ft. in length. Sometimes *makomako* wood is used: it is lighter than *toatoa*, but snaps more easily. In the example figured the handle is 6 ft. 6 in.

from the free end to the hoop, and 41½ in. within the hoop. Just above the hoop it is 5½ in. in circumference. The part within the hoop is scraped down to a lesser thickness, and at the lower end of the hoop it is shaped into a knob (fig. 37). The free end of the handle is sharpened to a point, which is used to drive off sting-rays.

The hoop (*whiti*) is made of a length of supplejack (*pirita*). A piece 9 ft. 6 in. long is bent into a hoop as shown in Plate 106, fig. 1. The two ends are crossed on the lower end of the handle, just above the knob (fig. 37). They are tied to the handle with a split strip of *pirita*, which is first warmed to render it soft and pliable for binding. This lashing lasts longer than flax. This end of the net is called *te putiki o te kupenga* (the knot of the net). The Whanau-Apanui call it the *nake*. The upper end of the hoop crosses the handle 41½ in. from the point, and it is tied with the slack of the circumferential cord. This gives the shape shown in the picture. The diameter of the hoop at the widest part is 29 in. If it is desired to narrow the hoop to fit a particular channel, the cord can quickly be untied and the upper end of the hoop drawn farther up the handle; it is then tied in the new position, and the diameter of the hoop thereby narrowed.

The net (*kupenga*) is made like the bag-net described. The size is counted by the number of meshes round the circumference. The usual net contains sixty-four meshes, or *mata*. The number must be even, so that



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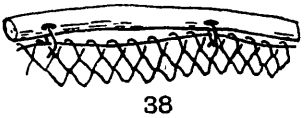

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FIG. 37.—Lower end of handle of *kupenga koko kehe.*
FIG. 38.—Attachment of net to hoop.

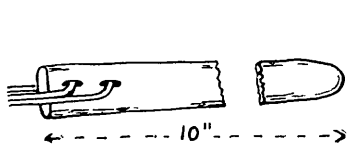
the net hangs right on either side of the handle. An odd number of meshes is called *tauwhara*, and indicates bad workmanship. The depth is measured from the outstretched finger-tips to the anterior fold of the armpit or to the tip of the shoulder—*i.e.*, from 22 in. to 30 in. This net is usually cylindrical, as no additional meshes, or *mata torea*, are added. The sides and bottom are closed in the usual manner. It is not good to have the net too deep, as the slack is washed back over the side of the hoop by the backwash of a wave. These nets are now usually made of dressed fibre.

The circumferential cord consists of a two-ply twisted cord of dressed fibre (*aho*). It is run through the marginal meshes of the open part, and is called *te ngakau o te kupenga* (the support of the net). The cord is attached to the inner side of the hoop by loops of thinner fibrous cords. These are placed 6 in. apart, and are passed through holes pierced through the inner side of the hoop (fig. 38). By this method the loops do not show on the outer side of the hoop, and are thus saved from being worn through by friction against the rocky sides of the channels. The *ngakau* cord is longer than the circumference of the net, so as to provide an extra length to tie the upper part of the hoop to the handle.

A threading-needle (*au*) forms part of the equipment. It is usually made of whalebone, about 10 in. long and fairly strong, with a blunt rounded

point. Two holes are pierced through the other end (fig. 39). Strands of dressed flax-fibre are passed through them and plaited together for a few inches with a four-ply plait (*whiri tuapuku*). It is then changed into a three-ply plait (*whiri papa*), and continued into a cord or rope about 10 ft. in length.

(*b.*) *Kupenga taki.*—This net has a larger hoop, which is kept in an oval shape by means of two cross-bars (*kaho*) tied across the handle and to the hoop on ether side (fig. 40). The previous net has the lower end somewhat



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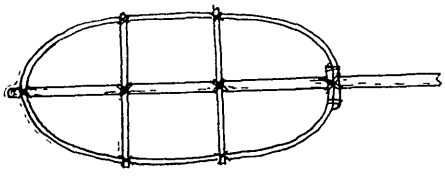

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FIG. 39.—*Au*, or threading-needle for *kehe*.
FIG. 40.—Frame with cross-bars of *kupenga taki*.

pointed, as it is used in an upright or slanting position, so that the lower end may fit into channels in the rock. The *kupenga taki* is not used in channels, but in the open water beside rocks, where it is held horizontally. Hence the difference in shape.

(*c.*) *Kupenga ruku kehe.*—This form of net is used in some parts of the Bay of Plenty in deeper water, hence the name, meaning a *kehe* net for the diving method. The hoop is again much larger than in the last, whilst the handle is as long as possible. It must be long enough to reach from the bottom of the sea to the surface.

Methods of catching Kehe.

We have indicated that the method adopted and the type of net selected depends on the seasons, the tides, and the character and disposition of the rocks. In some fishing-grounds there are definite rocky channels up which the fish come to feed. In these channels the net with the pointed lower end (*kupenga koko kehe*) is used in three ways. Each method has its name.

(1.) *Tu* (Stand).—*Tu* means "to stand," and the method takes its name from the fisherman remaining stationary at a selected spot on the channel. It is used during spring tides. The channels in the rocks are cleared and prepared. A rock in the channel covered with seaweed is selected. A stand is taken up behind it so that the seaweed conceals the net: this is especially necessary if the net has not been dyed. After the channel has been prepared it is left for three or four tides so that the fish may become accustomed to travelling up it. A track of stones may be made towards the stand, and other stones placed in position for the fisherman to stand on as the water deepens. An upright stake is often fixed to mark the spot that has been prepared.

The fisherman takes up his stand when the tide is coming in. He fits the pointed net into the channel, with the opening towards the current (*ka poua te kupenga*). Then he waits until he feels a fish bump (*tuki*) against the net, when he immediately twists the handle to bring the opening upwards and at the same time lifts the net out of the water. The threading-needle has been held by the right hand against the net-handle with a twist

of the cord round the hand, as shown in Plate 106, fig. 1. The rest of the cord hangs loose. The cord is quickly untwisted from the hand, and the needle threaded through the gills of the fish. The free end of the cord is tied to the first fish. It is dropped in the water, the needle end of the cord retwisted round the hand, and the net reset in the channel. Subsequent fish are simply threaded on the cord and dropped back into the water, the first fish tied preventing them from slipping off. If the fisherman changes to another stand, he simply trails the fish along behind him in the water. When the tide is going out the fisherman turns his net to face the current. If the fish come quickly the net may be kept down until two or three fish are in before lifting. They are then threaded (*kotui*) very quickly.

The bone needle (*au*) is long and strong, for the purpose of killing sharks if they get into the net. They are struck on the nose; and care must be taken not to let any blood stain the water, as it would attract others. Sting-rays (*whai*) sometimes get into the net. If not seen, they are readily known by their weight. The net is immediately turned upside down and lifted out of the water to allow the sting-ray to escape, as they are too difficult to deal with. Though the sting-ray is eaten, we must remember that the fisherman is in fairly deep water and some distance from the shore. The sting-ray is a breaker of nets, and the fisherman has nothing to kill it with except the bone threading-needle, which cannot prove so efficacious as in the case of the easily killed shark. As the net is removed from the water the handle is reversed, and the retirement of the sting-ray accelerated by stabbing it with the pointed end of the handle. In this method there is a certain element of excitement and danger.

Other fish, such as *kahawai* (*Arripis trutta* (Forster)), *tamure* (*Pagrosomus auratus* (Forster)), snapper, and *moki* (*Latridopsis ciliaris* (Forster)), are also caught.

(2.) *Rama* (Torch).—The pointed net is also used in the channels at night with a lighted torch, but the fisherman moves about. Torches were usually made of resinous strips of the *kahikatea* (*Podocarpus dacrydioides*; white-pine). The *kehe* are attracted towards the light, and are intercepted by the net. They are sometimes seen asleep. The net is placed in front, and the fish startled forward into it by touching with the foot.

(3.) *Kōkō* (Prodding with a Pole).—This method is the most common of all, as it can be used at any time of the year, provided, of course, there are suitable channels in the rocks. The *kōkō* method requires two men, one with the pointed net and the other with a pole about 9 ft. long. The net-bearer is the skilled fisherman who knows all the channels and the good spots for setting down his net (*hei tukunga mo te kupenga*). He is careful to avoid walking along the channel lest the fish be frightened away: he makes a detour to arrive at his proposed stand. Whilst he is placing his net in position the assistant with the pole stands away from the channel. All being ready the netter calls out "*Kōkōtia mai.*" (*Kōkō*, with long vowels, means "to prod with a pole." It is probably derived from the verb *kō*, to dig, or, rather, loosen by thrusting into the soil. It is quite a different word from *kŏkŏ*, with short vowels, which means "to scoop" or "to scrape up." Though the netter has a scoop-net to which *kŏkŏ* could apply, the process of *kōkō* in this method refers absolutely to the assistant and the process of thrusting forward with his pole in the channel to drive the fish into the net.) On the command to commence to *kōkō*, the assistant walks across to the channel and works forwards towards the netter. Besides prodding in front of him with the pole, he may strike the surface of

the water with it so as to startle the fish. The moment a fish bumps into the net (*tuki*) the net is twisted upwards in the same manner as in the *tu* method. The netter calls to his assistant to stand (*kia tu mai*). When the fish has been threaded with the *au* on to the cord and the net replaced, the assistant is commanded to resume. This process is continued until the assistant reaches the net. Perhaps three or four fish are caught in that channel. The fishermen then go on to another channel, which is worked in the same way. Plate 106, fig. 2, shows three pairs of fishermen on the Whareponga beach.

The man with the net, when taking up his position, sees to it that the bottom of the net fits into the bottom of the channel. When the channel is about the width of the net the handle will be held fairly vertical; where it is wider the handle will be at more of an angle, so as to get more of the side of the hoop along the bottom. In cases where the channel is very narrow the net may have to be held slantwise so as to fit in. Channels that do not fit the net are generally fixed up beforehand. When too wide it is narrowed by arranging stones at the side. Sometimes, in narrower clefts, the fish would escape beneath the net, but stones are filled in so as the make the channel suit the net. These stands are made at certain places, and the experienced netter knows where they are. It is thus seen that the smaller pointed end of the net was evolved as being more suitable for fitting into the channels. Though this net is used in the two previous methods, it obtains its name of *kupenga kōkō kehe* from the method of *kōkō*, or thrusting with the stick. This method is best conducted when the water is dirty, as after rain, when the fresh water from the streams has discoloured the sea. In Whareponga the same effect is produced by a strong *hau tonga*, or south wind.

The next two methods depend on season, when the larger rocks lying about near the shore are covered with the algae upon which the *kehe* feeds. As these rocks are not in the channels, there is no need for the specially shaped *kōkō* net. On the other hand, there are often open spaces round these rocks, so the larger the net the better. To offer as large an opening to the fish as possible, the net is held in a horizontal position. Therefore the larger oval net with the two cross-pieces has been devised for fishing round the rocks. The two methods are termed *hura* and *taki*.

(4.) *Hura.*—This method is used in the daytime, especially when the water is rippled or discoloured (*kauehu*). Rocks that bear plenty of feed are marked, and the fisherman travels about amongst them. He places his net in an appropriate position against the side of the rock, and drives the fish into it by feeling round with his foot and turning over any smaller stones amongst which the fish may be feeding. *Hura* really means "to turn rocks over," and it is the groping-round amongst the rocks that gives the name to the method.

(5.) *Taki.*—The *taki* process resembles the *hura*, but is used at night. The same kind of rocks are selected. The best time is March, when the *kohuwai* seaweed is plentiful. In the daytime the favoured rocks can be noted, as the seaweed shows signs of being nibbled by the fish. At night the *kehe* may often be seen feeding round a rock. As the tide rises they feed on the higher levels of the same rocks. They can be seen rising with the swell of a wave and biting at the seaweed above. When the wave subsides they are often left clinging to the seaweed for a second or so. It is from the observation of these feeding-habits that the Maori adopted the *taki* method. The fisherman brings his larger oval net in a horizontal

position close to the rock; then, as the fish rise on a wave to grasp the feed above, the net is brought up behind them against the side of the rock, with the opening upwards; as the wave subsides the line of feeding fish drops back into the net. This method produces good catches.

The sixth method seems to be peculiar to the Whanau-Apanui district. It is used in the deeper water where the above methods are unsuitable. It is unknown amongst the Ngati-Porou.

(6.) *Ruku* (Diving).—The conditions as to channels in the rocks close inshore are, of course, continued out into deeper water. They teem with *kehe* in some parts. It remained, however, for the Whanau-Apanui to overcome the difficulty that the deeper water occasioned. They did this by putting a longer handle on the net; by swimming instead of walking; and using beaters to drive the fish into the net; by diving instead of thrusting with a stick. These deep *kehe* grounds were evidently well explored, for the best places to stand the nets were well known, and were termed *unuunuhanga*. Such a ground, known as Te Wharau, exists off the beach fronting the village of Omaio. One of the special occasions for lifting—or, rather, "knocking down"—the *rahui* was the becoming pregnant of a chief's wife. When the mother of the present chief of Omaio, Te Ara Ngamoki, became pregnant, all the *rahui* on the neighbouring *kehe* grounds were removed. The people assembled on the beach and made a gala day of it.

The net has already been described. The expert swam out to the *unuunuhanga*. He dived down and set the *nake* of the net in the right spot in the channel. He worked his way up the handle, and at the surface he maintained pressure on it to keep the net in position. He kept himself afloat with the assistance of the handle and by swimming. Meanwhile the assistants had taken up their position on neighbouring rocks, and by swimming, to make, as far as possible, an arc facing the net. The expert gave the command "*Rukuhia!*" (Dive!). The assistants farthest away dived first, and the others, judging their distance, followed suit, so that they all converged down various channels to drive the *kehe* into the net. The first diver to reach the net seized it by the *nake* and brought it to the surface, with the opening upwards. Large numbers of fish were caught in this manner. What with swimming, diving, and the plaudits of the onlookers, it was a day of excitement and pleasure that did honour to the prospective heir of the chief. The fish caught were supposed to form a dainty repast for the pregnant chieftainess, and were hence called a *whakakakitanga* (something for the throat). Of course, the people shared in the feast.

The seventh method of catching *kehe* is by means of a set trap-net, called a *haua*, or *hinaki kehe*. It will be described under the heading of "Set Trap-nets."

Fishing-grounds.

In common with other fishing-grounds, those for *kehe* are also named. The most famous ones along the Ngati-Porou coast are enumerated below, as an example of the importance that was given to all food-producing areas. Commencing in the south near Tokomaru Bay, they are—

Te Mawhai: This is famous as containing the source of Whakawhiti-ra, a fresh-water spring sought after by fish. No inexperienced man (*tauhou*) was allowed on the ground, but only the experienced (*tautohito*).

Te Haha, near Tawhiti Point.

Waimahuru: There is a stretch of two miles of reef between this and Te Haha, all of which is good ground for *kehe*. Travelling-parties passed over Tawhiti Point whilst the reef at Waimahuru remained undisturbed. Hence the saying, *Haere tou te korero i runga o Tawhiti, takoto noa Waimahuru* (Gossip and news pass continually over Tawhiti, but Waimahuru remains undisturbed).

Te Waiwhero is in the cove to the south of Waipiro Bay.

Otama-rauiri, at the mouth of Waipiro, had no channels, and only the *hura* and *taki* methods were used here.

Mataahu, between Waipiro and Whareponga, is well known.

Wai-o-rongomai, near Whareponga, was the scene of the famous Ikakoraparua battle. The *koko* method was used before the fight.

Whareponga, near the village of that name.

Whangai-potiki, beyond Whareponga, is a large channel through the reef which was used for canoes. Here the Ngati-Porou ancestor Porourmata was killed.

Omataira, farther north of Whareponga, contains four miles of reef which was all good *kehe* ground. Sections had special names, such as Te Kehe-tuaranga, Te Ahi-kehe, &c.

Otairi to Tahere-pohue, south of Reporua, had good *kehe* grounds, where the *hura* and *taki* methods were mostly used.

Channels (Awa).

Whilst the general grounds have names, special channels in these grounds are also named. The channels are due to the geological formation, where rock-strata have been tilted and channels worn between. Up these channels we have seen that the *kehe* come on the tide to feed. Many of the channels have been improved by human agency. Not only have special stands been prepared to suit the size of the net, but the sides of the channel have been built up in places to make sure of the fish proceeding onwards. A very old channel was made by the Ngati-Ruanuku, who were dispossessed by the Ngati-Porou. The side walls were made with alternating layers of fern and stones. It was named Wananga, and still remains intact in spite of the ceaseless wear of the waves. This stability is attributed to potent incantations recited during construction. Here Rangi-rakai-kura, of Ngati-Ruanuku, was slain by Pakanui, of Ngati-Porou, during the campaign of conquest by the latter. Whilst some names are old, others are comparatively recent. Many of these *awa* belonged to particular families, and outsiders dare not trespass on them. The *kehe* is a *tapu* fish, and must not be cooked in the earth-oven at night, or they will forsake the channels.

Tupore is a famous channel at Mataahu. Amongst other fish, the very best kind of *nanua* is caught here. The feed is plentiful, and the fish get very fat—becoming, as the common phrase puts it, *he hinu katoa* (all fat).

Kauparara is near Tupore. It is also famous for *nanua*, which are at their best in March, but after that month lose condition.

Tangitu, Wetea, Manutaunoa, Tapiri, and Wananga are all channels at Mataahu. The number of named channels shows what a famous ground Mataahu was. Wananga has been mentioned above as the famous channel made by Ngati-Ruanuku.

Korouanui, Te Hoe, Kowhae-tu, Wai-whakaata, Taratara-taua, and Haowhenua are well-known *awa*.

Whangai-kuia was a large channel where the *kopipiro* and other fish were very plentiful.

Near Awanui *kehe* abound, but there are no names to the channels and grounds, owing probably to a sparser population on this part of the actual coast.

At the East Cape there are a number of named channels, of which examples are Tupo and Pokai-takataka. The *kehe* grounds here are very rich, and at one time helped to support a large population.

The Horoera district, between East Cape and Te Araroa, has the famous reef of Mataikaro. Here there are a number of channels where the *tu* method is used. Some of the channels are Te Awanui, Pararaki, Te Waipuna, Ngautahi, Te Awa-a-Koirere, Umupokipoki, and Ngareiawa. Two have modern names—Awa-o-Hare (Harry's Channel) and Awa-o-Anaru (Andrew's Channel).

The channels and rocks are useless, and hence unnamed, unless algae such as the *kohuwai* provided food to attract the *kehe*.

Season.

The season when the *kehe* are in the best condition naturally depends on the time when the best food is in abundance. The *kehe* feed on both the *parengo* and *kohuwai* seaweeds that grow abundantly on the rocks of the district. The *parengo* is best in July, and lasts till March, but the Ngati-Porou say that it seems to have shortened its period to about January. The *kohuwai* comes on when the *parengo* has died down. Its season is from March to June. It is during the *kohuwai* season that the *kehe* reach their best, being at their very best in March.

The *kehe*, however, is peculiar in that it forms good eating even when it is thin. This has led to the saying, *Tupuhi kaka ki uta, tupuhi kehe ki te moana* (A thin *kaka* on land, a thin *kehe* in the sea). The *kaka* (*Nestor meridionalis* Gray) is good eating when thin, and so is the *kehe*, though appearances may be against them. Hence the Maori say there is no restriction or closed season for the *kehe*, and the *koko* method of catching can be used throughout the year. The methods which depend upon special feeding-habits also depend upon season.

As regards the exception described in the Bay of Plenty district, where a close season is declared over the deeper fishing-grounds, it seems that this is done by chiefs to add to their prestige. The method of diving would hardly be used as an ordinary method to provide food-supplies. Thus declaring a *rahui*, or close season, over these deeper ground entails no irksome restriction on the people, and gives the chief an opportunity of exercising his *mana*, or authority. The removal provides a special function, which is as much an aquatic sports gathering as a means of providing food. At the same time it stresses the importance of the ruling family.

Miscellaneous.

The *kehe* is eaten fresh, as the flesh turns yellow if kept. The flesh is firm, and in cooking in the earth-oven it is not necessary to wrap it up in fern-leaves, as in the case of fish with a softer flesh. It is also preserved by splitting in halves (*pawhara*) and drying in the sun (*rārā*).

The old *kehe* grows very large, but are too tough to be sought after as food. They are called *katirimu*, and the Maori say they are the bull *kehe*. The word *katirimu* is thus used as a term of derision in the following extract

from a song composed for one of the competitive meetings held by the Ngati-Porou parishes some few years ago. It refers to the Horoera district, and mentions the Mataikaro reef, famous for *kehe*, crayfish, and the edible *parengo*.

Kia te kehe pohatu,
Tihei taruke,
Hinaki katirimu,
Huhuti parengo,
Kiri haunga o Mataikaro.

To the foot-crushers of rocks,
Porters of crayfish-pots,
Trappers of bull *kehe*,
Pluckers of seaweed,
With malodorous skins from Mataikaro.

The entrails of the *kehe* become very fat in the right season, and are better esteemed by the local people than the flesh of the fish. Hence, in the saying below, used as an invitation to a visitor, they make a display of hospitality and at the same time reserve the tit-bits for themselves :—

Hoatu ki te kainga,
Kotaku ika ki a koe,
Ko te ngakau ki au.

Go on to my home;
My fish will be for you
And the entrails for me.

KAHAWAI.

(2.) *Scoop-nets for* Kahawai (Arripis trutta).

The *kahawai* is a well-known fish that comes up the North Island rivers in large shoals in certain seasons. The common way of catching them is by trolling from a canoe with an unbaited wooden hook barbed with bone and inlaid with *Haliotis* shell (*paua*). From the last, the hook gets the name of *paua*. The *paua* is also used at the mouths of rivers, where it is thrown in on a long line (*piupiu*) as the tide is coming in. The current gives the hook a spin, and deludes the *kahawai* into swallowing it as a sprat. It is curious that the fish will often prefer a badly made hook with a dull piece of shell. Its vagaries in this respect are embodied in the cynical saying, *He kahawai ki te moana, he wahine ki uta* (As a *kahawai* in the sea, so is a woman on land).

Another common method of catching the *kahawai* is by means of the seine-net, which may be hauled or set in river-estuaries.

At the mouth of the Waiapu River the fish is caught in a large scoop-net. In the region under discussion it is peculiar to this particular part, but the Ven. Archdeacon H. W. Williams informed me that the method is also used at the mouth of the Wairoa River, in Hawke's Bay.

Kupenga kŏkŏ kahawai (Net for scooping-up *Kahawai*).—The word *kŏkŏ* in the name of the net is the word with the short vowel already referred to. In this case it means "to scoop up," as the person with the net does all the work and has no assistant armed with a stick to drive the fish into the net. Plate 105, fig. 1, gives a good idea of the size of the net. The net in the plate is held by Panikena Kaa, of Rangitukia, who demonstrated its use, and is mainly responsible for the information in this section. The *kupenga kŏkŏ kahawai* consists of a handle, a hoop, the net, and a circumferential cord.

The handle consists of a *manuka* pole, 14 ft. long, and with a fork at the thinner end. It needs a strong wood like *manuka* to bear the strain. The handle just below the fork is 3½ in. in circumference, and at the other end, where it is scraped down, it is 6 in. in circumference. The fork supports the hoop at one end, and at the other the handle projects 10 in. beyond the hoop. The 10 in. projection is called *te puritanga ringa* (the grasping-place), and the part within the hoop is called the *tango* (handle).

The hoop (*whiti*) is formed of two lengths of supplejack. The ends of the two pieces are passed through the fork to overlap one another for about 41 in. (fig. 41). A third piece of supplejack about 34 in. long is added to them and overlaps them for 17 in. on either side of the fork. These are securely bound together, and this end of the net is called the *rae*. The other ends of the two supplejack lengths are bent back to form a laterally compressed oval, and are crossed over the pole 10 in. from the other end. The ends are made to overlap for 17 in. on each side of the pole. The overlap is bound together and securely fastened to the pole where it crosses. Except for the curve at each end, the sides of the hoop are fairly parallel, being about 44 in. apart.

The net was usually made of dressed fibre. It is an elongated bag-net, having been made sufficiently long to go round the circumference of the hoop. It is joined at the sides and the bottom in the usual way, and is about 6¼ ft. in depth. A 3 in. mesh may be used in the early part of the season, when the fish are smaller, but after November a 4½ in. mesh is preferable.

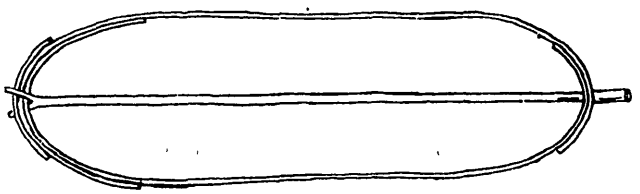


FIG. 41.—Frame of *kahawai* net.

A circumferential cord (*aho*) is threaded through the marginal meshes, and tied to the hoop at intervals of about 1 ft. This cord is the *ngakau* (support). As there is no friction against rocks, the ties are passed right round the hoop, instead of through holes as in the *kehe* net.

When not in use the slack of the net is usually knotted in three places and wrapped over the handle. In carrying the net the handle is balanced over the shoulder, as in Plate 105, fig. 1.

Method of Use.—The fish are caught as they make their way in shoals towards the mouth of the Waiapu River. They come in close to the shore and travel parallel with the beach. The shoals are easily seen, and the fishermen dash into the waves with the scoop-nets. The nets, though heavy when carried, are easily manipulated when in the water. The right hand holds the *tango*, and the left hand grasps the *puritanga ringa*. The opening of the net is directed towards the course of the fish, with the long axis horizontal. The net is then simply swept along through the shoal until a sufficient number are in. The net-opening is then turned upwards, so that the hoop is level with or above the surface of the water. The fisherman then dashes ashore, trailing the fish in the water as long as possible, and empties his catch on the beach. Many of the fish are caught

by the gills in the meshes. As soon as the net is empty he dashes back again and repeats the process. When the fish are not in big shoals only a few may be caught at a sweep. They are kept in the slack of the net near the operator until a sufficient number has been caught to justify going ashore. As the fish swim with some force, the fishermen always stand sideways to their course, so as to receive the impact of the fish passing outside the net upon the outer surface of the thigh. Though the weight of the net is lightened in the water, the dashing out and in with heavy catches of fish and a wet net make the work very strenuous. As the shoals are mostly in the smooth water just beyond the breaking waves, the fishermen when dashing out plunge head first through the larger incoming waves. Hence, to a child born with a large head, the following saying was applied: *E rahi te mahunga o tamaiti nei hei tukituki i nga ngaru o Waikaka* (The head of this child is big to break through the waves at Waikaka). Waikaka is the ocean beach to the north of the Waiapu mouth where the scoop-net is used.

At the present day the people of the village of Rangitukia are experts in this method of fishing, and are naturally proud of it. In season, when the *kahawai* are plentiful, regular field days are held on the Waikaka beach. Though the work is hard, the men enjoy the fun and competition. Sometimes a man gets out of his depth and is almost carried away by the team of live fish in his net, but the spice of danger adds to the excitement.

Food-supply.

The *kahawai* is a somewhat dry fish for eating purposes, but improves when fat. Its quantity, however, made it of some importance. In the season the local people camp on the beach. Whilst the men land the fish the women are kept busy cleaning and hanging them up. Two tripods of heavy drift timber are erected to support a cross-bar, upon which the cleaned fish are hung up to dry. This support comes under the term of *whata*. Those which cannot be eaten fresh are thus dried for future use. Inland people come down to the beach with carts, which go away heavily laden.

Season.

The *kahawai* come up the rivers in shoals, usually in pursuit of the fry of other fish. The season commences in November, but they are not usually fat until December. They are good in January, and begin to disappear in February. The usual term for a shoal of fish is *rangai*, but with *kahawai* the word *moana* is also used—as, *he moana kahawai* (a shoal of *kahawai*). In attracting attention to a shoal the closed fist or the bent elbow must be used in pointing. If the outstretched finger is used it is equivalent to a *pana* (a motion to expel). The sensitive *kahawai*, either through excellent vision or some occult power, are quick to take offence, and will depart for more courteous waters.

Influence of Environment on Fishing Methods.

Mention has been made of two other methods of catching *kahawai*—with the *paua* hook and the seine-net. Both these methods are used in the region under discussion. The Motu River is famous for *kahawai*: there the *paua* hook is used. Hicks Bay is also frequented by the *kahawai*, and there the seine-net is used. Thus, in three parts of the same cultural region, three totally distinct methods are in use. Both the Whanau-Apanui

and the Ngati-Porou recognize Pou as the tutelary guardian of fish. Until recently the first *kahawai* of the season was offered to him. Dr. Wirepa, of Te Araroa, has made some interesting observations on the reasons for these three different methods. In the Motu River the current gixes the *paua* hook the right spin as the line is drawn in. The method gives all the sport desired, and provides an ample sufficiency of food. There is no need to seek other methods. At Hicks Bay the river is sluggish and there is not sufficient current to spin the *paua* hook. The beach and estuary are clear of rocks, and have a smooth sandy bottom. The seine-net is suitable, and came into permanent use. In the Waiapu region the current is such that it casts the hook and line back on to the beach. The *paua* method was eliminated. The beach, owing to rocks in places, is unsuited for the seine-net, whether set or hauled. Thus the two ordinary methods could not be adopted. Yet it was hard to see shoals of *kahawai* passing along close to the shore without making some effort to secure them on a large scale. Shoals of whitebait were scooped up with a scoop-net. *Kahawai* were bigger, certainly—hence a larger net was required. At all events, whether from whitebait or other fish, the using of a scoop-net was tried, proved a success, and became established. Thus in this one district man adapted his procedure to suit the different local conditions, or, in other words, environment effected changes in his material culture.

WAREHOU.

(3.) *Landing-net for* Warehou (Seriolella brama *Guenther*).

The *warehou* is a salt-water fish found plentifully about Cook Strait, and along the east coast into part of the Ngati-Porou waters. It is a good-eating fish, and is caught with a baited hook on rod and line. The Ngati-Porou say that north of Gisborne the fish differs from those farther south in having a very tender mouth, which thus prevents its being lifted directly out of the water on the hook. The weight causes the lip to give way, and the fish is lost. To prevent this, a landing-net is used that is peculiar to this district.

Korapa (Landing-net).—As we have seen, the term *korapa*, whilst used generically with the two scoop-nets already described, applies particularly to the landing-net for *warehou*. Hamilton figures three in *Museum Bulletin No. 2*, page 65. He has been misinformed, however, and states in error that they were used "for fishing in rock-pools and in the long narrow rifts in the clay rocks on the east coast." This description applies to the scoop-net for *kehe*, which is also called *korapa*. The nets that he figured are landing-nets for *warehou*. The confusion has been caused by the name *korapa* being applied to both forms of net.

The *korapa* consists of a handle, hoop, and net (Plate 112, fig. 1). The handle is a short T-shaped piece of wood, which is usually carved. One limb, carved like a bird's head, is used for grasping. The cross part of the handle is curved on either side, and grooved on its outer surface to fit the hoop. The groove is continued as a hole into the actual handle, to take the ends of the hoop. The hoop is of supplejack, bent round in an oval, and lashed to the grooved part of the handle on either side. The net is a shallow bag-net. In the plate it is a rather poor one, made of string. The hoop has been run through the marginal meshes before tying to the handle.

Methods of Fishing.

The *warehou* is caught by two methods on recognized fishing-grounds :—

(1.) *Tararo.*—This method is with a hand-line about six *maro* in length. The *maro* is the distance of a full span of the arms. Roughly, it is usually regarded as about a fathom. The fish does not keep to the bottom, hence the shortness of the line and the light sinker used with it.

(2.) *Tihengi* (Rod-fishing).—With the same length of line, a rod, called a *tautara*, is used. The rod is made from a *toatoa* sapling about 8 ft. to 9 ft. long. The *toatoa* growing on the hills are considered best for the purpose, as they are *kakara* (sweet-smelling). Sometimes a short carved piece of wood, about 7 in. long, is lashed to the end of the rod. The carving is in the form of a head, and contains holes, to which loops may be attached. One is figured by Hamilton in *Dominion Museum Bulletin No. 2*, fig. 47. To the end of the rod, or one of the holes in the carving, is attached a loop carrying a number of threaded shells of the univalve called *ataata* (*Turbo smaragdus* Martyn). Through the loop the 6-fathom line passes. The baited line is thrown out, and the proximal end of the rod attached to one of the thwarts of the canoe. A man may have two or more rods out. When the fish takes the baited hook the pulling on the line causes the shells to make a noise, which attracts attention. Part of the equipment is a *rou*—a rod slightly longer than the *tautara* and hooked at one end. The *rou* is also of *toatoa*, and is prepared by tying the top of a thin growing sapling into a loose overhand knot. When it grows to the right size it is cut down and the knot trimmed into a hook, which will not straighten out. When the shells jingle, the fisherman reaches out with the *rou*, hooks in the line from beyond the edge of the rod, and brings it to his hand.

Since the above was written the writer had the privilege of accompanying Mr. George Ryland on to the *warehou* fishing-grounds off Tokomaru Bay. Some extra details were noted. The appropriate length of line was knotted near the end of the rod with an overhand knot, and the proximal end brought along the rod for 3 ft. or 4 ft., when another overhand knot was made and another length of fishing-line freed. Thus to each rod there were two fishing-lines with their own hooks and sinkers. The proximal end of the rod was fixed to a thwart, and the fisherman also used a hand-line. The *tararo* and *tihengi* methods were carried on at the same time. The object was to have as many lines out as possible in the restricted space available. Each fisherman sitting on a thwart, instead of being restricted to one line, had three lines, which were well spaced outwards to prevent their becoming entangled. Instead of shells, a tin match-box containing leaden shot was tied to the end of the rod. When the fish pulled on the baited hooks the sound made by the shot in the match-box attracted immediate attention.

Use of the Landing-net.

When the fish is hooked the line is hauled in, and when it is close to the canoe it is played with one hand whilst the other slips the landing-net into the water. The fish is met with the net, but if it pulls away it is played. Once in the landing-net there is no hurry in lifting it into the canoe. The fish struggles strongly at first, and it is allowed to exhaust itself before being lifted in. If there is another fishing-canoe near at hand, the correct thing is to jam the fish against the outside of the canoe with the net and let its flappings be heard by the rival fishermen, who are further annoyed by the exultant yells of their successful neighbours.

Bait.

The best bait is the flesh of the crayfish.

Omens.

Dreams were regarded as omens. The lucky omens were to dream of cooked food, old torn garments, being bespattered with mud and dirt, or embracing a woman. As the luck indicated by a dream was personal, the dreamer kept it to himself. The luck could be taken by any one who put his arm round the dreamer. The dreamer would then catch about two fish whilst the other obtained a big catch. The dreamer, therefore, besides concealing his dream, would keep away from too close contact with any one, lest any demonstration of affection rob him of his luck. This action often defeated its purpose, for non-dreamers were on the lookout for any one who avoided them. The dreamer, however, could save his luck by immediately striking with his open hand the person who embraced him and saying, "*E kore taku moe e riro i a koe*" ("My dream cannot be taken by you"). On the fishing-ground the lucky dreamer caught all the fish whilst the others looked vainly on.

Cooking.

The fish had to be cooked in the earth-oven (*tao*) and not broiled or grilled until the season was well advanced. Immediate grilling on return to the shore was termed *taiki*, and caused the fish to leave the fishing-ground.

Season.

This varied, on different grounds, from April to July.

Fishing-grounds.

Te Puna was a famous ground near Akuaku, between Waipiro and Whareponga. It opened in April. The term for opening a fishing-ground is *takiri*: thus, *Ka takiritia Te Puna i a Aperira* (Te Puna will be opened in April). The *mana*, or authority, over this ground was exercised by the chief of the Whanau-o-Te-Haemata subtribe. The first fish had to be eaten by the chief of that family, who at present is Tuta Ngarimu.

Te Poroporo ground is near Waipiro, close to the point. There large fish are caught.

Puakato, near Waimahuru, has large fish, and opens as late as July. The *mana* belongs to the Whanau-a-Rakairoa subtribe. To that tribe belongs Renata Tamepo, who supplied these notes. The ground is mentioned in a lament composed by Riria Turiwhewhe for Te Rakahurimai, who, with a boat's crew, was blown out to sea by a *parera* wind and drowned.

E au kuware kihei rawa i puritia
Tukua kia haere kia tae te koronga
Tera Puakato ka rewa kei runga,
Kei tua koutou e aroha nei au-ee

Ah! ignorant I, who did not detain,
But allowed their wish to seek its end!
There Puakato rises above the waves;
Beyond lie ye for whom I grieve—ah me!

B. Bag-nets.

Bag-nets are attached to circular hoops, and depend upon bait for attracting fish within the area of the hoop. The presence of the fish being known by touch or sight, the net is drawn up vertically and, as the tendency of fish is to sound or dive downwards when startled, they are easily secured within the net. In this section there are three kinds of nets, for securing (1) crayfish, (2) *tangahangaha*, and (3) *maomao*.

CRAYFISH.

(1.) *Bag-net for Crayfish* (Pouraka).

Crayfish are very plentiful all along the East Coast and Bay of Plenty area. There are four methods of securing them. The commonest is by diving. A simple method is with the *matire*, a rod with a number of strands of flax looped over one end. In the midst of the strands is a bait of *paua* (*Haliotis*). The rod is thrust down into rocky crevices. The crayfish, attracted by the bait, gets its legs tangled in the strands and is drawn to the surface. A third method is by baited crayfish-pots made of thin *manuka* rods. These traps are called *taruke*, and are set on the sea-bottom, whilst a long rope with wooden floats marks the spot.

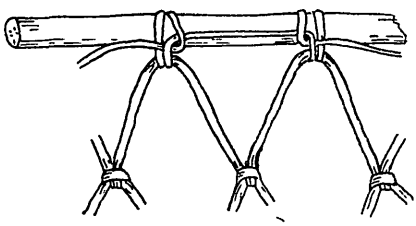


Fig. 42.—Attachment of *pouraka* net to hoop.

The fourth method is by means of the bag-net termed *pouraka*. In the East Coast - Bay of Plenty area *pouraka* refers solely to this kind of trap. In Lake Taupo a *pouraka* is a netted trap, set like a *taruke*, and used for catching *kokopu* (*Galaxias brevipinnis*). At Maketu and on the Waikato coast the *pouraka* is similar in make to that of Lake Taupo, but is used to catch *aua* (*Agonostoma forsteri*). The crayfish-*pouraka* consists of a net, hoop, handle, sinkers, bait-support, and line (Plate 107, fig. 1).

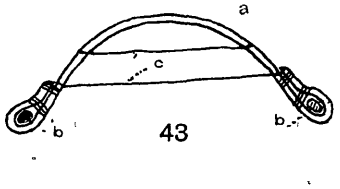
The net is made of flaxen strips. Thirty-one meshes are put on the supporting-strand, by any one of the three direct mesh-commencements. The thirty-second mesh is added when the sides are closed. The depth is carried down to ten rows of meshes, additional meshes being added. The sides and bottom are closed as already described.

The hoop for the mouth of the net (*whiti*, or *potaka*) is of supplejack. With the Ngati-Porou the supplejack is threaded through the marginal meshes, the ends overlapped, and lashed together. Roughly, the hoop was 36 in. or more in diameter. With the Whanau-Apanui the bag-net is attached to the hoop by a chain-knot of fibre-cord, which is looped twice round the hoop and each circumferential mesh, as shown in fig. 42.

The handle is made of split supplejack, which forms an arch over the hoop. The ends are attached to opposite points of the hoop by doubling

the ends round the hoop with a 6 in. or 7 in. overlap and lashing together as in fig. 43. Another strip of supplejack may be attached in a similar manner at right angles to the first, and an additional lashing made where the two handles cross at the top of the arch. This arched handle is called a *pewa*.

In some nets I saw at Opape, in the Bay of Plenty, a single handle was used, but these were stayed with two sets of a two-ply twisted cord of undressed flax, as shown in fig. 44. The handle also had two cords of a similar nature stretched across from side to side at the levels of the two sets of side stays, as shown in fig. 43. These are tied to the handle below the side stays so as to prevent their slipping up on the handle. In this last type the bait is attached to the middle of the lower cord. In the double handle there is no need for these two cords. A special cord for the bait is therefore stretched across the circumference of the hoop from the bases of one of the handles. The bait-cord is called the *pae mounu*. In some cases a special bait-rest is made by tying a short piece of stick at right angles to the middle of the bait-cord to form a cross. A strip of flax about $\frac{1}{4}$ in. wide is then wrapped successively round each arm of the cross so as to overlap, as in a fly-flap.* To this a piece of thin flax is attached to tie on the bait, which is laid on the lozenge-shaped bait-rest. This bait-tie is called the *tau-mounu*. Sinkers (*punga*) of stone are attached on the outer side of the circumferential hoop at the handle-junctions,



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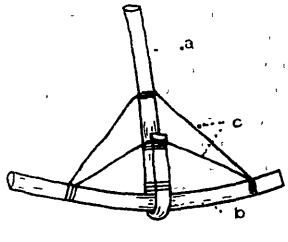

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FIG. 43.—*Pouraka* handle: *a*, handle; *b*, cross-section of hoop; *c*, handle-stays.
FIG. 44.—*Pouraka* handle: *a*, handle; *b*, hoop; *c*, side stays.

care being taken to select stones of even weight so as to maintain the balance. In these days a piece of cloth is often wrapped round the stones to prevent their slipping. In ancient days grooves were chipped on the stones, or they were enclosed in a small net to serve a similar purpose. A line or fine rope of sufficient length was attached to the handle or the crossing of the two.

An ingenious thought was the attachment of a thin strip of flax from the bait-rest to the lower end of the line where it was attached to the handle. When the baited trap rested on the bottom of the sea, the tugging of the crayfish at the bait was clearly transmitted along this cord to the line and the fisherman above. It was therefore called "*te tau whakarongo*"—the feeling-string.

Method of Use.—The *pouraka* is baited usually with *paua* (*Haliotis*), or any kind of fish. In these days meat may be used. In the night-time

* TE RANGI HIROA, Maori Plaited Basketry and Plaitwork, *Trans. N.Z. Inst.*, vol. 55, p. 356, 1924.

the nets may be set in the shallow water near the reefs, at low water, or just when the tide is coming in. When baited the net is simply lowered into the water at the selected spot, and the sinkers take it to the bottom. If the line is held, the pulling of a crayfish at the bait is transmitted up the feeling-string to the line, and distinctly felt. On hauling up, the crayfish drop down into the net. It is usual, however, to set a number of nets and tie the ropes to rocks or points on the reef. When the last is set the fisherman starts at the first and lifts them up. They are reset when the contents are removed. By the time he has completed his task it is time to start on his round again. Half a dozen nets is a convenient number to keep one man employed.

In deep water the nets may be set in the daytime. A raft (*mokihi*) made of the light *houama* (*Entelea arborescens*) is used. Floats (*poito*) of the same wood are tied with a clove hitch to the end of the rope when the net reaches the bottom. A number are set, and the fisherman paddles round on the raft, picking them up in turn. When crayfish are plentiful, ten or twelve are caught in one net at a haul.

Season.

Crayfish are caught all the year round, being at their best in September and October, but especially in September, when the *kowhai* (*Edwardsia tetraptera*) is in bloom. *Koura* are not put in fresh water to render them soft (*mara*) until the blooms are off the *kowhai*. If it is done, the crayfish becomes small (*pakupaku*), thin (*tupuhi*), and *rerewai*. *Rerewai* means that there is nothing inside the cephalothorax (*papa*) but froth (*pohuka*). After October the crayfish sheds its shell. This process of ecdysis is termed *maunu* (to become loosened or cast off). The same term is applied to birds when moulting, as in *parera maunu* (a moulting duck). The soft crayfish is called a *koura maunu*. They are very fat, and esteemed best of all *koura*. Hence November is looked upon as the best month of the season.

Crayfish-holes (Rua Koura).

When the crayfish are shedding their shells they collect in large numbers in certain holes between the rocks. These spots are called *rua maunu* (shell-shedding holes), or simply *rua koura*. A knowledge of their location is very important, and they are named. Such are Kaitangata, Tara-o-kaikore, and Oruamariu, at and near Horoera. Others are Te Awa-tapae and Hangai-koroua. Te Wharau-o-Ngati-Porou and Okahu are two famous *rua koura* at Mataaho. The former faces south and the latter north. Tangitu and Te Poti are also in this neighbourhood. In the season boats are taken to them and the *koura* loaded in sacks. In feeling for them, the old shells are removed first, to get at the fish which are below.

Grounds for setting Traps (Tukutukunga Taruke).

Though these grounds are for setting *taruke* traps, the *pouraka* is used on them in the daytime. They are situated out in the deeper water. These grounds, like fishing-grounds, are picked up from certain land-marks. Two cross-bearings are obtained by certain objects being got into line: the bearings were referred to as *nga rarangi* (the lines). Good grounds were named: such are Te Poho-o-Whakarara, at Mataikaro; Tunga-o-Hurumanu, Taka-koau, Te Rua, Tunga-o-Tope, Ngawhakararangi, and Tokatutahi, all in the vicinity of Horoera.

Names of Crayfish.

Different names are given to crayfish, but they seem to refer more to various sizes. Thus the smallest ones are called *weta* the ordinary larger size, *matapuku;* and the very largest, *pawharu*. *Pawharu* are caught only in deep water. They are often covered with shells, and are considered the best for eating. A dark-coloured crayfish is called *matapara*.

New Zealand marine crayfish* were first assigned to the genus *Palinurus*. The common crayfish was described as *Palinurus edwardsii*. The generic name now stands as *Jasus*, and of the two species inhabiting these waters the common market crayfish is *Jasus lalandii*, and the rarer one *Jasus hugelii*. Whether the Maori names above represent different sizes of *Jasus lalandii*, or whether the *matapara* and the *pawharu* represent *Jasus hugelii*, I am unable to say at present.

Parts of the Crayfish.

The antennae are called *puihi*. The first large pair of legs are called the *konui*. The same word is applied to the human thumb or big toe. The other four pairs are the *waewae* (legs). The abdomen (commonly called the "tail") is the *hiku*—also meaning "tail." The cephalothorax is divided into two: the upper part with the carapace is called the *papa*, and the lower part with the sternum is the *tuke*.

Diving for Crayfish.

The crayfish frequent the clefts between the rocks in parts that are easily accessible at low tide. These are obtained by submerging or diving. A plaited basket with three pairs of handles is fastened round the waist by a strong strip of flax tied to the outer pairs of handles. This type of basket is called a *kawhiu*, and is also used for gathering shell-fish. The fisher feels down the crevices with the foot for the *puihi* of the crayfish, or any other part. If the water is very shallow the crayfish is reached by the arm; if beyond reach, the fisher simply submerges under the water sufficiently to reach the fish. If deeper still, the head has to go down and the feet up in the process of diving. In grasping the *koura*, it is seized by the *papa* (carapace): it then comes up easily. It is usual, also, to turn the crayfish with its legs upwards immediately, to render it helpless. If the fish is caught by the *konui* it is difficult to get it up: the leg usually breaks off. The right thing is to break the other one off as well and so render extraction more easy. Though this pair of legs is not furnished with chelae, or nippers, one has to be careful, as they can inflict a very nasty scratch. Women usually do the diving. In the old days, when a certain definite procedure was still observed, if a woman broke off a *konui* she always dived back to remove it: otherwise crayfish never returned to the hole. In the *kawhiu* basket the middle untied pair of handles are pulled apart to admit the catch. Experts emerge from a dive with a crayfish in each hand, and some are said to come up with a third crayfish in the mouth, where presumably it has been transferred by hand. In these degenerate days an old sock is often used as a glove to protect the hand from the sharp spines.

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* G. ARCHEY, The Marine Crayfish of New Zealand, *Trans. N.Z. Inst.*, vol. 48, p. 396, 1915.

Cooking and Preserving.

Crayfish cooked in a *hangi* (earth-oven) have a better flavour than if boiled. A great delicacy with the Maori is *koura mara.* This is prepared by soaking the crayfish in fresh water for about three days if the water is warm, and four or five if it is colder. The test is the loosening of the shell. When it comes away easily it is termed *mahiti.* People used to crayfish will then eat them raw and enjoy them: the smell is worse than the taste. When thoroughly *mara* the fish separates into three parts—the *tuke, papa,* and *hiku.* The flesh of the legs easily separates and comes away with the *tuke.* The flesh is placed on a wooden platform or support and left to dry for a day. Two *tuke* are placed together (*karapiti*), beaten or pounded to stick together, and exposed for another day. They are again beaten, cooked in an earth-oven, and dried. When dry they are packed in baskets, and will keep for a year. The other parts are dealt with in a similar manner. The *papa* part is usually consumed by the family, but the *tuke* and *hiku* parts are kept in the storehouse for occasions. Crayfish preserved in this way, whilst very palatable, create a great thirst. In the historic attack on the fort of Pakaurangi the garrison were given a present of preserved crayfish beforehand. The fort was then invested and the water-supply cut off. The inmates were so crazy with thirst that some of them broke through and sprang into the water, covered with as many garments as they could carry. A few regained the fort, and the unfortunate inmates squeezed precious drops out of the soaked garments. Hence the battle was called *Pueru Maku* (The Battle of the Wet Garments). The incident is referred to in song:—

He koura te kai i tahuri ai Pakaurangi.

Crayfish was the food through which Pakaurangi fell.

TANGAHANGAHA.

(2.) *Bag-net for Tangahangaha* (Tutoko Tangahangaha).

The *tangahangaha* (*Pseudolabrus pittensis*, banded parrot-fish) is one of the smaller fish found about the rocks and reefs. Though the net to be described is usually associated with it by name, any of the other rock-fish are equally welcome.

The *tutoko* is made on the same principle as the *pouraka,* but it differs in having a long rigid wooden handle. The handle thus takes the place of the line, and sinkers are rendered unnecessary. It consists of a net, hoop, handle, and bait-string (Plate 107, fig. 2).

The net is a bag-net made like the *pouraka.* In the net figured the closed-loop commencement was used, with thirty-two loops. The net was continued down for ten meshes in depth, and no additional meshes were added. The side and bottom were closed in the usual way. In this case the bottom was the last row of meshes made. The hoop was made of split supplejack, 49 in. in actual circumference. The length of supplejack is thus a few inches longer to allow for overlap. In the net, the supporting-strand is left in position and adjusted to the circumference of the hoop, or a stronger strand is put through the closed loops in its place. This circumferential cord is tied to the hoop at regular intervals with overhand knots.

The handle consists of a *manuka* rod about 10 ft. long, with two long, thin branches forming a fork at one end. The branches are cut off level and tied to each side of the hoop, as clearly shown in the plate.

The bait-cord consists of a strip of flax tied across the hoop between the two limbs of the handle. Its middle carries a *pae mounu* (bait-support), as in the crayfish-net. The strip of flax attached to the bait-support, and temporarily attached to the left limb of the handle in the plate, is the *tau mounu*, or bait-tie. From the bait-support to the bifurcation of the handle stretches another strip of flax, the *tau whakarongo*, or feeling-line, to convey messages to the person at the end of the handle.

The difference in shape between the *pouraka* and the *tutoko* nets will be noticed. Though they started with the same number of loops or meshes, in the *pouraka* additional meshes were added, whilst the longer hoop has stretched the upper meshes. The net has thus an inverted-cone appearance. In the *tutoko* no additional meshes were added, but the hoop has stretched the upper meshes whilst the bottom has been flattened out by the bottom join. This gives the net a shape somewhat like an hour-glass.

Method of Use.—The net is baited with crayfish, or any kind of fish or meat, and the bait securely tied to the bait-rest by means of the bait-tie. It is used off the rocks, and by means of the long rigid handle can be thrust anywhere, either to the bottom or to any intermediate position.

The net is very successful in taking smaller fish which often cannot be taken with a line. Even fairly large fish, such as snapper and *moki*, may be caught in it. It is easy to make, and would form a useful net for seaside campers near rocks and reefs.

MAOMAO.

(3.) *Bag-net for* Maomao (Matarau).

The *maomao* (*Scorpis violaceus* Hutton) is a deep-sea fish that travels in shoals. It frequents certain grounds in season. It was for fishing from a canoe on the grounds that the large bag-net was devised.

The net is called a *matarau* by the Ngati-Porou, from *mata* (mesh) and *rau* (a hundred, or many). The Whanau-Apanui and the Ngati-Awa call it *wahanui* (large mouth), from the size of the opening. I understand that the Ngati-Kahungunu, of Hawke's Bay, call it *tawiri* or *tawaru*. The *matarau* consists of a net, hoops, and an arrangement of cords and lines to suspend the net and carry the bait. A sinker and a strong rod are also used. (Plate 108, fig. 2.)

The net part consists of two distinct nets. They are made of prepared flax-fibre twisted into two-ply cords. The upper net is made about 36 ft. long and 5 ft. deep. No additional meshes are introduced. When completed the sides are joined together to make a cylinder about 12 ft. in diameter. The lower net is started with the closed-loop commencement, with fewer meshes than the first net. This is rapidly increased by additional meshes until, when about the same depth as the first, it has exactly the same number of meshes. The sides are now joined to form a cone- or funnel-shaped net. It is turned base upwards, and joined to the lower circumference of the first net by running a strong cord through the marginal meshes of each, as in fig. 45. The cord, which is called the *ngakau*, is tied together at its two ends. Another strong cord is now passed through the closed loop at the bottom of the second net, drawn taut, and tied to close the opening.

There are two hoops in this net. The upper, which forms the opening, is composed of two or three supplejacks twisted together, and having a diameter of 12 ft. to correspond with the upper net. The upper margin of

the first net is securely lashed to the hoop with a continuous cord A second hoop of a single supplejack is tied round at the junction of the two nets to assist in keeping the net spread out. The two nets and the hoop show up well in Plate 108, fig. 2. The owner, Hohepa Piri, is shown on the left of the picture.

The complicated arrangement of lines is seen in Plate 108, fig. 1. These lines of dressed fibre are spliced to a central cord ending in a loop to which a line and rod are attached during fishing operations. The upper set of radiating lines are eight in number. These are suspension lines, and are called *tau popoia.* The outer ends are attached by clove hitches to the upper hoop at regular intervals—*i.e.*, 4½ ft. Below them is a set of four radiating lines which are tied to the hoop alongside four alternate suspension lines. They are the bait-lines (*tau mounu*). To each of these is attached a number of fine cords throughout their length. They are the bait-ties (*taka mounu*). A short length of cord connects the centres of the two sets of radiating lines. This seems to keep the system of lines together, besides suspending the bait-lines. From the fact that it also transmits the pulling of the fish on the bait to the line above, it is called the *tau whakarongo* (the feeling-line). It is named on principle; for the fish are observed by sight and not by touch.

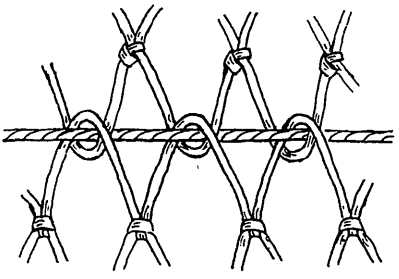


FIG. 45.—The *ngakau* cord joining the free margins of two nets

The whole system of lines is neatly spliced together, and when the net is not in use the lines are removed and folded up in one piece. This method obviates time and trouble when the net is being assembled. Before going out to the fishing-grounds the net is put together and suspended from a spar. The suspension and bait-lines are then tightened or loosened until the net hangs true.

A stone, or *punga*, is tied to the bottom of the net to act as a sinker, as shown in Plate 108, fig. 2.

Method of Use.—When the net is assembled the upper and lower hoops are placed together. The circle is flattened by bringing two opposite points together, and then, by a kind of figure-of-eight movement, the hoop is twisted on itself in the middle and doubled over to form a double hoop occupying half the size: this is for ease of transport on the canoe. When the fishing-ground is reached the net is untwisted and the four lines baited with the tail-part (abdomen) of crayfish: this is the proper bait. Some idea of the number of bait-ties on the lines may be gained from the fact that it takes a large sack and a half of crayfish to completely bait the lines. The net is put over the side, with a line attached to the loop above the supporting-lines at one end and to a slanting rod at the other. The net

is lowered below the surface, and the crushed parts of the cephalothorax of the crayfish thrown out on the surface to attract the fish. This loose bait is called *poapoa*, or *taruru*. *Maomao* swim fairly close to the surface. When a shoal is attracted to the surface, the fish darting round the loose bait fairly make the sea foam. The tails, dorsal fins, and mouths of the fish come up above the surface of the water. The upper hoop of the net is kept about 3 ft. or 4 ft. below the surface. The fish soon find the bait-lines, and when sufficient are over the net it is raised. The startled *maomao* dart downwards—never upwards or sideways. They remain in the region of the lower net. The hoop is again lowered to allow more fish to get to the bait-lines. When it is judged that a sufficient catch is in the lower net the hoop is raised out of the water and the sides of the net drawn in by hand and gradually raised until all the fish are concentrated in the lower part of the net. This part is then lifted into the canoe. The whole net is never raised out of the water by means of the rod, as it would not only be too awkward from the depth of the net, but the weight of the fish would break the supporting-lines. The cord at the bottom of the net is unfastened and the fish poured out into the canoe. The smaller fish are entangled in the meshes of the net: these are called *papapa*. The fish which are too large to be enmeshed are called *kiwi*. Large numbers are caught—as many as from seven hundred to two thousand. Seven hundred is looked upon as a poor catch, and the following phrase expresses this: *Kaore i mate te ika* (There was a poor killing of fish). The fish are so ravenous that they will even struggle over the hoop when it is level with the surface to get at the bait. When a shoal appears, the part of the hoop near the canoe is often kept out of the water whilst the outer part is raised and lowered by hand.

Status of Maomao.

Amongst the older people the two fish of consequence in this area were the *maomao* and the *moki* (*Latris ciliaris*). According to some, both these fish were obtained by Pou from Hawaiki. They are referred to as *nga potiki a Rehua* (the children of Rehua). When the signs of the season were seen in the heavens the phrase was used, *Kua tata nga po o nga potiki a Rehua* (The nights of the children of Rehua are drawing near).

Season.

The season for *maomao* begins towards the end of January, lasts through February and March, and ends in the early part of April.

Fishing-grounds.

The *matarau* was only used on definitely-located fishing-grounds. Between Gisborne and Hicks Bay there is only one fishing-ground of any importance: this is off Waipiro Bay. Farther round the coast to the north and west the fishing is much better. A very famous *maomao* ground is situated off Lotin Point. Hohepa Piri, owner of the net figured, annually travelled up from Te Araroa to Lotin Point for the fishing. The catch was cooked and brought home for distribution amongst his friends and relatives. He had just returned when these notes were made, and we had the opportunity of partaking of some of the last-cooked *maomao* of the season's catch. Another famous ground was at Motu-kiore, off Te Kaha.

Cooking.

The best way of cooking *maomao* is by grilling. A fire is lighted on the fine gravel beach. When the gravel beneath the fire becomes heated the wood and embers are swept aside. Sticks are laid parallel over the heated gravel and pressed down. The fish are laid across the sticks, and the heat of the hot gravel cooks them. The Maori say that the fish are so fat that they cook in their own fat. The fish are so rich that it takes a good trencherman to eat two whole ones. When cooked and dried they keep for some time.

Habits.

The *maomao* moves in shoals. The Maori naturalists held the opinion that when they were directing their course in a certain direction they were never turned back. Tamatea, defeated in battle in the region of Doubtless Bay in the north, set off with his fleet for the south. On rounding Nukutaurua Point he met the fleet of Kauri coming up with reinforcements. The latter urged him to return; but Tamatea replied, "*He rangai maomao ka taka i tua o Nukutaurua e kore a muri e hoki ia*" (A shoal of *maomao* that rounds Nukutaurua Point never goes back).

C. Set Trap-nets.

Set trap-nets differ from scoop-nets in being left in a set position, and depending for their catch on the current of stream or tide, the seasonal movement of fish, or human beaters. They differ from bag-nets in being unbaited. In the area under consideration there are four varieties of nets, of which three are used in fresh water and one in salt water. The one used in salt water is the seventh method for catching *kehe*, so it will be dealt with first.

KEHE.

(1.) *Set-net for* Kehe (Haua, *or* Hinaki Kehe).

(Plate 114.)

This net is called *haua* by the Whanau-Apanui, and *hinaki kehe* by the Ngati-Porou. The word *hinaki* properly belongs to eel-traps made of stiff material. It seems to be used, however, for all traps which are set horizontally, and thus have the entrance facing sideways like the door of a house. Thus traps made of rushes to catch *koaro* in Lake Roto Aira are called *hinaki*. Two traps in this section, made of flax netting, but used in the horizontal position, are called *hinaki*. The traps with the opening facing upwards, such as the rigid *taruke* and the netted *pouraka*, for *kokopu* or *aua*, are never called *hinaki*.

The *hinaki kehe* consists of a framework of poles and hoops and two nets stretched over them. The framework consists of six *manuka* poles, of which four are from 5 ft. to 6 ft. long and two are 1 ft. longer. Sometimes *kohekohe* poles are used. These poles are tied together at the thin ends, and at the other ends attached at regular intervals round a hoop. The diameter of the outer hoop varies. The one I saw at Te Kaha was oval, with the diameter 38 in. by 48 in. The rods and hoop thus form a long cone. Two other hoops are fitted into the cone, one being 20 in. from the outer and the other about 18 in. from the second. The rods are securely tied to the hoops, and the framework rendered firm. The hoops are made of supplejack. In some traps there may be four hoops. The two longer

rods are placed at the lower part of the framework, and project 1 ft. beyond the outer hoop.

The net part consists of two funnel-shaped nets. The first net is commenced with ten closed loops, and additional meshes are added gradually until there are forty meshes to a row. By this time the depth of the net should be from the outstretched finger-tips to the point of the opposite shoulder. The sides are joined, and both ends are left open. The second net is commenced with twelve loops, and increased also to forty meshes per row. The depth is from the finger-tips to the sternum.

The small end of the second net forms the trap. A two-ply twisted cord of flaxen strips is passed through four or five of the lower loops of the smaller opening and tied on either side. This cord is drawn fairly taut across the horizontal diameter of the third hoop and the ends tied. It gives the counter-pull against the base end of the net, as it is turned over the outer hoop and stretched back over the framework as far as it will go, evenly all round the circumference. The middle part of the two-ply cord is the part that the threaded meshes of the smaller end can occupy when the base is evenly stretched. The pull coming evenly from all the radii of the funnel helps to maintain them there. Thus the cord, besides providing counter-pull in stretching the net, also serves to assist in keeping the smaller opening in the middle axis of the framework. The outer part of the net stretches back on the framework for 12 in. or more.

The other net is now drawn over the small end of the frame. Its base or larger opening is drawn up to the base of the other net, and they are joined together by running a cord through the marginal meshes of each, as in the case of the two nets in the *matarau* for the *maomao* fish. The net is then pulled back to tighten it. A cord is passed through the loops of the small end, and tied round the small end of the framework about 12 in. from the end. Owing to the overlap of the frame-rods with the necessary lashing, it is at this spot that the interstices between the rods are wide enough to need covering by the net. Thus the outer surface of the framework is completely covered by netting, and a funnel projects inwards from the outer hoop. The small internal end of the funnel occupies a central position upon the cord fixing the lower meshes. The upper meshes of the opening hang loose, and, whilst they offer no obstruction to fish entering, their collapsed condition renders return more difficult. It is found that the loose meshes act better than a hoop. The funnel is called the *puwhatero* (see fig. 46).

Two hoops are passed round outside the net in the position of the outer and second hoops of the framework. These are to protect the net from wear-and-tear on the rocks. In general principle the net resembles the eel-trap, or *hinaki*. Any seeming inconsistencies between the distances given will be found to disappear when the nets are stretched, the small end of the framework well lashed together, and the cord supporting the opening readjusted to suit the stretching of the nets.

A typical *haua* is shown in Plate 114: this net was specially made for this article by Te Pirimi Tautuhi, of Te Kaha.

Method of Use.—A place is selected at low water where *parengo* or *kohuwai* seaweeds are plentiful. The place is cleared to suit the net, and stones may be arranged to form a *pa*, or race, towards the net. A piece of wood (*rakau kurupae*) is laid down to make a firm foundation for the net. Another piece of wood is lashed across the projecting ends of the two lower rods of the framework. Stones are placed on these ends to keep the net

down. The thin end is also weighted down, and stones are placed at the sides. In addition, ropes are tied from the front and back to rocks to keep the trap in position when the tide rises and falls. The trap is set facing the shore or a large pool near the shore: it is fixed in position when the tide is out. The catch is made when the tide is going out. Fish returning down the channel and following the current pass into the trap and cannot get out. Other fish, such as snapper and *moki*, are caught as well as *kehe*. Sometimes thirty or forty fish are caught. Occasionally a shark gets into the net and knocks it about. Shags have entered the net whilst diving down the channel after fish, and have been found drowned.

The fish are collected after the tide has gone out. The Ngati-Porou remove the fish from the net by untying the cord threaded through the bases of the two nets. The Whanau-Apanui untie the loop round the small end of the net tied to the apex of the framework. When this latter opening is loosened and stretched there is ample room for the exit of the fish.

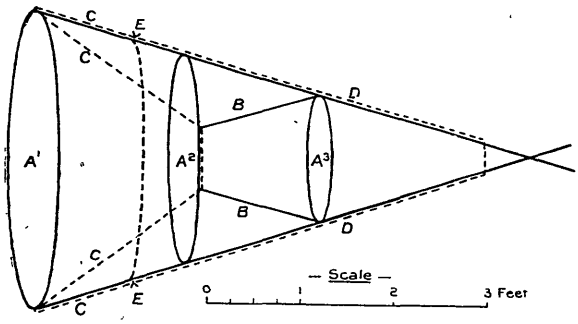


FIG. 46.—*Hinaki kehe:* diagrammatic sketch. A^1, outer hoop, 38 in. diameter. A^2, A^3, second and third hoops, 20 in. and 38 in. respectively from outer hoop. B, cord spreading small opening of trap-net and holding it in centre. C, trap-net (length—from finger-tips to sternum, 39 in.; side of cone, 26 in.; outer overlap, 13 in.). D, outer net (length from finger-tips to opposite shoulder, 47 in.). E, place of overlap of trap-net and outer net.

For fresh-water fish in the rivers and streams there are three traps where netting is used. There was a scoop-net used in catching whitebait, but, owing to the fine mesh required, true netting was not used. This special scoop-net, called a *kaka*, was made from rushes (*wiwi*), or strips of green flax. These were placed like the warps in weaving, and kept together by spaced rows of single-pair twining, as in rain-capes. A rectangular piece was completed, doubled over, the sides sewn together, and a hoop fitted into the open part. A handle was then attached. The use of scrim or mosquito-netting has led to this type of net being abandoned.

GRAYLING..

(2.) *Net for Grayling* (Kupenga Upokororo).

The *upokororo* (*Prototroctes oxyrhyncus* Guenther), New Zealand grayling, was once very plentiful in the upper branches of the Waiapu, Awatere, Wharekahika, and other streams. The fish travels in shoals, and frequents rivers with a shingly bottom. Nets were set in the rapids in prepared sites and the fish driven into them.

The net is made like the scoop-net used in the *hura* and *tu* methods of catching *kehe*, but the handle is short, and used to fix the net in a stationary position. The technique of the net is like that of the bag-net described, but is made longer and deeper. The hoop consists of supplejack, which is kept in a flattened oval shape by means of three cross-bars, or *kaho* (fig. 47). The handle (*tango*) projects for about 2 ft. on either side of the long axis of the hoop. It is securely lashed to the hoop and the cross-bars.

Method of Use.—The fish usually feed at night on the fresh-water algae growing on the river-boulders. In the daytime they rest in the deep pools. Sometimes their silvery sheen may be seen gleaming in the daytime as they turn about round the boulders on the rapids. Their whereabouts may be detected by examining the rocks for marks of their feeding: the weeds are found to be eaten down, and marks of their teeth may even be found on the softer sedimentary rocks. Having been approximately located, a place is prepared on the rapids for the net. Rapids are chosen not only for the shallow depth, but also that the current may be utilized. Stones are arranged and built up to form a V-shaped race, at the point of which the net is set. The handle at each side is supported to keep it securely in position. The wings of the race may be run well out: these

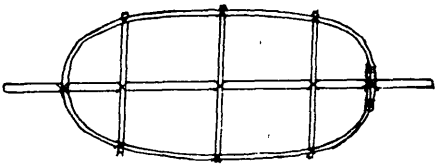


FIG. 47.—Framework of net for catching grayling.

stone wings are called *koumu*. It is not necessary to make a close wall. Large stones here and there in line directs the course of the current and the fish towards the net. Three or more nets may be set on the rapids (*taheke*), according to the width of the stream.

It is better to have several men to drive the fish into the nets. The nets being set, the beaters go up-stream above the deep pools where the fish are suspected to be asleep. The beaters are armed with poles, to one end of which a bunch of fern or leafy branch is attached: these are called *raupoto*. With them they beat down-stream, swimming in the deep pools, thrusting with the poles and beating the surface of the water to startle the fish down-stream. They follow them up over the shallow water of the rapids, and drive them into the nets in shoals. Sometimes the fish attempt to turn back from the rapids, and many are killed with the poles. Large numbers are caught in the nets, the fish becoming enmeshed. Where the shoals are large many fish have to be allowed to escape, as the nets become full and may break. On occasions, in more recent times, beaters mounted on horseback have ridden clattering down the stream to drive the fish into the nets. This, of course, could only be done in suitable streams, like the Awatere.

Another method was to leave the nets in position overnight. The fish feeding in the rapids got into the current of the race and were swept into the nets.

The Grayling.

Season.—The grayling feeds on the fresh-water algae, especially the kind known as *tuhou-kura.* These are plentiful in the later summer and autumn months, especially March and April. The fish then become very fat, and are often cleaned by twisting a stick round the entrails, which are easily withdrawn by pulling through the vent (*kotore*).

Cooking, &c.—If partaken of too heartily when very fat the fish are liable to make one ill. In this respect the grayling is *he ika kino* (a dangerous fish) and must be used with restraint. Otherwise they are good eating, and possess none of the muddy flavour usually associated with fresh-water fish.

For preserving they are grilled (*tauraki*) over a number of horizontal sticks set above a fire of embers. When cooked they are packed in baskets and stored for future use.

Names.—The general name is *upokororo* (" head full of brains "), derived from the fatness which characterizes it. The small ones are also called *rehe,* and the large size *tirango.* This is another example of naming different sizes of the same fish. Unless these different names are followed up, one is apt to think from the number of Maori names that there are more kinds of fish than actually exist.

(3.) *Leading-net to a Fish-trap* (Purangi).

The *purangi* is a leading-net used to connect an eel-trap (*hinaki*) to the end of a fish-weir. Besides connecting the trap, it serves, by means of its funnel shape, to direct the fish into the comparatively small opening of the trap. Being made with a large open mesh, it allows a large volume of water to escape without passing through the trap. The current is yet directed to the mouth of the trap, and sweeps the fish into it. In spite of this escape of water, the current is so strong that the net often gives way and the *hinaki* is lost.

With the Ngati-Porou the *purangi* consists of a funnel-shaped net with a hoop at either end. In Mr. Downes's* excellent paper on eel-weirs he states that with the Whanganui and Nga Rauru tribes the net without the hoop is called *purangi,* whilst the net fitted with the two hoops and a square or triangular frame to support the larger hoop is termed a *poha.* The following description is of an average-sized *purangi* net in the possession of Paratene Ngata, of Waiomatatini :—

The net, of the usual flax strips, is begun with a simple-loop commencement of twenty-three loops. The meshes are 2 in. As the depth increases, additional loops are introduced gradually, so that eighteen extra meshes are added in twenty-five rows. There are thus forty-one meshes on the last row, and on the two sides being joined up in the usual way there are twenty-four meshes at the small end and forty-two at the large. The stretched net is about 46 in. long.

The Hoops.—For the smaller end a length of *aka tea* (vine) is run through the commencing-loop in place of the supporting-strand of flax. The ends are brought round into a hoop, overlapped, and lashed so as to form a hoop 15 in. in diameter. This is called *te whiti o te ngutu o te hinaki* (the hoop for the mouth of the fish-trap). A larger hoop of supplejack, 30 in. in

* T. W. Downes, Notes on Eels and Eel-weirs, *Trans. N.Z. Inst.,* vol. 50, pp. 296–316, 1918.

diameter, is fixed to the larger end of the net by running strips of flax through the marginal meshes, winding round the hoop, and tying at intervals.

Attaching Net to Fish-trap.—The small end of the net is fitted with the hoop just inside the mouth of the *hinaki*. The size of the hoop is really adjusted to fit against the hoop of the trap, which is just inside the circumference of the mouth, or *puwhatero*. The two hoops are tied with strips of flax in a chain knot of overhand knots. Plate 110, fig. 1, shows Paratene Ngata doing this.

Fish-weirs.—The fish-weir with which the above net was used belonged to the smaller variety known as *pa tauremu*. *Pa* is the generic word for "weir," and refers to the blocking of the stream. The weir is erected on a *taheke*, or rapid, which, of course, must be selected so as not to be too swift or too strong. A piece of dry wood is thrown into the stream to judge the line of the current, and so aid in selecting the site for the apex of the V-shaped weir. Stakes of manuka, and the leafy top of the same bushes, are prepared beforehand. The stakes, about 5 ft. long, are sharpened at one end. Two strong stakes are driven in parallel to each other, and at slightly less than the diameter of the large hoop apart. Other stakes a few feet apart are then driven in, in lines diverging up-stream to form a V. Two horizontal rails of manuka rods are lashed to the stakes with strips of flax. The lower rail is a few inches above the bottom, and the other somewhere about the level of the water. The brushwood is now laid against the inner side of the two arms of the weir. The pressure of water will usually serve to keep them in position, but they may be tied here and there. The brushwood must be so arranged to have a slight space in front of the two posts first driven in. It is sufficient to run the brushwood arms back a few yards. The arms may then be continued back by piling up stones from the rocky bed of the stream. It is not advisable to have too wide a weir, as the force of the water may carry away the net. The space between the two first (or apical) stakes has been kept clear.

Setting the Net.—The *purangi* net with the attached trap is now placed in position. The large hoop is placed on the inner side of the two apical stakes which catch part of the sides of the hoop. The hoop is pushed down so that it touches the bottom, and part is caught by the lower cross-bar. The other bar placed across the inner side of the two stakes is tied so as to catch part of the upper circumference of the hoop. The hoop is thus held securely in position against the rush of the water down the race. The fish-trap floats below, but it may be necessary to place a stone on it to keep it down and place its opening in the direct current from the opening of the weir. Plate 110, fig. 2, shows everything very clearly.

It is usual to attach a rope from the fish-trap to one or more stakes, to save it in case of the leading-net giving way. The art in making the nets is so to arrange the meshes that the completed net sits evenly when it is set to the weir. If the sides are uneven the trap will not ride properly in the current, and if the current is directed to the side of the net, instead of the opening of the trap, fish are liable to escape through the meshes.

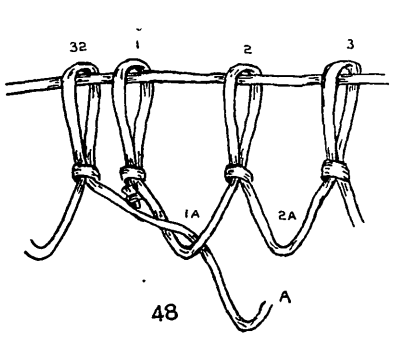
The Fish.—This type of trap-and-weir arrangement is usually associated with the catching of eels. They must, however, be the eels which are moving without waiting for the floods. When the migrating eels (*tuna heke*) come down in the March floods, the weir described is too flimsy to withstand the rush of waters, and the nets are usually taken up. Grayling are often caught in these traps.

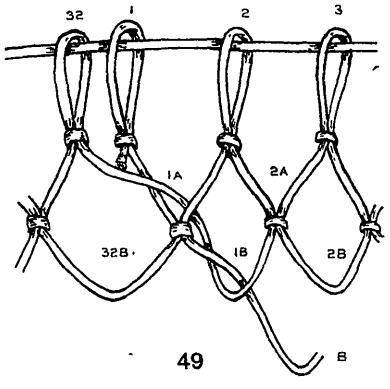
The *kokopu (Eleotris gobioides)* are caught in large numbers as late as March. The weir described was made in the beginning of April by members of the Dominion Museum Ethnological Expedition, under the direction of Paratene Ngata. Not a single *kokopu* was caught. The name *kokopu* on the west coast of the North Island is applied to *Galaxias fasciatus*, which on the east coast is called *para*. At Lake Taupo *kokopu* is applied to *Galaxias brevipinnis*. The name *kokopu* is used in the Cook Islands for a fresh-water fish, specimens of which were brought back by Sir Maui Pomare. The above type of weir is also called a *pa kokopu*.

The *papauma (Cheimarrichthys fosteri)* is also caught in large numbers. The same fish is caught in the eel-traps in the Whanganui River, where it is called *papanoko*. We secured a large number in April, when they were full of roe.

(4.) *Combined Leading-net and Fish-trap* (Hinaki Purangi).

This net is now somewhat rare. A good idea of it can be formed from Plate 109, fig. 1. The previous net, the *purangi*, is merely a leading-net to a *hinaki;* but this net combines the functions of both, hence the double name, *hinaki purangi* (the *purangi* fish-trap). It must have occurred to





FIGS. 48, 49.—The side join of the *hinaki purangi*.

the early fisherman that the force of water sweeping down the race and rushing with some violence through the *purangi* would effectively prevent the fish from turning back. The special arrangement in the entrance to the stiff fish-trap, *hinaki*, to prevent the escape of fish, was therefore unnecessary. The lengthening of the funnel and the closure of the small end was all that was needed, combined, of course, with a mesh small enough to prevent even small fish from being swept through the closed end by the current. The results of these observations were materialized in the *hinaki purangi*, which is leading-net and trap combined in one piece, with the same material and technique throughout.

The net required is 15½ ft. long. It is begun at the small end on a supporting-strand by the closed-loop commencement with thirty-two loops. After the loops are set up the technique differs from all the nets so far described. The usual method of netting backwards and forwards by twisting the supporting-strand and then joining up the sides is departed from: this was probably due to the length of the net. Thus when the

thirty-second loop is completed, instead of turning back, as in fig. 23, the last loop and the first loop on the supporting-strand are slid round till they come together (fig. 48). The netting-strip, A, is passed through the first open loop, 1A, and, after gauging with the fingers, is fixed to the second open loop, 2A, with the usual netting-knot (fig. 49). This forms the first mesh, 1B, of the second ROW. It is continued in 2B, and continues round till it comes to the loop 32B, when this loop is netted to the loop 1A, which was passed over in fig. 48. This completes the second row of meshes. The netting-strip, B, in fig. 49, is now slipped through the next mesh, 1B, spaced with the fingers, and netted to the next loop, 2B. This process is continued, and the net is made like a tube, each row of meshes being completed and closed before going on with the next. The process is quite simple. Each time a new row is commenced the netting-strip passes through a mesh to the right of the last commencement; and the line of side joins, easily seen from the interlacing effect, runs diagonally down and to the right. In the completed article it shows as a long spiral. Thus there is no break in the continuity of the netting process.

Plate 109, fig. 2, shows the closed-loop commencement on the supporting-strand, and the fine ½ in. mesh at this end. With the tubular net flattened out it is 7½ in. wide: this is maintained for about 4 ft. The mesh increases to ¾ in. At 5 ft. it is 10 in. across and the mesh 1 in.; at 6 ft. 6 in. it is 13 in. across and the mesh 1¼ in.; at 7 ft. 6 in. the width is 16 in. and the mesh 1½ in. From now on the mesh increases to 3 in. at the large circumference, which is 4 ft. in diameter and 15½ ft. from the commencement.

A hoop of two pieces of twisted supplejack is fixed to the larger end. The hoop is 45 in. to 48 in. in diameter, and is lashed with a chain knot to the marginal meshes. At the small end a strong strand of flax is passed through the closed loops of the commencement. It is drawn taut and tied to close the opening.

A stone sinker or anchor (*punga*) is tied to the end of the closing-strand at the small end when the net is set.

Method of Use.—This net is used with small weirs in exactly the same manner as the previous net. In constructing the weir the two apical stakes are driven in to suit the diameter of the large hoop. The hoop is maintained in position by the two apical stakes and upper and lower cross-bars. The anchor having been attached, the small end of the net is stretched out to lie in the direct current from the race. It is then dropped, and the stone helps to keep it in position.

As before, the important thing is to have the apical stakes driven in the right position, and a properly constructed net set right so that the current will sweep straight down the middle line of the net. In spite of the large 3 in. meshes of the leading part of the net, the smallest fish are swept down into the tubular fine-meshed end of the net. There they are packed like sardines by the force of the water, and not even eels can turn back: they speedily die. If through error in placing the apical stakes, or fault in construction or setting the net, the current is directed even slightly to the side, fish will escape through the larger meshes.

Plate 111, fig. 1, shows a side view of the *hinaki purangi* set to a weir in the Waiapu River. It will be noticed that strands of flax have been tied to the hoop and braced to stakes in the arms of the weir. This was to tilt the upper part of the hoop forward to get the right lie for the net, which is tightened up perfectly by the current. Plate 111, fig. 2, shows the

opening of the net when looking down the weir. It also shows up the brushwood arms of the weir very well.

The net may be left in all day, but the main catch is made at night. The owner of the weir usually lifts his net very early in the morning. The nets are so easily seen and lifted that it is safer to put temptation out of the way of the passer-by. To remove the fish, the anchor is lifted, the strand untied, and the catch poured into baskets through the small end.

The Fish.—The fish caught are the same as in the previous net. The weir in Plate 110, fig. 2, was made first as an experiment, for ethnological purposes. Besides *papauma*, one grayling was caught. Grayling had not been caught in that part of the Waiapu River for over twenty years. As the grayling goes in shoals, it was held that there were others about, and our experimental weir, being close to one side of the stream, had caught a fish from the flank of a shoal feeding farther out on the rapids. The new weir was immediately built so as to overlap the first and take in almost the rest of the stream. The next morning we caught over forty grayling. The news spread, and many unbelieving Ngati-Porou came to see them. The fish-weir industry received a great impetus, but rain came on and stopped further operations.

D. Baited Trap-net.

In this class there is only one example. It differs in construction and principle from the baited bag-nets and from the set trap-nets. Hence it is set in a class by itself.

Torehe.

The *torehe* is a circular net that is kept flattened out by supplejack radials, and can be closed at will by a line passing round its circumference. In Plate 113, fig. 1, it is held vertically instead of lying horizontally, in order to show the construction. It is also called a *toemi*. It consists of a net, radials, bait-rest, sinker, and line.

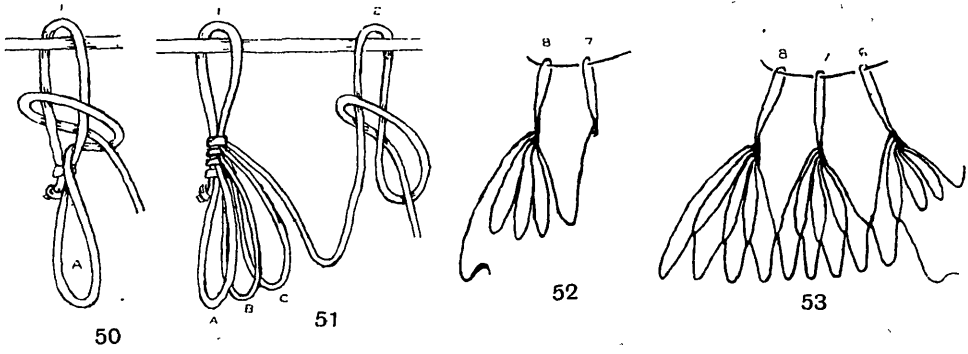
The Net.—The net is commenced in a different manner from those described. It is begun by the closed-loop commencement, but three additional loops are tied to each closed loop before the next closed loop is made on the supporting-strand. Thus the first closed loop is made as in figs. 3, 4, and 5. This loop is treated as the lower end of a mesh on which to make an additional loop, as in fig. 31. Thus in fig. 50, after tying the closed loop 1, the netting-strip is looped below it, passed through the closed loop 1, and a netting-knot made in the usual way. The loop A is, of course, gauged with the left forefinger. The netting-strip is again passed through the closed loop 1, and the loop B gauged and tied. This is repeated a third time, and we have fig. 51 with the closed loop 1 to which are attached three additional loops, A, B, and C. The closed loop 1 is called a *puriri*. The netting-strip is now carried over the supporting-strand and a second closed loop, 2, is tied (fig. 51). The netting-strip between the two closed loops is gauged with the left finger to coincide in level with the three loops that have been made.

To the closed loop 2 three loops are attached, and this procedure continued until eight closed loops, or *puriri*, have been made on the supporting-strand. Each *puriri* carries three loops or meshes, making twenty-four in all. Between the eight *puriri* there are seven connecting-loops, thus making thirty-one loops to net to in the next row. The supporting-strand is now twisted so that the last mesh of the row may be brought

back to the left and the netting of the second row be continued from left to right. The netting-strand is brought down from the upper part of the last mesh, gauged to a full-sized mesh, and netted to the last (now first) mesh of the first row (fig. 52).

From now on it is plain netting. The netting-strand is netted to the lower end of the other two meshes of the same group, and then to the loop connecting with the next *puriri* (fig. 53). Thus the groups of three and the connection-loop are netted in turn until the last mesh is reached. The supporting-strand is turned, and the third row commenced from the left in the usual way by gauging a full mesh and then netting to the meshes above in turn.

Except for setting up groups of three at the commencement, the netting proceeds as in the ordinary bag-net. In the *torehe* net, however, no extra meshes are introduced after the first row, but in order to carry out the circular plan of the net the meshes of succeeding rows are increased in size. The number throughout, however, is restricted to thirty-one in each row (see Plate 112, fig. 2). In good work the meshes may be gauged



50 51 52 53

FIGS. 50–53.—Commencement of *torehe* net.

on the fingers, but as they increase in size they are judged by eye. When a sufficient number of rows have been added—say, eight—the sides of the net are brought together and joined up in the usual manner (fig. 35). The joining adds the extra mesh which makes thirty-two in each row.

Waiheke Puha, of Te Araroa, demonstrated the Ngati-Porou method of finishing off the net. The supporting-strand is not removed, but tightened up and tied so as to bring the loops of the eight *puriri* close together.

The net has now assumed a circular form, and the reason for grouping three meshes to each *puriri* and the gradual increase in the size of the meshes is obvious. The usual size is from 24 in. to 26 in. in diameter, but larger ones may be made.

Radials of split supplejack are prepared. Four pieces a little longer than the diameter of the net are needed. They must not be split too thin, as they are then liable to break. Before inserting these the net is marked off for the first radial. A piece of flax is tied to one of the knots between two meshes on the circumference. The net is doubled over, and the meshes are picked up in pairs, commencing with the meshes on either side of the marked knot. The next pair contains the second mesh on either side of the knot. This is continued until the last pair is picked up. The knot between them

will be exactly opposite to the marked knot. It also is marked with a piece of flax. Thus between the two marked knots there will be exactly sixteen meshes on either side of the circumference. It might be just as easy to count off sixteen meshes from the first marked knot, but the picking-up of two pairs makes no mistake possible, and—well, the Maori did it in that way.

The radials are about 28 in. long. The first supplejack radial is now threaded through the meshes from marked knot to knot, care being taken on passing through the central part to keep four *puriri* on either side. The second radial is run through at right angles to the first, making four quadrants with eight meshes and two *puriri* in each. Two diagonal radials are now put through. The four radials divide the net into eight equal sections with four meshes and one *puriri* in each. The net is drawn out and tied at the circumference over the knots that coincide with the spreaders. After tying one end of a radial spreader, the radial is pushed out until the net is taut, and then the other end is tied. The radials are called *wanawana*, and are counted as eight, though there are really only four pieces of supplejack. The supporting-strand is further tightened.

The bait-rest (*pae mounu*) is made of two strips of split supplejack. The two ends of one piece are pushed up through the bottom so as to pass up about 1 in. or so on either side of the centre. The second piece is treated

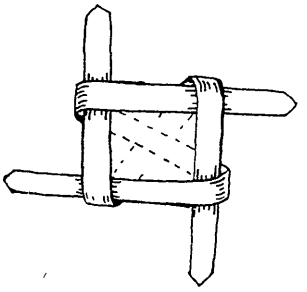


FIG. 54.—Bait-rest for *torehe*.

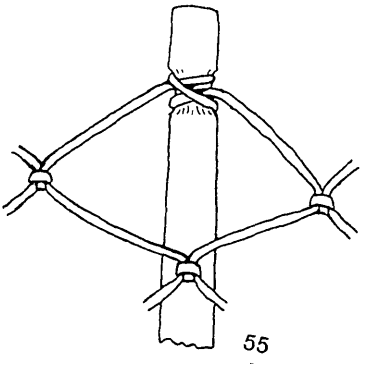
similarly, so as to cross the other on the bottom at right angles. There are then four pieces projecting vertically through the bottom of the net. One piece is bent at right angles to lie in the plane of the net; the piece next to it is bent horizontally and crossed over the first at right angles; the third crosses the second at right angles; and the fourth, after crossing the third at right angles, has the end pushed under the first, as in fig. 54. This locks them securely, making a rest with four free limbs projecting 1 in. or so. A broad strip of flax is wrapped successively round each limb, so that each round overlaps the preceding one, as in the technique of a fly-flap. A few turns are made and the projecting limbs trimmed off. A thin strip of flax is attached to the bait-rest for tying on the bait.

A stone sinker is tied to the underside of the net, opposite the bait-rest.

The net is completed by passing a cord through the circumferential meshes. The ends are tied together to form a loop, and a line is tied to the loop.

In the *torehe* demonstrated at Te Kaha, Bay of Plenty, by Waikura, of the Whanau-a-Apanu Tribe, there are some differences in detail. The net is finer, the first meshes being measured on the little finger, increased to the

thumb, and then judged by pulling on the mesh. The netting is continued until it reaches a depth of 12 in. to 14 in. The spreaders are measured after insertion, cut off, and a nick cut near the ends. The free margin of the appropriate circumference mesh is itself attached to the nick on the radial by means of a clove hitch (fig. 55). There is no extra piece of flax used in tying. The bait-rest is made in a different way. The supporting-strand used whilst the net is being made is removed. A piece of split supplejack 9 in. long is run through the closed loops of the *puriri* to take the place of the supporting-strand. This piece is bent round into a circle with the ends overlapping for 1 in., and the overlapping ends are lashed together. The centre of the net is thus occupied by a supplejack circle 8 in. in circumference. Another piece of split supplejack about $6\frac{1}{4}$ in. long is bent into an inverted U, placed vertically over the circle, and the two ends lashed to opposite points on the circle. To the upper surface of this loop two short pieces of split supplejack are lashed in a cross with the plane horizontal. This forms the bait-rest, and is provided with a strip of flax for tying on the bait.



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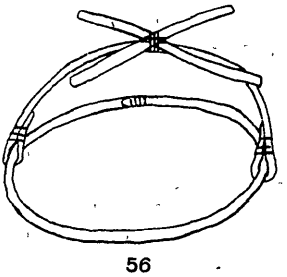

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FIG. 55.—Clove-hitch attachment of mesh to radial.
FIG. 56.—The *pouraka torehe* bait-rest.

The circle, hoop, and cross-piece forming the Whanau-Apanui bait-rest is called by them a *pouraka torehe*, to distinguish it from the *pouraka koura*, or bag-net for crayfish. The Ngata-Porou do not use the term in this sense. This form of bait-rest gives a much neater appearance to the net. That the term *pouraka* is old amongst the Whanau-Apanui people the following incident proves: Tamahae, the famous warrior of the Te Kaha region, whilst passing along the beach below the hut of Korokoro, who had slain his brother Teehu-tu, was greeted with a taunting remark by Korokoro. Tamahae replied. "*E tika, e tika! Akuanei o kauae meatia rawatia hei pouraka torehe mo Paringaere*" ("Is it so! Soon your lower jaw-bone will be made into a *pouraka torehe* [bait-rest for a *torehe*] to use on Paringaere"). Paringaere was a well-known fishing-ground. The threat in the reply was to use the lower jaw-bone to form the inverted U to carry the cross-piece and bait. Truly it was an insult of the greatest intensity!

The sinker in these nets was fastened below to the supplejack ring of the *pouraka*. The loop of cord round the circumference was termed the *ngakau*. By removing the radials and sinker the net could be rolled up in small compass and carried about.

Method of Use.—The best bait for the *torehe* is the cephalothorax of the crayfish with the carapace and legs removed. This corresponds to the

tuke, and, being tough from skeletal reinforcement, has not to be so often renewed. The bait is tied on to the cross-piece by taking turns with the bait-string over it and round the arms of the cross-piece. The net can be used from a canoe or amongst the rocks. It is placed flat on the water, and sinks to the bottom. Care must be taken to pay the line out quickly to prevent any strain or pull prematurely closing the trap. On reaching the bottom the slack of the line is drawn in carefully until the trap can just be felt. The tugging of the fish at the bait can be distinctly felt on the line. The line is sharply jerked, which closes in the circumference of the net, the flexible radials bending readily (see Plate 113, fig. 2). The line is drawn up quickly and not allowed to slacken. Large fish are caught head downwards in the trap, and even if the tail is sticking out the scales catch against the meshes of the net and prevent escape. Two or more fish may be caught at a time. On bringing the trap into the canoe the circumferential loop is slackened off and the fish removed. The supplejack radials are further straightened out, and the net dropped back again.

The Fish.—All kinds of fish are caught, from *moki* and *tamure* (snapper) to the smaller fish that abound about the rocks and reefs. Some of the smaller fish that remove the bait from hooks with impunity fall an easy victim to the *torehe*. Such a fish is the *kokiri* (*Cantherines convixirostris* Guenther) (leather-jacket). The *hiwihiwi* (*Chironemus fergussoni*), *tupuku*, *nguture*, *tangahangaha*, and *koeaea* (*Coridodax pullus* Forster) (butterfish), are amongst those caught. The region round Te Kaha is especially rich in varieties of fish. The *nanua* (*Chironemus spectabilis*) may also be caught.

Remarks.—By constant use the supplejack radials become weak and lose their spring, but fresh ones are easily put in. When jerking the line of the net, the stone sinker gives a counter-pull and thus serves a double purpose.

The net would be extremely useful to naturalists for collecting specimens of the smaller sea-fish. There is no net that would give more satisfaction to women, children, and indifferent fishermen. It is so easy to make, and so efficacious, that it would pay seaside campers and yachtsmen to test its possibilities.

CONCLUSION.

Acknowledgment has been made throughout these pages to various men from whom information has been received. Where all have imparted cheerfully, it is impossible to name more than a few. Acknowledgment must again be made to Mr. J. McDonald, of the Dominion Museum, for his valuable photographs, without which this article would lose much of what little value it has.

There are other nets in other regions yet to be described. Such are the nets of the dredge-rakes and dredge-nets of Rotorua, the *pouraka* of Taupo, and various nets from divers places. It is hoped, however, that the description of the netting technique and the concentration on the articles made in one area has opened up the subject sufficiently to enable others to supplement and help in completing, as far as possible, the records of the netting-craft of the Maori branch of the Polynesian race.