

# The String Figures of Yirrkalla: A Major Revision

collected by  
FREDERICK D. MCCARTHY, 1948

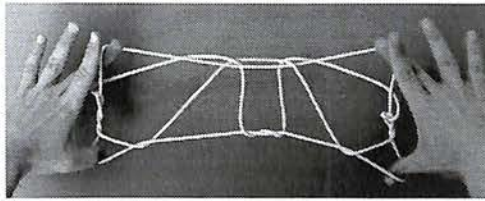
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Photo of Narau here

## ABSTRACT

*Frederick D. McCarthy's collection of string figures, gathered in 1948 among the Yirrkalla aborigines of Arnhem Land, Australia, has been hailed as the largest collection ever assembled from a single community. Unfortunately, less than ten percent of the figures can be made from the instructions provided by McCarthy. We have therefore revised McCarthy's text to convey, in conventional terminology, what we believe to have been the method by which each figure was in fact made by his informant.*



sample of reduced and cropped  
illustration for the paper

## INTRODUCTION

The popularity of string figures among the native inhabitants of Australia was first reported in the 1840's (Cawthorne 1844; Eyre 1845). Since then, several impressive collections have been published, many of which include construction methods (Roth 1902; K. Haddon 1918; Stanley 1926; Davidson 1941; Mountford 1950; McCarthy 1960).

In 1948, Frederick D. McCarthy's spent three months collecting string figures among the Yirrkalla aborigines of Arnhem Land, a region located in the northeast corner of Australia's Northern Territory (fig. 1). His collection of 213 figures was published twelve years later in Volume 2 of *Records of the American-Australian Scientific Expedition to Arnhem Land* (pp. 415-511). Even before its publication, the significance of the collection was often cited (Mountford & Walker 1949; McCarthy 1957; McCarthy 1958).

Soon after its publication in 1960, the collection became the topic of much debate among anthropologists. After reviewing McCarthy's collection, Birdsell (1962, 1963) argued that string figures should not be used to trace cultural affinities since only twenty-four of the Yirrkalla figures occur in Queensland, a culturally related area to the East. In a scathing reply, Lane (1963) defended McCarthy's collection, explaining that one must examine not only the finished patterns in assessing cultural affinities, but also the range of techniques routinely employed at each location. Ironically, neither scholar bothered to mention that less than ten percent of the figures in McCarthy's collection can be made from the instructions he provides! As a result, McCarthy's impressive collection has been largely ignored by anthropologists and string figure enthusiasts alike. A revision is long overdue.



Map of Australia here

## MATERIALS AND METHODS

### *Documentation*

This revision of McCarthy's text was inspired by conservation work recently undertaken by Dr. Stan Florek of the Australian Museum. Dr. Florek has devoted a great deal of time to cataloging and preserving McCarthy's impressive collection. As explained in his recent paper (Florek 1993), the collection itself consists of 196 mounted specimens, 185 photographs showing the figures being made, and a field book in which McCarthy recorded construction methods. The specimens, mounted on cardboard, are labelled with a field number and museum registration number. Also included is the figure's native name, an english translation of the name, and the name of the figure's maker. Oftentimes the position of the maker's hands are also noted, as well as notes describing features that are illustrated by the figure (animal's head, wing, tail, etc.). Occasionally, comparative notes are present (i.e., string figure X same as string figure Y). All of the above is masterfully summarized in Table 1 of Florek's paper.

The drawings in McCarthy's published report were prepared from both the mounted specimens and the photographs. Unlike illustrations in other string figure monographs, nearly all of McCarthy's illustrations show the figure *as seen by an observer facing the maker* (exceptions are noted throughout this paper). This means that the reader must view his hands in a mirror before comparing the final design with the illustration provided by McCarthy. Drawings made from the mounted specimens typically *do not* show the hands, whereas those made from the photographs *do*. Most of the string crossings and wraps in the drawings made from the mounted specimens are correct; however, those made from the photos are often riddled with errors. A few drawings that include hands show the string figure *as seen by the maker*. However, these are artist renderings based on notes written on the mounted specimens. Oftentimes, these illustrations are backwards or inverted, with fingers inserted into the loops from the wrong side.

In revising McCarthy's construction methods, the authors worked primarily with high-quality photocopies of the mounted specimens and photocopies of contact sheets made from McCarthy's negatives, both of which were generously provided by Dr. Florek. McCarthy's original field notes were not consulted since it is obvious that the errors in McCarthy's text are not typographical in origin. Most of the photographs prepared for this revision show the figure *as seen by the maker*.

*The nature of the errors in McCarthy's text*

The errors that plague McCarthy's text can be divided into three broad categories: (1) identity errors, (2) transposition errors, and (3) omission and duplication errors.

Identity errors, by far the most common, are those in which a string, loop, or finger is misnamed in the text. During his recording sessions, McCarthy apparently faced the performer rather than observed her from behind. As a result, there are numerous examples where "near" means "far," "right" means "left," and "away from you" means "toward you." There are also numerous examples where a string's identity was merely guessed at based on its proximity to a finger — a near middle finger string can look like a far thumb string when the hands are held in an unusual position.

Transposition errors occur *within* a set of instructions as well as *between* sets of instructions. As an example of the former, one occasionally finds that the order of commands within a set of instructions is wrong, i.e., *step 3* is given before *step 2*. Transpositions between sets of instructions are by far the most serious. Here, instructions for string figure X don't give the illustration provided with X but illustration Y, found thirty pages away! One might argue that the illustrations are transposed rather than the construction methods. However, examination of the mounted specimens reveals that nearly every illustration is correctly associated with the title provided with the illustration, i.e., the illustration for *Two Conch Shells* does indeed illustrate the mounted specimen of that name, but the instructions provided by McCarthy do not necessarily correspond to this string figure. Therefore, in the revision that follows, the phrase "McCarthy method 65" refers to the set of instructions published by McCarthy under string figure 65, *Echidna*, even though these instructions actually give *Two Conch Shells*, the first string figure in McCarthy's collection.

Omission and duplication errors likewise occur *within* and *between* sets of instructions. Omission errors within a set of instructions occur when a command is left out (i.e., a required "release little finger loop" command is missing); duplication errors occur when a previously given command is needlessly repeated (i.e., "pick up far index string," when it was already picked up in the previous command), or when *four* repetitions of a command are requested when only *three* are required. Omission and duplication errors between sets of instructions occur simultaneously. For example, McCarthy methods 36 and 38 are duplicates, yet neither of them gives the illustration provided with *Frog in a Pool* (36) or *Moon Fish* (38).

All commands are to be performed *on both hands* unless otherwise stated. By providing instructions for one hand only, the authors hope to better define the actual number of loops/strings being manipulated.

#### *Common manipulations*

*Pick up* - Use the nail side of the finger to retrieve the string.

*Hook up* - Use the fingerprint side of the finger to retrieve the string. This usually requires bending the finger. Once the string has been retrieved, the finger is often straightened by rotating it half a turn.

*Navaho* - Given two loops on a finger, use your mouth or fingers of the opposite hand to lift the lower loop over the upper loop and release it. Extend the hands to absorb the slack.

#### *Common openings*

In preparing his introductory text, McCarthy essentially copied Davidson's published descriptions of Openings A, B, and C. Unfortunately, McCarthy's principal informant appears to have been left-handed, whereas Davidson's was probably right-handed. As a result, many of the Yirkalla figures cannot be made if one employs the openings supplied by McCarthy. The exact method employed at Yirkalla is therefore provided below to eliminate ambiguity.

*Position 1* - Place an untwisted loop on thumbs and little fingers of each hand and extend (fig. 2).

*Opening A* - Position 1; use index fingers to pick up the string on the opposite palm; the second pick up is made through the index loop of the opposite hand. The order in which the palmar strings are picked up is oftentimes important. In these cases, the order is specified in the text. For the majority of Yirkalla figures, the *right* palmar string must be taken up first (fig. 3).

*Navaho Opening (Opening B in McCarthy's text)* - Grasp a six-inch (15 cm) segment of the loop with the thumbs and index fingers of each hand. Form a small hanging loop by passing the right end of the segment in front of the left end until the strings cross. Insert index fingers, from behind, into

Given the diversity of errors in McCarthy's text, it is not surprising to learn that *X* figures remain unsolved by the current authors. These are left to a future string figure sleuth. In pursuing reconstructive work, one is always tempted to consult other sources that report the same final pattern, hoping that the descriptions will provide new insight into McCarthy's cryptic instructions. However, every effort has been made to avoid this temptation since we often "see what we want to see" in a set of instructions, rather than seeing what is really there. And even though the methods given below conform as closely as possible to the instructions gathered by McCarthy, they are still "educated guesses" nonetheless, and should be treated with due caution by scholars pursuing comparative work.

#### *Nomenclature*

The string figure terminology used throughout this paper is that of Maude (1971), incorporating abbreviations proposed by Storer (1988) and D'Antoni (1994, and this volume):

- *Hands*: R (right); L (left).
- *Fingers and/or loops*: 1 (thumb); 2 (index finger); 3 (middle finger); 4 (ring finger); and 5 (little finger).
- *Strings*: n (near); f (far); upper and lower are spelled out to avoid ambiguity.
- *Loop twisting*: > (twist loop half a turn away from you, i.e., remove loop, twist, and replace); >> (twist loop a full turn away from you, i.e., simply rotate the finger without removing the loop); < (twist loop half a turn towards you, i.e., remove loop, twist, and replace); << (twist loop a full turn towards you, i.e., simply rotate the finger without removing the loop).

#### *Examples*

- *lower L2n* translates as "near string of lower loop on left index."
- *R1 loop >>>>* translates as "twist right thumb loop two full turns away from you."
- *1, from above, removes 2 loop* translates as "insert thumb from above (distally) into the index loop; release loop from index finger, transferring it to thumb; return thumb to its former position."

the small hanging loop, then rotate the index fingers down and away from you to straighten them; insert thumbs, away from you, into the large hanging loop and extend (fig. 4). The far thumb and near index strings are transverse (run directly from finger to finger); the near thumb and far index finger strings cross (the L1n-R2f string passes in front of the R1n-L2f string).

*Murray Opening (Opening C in McCarthy's text)* - Grasp a six-inch (15 cm) segment of the loop with the thumbs and index fingers of each hand. Form a small hanging loop by passing the right end of the segment in front of the left end until the strings cross. Insert index fingers, from behind, into the small hanging loop, then rotate the index fingers up and toward you to straighten them; extend (fig. 5). You now have two loops on each index finger: the upper and lower near index strings are transverse and parallel; the upper and lower far index strings cross (the lower L2f-upper R2f string passes in front of the lower R2f-upper L2f string).

#### *Common endings*

*Pindiki extension* (also known as the *Caroline extension*) - After picking up the lower far thumb string with the middle fingers (or sometimes the index fingers), press the thumbs firmly against the sides of the middle fingers in order to prevent the short segment of string that passes from thumb to middle finger from slipping; then pivot wrists so that palms face away from you, fingers pointing upward (fig. 6).

## THE STRING FIGURES OF YIRRKALLA

### 1. TWO CONCH SHELLS (E83734)

1. Opening A (pick up L palmar string first).
2. Place figure on lap, fingers pointing upward, and release hands; pick up figure by inserting 1 downward into former 1 loop and 2 downward into former 2 loop; extend, returning hands to normal position.
3. 1, from above, removes 2 loop.
4. 5 picks up upper 1f.
5. 3 picks up remaining 1f.



6. Release 5 loop and extend.
7. Rotate hands 180 degrees away from you and lay the figure on the ground (fig. 7). 5 hooks up side string of central triangle while 1 picks up triangle's base by passing 1 towards you, under the near transverse string; extend, returning hands to normal position. You now have single loops on 1 and 5. The 1 loop is twisted half a turn away from you; the 5 loop, a full twist towards you.
8. 1 picks up 5n.
9. 3 picks up 1f; Pindiki extension; display the figure vertically, palms facing away from you, right hand centered over your chest, left hand centered over your stomach (fig. 8).

Notes: McCarthy method 65 belongs here. McCarthy method 1 belongs to either *Two Vulvas/Penis and Vulva* (2), *Two Bottles* (3), or *Two Waterholes* (4).

2. TWO VULVAS (E83795); PENIS AND VULVA (E83826)

3. TWO BOTTLES (E83769)

4. TWO WATERHOLES (E83723)

*Version 1*

1. Position 1.
2. L2 picks up R palmar string.
3. Release L1 loop. L1, under L2 loop, picks up L5n, then L2f and returns.
4. Release L2 loop.
5. R1 picks up R5n.
6. 3 picks up 1f.
7. Navaho 1 loops, lifting transverse 1n string off of 1.
8. Release 5 loop.
9. To extend, turn palms away from you, then rotate right hand 180 degrees away from you so that R palm faces you; swing left hand downward so that it is centered over your stomach (palm away from you, fingers pointing to the left); swing right hand upward so that chin rests on right palm, fingers pointing to the left (fig. 9).

*Version 2* - same as *Version 1*, except for step 3:

3. L1 passes under L2n and returns with L2f.

*Version 3* - same as *Version 1*, except for steps 3, 4, and 5:

3. L1 passes under L2n and returns with L2f.
4. R1 picks up R5n.
5. Release L2 loop.

Notes: McCarthy method 1 belongs to one of the above figures, not *Two Conch Shells*; here it is listed as *Version 1*. McCarthy methods 2 and 3 are identical; here they are listed as *Version 2*. McCarthy method 4 is listed here as *Version 3*. McCarthy's illustrations for *Two Vulvas* (2) and *Two Water-holes* (4) need to be rotated 90 degrees clockwise to show the figure as seen by an observer.

#### 5. MAN LYING DOWN (E83787)

Use a small loop of string.

1. Navaho opening.
2. 1, from above, removes 2 loop.
3. 5 picks up upper 1f.
4. 2 picks up remaining 1f.
6. Release 5 loop; extend.
7. Allow loop encircling both 1 and 2 to slip off 1; extend gently, fingers pointing downward, palms facing you (fig. 10).

Notes: McCarthy method 5 belongs to 200. Above method reconstructed by the authors. McCarthy's illustration shows figure as seen by the maker. The double parallel upper string in McCarthy's illustration is an artifact introduced by the artist (i.e., in the mounted specimen, the 2n string is not "kinked").

#### 6. IRONWOOD GUM CEMENT (E83758)

1. Position 1.
2. Release R hand.
3. With R1 and R2, draw out L palmar string and release.
4. Repeat step 3.
5. Insert R1 and R5 into hanging loop as in Position 1; extend.
6. R2 picks up L palmar string.
7. R1, from above, removes R2 loop.
8. L1 picks up L5n.

9. 3 picks up 1f.
10. Navaho 1 loops; release 5 loops; extend, palms facing you, fingers pointing downward (fig. 11).

## 7. MANGROVE BIRD (E83681)

## 8. NATIVE CAT (E83847)

1. Position 1.
2. L2 picks up R palmar string.
3. L1, under L2n, picks up L2f.
4. R1 picks up R5n.
5. Release L2 loop
6. 2 picks up 1f (*Mangrove Bird*), or 3 picks up 1f (*Native Cat*).
7. Release 5 loop (fig. 12).
8. 5, from below, removes 2 loop (*Mangrove Bird*) or 3 loop (*Native Cat*).
9. 3 picks up 1f. (Extend, palms away from you for fig. 13).
10. Navaho 1 loops, lifting transverse 1n off of 1.
11. 1, from above, removes 3 loop.
12. 3 picks up 1f.
13. Navaho 1 loops; release 5 loop; extend, palms away from you (fig. 14).

Notes: The intermediate figure produced after step 7 = 196 (fig. 12). If the palms are turned away from you after step 9, 199 is obtained (fig. 13). If one releases the little finger loop here, 195 is obtained (fig. 15). McCarthy's illustration for Mangrove Bird (7) indicates that a Pindiki extension is employed. The standard Yirkalla procedure for improving the extension of a figure is as follows:

14. R1 and R2 grasp the left "knot" where the strings meet between L1 and L3; release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L3 loop). Repeat on right hand.
15. 3 picks up 1f; Pindiki extension (fig. 16).

## 9. MACASSAN MAN (E83763)

1. Position 1.
2. L2 picks up R palmar string.

3. L2 loop >>>>.
4. R1 picks up R5n.
5. R3 picks up R1f.
6. With L1 and L2, grasp both R1 loops and release R hand; insert R1 towards you into the near hanging loop and R5 away from you into the far hanging loop; release L1 and L2, returning R hand to normal position.
7. Repeat 4, 5, and 6 twice more.
8. Repeat 4 and 5; Pindiki extension with right hand only, fingers pointing downward, palm facing you. Rotate left hand a quarter turn so that fingers point away from you (fig. 17).

Notes: Steps 4, 5, and 6 represent a weaving process common to many Australian and Melanesian figures. If, in step 3, L2 is twisted only once (>>), and the figure extended vertically, 186 is obtained (fig. 18).

#### 10. SCORPION (E83786)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>>>.
4. L1, from below, removes L2 loop.
5. R1 picks up R5n.
6. 2 picks up 1f; release 5 loop.
7. 5, from below, removes 2 loop.
8. 2 picks up 1f (close to the thumb).
9. Navaho 1 loops.
10. 1, from above, removes 2 loop.
11. Repeat step 8 and 9.
12. Release 5 loop; extend, palms away from you (fig. 19).

Notes: McCarthy method 10 calls for the index finger in step 8, but one must use the middle finger to obtain his illustration. The *Scorpion* is a simple variation of *Mangrove Bird/Native Cat*.

#### 11. LITTLE BOY STANDING ON ONE LEG (E83788)

1. Murray opening.
2. 1, from below, removes upper 2 loop.

3. 1, from below, removes lower 2 loop.
4. 5 picks up upper 1f.
5. 3 picks up remaining 1f; Pindiki extension.
6. Extend vertically as follows: rotate L hand 180 degrees away from you so that fingers point downward and L palm faces you; swing L hand downward so that L hand is centered over your stomach and fingers point to the right; swing R hand upward so that R hand is centered over your chest and fingers point to the left (fig. 20).
7. Examine upper and lower R1 strings; upper R1n coils around R3f, whereas lower R1n crosses the same string only once, near the left hand. Release R1 gently, hook "down" (i.e., to the right) lower R1n, then pick up R5f, drawing it through the former lower R1 loop; extend with R hand open, palm facing the ground (fig. 21). R5 loop represents the boy's head; R3 and R1 loops his arms, and L5 loop his one leg.

Notes: McCarthy method 11 does not give *Little Boy Standing on One Leg*. Above method reconstructed by the authors. The intermediate figure produced after step 6 is illustrated by 181. McCarthy's illustration, when rotated 90 degrees counterclockwise, shows the figure as seen by the maker.

#### 12. CAT-FISH (E83696)

Steps 1 through 9 of Ironwood Gum Cement (6), extended Pindiki fashion and inverted (fig. 22).

Notes: McCarthy method 12 belongs to 80, *Three Locusts in a Tree*. McCarthy's illustration for *Cat-Fish* is incorrectly drawn. The hands, sketched in by an artist based on notes attached to the mounted specimen, are inserted from the wrong side.

#### 13. WATER IN A RIVER-BED (E83760)

1. Position 1.
2. L2 picks up R palmar string.
3. L1, from above, removes L2 loop.
4. R1 picks up R5n.
5. 3 picks up 1f.
6. Release 1 loops.
7. 1, under 3 loop, picks up 5n, then 3f and returns under 3n.

8. Release 3 loop.
9. Repeat steps 5, 6, 7, and 8.
10. 3 picks up 1f; Pindiki extension (fig. 22A).

Notes: The figure's title makes more sense if the figure is displayed upside-down, palms away from you, fingers pointing downward.

#### 14. CENTIPEDE (E83785)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>.
4. L1, below L2n, picks up L2f; release L2 loop.
5. R1 picks up R5n.
6. 2 picks up 1f; release 5 loop.
7. 5, from below, removes 2 loop.
8. 2 picks up 1f (close to the thumb).
9. Navaho 1 loops.
10. 1, from above, removes 2 loop.
11. Repeat step 8 and 9.
12. Release 5 loop; extend.
13. 1 enters nearest diamond and hooks down the string forming the lower, outer side, allowing the original thumb loop to slip off in the process (fig. 23).

Notes: A simple variation of 10, *Scorpion*. Above method reconstructed by the authors. McCarthy's illustration shows figure as seen by the maker. McCarthy method 14 gives 200.

#### 15. MAN SITTING DOWN (E83783)

Use a doubled loop of string.

1. Position 1.
2. L2 picks up R palmar string.
3. R1 picks up R5n.
4. R3 picks up R1f.
5. With L1 and L2, grasp both R1 loops and release R hand; insert R1 towards you into the near hanging loop and R5 away from you into the far hanging loop; release L1 and L2, returning R hand to normal posi-

tion.

6. Repeat 4, 5, and 6 twice more.
7. Repeat 4 and 5; Pindiki extension with right hand only.
8. Release L2 loop; release R1 loops; extend gently and display inverted (fig. 24).

Notes: This figure is simply an alternate extension of *String Bag* (16).

#### 16. STRING BAG (E83747)

1. Position 1.
2. Put L hand loop over head and release L hand.
3. Mouth picks up R palmar string.
4. R1 picks up R5n.
5. R3 picks up R1f.
6. With L1 and L2, grasp both R1 loops and release R hand; insert R1 towards you into the near hanging loop and R5 away from you into the far hanging loop; release L1 and L2, returning R hand to normal position.
7. Repeat 4, 5, and 6 twice more.
8. Repeat 4 and 5; Pindiki extension with right hand only, palm facing stomach (fig. 25).
9. Release mouth loop; extend gently (fig. 26).

Notes: The intermediate figure produced after step 8 (before releasing the mouth loop) is 184 (fig. 25), also known as *Lightning* (46).

#### 17. RED KANGAROO (E83770)

1. Position 1 using a doubled string.
2. L2 picks up R palmar string.
3. Release L1 loop.
4. L1, under L2 loop, picks up L5n, then L2f and returns under 2n.
5. Release L2 loop.
6. R1 picks up R5n.
7. 3 picks up 1f.
8. Release 1 loops.
9. 1, under 3 loops, picks up 5n, then 3f and returns under 3n.
10. Release 3 loop.

11. Repeat steps 7, 8, 9, and 10
12. Repeat step 7.
13. Release 5 loop; release upper 1 loop; extend; display inverted, fingers pointing downward, palms facing you (fig 27).

## 18. CIRCUMCISION (E83831)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>.
4. R2, through L2 loop from above, picks up L palmar string and returns; extend, fingers pointing away from you (fig. 28).

## 19. PIG (E83768)

1. Position 1.
2. L2 picks up R palmar string.
3. L1, under L2n, picks up L2f; release L2 loop.
4. R1 picks up R5n.
5. 3 picks up 1f.
6. Release 5 loop; extend, fingers pointing downward, thumbs away from you (fig. 29).

Notes: Same as 196.

## 20. MANGROVE CRAB (E83695)

1. Opening A.
2. Mouth, under all strings, picks up 5f.
3. Toe, from above, removes mouth loop.
4. Release 5 loop and extend.
5. 5, from below, removes toe loop (close to the toe).
6. Mouth, from above, passes through 5 loop, then picks up 1f and 2n strings where they cross.
7. Toe, from above, removes double mouth loop.
8. Release 2 loop.
9. Four strings emanate from the toe: the outer strings are continuations of 1f; the inner strings, which cross near the toe, encircle the transverse 1n string, then become 5n strings. 2, from below, picks up the inner



- string close to the toe (beyond the point where the inner strings cross).
10. Release toe loops.
  11. 1, from below, removes 2 loop.
  12. Release 5 loop.
  13. 5 picks up double 1f string; extend (fig. 30).
  14. Two strings pass vertically across the figure, spanning the double transverse 1n string and the double transverse 5f string. The vertical strings define a central "circle." 2, from below, enters the central circle and returns with the nearest vertical string.
  15. Release double 1 loop.
  16. 1, under 2n, picks up 2f; release 2 loop.
  17. 1 picks up double 5n string.
  18. 3 picks up 1f and immediately releases it (this stretches the strings).
  19. A triangle is seen in the center of the figure. Rotate hands 180 degrees away from you and insert toe into triangle; release triple 1 loop and extend. Figure is suspended on toe and little fingers, the latter pointing downward. Two vertical strings pass from the toe to the double transverse 5 string.
  20. 1, from below, picks up double 5 transverse string.
  21. 2, from below, picks up the nearest vertical string.
  22. Release double 5 loop; release triple toe loop.
  23. 5, below 2 loops, picks up double 1f string and returns.
  24. Release double 1 loop.
  25. 1, under 2n, picks up 2f; release 2 loop.
  26. 1 picks up double 5n string.
  27. 3 picks up 1f; Pindiki extension (fig. 31).

Notes: The figure produced after step 13 is *Crab-hole in Sand or Rock* (23). Steps 14-23 merely invert the figure in preparation for further manipulation. McCarthy's illustration shows figure as seen by the maker.

#### 21. WATERHOLE OR BILLABONG (E83743)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. 1, under 2 loop, enters 5 loop from below; return with 5n and 2f.
4. Release 2 loop.
5. 3 picks up 1f.
6. Release 1 loops.

7. 1, under 3 loop, enters 5 loop from below; return with 5n and 3f.
8. Release 3 loop.
9. 3 picks up 1f.
10. Navaho 1 loops, lifting straight 1n string off 1.
11. Release 5 loop.
12. Extend, palms away from you. Rotate L hand 180 degrees away from you (fingers pointing downward, palm facing you) to open the figure, then rotate both hands an additional 180 degrees away from you, centering the figure over your stomach (fig. 32).

Notes: Final figure same as *Waterhole or Billabong* (118).

#### 22. SUN (E83685)

1. Opening A.
2. Release 1 loop.
3. 1 presses down 2n, 2f, and 5n strings while L2 hooks up 5f (i.e., L2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. R2, from below, enters upper L2 loop and draws it out, returning to normal position.
5. 1, under 2 loops, picks up 5n.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops.
8. Release upper 2 loop.
9. 3 picks up 2n.
10. Release 5 loop. Extend. Display the figure with fingers pointing downward, palms facing you (fig. 33).

Notes: A variation of Jayne's "Ten Men" (1962:150-156).

#### 23. CRAB-HOLE IN SAND OR ROCK (E83761)

Complete steps 1-13 of *Mangrove Crab* (20). The final pattern is shown in fig. 30.

#### 24. WATER BUFFALO (E83664)

1. Opening A (pick up R palmar string first).

2. Release 1 loop.
3. 1, under 2 loop, enters 5 loop from below; return with 5n and 2f.
4. Release 2 loop.
5. 3 picks up 1f.
6. Release upper 1 loop only.
7. 1, from above, removes 3 loop.
8. Repeat steps 5, 6, and 7.
9. Release 5 loop.
10. 5 picks up upper 1f.
11. 3 picks up remaining 1f.
12. Release 5; extend.
13. Rotate hands 180 degrees away from you and lay the figure on the ground (fig. 7). 5 hooks up side string of central triangle while 1 picks up triangle's base by passing 1 towards you, under the near transverse string; extend, returning hands to normal position. You now have single loops on 1 and 5. The 1 loop is twisted half a turn away from you; the 5 loop, a full twist towards you.
14. 1 picks up 5n.
15. 3 picks up lower 1f; Pindiki extension (fig. 34).

Notes: Same as *Two Conch Shells* (1), but set up differently.

#### 25. LEECH IN RAKIA SWAMP (E83692) OR RAIN (E83750)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
5. 1, from above, enters lower 2 loop; return with lower 2f and upper 2f.
6. 3, over upper 2n, picks up lower 2n.
7. Release double 1 loop gently, then re-insert 1 from the opposite side; 1 picks up upper 2n (segment within 3 loop) and returns through double 1 loop, which slip off.
8. Extend, fingers pointing away from you (fig. 35).

Notes: McCarthy's illustration is upside down, showing figure as seen by

the maker.

26. DOLPHIN (E83746)

1. Opening A (pick up R palmar string first).
2. Release L2 loop; extend.
3. R2, from above, enters its own loop; close R2 to the palm over the R palmar string; release R1 loop (R2 loop slips off R2); the former R palmar string is now hooked under R2. R1 removes loop hooked under R2, entering the loop "from below" (so that 1n is a transverse string). You now have a single loop on L5 and a fully-twisted loop on L1. The strings on the R hand resemble position 1, except for the loop that encircles the R palmar string which creates strings that resemble R1f and R5n.
4. L2, from above, enters L1 loop; L2 hooks up L1f, carries it away from you over L5n, then enters L5 loop from above; L2 then hooks up L5n, drawing it through the L1 loop as it returns to position (half a turn towards you).
5. Similarly, from above, enters R1 loop; R2 hooks up "R1f," carries it away from you over "R5n," then comes toward you, hooking up "R1f," as it returns to position (half a turn towards you).
6. 5, from below, enters 2 loop, then 1 loop from above, thus hooking down a single transverse string. Allow former 5 loop to slip off. Release 1 loop and extend (fig. 36).
7. 1 picks up central transverse string at "X" (fig. 36); release 5 loop and extend.
8. Extend. Figure is displayed upside-down, fingers pointing downward, palms toward you (fig. 37).

Notes: McCarthy's illustrations for *Dolphin* (26) and *Dugong* (27) are reversed. The intermediate figure produced after step 6 is 197.

27. DUGONG (E83718)

Complete steps 1 through 8 of *Dolphin* (26). Improve the extension as follows:

9. R1 and R2 grasp the left "knot" where the strings meet between L1 and L2; release L hand gently, allowing the left side of the figure to fold in

half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L2 loop). Repeat on right hand.

10. 3 picks up 1f; Pindiki extension (fig. 38).

Notes: McCarthy's illustrations for *Dolphin* (26) and *Dugong* (27) are reversed. The technique of "folding the figure in half" (step 9) in preparation for the Pindiki extension is utilized in a number of Yirrkalla figures (see 44A, 64B, and 107). It is also used to eliminate unwanted loops (see *Jabiru* (28)).

#### 28. JABIRU (E83709)

1. Opening A.
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
5. 1, under 2 loops, enters 5 loop; return with 5n and lower 2f.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops, lifting double lower loop over single upper loop.
8. Release upper 2 loop.
9. 2, from below, removes 1 loop.
10. Repeat steps 5, 6, and 7.
11. 3, over upper 2f, picks up lower 2n.
12. Release 5 loop and extend, palms away from you (fig. 39).
13. Release 2 loops and extend.
14. Improve the extension as follows: R1 and R2 grasp the left "knot" where the strings meet between L1 and L3; release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L3 loop). Repeat on right hand.
15. 3 picks up 1f; Pindiki extension (fig. 40).

Notes: A variation of Jayne's "Ten Men" (1962:150-156).

## 29. A BIG BLUE BIRD (E83814)

Same as *Jabiru* (28), but omit steps 13, 14, and 15. (fig. 39).

## 30. Two EMUS (E83704)

Same as A Big Blue Bird (29), but displayed upside-down, fingers pointing downward, palms facing you (fig. 41).

## 31. EMU'S EGGS (E83687)

Same as *Jabiru* (28), but omit steps 14 and 15 (fig. 42). Figure is displayed upside-down (fingers pointing downward, palms facing you). Same as 211.

## 32. TWO BOOMERANGS (E83698)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>.
4. L1, below L2n, picks up L2f; release L2 loop.
5. R1 picks up R5n.
6. 3 picks up 1f; release 5 loop.
7. 5, from below, removes 2 loop.
8. 3 picks up 1f (close to the thumb).
9. Navaho 1 loops, lifting straight 1n string off 1.
10. 1 hooks down straight string just released from 1, drawing it through the 1 loop, which slips off.
11. Release 5 loop; extend, fingers pointing downward, palms facing you (fig. 43).

Notes: Above method reconstructed by the authors (a simple variation of *Scorpion* (10)). McCarthy method 32 is the same as steps 1 through 6 of *Dolphin* (26). The resulting figure is 197 (fig. 36).

## 33. MORNING STAR (E83671)

Appears to be the same as *Dolphin* (26), assuming McCarthy's illustration shows the figure as seen by an observer. McCarthy method 33 belongs to X.

## 34A. TWO STINGRAYS (E83722) OR KOOKABURRA (E83748)

1. Opening A.
2. Release 1 loop.
3. 1, under 2 loop, removes 5 loop from below.
4. 1, from above, removes 2 loop.
5. 5 picks up upper 1f.
6. 3 picks up remaining 1f, close to 1.
7. Release 5; extend.
8. Rotate hands 180 degrees away from you and lay the figure on the ground (fig. 7). 5 hooks up side string of central triangle while 1 picks up triangle's base by passing 1 towards you, under the near transverse string; extend, returning hands to normal position. You now have single loops on 1 and 5. The 1 loop is twisted half a turn away from you; the 5 loop, a full twist towards you.
9. 1 picks up 5n.
10. Release 5 loop gently; 5, from above, enters former 5 loop and returns with 1f.
11. Repeat step 10 four more times.
12. 3 picks up 1f; Pindiki extension (fig. 44).

Notes: Adding multiple twists to the ends of diamonds is a feature unique to Yirrkalla.

## 34B. TWO STINGRAYS AND TWO YOUNG ONES (E83691)

13. Mouth picks up center strings where they cross, creating double mouth loop (fig. 45). Withdraw 1 from all loops.
14. Draw the entire figure, from above, through the double mouth loop as follows: Pinch right double mouth string, close to the mouth, between R2 and R3; release double mouth loop and hold it in front of the other strings; Pass the tips of R1 and R2, from below, through double loop and grasp L3n and L3f close to L3, pinching them together; lift loop off L3, draw it down through the double loop held by R2 and R3, and replace it on L3; repeat with L5 loop, passing the loop under the L3 loop when replacing it on L5; repeat on R hand (pinch double loop between L2 and L3 during the manipulations); release double loop and extend.

15. 1, under 3 loop, picks up 5n, then 3n.
16. Release 3 loop.
17. 3 picks up 1f; Pindiki extension (fig. 46).

Notes: McCarthy's illustration for 34B belongs to 34A; 34B is not illustrated. 206 (fig. 45) shows how the mouth is used to pick up the center strings (step 13). The process of drawing the entire figure through the center of the design (step 14) is applied to several other figures in the Yirkalla repertoire (44A, 75). The process creates an additional diamond on each end of the figure.

### 35. THREE HUTS (E83705)

1. Opening A (pick up R palmar string first).
2. Release L2 loop; extend.
3. Release L hand gently; L1 enters R1 loop from above, passes under R2n and R2f, then enters R5 loop from below; return with R2n and R2f.
4. L5 picks up double L1f, creating position 1 on L hand.
5. L2, from above, removes R2 loop.
6. R2, through L2 loop from above, picks up double L palmar string.
7. Release double L1 and double L5 loop; extend sharply (fig. 47).
8. L1 and L5, from below, remove L2 loop, thus creating position 1 on L hand.
9. Release double R2 loop; extend. You now have position 1 on both hands, but the loops on R1 and R5 are twisted (R1 loop is twisted a full turn away from you, R5 loop is twisted a full turn towards you).
10. L2 picks up R palmar string as in Opening A.
11. L1, over L2n, picks up L2f.
12. R1 picks up R5n.
13. Release L2 loop with the help of R1 and R2.
14. 3 picks up 1f, close to 1.
15. Navaho 1 loops, lifting straight 1n string off 1.
16. Release 5 loop; extend, palms away from you (fig. 48).

Notes: Same final figure as *Ironwood Gum Cement* (6), but displayed with fingers pointing upward. The figure produced after step 7 is otherwise known as *Emu's Tracks* (66).

### 36. FROG IN A POOL (E83663)



McCarthy method 36 is identical to methods 38 and 41. All give 185.

### 37. WHITE MAN (E83663)

1. Opening A (pick up R palmar string first).
2. Release L2 loop.
3. L1 picks up L5n.
4. L3 picks up L1f.
5. With R1 and R2, grasp both L1 loops and release L hand; insert L1 towards you into the near hanging loop and L5 away from you into the far hanging loop; release R1 and R2, returning both hands to normal position.
6. Repeat 4, 5, and 6 twice more.
7. Repeat 4 and 5; Pindiki extension with left hand only; extend vertically by placing left hand over stomach, palm facing you, and right hand under chin, palm facing downward (fig. 49).
8. Release R2 loop gently (fig. 50).

Notes: Same as *Birth of a Baby* (45A), but formed on the opposite hand. 183 shows the extension prior to releasing R2 loop. McCarthy's illustration for *White Man* (37), when rotated 90 degrees clockwise, shows the figure as seen by an observer. The unusual extension (R2 loop threaded through R palmar loop) is an artifact of mounting.

### 38. MOON FISH (E83713)

McCarthy method 38 is identical to methods 36 and 41. All give 185.

### 39. RAKIA BULB (E83661)

1. Opening A.
2. 1, 3, 4, and 5 enter 2 loop from below, transferring 2 loop to wrist.
3. 2, from above, enters 1 loop; 2 hooks up 1f and carries it away from you, over 5n, then enters 5 loop from above; 2 then hooks up 5n, drawing it through the 1 loop as it returns to position (half a turn towards you).
4. L1 and L2 grasp R1f and R2n where they cross on R palm; release R 1,

- R2, and R5 gently, noting the origin of each loop; insert R5 away from you into the first hanging loop (i.e., distally into former R1 loop); insert R1 towards you into the second hanging loop (i.e., distally into former R2 loop, rotating R1 half a turn *towards* you as it returns to position). Repeat on L hand.
5. Repeat steps 3 and 4 twice more.
  6. Repeat step 3.
  7. L1 and L2 pick up R wn (right near wrist string) and lift it over R1, then R1f and R2n where they cross (L1 and L2 now hold three strings); release entire R hand gently, noting the origin of each loop (former 1 loop = near hanging loop, former wrist loop = middle hanging loop, former 2 loop = far hanging loop); insert R1 and R5 away from you into the near hanging loop (i.e., distally into former R1 loop), then pass R1 only away from you into far hanging loop (i.e., proximally into former R5 loop), by-passing the middle hanging loop completely. Repeat on L hand.
  8. 3 picks up 1f; Pindiki extension (fig. 51).

Notes: See Jayne's *Three Stars* (1962:167-175) for a fully-illustrated set of instructions.

#### 40. FRILL-NECKED LIZARD (E83708)

1. Opening A (pick up R palmar string first).
2. Release L2 loop; extend.
3. L1 picks up L5n.
4. L3 picks up L1f.
5. With R1 and R2, grasp both L1 loops and release L hand; insert L1 towards you into the near hanging loop and L5 away from you into the far hanging loop; release R1 and R2, returning L hand to normal position.
6. Repeat 3, 4, and 5 twice more.
7. Repeat 3 and 4; Pindiki extension with L hand only.
8. R1, from below, enters R2 loop close to R2 to create an R12 loop.
9. R1 and R2 grasp double L1n; release L hand gently, noting the origin of each loop; draw all strings held by R1 and R2 up through the R12 loop, which slips off; replace held loops on L hand in their original position.
10. Pindiki extension, L hand only (palm facing you, fingers pointing

downward); extend right hand so that R palm faces the left and finger point away from you (fig. 52).

41. ST. ANDREW'S CROSS SPIDER MAKING WEB BETWEEN TREES (E83694)

McCarthy method 41 is the same as McCarthy methods 36 and 38. All give 185. McCarthy's notes indicate that *Spider* (41) is the same as *Mangrove Bird* (7). His illustration for 41, assuming it shows the figure as seen by an observer, suggests that the figure is displayed with fingers pointing downward, palms facing you (fig. 53).

42. BOOBOOK OWL (E83660)

To be solved.

43. LOBSTER (E83731)

1. Opening A (pick up R palmar string first).
2. Release R2 loop.
3. L2 loop >>>>>> (three full turns).
4. L1, from below, removes L2 loop.
5. R 1 picks up R5n.
6. Release 5 loop.
7. L5 picks up upper L1f; R5, through upper R1 loop from above, picks up lower R1f. The 5f string is now heavily twisted in the center.
8. 3 picks up 1f, close to 1.
9. Navaho 1 loops, lifting straight 1n string off 1.
10. 1, from above, removes 3 loop.
11. 3 picks up 1f.
12. Navaho 1 loops.
13. Release 5 loop; extend, fingers pointing downward, palms facing you (fig. 54).

Notes: McCarthy's Illustration shows four central twists, whereas mounted specimen shows six.

44A. HUNGRY WOMEN (NO SPECIMEN)

1. Opening A.

2. 3, from above, enters 2 loop and returns with 1f and 2n.
3. Release 1 loop(s).
4. 1, under all strings, enters 5 loop from below and returns with 5n and 2f.
5. Release 5 loop.
6. 5, through 3 loop from above, picks up 1f.
7. Repeat steps 3, 4, 5, and 6 (fig. 55).
8. 1 picks up upper 3n (straight string).
9. Navaho 1 loops, lifting double lower loop over upper single loop; extend.
10. Improve the extension and eliminate the 2 and 3 loops as follows: R1 and R2 grasp double L3 loop on back of L3; release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (i.e., distally into the former L1 loop); insert L1 away from you into both hanging loops (i.e., distally into the former L1 loop and proximally into the former L5 loop). Release held strings from R1 and R2. Repeat on R hand.
11. 3 picks up 1f; Pindiki extension (fig. 56).

Notes: McCarthy's illustration belongs to *Yam* (44B), and shows figure as seen by the maker. There is no illustration for 44A. The intermediate figure produced after step 7 = 201 (fig. 55).

44B. YAM (E83727)

12. Lengthen the 3 and 5 loops by feeding them with string from the central double diamonds (use your mouth or fingers of the opposite hand).
13. Mouth picks up center strings where they cross, creating quadruple mouth loop. Withdraw 1 from all loops.
14. Draw the entire figure, from above, through the quadruple mouth loop as follows: Pinch right quadruple mouth string, close to the mouth, between R2 and R3; release quadruple mouth loop and hold it in front of the other strings; Pass the tips of R1 and R2, from below, through quadruple loop and grasp L3n and L3f close to L3, pinching them together; lift loop off L3, draw it down through the quadruple loop held by R2 and R3, and replace it on L3; repeat with L5 loop, passing the loop under the L3 loop when replacing it on L5; repeat on R hand (pinch quadruple loop between L2 and L3 during the manipulations); release quadruple loop and extend.

15. 1, under 3 loop, picks up 5n, then 3n.
16. Release 3 loop.
17. 3 picks up 1f; Pindiki extension (fig. 57).

#### 45A. BIRTH OF A BABY (E83677)

1. Position 1.
2. L2 picks up R palmar string.
3. R1 picks up R5n.
4. R3 picks up R1f.
5. With L1 and L2, grasp both R1 loops and release R hand; insert R1 towards you into the near hanging loop and R5 away from you into the far hanging loop; release L1 and L2, returning both hands to normal position.
6. Repeat 4, 5, and 6 twice more.
7. Repeat 4 and 5; Pindiki extension with right hand only; extend vertically by placing right hand over stomach, palm facing you, and left hand under chin, palm facing downward.
8. Release L2 loop gently (fig. 58).

Notes: Same as *String Bag* (16), but not suspended from the neck.

#### 45B. BABY BORN (E83679)

9. Release L1; hold L5 loop with L1 and L2; left hand loop narrows, allowing former L2 loop to slide to the bottom as baby is "born" (fig. 59).

#### 46. LIGHTNING (E83670)

Same as *String Bag* (16), also illustrated as 184. McCarthy method 46 gives a four-diamond figure, displayed by the Pindiki extension (see appendix).

#### 47. TWO SEA-HAWKS' NESTS WITH YOUNG (E83757)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to

normal position.

5. 1, under lower 2n, picks up lower 2f.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops.
8. Release upper 2 loop.
9. 2, from below, removes 1 loop.
10. Repeat steps 5, 6, and 7.
11. 3, over upper 2f, picks up lower 2n.
12. Release 5 loop and extend, fingers pointing downward, palms facing you (fig. 60).

48. FORK-TAILED (BROMILEY) KITE; BIRD WITH BLUE SHORT LEGS (E83699)

1. Opening A (pick up R palmar string first).
2. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
3. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
4. 1, 3, 4, and 5 enter 2 loop from below, transferring 2 loop to wrist.
5. 2, from above, enters 5 loop; 2 hooks up 5n and carries it toward you, over 1f, then enters 1 loop from above; 2 then hooks up 1f, drawing it through the 5 loop as it returns to position (half a turn away from you).
6. Release 1 loop.
7. 1, from below, removes 2 loop.
8. Using the opposite hand, lift double wrist loop off the hand and place it on 1 and 5 in Position 1.
9. Repeat step 5.
10. Release 5 loops.
11. 5, from above, removes 2 loop (so that the transverse string become 5f).
12. A loop encircles each palmar string: the far string of this loop wraps around the 5f string; the near string of this loop becomes a 1f string on the opposite hand. 2, from above and from the far side, hooks up the near string of this loop as well as the string representing its continuation from the opposite hand (i.e., the 1f string) (fig. 61); straighten 2 by rotating the finger half a turn towards you, thus creating a double 2f string.
13. Release 1 loops.

14. 1, from above, removes 2 loops, thus creating a double transverse 1n string and a single transverse 1f string.
15. 3 picks up transverse 1f string (close to 1); extend in three dimensions, fingers pointing away from you (fig. 62).
16. Navaho R1, lifting the lower loop over the upper loop, placing it on R2 without twisting; L2, from below, removes upper L1 loop, thus creating a single transverse 2n string and a single transverse 1n string; extend in three dimensions, teasing apart the central tangles until they separate; display with fingers pointing away from you (fig. 63).

Notes: McCarthy method 49A belongs here. The intermediate figure produced after step 15 is illustrated by 188 (drawing inaccurate; central strings are not really crossed). McCarthy method 48 is the same as *Sea Eagle* 64A.

#### 49A. MACASSAN PRAU (NO SPECIMEN)

*Macassan Prau* is the same as *Fork-Tailed Kite* (48). 48 was made by Nauru; 49A/B by Bali.

#### 49B. CARGO OF PRAU (E83702)

Restore the intermediate stage (fig. 62) of *Macassan Prau* as follows:

17. Lay the figure on your lap, fingers pointing upward, but do not release hands
18. Release 3 loop gently.
19. 1, from below, removes 2 loop.
20. 3 picks up 1f (single transverse string) close to 1; Extend in three dimensions (fig. 62).

#### 50A. IBIS (NO SPECIMEN)

1. Opening A.
2. 1, 3, 4, and 5 enter 2 loop from below, transferring 2 loop to wrist.
3. 1 picks up 5n.
4. 3 picks up 1f.
5. With L1 and L2, grasp both R1 loops and release R hand; insert R1 towards you into the near hanging loop and R5 away from you into the far hanging loop; release L1 and L2, returning R hand to normal posi-

- tion; repeat on L hand.
6. Repeat steps 3, 4, and 5 twice more.
  7. Repeat steps 3 and 4.
  8. Release wrist loop; Pindiki extension (fig. 63A).

Notes: McCarthy's illustration shows figure as seen by the maker.

50B. IBIS FLYING INTO TREE (NO SPECIMEN)

9. Continue to separate the hands so that central diamonds travel in opposite directions and collapse (fig. 64).

51A. FLYING FOX (E83697)

Same as *Ibis* (50A).

51B. MANGROVE-CRAB ESCAPING (NO SPECIMEN)

Same as *Ibis Flying into Tree* (50B).

52. WHITE GOSHAWK (E83662)

1. Opening A.
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
5. 1, under 2 loops, picks up 5n.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops.
8. Release upper 2 loop.
9. 2, from below, removes 1 loop.
10. Repeat steps 5, 6, and 7.
11. 3 picks up upper 2f.
12. Release 5 loop.
13. 4, over 3f, picks up lower 2n.
14. Release L3 loop with the help of the mouth.



15. L3, from below, removes L4 loop.
16. Extend, fingers pointing downward, palms facing you (fig. 65).

Notes: A minor variation of the following three figures (53, 54, and 55). The asymmetric extension creates a head (L2 loops), wings (L1 and L3 loops) and a tail (R hand loops).

53. PARROT (E83721)

54. WOMEN'S CROCODILE (E83686)

55. RIPPLES ON A POOL (E83781)

1. Opening A.
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
5. 1, under 2 loops, picks up 5n.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops.
8. Release upper 2 loop.
9. 2, from below, removes 1 loop.
10. Repeat steps 5, 6, and 7.
11. 3, over upper 2f, picks up lower 2n.
12. Release 5 loop.
13. Extend, fingers pointing downward, palms facing you (fig. 66).

Notes: 53, 54, and 55 are the same figure made by three different informants. 52 is also the same, but extended somewhat differently. As noted by McCarthy (p. 418), identical figures displayed differently are often given separate names. He also notes (p. 421) that the names given to figures vary considerably among the men, women, and children.

56. CLOUDS (E83782)

1. Opening A (pick up R palmar string first).
2. Pinch 1, 2, and 3 together to prevent 2 loop from slipping.
3. L1 and L2 draw out string on back of R2 to form a small upright loop;

draw out L2 loop in a similar fashion.

4. Pass L upright loop distally through R upright loop; withdraw R2 and L2 from their original loops and insert them into the nearest upright loop, thus exchanging 2 loops.
5. Extend, fingers pointing away from you (fig. 67).

Notes: McCarthy's illustration is upside-down (assuming it shows the figure as seen by a second person).

#### 57. MENSTRAL BLOOD OF THREE WOMEN (E83818)

1. Opening A (pick up R palmar string first).
2. 1, 2, and 5 loop >> (i.e., a full turn away from you); extend, fingers pointing away from you (fig. 68).

Notes: McCarthy method 57 calls for triple twists on each loop. The mounted specimen has double twists on 1, 5, and L2, and a quadruple twist on R2. The photograph shows single twists on each loop.

#### 58. THREE FRESHWATER SNAKES (E83806)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. R1 presses down R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
4. L2, from below, enters upper R2 loop and draws it out, returning to normal position; extend, fingers pointing away from you (fig. 69).

Notes: One string crossing in McCarthy's illustration does not match the mounted specimen (string "1" passes under string "2" in the specimen). It is not clear if the half twist in the upper R2 loop is real or a mounting artifact (to reproduce the mounted specimen exactly, close 5 to the palm and rotate the tip of R2 half a turn toward you).

#### 59. THREE WOMEN SITTING DOWN (E83789)

*McCarthy method 59:*

1. Opening A (pick up R palmar string first).

2. R5 >>.
3. R2 >>.
4. R1 >> (fig. 70).

*To make McCarthy's illustration (view of an observer):*

1. Opening A (pick up L palmar string first).
2. L5 >>>.
3. L2 >.
4. L1 > (fig. 71).

*To make mounted specimen:*

1. Opening A (pick up L palmar string first).
2. L5 >>>.
3. L2 >>.
4. L1 >>> (fig. 72).
- 5.

Notes: The true identity of *Three Women Sitting Down* (59) is uncertain.

#### 60. FISH-NET (E83779)

*McCarthy method 60:*

1. Opening A (pick up R palmar string first).
2. R5 >>.
3. R2 >>.
4. R1 >>.
5. R5 >>.
6. R2 >>.
7. R1 >>.
8. Extend, fingers away from you (fig. 73).

*To make McCarthy's illustration (view of an observer):*

1. Opening A (pick up R palmar string first).
2. R2 >>.
3. L5 >>.
4. L2 >>.
5. L1 >> (fig. 73A).

*To make the mounted specimen :*

1. Opening A (pick up R palmar string first).
2. R2 >>.
3. L5 >>>.
4. L2 >>>>>.
5. L1 >>> (fig. 73B).

Notes: The true identity of *Fish-Net* is uncertain. McCarthy method 60 gives 204 (fig. 73).

#### 61. TWO CAT-FISH (E83820)

1. Opening A with double loop (pick up R palmar string first).
2. Release L2 loop; extend.
3. R2, from above, enters its own loop; close R2 to the palm over the R palmar string; release R5 loop (R2 loop slips off R2); the former R palmar string is now hooked under R2.
4. L5 loop <<<<.
5. Use mouth to transfer loop hooked under R2 to R5, inserting R5 "from below" so that 5f is a transverse string.
6. L1 loop >>.
7. Extend, fingers pointing away from you (fig. 74).

Notes: McCarthy's illustration shows figure as seen by the maker.

#### 62. SMALL BOOMERANG (E83841)

To be solved.

#### 63. HUMAN FAECES (E83752)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>>>>.
4. R2, through L2 loop from above, picks up L palmar string.
5. R2 loop >>>>.
6. L1 and L2, through R2 from above, grasp R1f and R5n, pinching them together; release R hand, drawing former R1 and R5 loops up through former R2 loop; replace held R1 and R5 loops on their original fingers;

extend vertically, L hand under chin (fig. 75).

7. Release L2 loop; extend (fig. 76).

Notes: Intermediate fig. 75 matches 212 (drawing has minor errors). McCarthy's illustration, when rotated 90 degrees clockwise, shows figure as seen by an observer.

#### 64A. SEA-EAGLE (NO SPECIMEN)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. L1 presses down L2n, L2f, and L5n strings while L2 hooks up 5f (i.e., L2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return L1 to normal position.
4. R2, from below, enters upper L2 loop and draws it out, returning to normal position.
5. 1, under lower 2n, picks up lower 2f.
6. 1, from below, enters upper 2 loop and returns with upper 2n.
7. Navaho 1 loops.
8. Release upper 2 loop.
9. 2, from below, removes 1 loop.
10. Repeat steps 5, 6, and 7.
11. 3, over upper 2f, picks up lower 2n.
12. Release 5 loop and extend, palms away from you (fig. 76A).

Notes: McCarthy methods 48 and 64A give the same figure (fig. 76A). McCarthy does not provide an illustration of either figure.

#### 64B. SEA-EAGLE CATCHING MULLET (NO SPECIMEN)

13. R1 and R2 grasp L2 loops; release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L3 loop). Repeat on right hand.
14. 3 picks up 1f; Pindiki extension (fig. 77).
15. The figure consists of four diamonds, the center diamonds interlocking. Using your toe (or the finger of a second person) hook down the central

strings where they interlock. These loops represent fish being carried in the claws of the sea-eagle; each outer diamond represents a wing (fig. 78).

Notes: There is no mounted specimen of 64A or 64B. McCarthy's illustration for 64B was prepared from a photograph in which the long, hanging loops are looped around the toe. It is therefore not clear if the loops are free (opening A, L palmar string first) or interlocked (opening A, R palmar string first).

65. ECHIDNA (NO SPECIMEN)

McCarthy method 65 belongs to *Two Conch Shells* (1). McCarthy's illustration is a variation of *Four Yams* (164B). There is no mounted specimen or photograph of this figure.

66. EMU'S TRACKS (E83765)  
67. STINGRAY-SPINE SPEAR (E83741)

1. Opening A (pick up R palmar string first).
2. Release L2 loop; extend.
3. Release L hand gently; L1 enters R1 loop from above, passes under R2n and R2f, then enters R5 loop from below; return with R2n and R2f.
4. L5 picks up double L1f, creating position 1 on L hand.
5. L2, from above, removes R2 loop.
6. R2, through L2 loop from above, picks up double L palmar string.
7. Release double L1 and double L5 loop; extend sharply (fig. 47).

Notes: McCarthy methods 66 and 67 are the same as steps 1 through 7 of *Three Huts* (35).

68. FIRE-STICKS (E83724)

1. Opening A (pick up R palmar string first).
2. Release R2 loop; extend.
3. R2 enters R5 loop from above, passes toward you under R5n and enters R1 loop from below, picking up R5n and R1f in the process.
4. Release R1 loop; release R5 loop.
5. R2 loop <<<<<<; extend, fingers pointing away from you (fig. 79).

Notes: McCarthy's illustration shows figure as seen by the maker.

69. Y<sub>AM</sub> (E83732)

1. Opening A (pick up R palmar string first).
2. R2 enters R5 loop from above, then passes toward you under R2 loop and enters R1 loop from below, picking up R2f, R5n, and R1f in the process.
3. Release R5 loop; release R1 loop.
4. Rotate R2 half a turn away from you so that R2 points downward; display with fingers pointing away from you (fig. 80).

Notes: In McCarthy's illustration, the L1 loop has been transferred to L2.

70. Y<sub>AM</sub> (E83737)

1. Opening A (pick up R palmar string first).
2. R1 presses down R1f, R2n, R2f, and R5n strings while R2 hooks up 5f (i.e., R2 picks up 5f from the far side and from above, rotating half a turn towards you as it returns to position). Return 1 to normal position.
3. L2, from below, enters upper R2 loop and draws it out, returning to normal position.
4. L3, from below, removes upper L2 loop.
5. R2 enters R5 loop from above, then passes toward you under R2 loops and enters R1 from below, picking up double R2f, R5n, and R1f in the process.
6. Release R5 loop; release R1 loop.
7. R2 loop >>>>>>; extend, fingers pointing way from you (fig. 81).

71. WOMAN'S BREASTS (E83803)

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. L5 loop >.
4. L2 loop >; display with fingers pointing away from you (fig. 82).

Notes: Above method represents authors' reconstruction.

72. TREE (E83799)

1. Opening A (pick up R palmar string first).
2. Lay the figure on the ground.
3. Arrange as follows: former L2 loop >; former R1 loop >; fold the former R2 loop and former R5 loop inwards, towards the center of the figure, as if turning the page of a book. View figure vertically, former left hand loops pointing away from you (fig. 83).

## 73. MYTHICAL SNAKE (E83828, E83830)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 enters upper 1 loop from above and picks up lower 1f.
4. 3 picks up 1f; Pindiki extension (fig. 84).

Notes: The mounted specimen used to prepare McCarthy's illustration is highly distorted. A second specimen, made by a different informant, is much better.

## 74. INTERTWINED SNAKES (E83807)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up remaining 1f.
5. Release 5 loop; extend.
6. Rotate hands 180 degrees away from you and lay the figure on the ground (fig. 7). 5 hooks up side string of central triangle while 1 picks up triangle's base by passing 1 towards you, under the near transverse string; extend, returning hands to normal position. You now have single loops on 1 and 5. The 1 loop is twisted half a turn away from you; the 5 loop, a full twist towards you.
7. 1 picks up 5n.
8. 3 picks up 1f; Pindiki extension (fig. 85).

Notes: Final figure is the same as *Two Conch Shells* (1), and *Water Buffalo* (24).

## 75. TWO WOMEN WITH CARRYING-BAGS (E83840)



1. Steps 1 through 7 of *Intertwined Snakes* (74).
2. Release 5 loop gently; 5, from above, enters former 5 loop and returns with 1f.
3. Repeat step 2 twice more.
4. 3 picks up 1f; Pindiki extension (fig. 86).
5. Steps 13 through 17 of *Two Stringrays and Two Young Ones* (34B); ending with Pindiki extension (fig. 87).

Notes: McCarthy method 75 is undecipherable, full of duplication and stages that are subsequently dissolved. The above method, a reconstruction by the authors, represents a more direct method of making the final figure, merging elements of *Intertwined Snakes* (74) and *Two Stringrays and Two Young Ones* (34B).

#### 76. LAUGHING JACKASS (NO SPECIMEN)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up remaining 1f.
5. Release 5 loop; extend.
6. Rotate hands 180 degrees away from you and lay the figure on the ground (fig. 7). 5 hooks up side string of central triangle while 1 picks up triangle's base by passing 1 towards you, under the near transverse string; extend, returning hands to normal position. You now have single loops on 1 and 5. The 1 loop is twisted half a turn away from you; the 5 loop, a full twist towards you.
7. 1 picks up 5n.
8. Release 5 loop gently; 5, from above, enters former 5 loop and returns with 1f.
9. Repeat step seven more times.
10. 3 picks up 1f; Pindiki extension (fig. 88).

Notes: McCarthy's illustration, which shows the figure as seen by the maker, is upside-down.

#### 77. TWO ARM-BANDS (E83673)

1. Navaho opening.
2. Turn palms away from you and lay the figure on the ground, releasing hands.
3. Hands enter former 1 loop from above, pass towards you under near transverse string, then return to the upright position, thus creating wrist loops; 1 picks both middle strings where they cross (fig. 89); extend.
4. 5 picks up 1f.
5. Release wrist loop with opposite hand and extend gently, fingers pointing away from you (fig. 90).

Notes: Same as *Two Dingos* (104A), but begins with Navaho opening rather than Murray opening.

#### 78. BROWN HAWK (E83668)

To be solved. McCarthy method 78 belongs to X.

#### 79. FOREHEAD BAND (E83778)

1. Navaho opening (pass right string in front of left).
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up remaining 1f.
5. Release 1 loop.
6. 1, under all strings, picks up 5f.
7. 1 removes 3 loop from above.
8. Release 5 loop.
9. 5 picks up upper 1f.
10. 3 picks up remaining 1f; Pindiki extension; Rotate L hand 180 degrees away from you so that L fingers point downward and L palm faces you; then rotate both hands an additional 180 degrees (fig. 91).

Notes: It is not clear whether the figure is extended horizontally for vertically. To extend vertically proceed as follows: After rotating left hand 180 degrees, swing left hand upward, chin resting on left palm, fingers pointing to the right; swing right hand downward, right palm facing the stomach, fingers pointing to the left (fig. 92). Final figure is identical to *Frog in a Pool* (36). If step seven is replaced with: "1, under 3n picks up 3f; release 3 loop," the result is *Clam Shell* (169) (fig. 93).

## 80. THREE LOCUSTS IN A TREE (E83711)

1. Position 1; release L hand.
2. L1 and L2 draw out R palmar string to its full extent and release it.
3. Repeat step 2.
4. Position 1 on L hand with hanging loop.
5. L2 picks up R palmar string.
6. R1 picks up R5n.
7. L1 removes L2 loop from above.
8. 3 picks up 1f.
9. Navaho 1 loops.
10. Release 5 loops and extend, palms away from you (fig. 94).

Notes: McCarthy method 12 belongs here. Final figure is identical to *Ironwood Gum Cement* (6) and *Three Huts* (35). McCarthy method 80 gives McCarthy's illustration for *Cooking Parrot Fish* (101D).

## 81. MOON-FISH (NO SPECIMEN)

To be solved. Final figure supposedly the same as *Moonfish* (38).

## 82. PREGNANT WOMAN (E83725)

1. Navaho opening.
2. Turn palms away from you and lay the figure on the ground, releasing hands.
3. Hands enter former 1 loop from above, pass towards you under near transverse string, then return to the upright position, thus creating wrist loops; 1 picks both middle strings where they cross; 5 hooks up far transverse string, rotating 5 half a turn towards you straighten the finger (fig. 95); extend.
4. Release double 1 loop.
5. With the opposite hand, remove wrist loop and place it on 1 without twisting.
6. 1 picks up 5n.
7. 3 picks up 1f; Pindiki extension (fig. 96).

Notes: McCarthy methods 80, 82, and 83 are the same. The string crossings

between diamonds 1-2 and 3-4 in McCarthy's illustration do not match the mounted specimen. McCarthy's illustration shows figure as seen by the maker.

83. GECKO (E83701)

Same as *Pregnant Woman* (82), but displayed upside-down (fingers pointing downward, palms facing you) (fig. 97).

84. WATERHOLE OR BILLABONG (E83735)

1. Navaho opening.
2. 1, under 2n, picks up 2f.
3. Release 2 loop.
4. 5 picks up upper 1f.
5. 3 picks up remaining 1f; Pindiki extension (fig. 98).

Notes: A three-dimensional figure (1n strings represent base of water-hole). Examination of the mounted specimen reveals that the double 1n strings are not coiled, as suggested by McCarthy's illustration. McCarthy notes that this figure is also an intermediate stage in making *(Fresh)water Goanna* (88).

85. WATER-GOANNA (E83733)

1. Navaho opening.
2. 1 loop > (lift loop off 1, rotate half a turn away from you, and replace).
3. 1, from above, removes 2 loop.
4. 5, through upper 1 loop from above, picks up lower 1f.
5. 3 picks up remaining 1f.
6. Release 1 loops.
7. 1, over 3 loops, picks up 5f.
8. Release 5 loop.
9. 1, from below, removes 3 loop.
10. 5 picks up upper 1f.
11. 3 picks up remaining 1f; Pindiki extension; display inverted, fingers pointing downward (fig. 99).

## 86. NATIVE COMPANION (E83690)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. R2, through upper R1 loop from above, picks up lower R1f; L3, through upper L1 loop from above, picks up lower L1f.
4. Extend, fingers pointing upward (fig. 100).

Notes: The ubiquitous "W" design made as an independent figure (here, an "M" since it is not inverted). It is not clear why the extension is performed with R2 and L3 rather than 3 on both hands. This feature is common to several other figures made by Narau. 194 is the same, but displayed upside-down, fingers pointing downward, palms facing you.

## 87. BANDICOOT (E83759, E83667)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up remaining 1f; Pindiki extension (fig. 101).

## 88. WATER-GOANNA (E83736)

1. Navaho opening.
2. 1, under 2n, picks up 2f.
3. Release 2 loop.
4. 5 picks up upper 1f.
5. 3 picks up 1f.
6. Release 1 loops.
7. 1, under 3 loop, enters 5 loop from below and returns with 5n and 3f.
8. Release 3 loop.
9. Repeat steps 5, 6, 7, and 8.
10. Release 5 loop.
11. 5 picks up upper 1f.
12. 3 picks up remaining 1f; Pindiki extension (fig. 102).

Notes: The intermediate figure produced after step 5 is also known as *Waterhole or Billabong* (84), see fig. 98. Above method gives a figure matching the mounted specimen, but not McCarthy's illustration (string crossings

along upper transverse string are reversed).

#### 89. GOANNA (E83738)

1. Navaho opening.
2. 1, over 2n, picks up 2f.
3. 5, over 2n, picks up 1f.
4. 3 enters 5 loop from above and picks up segment of 2n that spans from the palmar string to 5f; Pindiki extension (palms away from you), then return to normal position.
5. Release 3 loop.
6. Release 2 loop with the help of the opposite hand.
7. 3 picks up 1f; Pindiki extension; display figure upside-down, fingers pointing downward, palms facing you (fig. 103).

Notes: Same final figure as *Mythical Snakes* (73), but displayed upside-down.

#### 90. BUTTERFLY (E83680)

1. Opening A.
2. 2, from below, removes 1 loop.
3. 1, under 2 loops, picks up 5n.
4. 1, from below, enters upper 2 loop and returns with upper 2n.
5. Navaho 1 loops.
6. Release upper 2 loop.
7. 2, from below, removes 1 loop.
8. Repeat steps 3 and 4.
9. 3, over upper 2f, picks up lower 2n.
10. Release 5 loop.
11. Extend, fingers pointing downward, palms away from you (fig. 104).

Notes: McCarthy's illustration shows figure as seen by the maker. Above reconstruction is a variation of *Parrot* (53). McCarthy method 90 belongs to *Kingfisher* (95).

#### 91A. DIVING DUCKS (E83843)

1. Navaho opening.
2. Toe picks up central string crossing to create a double toe loop.

3. 1, under 2n, picks up 2f; release 2 loop (creates small upper 1 loop).
4. 5 picks up upper 1f.
5. 3 picks up remaining 1f, close to 1; Pindiki extension, palms facing downward, so that 3f is between 5f and toe (fig. 105).

91B. WATERHOLE OR BILLABONG (NO SPECIMEN)

6. Work the figure by repeatedly sliding 3f along the double strings emanating from the toe. The large central triangle reveals upon full retraction is the *Waterhole* (fig. 106).

91C. TREE TO WHICH THE DUCKS FLY (E83844)

7. Release double 1 loop; release double toe loop.
8. 1, under 3 loop, picks up 5f; release 5 loop.
9. 1, under 3n, picks up 3f; release 3 loop.
10. 5 picks up upper 1f.
11. 3 picks up remaining 1f; Pindiki extension. To reveal the figure, rotate L hand 180 degrees away from you so that L palm faces you; swing R hand downward so that it is centered over your stomach (palm facing you, fingers pointing to the left); swing L hand upward so that chin rests on L palm, fingers pointing to the right (fig. 107).

Notes: McCarthy's illustration, if rotated 90 degrees counterclockwise, shows the figure as seen by an observer. Final figure is the same as 181, but displayed differently.

92. SPEAR-THROWER (E83777)

1. Position 1.
2. L2 picks up R palmar string.
3. R1 picks up R5n; L1, under L2n, picks up L2f; release L2 loop.
4. Release 5 loop gently, temporarily holding it under 3, 4 and 5.
5. 5 picks up 1f (release 3 and 4). 5f should be transverse with the upper 1n string looped around it.
6. 3 picks up 1f.
7. Release 5 loop; extend (fig. 108).

McCarthy method 92 belongs to *Granite Boulders* (106). The above

method represents steps 1 through 6 of McCarthy method 92, followed by release of the 5 loop. Note that McCarthy's illustration, which shows the figure as seen by the maker, is inaccurate: there is an extra wrap near R1 in the mounted specimen.

#### 93. THREE FISH-TRAPS (E83827)

1. Loop on 5.
2. R1, from below, picks up L5n; extend partially; L1, over R1 loop picks up R5n from below; extend fully. You now have single loops on each 1 and 5; the R1 loop is twisted half a turn away from you, the L1 loop half a turn towards you.
3. 1 picks up 5n.
4. 3 picks up 1f.
5. Release 5 loop.
6. Navaho 1 loops (note: lower 1 loops are not joined by a single transverse 1n string).
7. Extend, fingers pointing downward, palms away from you (fig. 109).

Note: McCarthy method 93 gives 198 (fig. 213). Above method reconstructed by the authors (steps 1 through 5 of *Bark Container* (125), followed by navaho).

#### 94. STILT (E83801)

1. Navaho opening.
2. 3, over all strings, picks up 1n; release 1 loop.
3. 1, over 2 loop but under 3n, picks up 3f; release 3 loop.
4. Rotate hands 180 degrees away from you, fingers pointing downward; lay 2 loop on the ground, then lay 1 loop on top of it; arrange as needed, pinching center of former 1n string to create head of bird (fig. 110).

Notes: Steps 2 and 3 simply reverse the half twist on 1 loop. A better way to extend and arrange the figure is as follows:

4. 1 removes 2 loop from below; enlarge double 1 loop by inserting 3, 4, and 5 from above, closing double 1f to the palm; rotate hands 180 degrees away from you and lay the figure on the ground; pinch center of



bottom straight string (former lower 1n) to form the head.

95. KINGFISHER (E83771)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up remaining 1f.
5. Release 5 loop; extend.
6. Release 1 loop; extend gently, drawing hands apart somewhat to reduce the size of the central figure (fig. 111).

Notes: McCarthy method 90 belongs here. McCarthy method 95 gives a three-dimensional figure pictured in one of McCarthy's photographs, but not illustrated in his paper. See appendix.

96. ONE ABORIGINAL (ALSO DEAD MAN) (E83751)

97. EVIL SPIRIT (E83666)

1. Navaho opening.
2. 1 removes 2 loop from above.
3. 5 picks up upper 1f.
4. 3 picks up 1f.
5. Release 1 loop.
6. 1, under 3 loop, enters 5 loop from below and returns with 5n and 3f.
7. Release 3 loop.
8. Repeat steps 4, 5, 6, and 7.
9. 3 picks up 1f; Pindiki extension (fig. 112)
10. Mouth picks up center strings where they cross, creating double mouth loop (fig. 113). Withdraw 1 from all loops.
11. Draw the 3 loop, from above, through the double mouth loop as follows: Pinch right double mouth string, close to the mouth, between R2 and R3; release double mouth loop and hold it in front of the strings of the L hand; Pass the tips of R1 and R2 through double loop and grasp L3f close to L3; draw it through the double loop held by R2 and R3, and place it on L2 so that the former L3f string becomes L2n; repeat on R hand (pinch double loop between L2 and L3 during the manipulations); release double loop and extend.
12. 1, under 2 loop, picks up 5n, then 2f.
13. Release 2 loop.

14. 3 picks up 1f; Pindiki extension (fig. 114).

Notes: McCarthy's illustration for *One Aboriginal* (96) shows the figure as seen by the maker. The illustration for *Evil Spirit* (97) is the same as for *One Aboriginal* (96) and *Echidna killed by a Stilt* (171). McCarthy's illustration for 97 is an artist's rendition and not based on photographic evidence: the extension on the thumbs and index fingers is therefore questionable. McCarthy method 96 is undecipherable. 205 (fig. 113) illustrates step 10.

#### 98. CROSS-SHOULDER STRAP (E83780)

1. Navaho opening.
2. R2 >>.
3. L2 >>.
4. R1 >>.
5. L1 >>.
6. Extend, palms away from you (fig. 115).

Notes: McCarthy's illustration shows an extra half twist on R2. It is not clear if this is an error or a deliberate feature of the figure (see below).

#### 99. TWO SHOVEL (IRON-BLADED) SPEARS (E83716)

1. Navaho opening.
2. 5, under 2 loop, removes 1 loop from below.
3. R2 loop >>>>>> (i.e., three full turns away from you).
4. R5 loop >>>>>> (i.e., three full turns away from you).
5. Re-insert L2 into its own loop from the opposite direction; extend, fingers pointing away from you (except for L2, which points toward you). (fig. 116).

Notes: As noted above for *Cross-shoulder Strap* (98), it is not clear if the asymmetric treatment of one index loop is a feature of the figure or just the whim of the informant. Note that both of these unusual features (the extra half twist on R2 in 98, and the inverted L2 loop in 99) can be incorporated into the figure from the beginning if, during the Navaho opening, the index fingers are inserted into the small loop in opposite directions (R2 towards you, L2 away from you).

## 100. TWO WOMEN FIGHTING (E83790)

1. Navaho opening.
2. R2 loop >>.
3. Mouth, over R1n, picks up R1f, removing loop from R1.
4. R4 and R5, under R2, remove mouth loop from below.
5. R1, from below, removes R2 loop.
6. R2, from below, removes R4-R5 loop.
7. Mouth removes R1 loop by grasping R1n.
8. R1 and R2 grasp mouth loop near right end, releasing mouth.
9. Mouth picks up L1n near loop held by R1 and R2; draw towards you slightly to extend (fig. 117).

101. PARROT-FISH SEQUENCE  
A. DUG-OUT CANOE (E83672)

1. Murray opening (pass right string in front of left string).
2. 1 passes away from you between upper 2n and lower 2n; L1 picks up upper L2f, while R1 picks up lower R2f; you now have a transverse 1n string encircled by the upper R2f - lower L2n string.
3. 5, over upper 2n, picks up lower 2n.
4. Upper 2n is a straight string that passes below most other strings; 3 picks up this string from the far side, drawing it through the 1 loops (fig. 118).
5. Release 1; extend sharply.
6. Lower 2f is now a transverse string running across the middle of the figure; 1 picks up this string; extend the figure in three dimensions, fingers pointing away from you (fig. 119).

B. ROCK-CRAB BAIT (E83674)

7. 1, over all strings, removes 5 loop from above.
8. With the opposite hand, navaho 1 loops, carrying the held loop over all strings and placing it on 5 to give a transverse 5f string.
9. Extend, fingers pointing away from you (fig. 120).

C. CATCHING PARROT-FISH (E83676)

10. Return hands to upright position. A transverse string passes across the

- center of the figure. 3 picks up this string from the far side (fig. 121).
11. Release 5 loops and extend sharply (fig. 122).

#### D. COOKING PARROT-FISH (E83744)

12. 5, from below, removes upper 3 loop.
13. Release remaining 3 loop; release double 2 loop.
14. 2, from above, remove 1 loop.
15. 1, under 2 loop, picks up 5n.
16. 1, from below, removes 2 loop.
17. 3 picks up 1f; Pindiki extension (fig. 123).

#### E. CROCODILE (E83845)

18. Release 3 loop.
19. Release 5 loop but do not extend; 5 enters former 5 loop from above, then picks up 1f string and extends.
20. Repeat step 19 six more times.
21. 3 picks up 1f; Pindiki extension (fig. 124).

Notes: McCarthy's illustrations for 101A, B, and C are scrambled (i.e., A belongs to C, B belongs to A, and C belongs to B). 101B (funnel-shaped figure) is as seen by an observer; 101C (four diamonds) is as seen by the maker. McCarthy's illustration for *Fish* (105) belongs to 101D, and McCarthy's illustration for 101D belongs to McCarthy method 80. McCarthy method 101D is undecipherable; the above method represents the authors' best guess at how to eliminate the index and middle finger loops from 101C.

#### 102. BUTTERFLY (E83756)

1. Steps 1 through 4 of *Dug-out canoe* (101A).
2. Extend, palms away from you. Release 1 loop gently but do not absorb the slack. Note that two diamonds are visible, but that the upper, outer sides are too long and the lower outer sides are too short, thus distorting the figure. Using the fingers of the opposite hand, shorten the former strings (and lengthen the latter) by feeding in string from one or more of the tightly coiled index loops. If necessary, release the 3 loop and retrieve it when finished (i.e., 3 picks up 1f; pindiki extension). (fig. 125).

## 103. BAT (E83846)

1. Murray opening.
2. 1 removes upper 2 loop from above.
3. 5, over 2 loop, picks up 1f.
4. 3 picks up 2n.
5. Release 1 loop; extend, displaying figure upside-down, fingers pointing downward, palms toward you (fig. 126).

## 104A. Two DINGOS (E83720, E83683)

1. Murray opening.
2. Point indices away from you and lay the figure on the ground, releasing hands. The nearest string the former lower 2n string; the farthest string is the former upper 2n string, both transverse.
3. Hands enter nearest loop from above, pass towards you under near transverse string, then return to the upright position, thus creating wrist loops; 1 picks both middle strings where they cross (fig. 89); extend.
4. 5 picks up 1f.
5. Release wrist loop with opposite hand and extend gently, fingers pointing away from you (fig. 90).

## 104B. FOUR DINGO PUPS (E83682)

6. Point fingers upward and lay the figure on your lap (do not remove hands); release 1 gently from its loops and pick up the nearest "vertical string" (i.e. the string that passes across the upper surface of the figure, spanning the framework strings); extend, picking up the figure.
7. 1 picks up 5n.
8. 3 picks up 1f; Pindiki extension (fig. 127).

Notes: *Two Dingos* (104A) is the same as *Two Armbands* (77), but made from the Murray opening rather than the Navaho Opening. McCarthy's illustration for 104B shows figure as seen by the maker. Diamond 2, upper string wrap, is incorrectly drawn.

## 105. FISH (NO SPECIMEN)

1. Murray opening (pass right string in front of left string).
2. 1 passes away from you between upper 2n and lower 2n; L1 picks up upper L2f, while R1 picks up lower R2f; you now have a transverse 1n string encircled by the upper R2f - lower L2n string.
3. 5, over upper 2n, picks up lower 2n.
4. Upper 2n is a straight string that passes below most other strings; 3 picks up this string from the far side, drawing it through the 1 loops (fig. 118).
5. Release 1 loop gently but do not extend; re-insert 1, from above, into the hanging loop and pick up the oblique string that runs from the palm to 5f (this string is actually the lower 2f string).
6. Release 5 loop to give a transverse string that runs across the middle of the figure.
7. 1, over all strings, removes 3 loop from above.
8. With the opposite hand, Navaho 1 loops, carrying the held loop over all strings and placing it on 5 to give a transverse 5f string.
9. 3, from the far side, picks up transverse string that runs across the center of the figure (created in step 6).
10. Release 5 and extend sharply (fig. 128).

Notes: McCarthy method 105 is a more direct way of making *Catching Parrot Fish* (101C). McCarthy's illustration for 105 belongs to *Cooking Parrot-Fish* (101D). There is no mounted specimen of this figure.

#### 106. GRANITE BOULDERS (E83753)

1. Position 1.
2. L2 picks up R palmar string.
3. L2 loop >>.
3. R1 picks up R5n; L1, under L2n, picks up L2f; release L2 loop.
4. Release 5 loop gently, temporarily holding it under 3, 4 and 5.
5. 5 picks up 1f (release 3 and 4). 5f should be transverse with the upper 1n string coiled around it.
6. 3 picks up remaining 1f.
7. Navaho 1 loops, lifting transverse 1n off of 1.
8. 1 removes 3 loop from above.
9. 3 picks up 1f; Pindiki extension; display figure inverted (fig. 129).

Notes: McCarthy method 92 belongs here.

## 107. COOKING CYCAD NUTS (E83808) OR SEA EAGLE (E83700)

1. Murray opening.
2. 1, under 2 loops, picks up 2f.
3. 1, from below, enters upper 2 loop and returns with upper 2n.
4. Navaho 1 loops.
5. Release upper 2 loop.
6. 2, from below, removes 1 loop.
7. Repeat steps 2, 3, and 4.
8. 3, over upper 2f, picks up lower 2n.
9. Extend, palms away from you.
10. Improve the extension as follows: R1 and R2 grasp the two strings forming the outer side of the left-most diamond (i.e., where the strings meet between L1 and L3); release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L3 loop). Repeat on right hand.
11. 3 picks up 1f; Pindiki extension (fig. 130).

Notes: A variation of *Two Sea-Hawks' Nests with Young* (47), made from the Murray opening rather than Opening A.

## 108. WAWALIK SISTERS STANDING UP (E83829)

1. Murry opening.
2. 1, from above, removes upper 2 loop.
3. 5, from below, removes 2 loop.
4. Untwist L5 loop and replace on L5; untwist L1 loop and replace on L1. Add an extra half twist to R1 loop by removing it, rotating it towards you half a turn, and replacing it on R1.
5. Extend (fig. 131).

Notes: This still is not right — needs work. Can't figure out correct view.

## 109. TWO BAMBOOS (E83764)

1. Grasp a short segment of a string between 1 and 2 of each hand; Form

a small upright loop by passing the left portion of the segment in front of the right portion; pinch string crossing between L1 and L2.

2. Insert R1, away from you, into the small loop and R5, also away from you, into the large loop; release L1 and L2 and insert L1 and L5 in a similar fashion.
3. Extend, fingers pointing away from you (fig. 132).

110. MAN THROWING SPEAR (E83804)

1. Loop on 2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 133).

111. PYGMY GOOSE (E83813)

1. Loop on L1, L2 and R2.
3. Lay figure on ground, withdraw hands and arrange (fig. 134).

112. PAPERBARK HEAD-COVER (E83815)

1. Double loop on 1 and 2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 135).

113. MANGROVE-GRUB (E83821)

1. Loop on 2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 136).

114. FISHING-LINE AND HOOK (E83822)

1. Loop on 2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 137).

115. CICATRICES (E83832)

1. Loop on 2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 138).



## 116. CASSAVA BUSH (E83837)

1. Loop on L2, R1, and R2.
2. Lay figure on ground, withdraw hands, and arrange (fig. 139).

## 117. OCTOPUS (E83810)

1. Murray opening.
2. Remove double loop from 2 and make Murray opening again with doubled loop.
3. R2 loop >> (fig. 140).

## 118. WATERHOLE OR BILLABONG (E83742)

Use a doubled loop.

1. Loop on 2 and 5 so that 2n and 5f are transverse and 2f and 5n cross (L2f-R5n string over R2f-L5n string).
2. 1, under 2 loop, enters 5 loop from below; return with 5n and 2f.
3. Release 2 loop.
4. 3 picks up 1f.
5. Release 1 loops.
6. 1, under 3 loop, enters 5 loop from below; return with 5n and 3f.
7. Release 3 loop.
8. 3 picks up 1f.
9. Grasp center of transverse 1n string with mouth and lift off of 1 (i.e., Navaho).
10. Release 5 loop; extend, palms away from you.
11. Rotate L hand 180 degrees away from you (fingers pointing downward, palm facing you) to open the figure, then rotate both hands an additional 180 degrees away from you, centering the figure over your stomach (fig. 141).

Notes: Same as *Waterhole or Billabong* (21), but made with a doubled string.

## 119. STONE AXE (E83665)

1. Single loop on 5.
2. L1, from below, picks up R5n and R5f; extend partially; R1, over dou-

ble L1 loop picks up L5n and L5f from below; extend fully. You now have single loops on each 5, and a double loop on each 1; the double R1 loop is twisted half a turn toward you, the double L1 loop half a turn away from you (fig. 142).

3. 2, from below, removes double 1 loop.
4. R2 loop >> (each double 2 loop now has the same twist).
5. L2 loop >>.
6. 2 loop >> (fig. 143).
7. Rotate L hand 90 degrees toward you (fingers pointing toward you, palm facing the right); rotate R hand 90 degrees away from you (fingers pointing away from you, palm facing the left) (fig. 144).

Notes: There is no photograph documenting this figure. McCarthy's illustration was created from notes written on the mounted specimen. Unfortunately, the specimen was upside-down when he recorded the positions of various fingers. McCarthy's illustration is therefore incorrect. McCarthy's notes also indicate that the figure is extended on the thumbs and little fingers, as in McCarthy's illustration; however, the instructions state that the thumb loops are transferred to the index fingers prior to twisting (step 3). 209 illustrates step 6 in progress.

#### 120. SCISSORS (E83675)

1. Double loop on 5.
2. 1 picks up 5n and 5f.
3. L2 picks up quadruple R palmar string; R2, through quadruple L2 loop from above, picks up quadruple L palmar string (as in opening A).
4. Release quadruple 1 loop.
5. Quadruple 2 loop >>>>>> (i.e., three full turns away from you).
6. Quadruple R2 loop << (subtract one twist).
7. Quadruple L2 loop << (subtract one twist).
8. Quadruple R2 loop >> (add one additional twist).
9. Rotate R hand 90 degrees toward you (fingers pointing toward you, palm facing the left); rotate L hand 90 degrees away from you (fingers pointing away from you, palm facing the right) (fig. 145).

Notes: McCarthy's illustration shows figure as seen by the maker. The twists seen on each little finger loop in McCarthy's illustration are created naturally when the index loops are overtwisted (i.e., no twisting of the 5



Notes: McCarthy's illustration shows figure as seen by the maker.

124. KNIFE (E83740)

1. Loop on 5.
2. R1, from below, picks up L5n and L5f; extend partially; L1, over double R1 loop picks up R5n and R5f from below; extend fully. You now have single loops on each 5, and a double loop on each 1; the double R1 loop is twisted half a turn away from you, the double L1 loop half a turn towards you.
3. 2 passes away from you, over 5 loop, hooks up 5n and 5f, then enters double 1 loop from above and picks up double 1f by rotating 2 half a turn away from you, thus straightening the finger.
4. 2 removes double 1 loop from above.
5. 1 picks up double lower 2n, close to 2, thus enlarging lower 2 loop.
6. Navaho double 2 loops by flexing 2 (i.e., insert 2 from above into loop encircling 1 and 2, allow lower double 2 loop to slip off of 2, then straighten 2).
7. Release double 1 loop (gently).
8. Extend; rotate L hand 180 degrees away from you (fingers pointing downward, palm facing you) to open the figure, then display vertically, left hand centered the stomach (fingers pointing to the right), and right hand centered over your chest, fingers pointing to the left (fig. 149).

Notes: McCarthy's illustration, when rotated 90 degrees counterclockwise, shows the figure as seen by the maker.

125. BARK CONTAINER (E83762)

1. Loop on 5.
2. R1, from below, picks up L5n; extend partially; L1, over R1 loop picks up R5n from below; extend fully. You now have single loops on each 1 and 5; the R1 loop is twisted half a turn away from you, the L1 loop half a turn towards you.
3. 1 picks up 5n.
4. 3 picks up 1f.
5. Release 5 loop.
6. 5 removes 3 loop from below (fig. 12).

7. 3 picks up 1f, close to 1.
8. Navaho 1 loops, lifting transverse 1n string off of 1.
9. 1 removes 3 loop from above.
11. 3 picks up 1f.
12. Navaho 1 loops.
13. Release 5 loop; extend (gives a four-diamond figure).
14. Mouth removes L1 loop from L1; L1 enters mouth loop from above and picks up the string that runs across the mouth loop (i.e., the lower outer side of the left-most diamond); release mouth loop; repeat on R hand.
15. Extend, fingers pointing downward, palms facing you (fig. 150).

Notes: Step 6 give 196 (fig. 12); step 7, if extended, gives 199 (fig. 13).

#### 126. WHITE MAN'S SHOE (E83767)

1. Double loop on 2.
2. L5 picks up double L2f.
3. L1 picks up double L2n.
4. Extend, fingers pointing away from you (fig. 151).

Notes: McCarthy's illustration shows figure as seen by the maker.

#### 127. DRONE-TUBE (E83776)

1. Double loop on 2.
2. Release L2 loop.
3. Pinch double R2n between R1 and R2; L1 and L2 grasp double R2f; complete the Navaho opening, passing double string held by R1 and R2 in front of double string held by L1 and L2.
4. Extend, fingers pointing away from you (fig. 152).

#### 128. CROW WALKING (E83793)

1. Make a double loop and lay it on your lap.
2. Arrange (fig. 153).

Notes: McCarthy method 128 calls for a quadruple loop followed by some sort of unfolding with 1 and 5 once the loop is placed on the lap.

## 129. THREE VULVAS (E83794)

1. Place double loop on right thigh, allowing the free ends to dangle on either side.
2. L1 and L2 reach between the legs and grasp one free end, while R1 and R2 grasp the other free end (right side of thigh). Lift the free ends above the thigh; pass the left free end through the right free end and lay the loops on the thigh.
3. You now have 3 doubled loops, the figure resembling Opening A. Label the loops A, B and C, A being nearest you. Each loop has a near and a far string, as well as a right and a left half. Arrange as follows: L1 and L2 grasp far strings of right B loop and lay them over the adjacent near strings of right C loop, while R1 and R2 grasp near strings of right B loop and lay them over the adjacent far strings of right 1 loop (fig. 154).

Notes: Rotate McCarthy's illustration 90 degrees counterclockwise to show the figure as seen by the maker.

## 130. WOODEN SPEAR-HEAD (E83805)

1. Extend a doubled loop on 1 and 2.
2. Place figure on ground, release hands, and arrange (fig. 155).

## 131. COCONUT PALM (E83835)

1. Extend a doubled loop on 1 and 2.
2. Place figure on ground, release hands, and arrange (fig. 156).

## 132. PAPA W TREE WITH FRUIT (E83836)

1. Navaho opening.
2. Lay figure on ground, release hands, and arrange. Embellish with 4 additional small string loops (fig. 157).

Notes: McCarthy method 132, steps 1 and 2, appear to be describing the initial stages of the Navaho opening.

## 133. BEE (E83796)

1. Grasp a short segment of the string loop with 1 and 2 of each hand.
2. Pass right portion of segment in front of left portion of segment, thus forming a small hanging loop; pinch string crossing between L1 and L2.
3. Slide R1 and R2 along the string held between their tips and repeat step 2, thus forming a second small hanging loop.
4. Insert 2, from behind, through large hanging loop and both small hanging loops; extend, giving a triple loop on each 2.
5. Lay figure on ground, release hands, and arrange (fig. 158).

## 134 THROUGH 151

The initial steps for making 134 through 151 are the same: "Make a small loop on a larger loop...extend on index fingers" i.e., *Murray opening*, allowing the loops to merge into one, doubled loop.

Some figures require a quadruple, or even an octuple loop. For these figures, simply repeat the *Murray opening* with the already doubled (or quadrupled) string.

Once the required loop is formed, lay the figure on the ground, withdraw the hands, and arrange. Although many of the figures appear to be the same, differences in size result in distinctly different names.

134. SNAIL (E83797) - DOUBLE LOOP (FIG. 159)

135. FEMALE WALLABY (E83798) - DOUBLE LOOP (FIG. 160)

136A. SEA-GULL (E83809) - DOUBLE LOOP (FIG. 161)

136B. EGG (E83851) - QUADRUPLE LOOP (FIG. 162)

137. OCTOPUS-HOLE IN ROCK (E83811) - DOUBLE LOOP (FIG. 163)

138. GEESE (E83812) - DOUBLE LOOP (FIG. 164)

139. CAMP (E83817) - DOUBLE LOOP (FIG. 165)

140. BRASS CANNON (E83823) - DOUBLE LOOP (FIG. 166)

141. CYCAD TREE RANGGA POST (E83850) - DOUBLE LOOP (FIG. 167)

142. RUNNING DOG (E83802) - DOUBLE LOOP (FIG. 168)

143. ANUS (E83755) - OCTUPLE LOOP (FIG. 169)

144. CASSAVA (E83838) - DOUBLE LOOP (FIG. 170)

145. PAINTED BARK COFFIN (E83834) - DOUBLE LOOP (FIG. 171)

146. TWO BANANAS (E83839) - DOUBLE LOOP SUBSEQUENTLY UNFOLDED (FIG. 172)

147A. CYCAD NUT SHELLED (E83849) - OCTUPLE LOOP (FIG. 173)

147B. CYCAD NUT COOKED (NO SPECIMEN) - DOUBLE LOOP (NO. FIG.)

148. FLAG (NO SPECIMEN) - OCTUPLE LOOP (FIG. 175)

149. GIRL POUNDING RAKIA BULBS (E83800) - QUADRUPLE LOOP (FIG. 176)

150. KANGAROO'S INTESTINES (E83774) - QUADRUPLE LOOP (FIG. 177)

151. COCONUT (E83833) - QUADRUPLE LOOP (FIG. 178)

152. MAN'S TRACK (E83766)

1. Quadruple loop on 2.
2. L1, from above, enters L2 loop and returns with double L2n; rotating L1 half a turn towards you to straighten it; lay the figure on the ground, fingers pointing upward (fig. 179).

153. CROW FLYING (E83791)

1. Double loop on 2.
2. Lay figure on ground, release hands, and arrange (fig. 180).

Note: McCarthy method 153 does not appear to belong to this figure.



## 154. DIVING DUCKS (E83819)

1. Quadruple loop on 2.
2. R2 > (i.e., half a turn away from you).
3. Lay figure on ground, withdraw hands, and arrange. Embellish with a second, small loop laid perpendicularly across the figure (fig. 181).

## 155. DOGS COPULATING (E83773)

Same as Two Armbands (77) and Two Dingos (104A), fig. 90. The opening is missing from McCarthy method 155. However, all subsequent steps require a figure "8" loop placed on the lap, and are identical to methods 77 and 104A. McCarthy's illustration, which shows the figure as seen by an observer, is upside-down.

## 156. ANT (E83772)

1. Position 1.
2. R1 passes between you and 1n, then enters L hand loop from below, returning with L1n, extend partially; release L1.
3. L1, from below, enters both R1 loops and returns. Thumbs now have a double 1n string and a single 1f string.
4. 2 picks up 1f.
5. Release 1 loops.
6. 1, under 2 loop, enters 5 loop from below and returns with 5n and 2f.
7. Release 2 loop.
8. 3 picks up 1f.
9. Release 5 loop.
10. 5, from below, removes 3 loop.
11. 3 picks up 1f.
12. Navaho 1 loops, lifting transverse 1n string off of 1.
13. 1, from above, removes 3 loop.
14. 3 picks up 1f.
15. Navaho 1 loops.
16. Release 5 loops; extend, palms away from you (fig. 182).

Notes: McCarthy's illustration shows figure as seen by an observer (hands were drawn in by an artist, inserted into loops from the wrong side).

## 157. CATERPILLAR CRAWLING ALONG A TWIG (E83710)

1. Position 1.
2. L1 and L2 grasp R1n and wrap it once (clockwise) around R1 to form a small loop; L1 and L2 release R1n.
3. L2, from below, enters small R1 loop and draws it out.
4. R2, through L2 loop from above, picks up L palmar string.; L2, through R2 loop from above, picks up R palmar string (as in opening A).
5. R2 enters R5 loop from above, then passes towards you under the strings and enters double R1 loop from below, thus picking up R2n, R2f, and both R1f strings.
6. Release double R1 loops; release R5 loop.
7. R2 >>>>>>>>> (i.e., 5 full turns away from you); gently remove the highly twisted loops from R2 and conceal them in the left palm, making a fist.
8. R1 and R5 enter upper L2 loop from above (slide them down the back of the finger); R1 continues by entering the lower R2 loop, also from above; R1 draws lower L2 loop through upper L2 loop; release L2; the former lower L2 loop is now on R1, the former upper L2 loop on R5; release twisted loops from palm of L hand and extend.
9. Lift L1 loop off of L1, rotate it towards you half a turn, and replace, thus creating a transverse 1f string.
10. 1 picks up 5n.
11. 3 picks up 1f; Pindiki extension (fig. 183).

158. MAN AND WOMAN COPULATING (E83688)  
OR WOMAN MENSTRUATING (E83842)

1. Loop over big toes; separate feet to extend loop.
2. L1 and L2 grasp center of near toe loop and draw it towards you, thus forming a triangle.
3. R1 and R2 pinch the side strings together, half way between toes and L hand.
4. Release L hand loop and use L1 and L2 to pinch together the side strings even closer to the feet, releasing R1 and R2.
5. R1 and R2 find the free end of the hanging loop and throw it away from you, over the far toe string. R1 and R2 then pass under the figure, recover the free end of the loop, and draw it towards you, thus wrapping the loop around the far toe string (fig. 184).

6. Thread the two loops held by L1 and L2 down through the single loop held by R1 and R2, releasing the single loop and returning the held loops to the left hand; extend (fig. 185).
7. Work the figure by tugging the inside strings of the held loops (fig. 186).

Notes: Rotate McCarthy's illustrations 90 degrees clockwise to see the figure as seen by the maker.

#### 159. KANGAROO'S TRACKS (E83754)

1. Double loop in position 1 on left hand only.
2. R1 and R2 grasp double L1n and wrap it once (counter-clockwise) around L1 to form a small double loop; R1 and R2 release double L1n.
3. R2 enters double hanging loop from below; extend; R1 and R2 enter small double loop on L1 from below, drawing it out.
4. Release double upper R2 loop; release double L5 loop; extend, fingers pointing away from you (fig. 187).

#### 160. MACASSAN PRAU, MAST AND ROPES (E83669)

1. Tie a knot in the loop of string about two inches from the end, thus forming a large and small loop.
2. Place the large loop on the hands in position 1 so that the knot is on the R palm. The small loop hangs from the knot on the R palm (fig. 188).
3. L2 picks up small loop hanging from R palmar knot and returns.
4. R2, from above, through small L2 loop, picks up L palmar string and returns (as in Opening A).
5. Release L1 loop and L5 loop; extend, fingers pointing away from you (fig. 189).

#### 161. ANT'S LEGS (E83775)

1. Opening A (pick up R palmar string first).
2. Release L2 loop and extend.
3. R hand makes a fist: L1 and L2 grasp R2 loop on back of L2 and draw it out slightly to form a small loop (release L1 and L2); L2 enters small loop from right to left (i.e., enters R2 loop from below) and removes it from R2 (open fist), rotating L2 half a turn towards you to straighten as

L hand returns to position; extend, fingers pointing away from you (fig. 190).

Notes: Apparently the strings were crossed when McCarthy's informant placed the loop on her hands in Position 1. Steps 1 through 5 of McCarthy method 161 describe the process of undoing this error. It is not clear if the half twist in the L2 loop is significant. The twist is also seen in *Yam* (173), an identical figure.

## FIGURES REQUIRING TWO PLAYERS

### 162. COFFIN ON A PLATFORM (E83825)

1. Player A: Opening A (pick up R palmar string first).
2. Player A: R2, from above, removes L2 loop; L2, from above, removes lower R2, lifting it over upper R2 loop (i.e. Exchange 2 loops, left through right).
3. Player B (facing you): 5 of B, from below, removes 5 loop of A.
4. Both players: Extend (fig. 191).

Notes: Rotate McCarthy's illustration 90 degrees counterclockwise to see view the figure as seen by the maker. The right twist in McCarthy's illustration does not match the mounted specimen.

### 163A. MALE OPPOSUM (NO SPECIMEN)

1. Player A: Navaho opening. Lay figure on ground, 2 pointing upward, 1 pointing downward.
2. 2 picks up former 1f; 1 picks up former 1n (pass 1 towards you, under 1n string, fig. 192); 2 hooks down former 2n (transverse string), drawing it through 2 loop (fig. 193); rotating 2 half a turn towards you to straighten the finger; extend, lifting figure off the ground.
3. 5, under 2f, picks up 2n.
4. Release L2 loop with the help of R1 and R2; release R2 loop with the help of L2.
5. Transfer the figure to the hands of Player B, placing them on same fingers.
6. Player B: 1 picks up 5n; 3 picks up 1f; Pindiki extension; display the

figure vertically as follow: rotate L hand 180 degrees away from you, fingers pointing downward, palm facing you, then rotate the entire figure 90 degrees counterclockwise so that L hand is centered over your stomach, fingers pointing to the right, and R hand is centered over you chest, fingers pointing to the left (fig. 194).

Notes: McCarthy's illustration shows figure as seen by the maker.

#### 163B. FEMALE OPPOSUM (E83689)

1. Player A (facing Player B): Insert 2 into L hand loops of Player B (L3 and L5 loops) on either side of the lower diamond; Player A raises 2, compressing the central diamonds, then inserts 1 into R hand loops of Player B (R3 and R5), on either side of the upper diamond (fig. 195).
2. Player B releases hands while Player A extends the figure on 1 and 2; Player A extends the figure vertically, R hand on top, fingers pointing away from you, palms facing each other (fig. 196).
3. Player B (facing Player A): Insert 2, from below, into L hand loops of Player A (L1 and L2 loops); insert 5, from below, into R hand loops of Player A (R1 and R2 loops). Player A releases hands while Player B extends the figure.
4. Player B: 1, under 2 loop, enters 5 loop and returns with 5n and 2f; release 2 loop.
5. 3 picks up 1f; Pindiki extension. Display the figure vertically by rotating the figure 90 degrees counterclockwise, fingers pointing to the left, palms facing away from you (fig. 197).

Notes: *Male opossum* (163A) is displayed with fingers pointing in opposite directions; female opossum is displayed with fingers pointing in the same direction (163B). The intermediate figure produced after step 2 (fig. 196) is the same as *Opossum in a Hole in a Tree* (167).

#### 164A. TWO YAMS (NO SPECIMEN)

1. Player A: Opening A (pick up R palmar string first).
2. Player A: Pinch 1, 2, and 3 together to prevent 2 loop from slipping; L1 and L2 draw out string on back of R2 to form a small upright loop; draw out L2 loop in a similar fashion; pass L upright loop distally through R upright loop; withdraw R2 and L2 from their original loops

and insert them into the nearest upright loop, thus exchanging 2 loops; extend.

3. Player B (facing player A): hands, from below, enter 5 loop of player A; B, with palms facing upward, hooks up 2f of player A with 5.
4. Player A: Gently release all loops; hands, from below, enter former 1 loop; A, with palms facing upward, hooks up former 2n with 5.
5. Both Players: draw 5 loops down through wrists loops, which slip off; 2 and 3, from above, remove 5 loop; extend figure on hooked 2 and 3, palms facing downward (fig. 198).

Notes: 192 illustrates *Two Yams* (164A).

#### 164B. FOUR YAMS (E83714)

6. Both players insert entire hand, from below, into the loop hooked under 2 and 3, thus transferring it to the wrist of the same hand.
7. A transverse string runs across the surface of the figure near each player (indicated by an "X" in fig. 198). Player A passes hands over the strings, grasps B's transverse string, and returns; Likewise, player B grasps A's transverse string and returns.
8. Both players: draw the transverse string down through the wrist loops, which slip off; extend (fig. 199).

Notes: McCarthy's illustration for *Echidna* (65) is a variation of this figure (loops interlock in the opposite direction).

#### 165A. GREEN TURTLE (NO SPECIMEN)

1. Two players each make opening A with their own loop of string.
2. Facing each other, player A inserts L hand, from above, into player B's R2 loop and R hand, from above, into player B's L2 loop. Player B releases her 2 loops, thus transferring them the wrists of Player A. Player B takes player A's 2 loops in a similar fashion.
3. Both players: with the help of the opposite hand, grasp 1 and 5 loops and lift them off the fingers; release wrist loop by inverting the hand, then replace held loops on 1 and 5.
4. Player A gently releases all loops, gathers them, and holds them in the mouth.
5. Player A inserts 2 and 3, from above, into opposite 5 loop of Player B

(i.e, R2 and R3 in L5 of partner), and draws back Player B's 5f string. Player B, from above, inserts 2 and 3 into his own 1 loops, releasing 1. Both players extend the figure, palms facing downward (fig. 200).

165B. GREEN TURTLE CUT OPEN (NO SPECIMEN)

6. Both players insert entire hand, from below, into the loop hooked under 2 and 3, thus transferring it to the wrist of the same hand.
7. A transverse string passes across the figure, parallel to and just beyond the string connecting your hands (indicated by an "X" in fig. 200). Player A passes hands over the strings, grasps B's transverse string, and returns; Likewise, player B grasps A's transverse string and returns.
8. Both players: draw the transverse string down through the wrist loops, which slip off; extend (fig. 201).

166. TORTOISE (NO SPECIMEN, E83729)

*Version 1* (no specimen)

1. Player A: Opening A (pick up L palmar string first).
2. Player A: mouth picks up 1n string.
3. Player B (facing A): pass hands away from you over all strings, including side strings emanating from A's mouth, then towards you, under the strings; grasp A's 5f string with 1 and 2 of each hand and return, drawing it over A's mouth strings.
4. Player B does the weaving: 3, through the held loops from above, hooks up A's L1f-R2n string (a single straight string), releasing loop held by 1 and 2.
5. 2, through hooked 3 loop from above, hooks up A's L2n-R1f string, releasing hooked 3 loop.
6. 3, through hooked 2 loop from above, hooks up A's L5n-R2f string, releasing hooked 2 loop.
7. 2, through hooked 3 loop from above, hooks up A's L2f-R5n string, releasing hooked 3 loop (fig. 202).

*Version 2* (E83729)

1. Player A: Opening A (pick up L palmar string first).
2. Player A: mouth picks up 1n string.

3. Player B (facing A): pass hands away from you over all strings, including side strings emanating from A's mouth, then towards you, under the strings; grasp A's L2n-R12f string (a single straight string) with 1 and 2 of each hand and return, drawing it over A's mouth strings.
4. Player B does the weaving: 3, through the held loops from above, hooks up A's L1f-R2n string (a single straight string), releasing loop held by 1 and 2.
5. 2, through hooked 3 loop from above, hooks up A's L5n-R2f string, releasing hooked 3 loop.
6. 3, through hooked 2 loop from above, hooks up A's L2f-R5n string, releasing hooked 2 loop.
7. 2, through hooked 3 loop from above, hooks up A's 5f string, releasing hooked 3 loop (fig. 203).

## 167. OPPOSUM IN A HOLE IN A TREE (E83719)

1. Player A: Navaho opening. Palms face each other.
2. Player B (facing Player A): 1 and 2 enter figure on either side of the central cross; grasp 1n (non-transverse strings), draw it toward you, then down, below 1f (transverse string) (fig. 203A); gently release 1n and grasp 1f (transverse string); draw it towards you, then up, above 2n (upper transverse string); 5 hooks up 2n, drawing it through loop held by 1 and 2; release loop held by 1 and 2; 1, from above, picks up lowest string (a continuation of A's 1n, after it passes through the twist on A's 1 loop (fig. 203B); A releases hands; B extends the figure.
3. Player B: 1 picks up 5n; 3 picks up 1f; Pindiki extension; display the figure vertically as follow: rotate L hand 180 degrees away from you, fingers pointing downward, palm facing you, then rotate the entire figure 90 degrees counterclockwise so that L hand is centered over your stomach, fingers pointing to the right, and R hand is centered over your chest, fingers pointing to the left (fig. 194).
4. Steps 1 and 2 of Female Opossum (163B), fig. 196.

Notes: *Opossum in a Hole is a Tree* (167) is essentially the same as the Male Opossum/Female Opossum series (163), except that a second person does the initial weaving of the Navaho opening and the game ends after the partner collapses the Male Opossum figure during the transfer.

## 168. SAWING WOOD (NO SPECIMEN)



1. Player A: Loop on 2, 3, 4, and 5.
2. Player A: R hand grasps L2n and wraps it once (counterclockwise) around the four fingers of the L hand; L hand grasps R2n and wraps it once (clockwise) around the four fingers of the R hand.
3. Player A: R3 picks up L palmar string; L3, through R3 loop from above, picks up R palmar string (cat's cradle opening).
4. Player B (to the right of Player A): R1 and R2 hand grasp A's transverse 5f string; L1 and L2 grasp A's transverse 2n string.
5. Player A: Draw hands downward, allowing double loops on backs of 2, 3, 4, and 5 to slip off (retain 3 loop); grasp 3 loop with 1 and 2 of the same hand, releasing 3 (fig. 204).
6. To work the figure, both players alternate drawing their hands apart.

### **STRING FIGURES FOR WHICH NO TECHNIQUES WERE RECORDED**

#### 169. CLAM SHELL (E83728) FIG. 93

Most likely a variation of *Forehead Band* (79). See p. X for a possible method. Rotate McCarthy's illustration 90 degrees clockwise to view the figure as seen by the maker.

#### 170. TWO MEN SPEARING STINGRAYS (E83745) FIG. 205

Most likely *Two Hungry Women* (44A), followed by steps 10-14 of *One Aboriginal* (96). In this case, "double" mouth loop should read "quadruple" mouth loop.

#### 171. ECHIDNA KILLED BY A STILT (E83824) FIG. 114

McCarthy states on the mounted specimen that this figure is the same as *Dead Man* (96). A Pindiki extension is used to display the figure.

#### 172. STEEL TOMAHAWK (E83703)

Most likely a variation of *Waterhole* (118):

1. Steps 1 through 10 of *Waterhole* (118).
2. L1, from above, removes R1 loop.
3. R1 and R2 lift L3 loop off of L3, rotate it half a turn away from you, and place it on L5 (former L3n becomes new L5f).
4. R2, from below, removes R3 loop; R2 > (extend figure with R2 in hooked position); display with fingers of L hand pointing away from you (fig. 206).

## 173. YAM (E83848) FIG. 207

Same as *Ant's Legs* (161), except made with a doubled loop. The mounted specimen was made with a quadrupled loop. McCarthy's illustration shows figure as seen by the maker.

## 174. TWINED BASKET (E83707)

Variation of *Tortoise* (166) in which the index loops are navahoed at one point. Method unknown.

## 175. HUT (NO SPECIMEN)

Same as *Man Lying Down* (5). Note that McCarthy's illustration is incorrect. The hands added later based on notes attached to the mounted specimen (there is no photograph). Although the fingers are inserted into the correct loops, they are inserted from the wrong side. As a result, McCarthy's illustration is upside-down and the palms face the wrong direction.

## 176. HUT (E83784)

To be solved.

## 177. Two BOYS (E83792) FIG. 208

Perhaps a thumb catch figure. Mounted specimen made with a doubled loop.

**UNNAMED STRING FIGURES FOR WHICH NO  
TECHNIQUES WERE RECORDED**

Many of these are simply intermediate stages that McCarthy happened to photograph. This explains why they are unnamed and why mounted specimens are lacking for all of them except 182 (E83730).

178.

Steps 1 through 6 of *Native Cat* (8); Pindiki extension (fig. 209).

Notes: String crossings in McCarthy's illustration do not match his photo; the photo shows two 1n strings and side knots are concealed by the thumbs.

179. (FIG. 210)

Right-handed version of Waterhole or Billabong (21): in Opening A, the L palmar string is taken up first, and in the final display, the right hand is rotated 360 degrees.

180.

A figure related to *Bat* (103), but with additional twists near 2. Possibly McCarthy method 95 after release of toe loops (fig 222).

181. (FIG. 20)

Steps 1 through 6 of *Little Boy Standing on One Leg* (11).

182.

Mounted specimen labelled *White Man*. Method unknown.

183. (FIG. 49)

Extension of *White Man* (37) prior to release of R2 loop. The figure is extended vertically, R hand on top (rotate McCarthy's illustration 90 degrees counterclockwise to view the figure as seen by an observer). One string crossing and one wrap in McCarthy's illustration does not match his photograph.

## 184. (FIG. 25)

Another illustration of *String Bag* (16) and *Lightning* (46), prior to releasing the mouth string. One wrap in McCarthy's illustration does not match his photograph.

## 185.

1. Opening A (pick up R palmar string first).
2. Release 5 loop.
3. 2, from below, removes 1 loop.
4. 1, over lower 2n, picks up lower 2f.
5. 1, over upper 2n, picks up upper 2f.
6. 3, over upper 2n, picks up lower 2n.
7. Navaho 1 loops.
8. To extend, turn palms away from you, then rotate R hand 180 degrees away from you so that palm faces you; swing L hand downward so that it is centered over your stomach (palm facing you, fingers pointing to the right); swing right hand upward so that chin rests on right palm, fingers pointing to the left (fig. 211).

Notes: McCarthy methods 36, 38, and 41. There are two photographs of this string figure in McCarthy's collection, but no mounted specimens. Rotate McCarthy's illustration 90 degrees clockwise to view the figure as seen by an observer.

## 186. (FIG. 18)

Same as *Macassan Man* (9), except for step 3: L2 loop >> (i.e., one full turn rather than two). Figure is displayed vertically, left hand on top.

## 187.

Possibly McCarthy method 46 after step 15 (fig. 219). See appendix.

## 188. (FIG. 62)

Intermediate stage produced after step 15 of *Forked-tail Kite* (48)/*Macassan Prau* (49A). The string crossings in McCarthy's drawing do

not match his photograph: in the photo, the center strings are entangled but not crossed to form diamonds.

189. (FIG. 51)

Extension of *Rakia Bulbs* (39). The string crossing between the left and middle diamond is a wrap in the photograph, not a simple crossing, as shown in the drawing.

190.

Possibly an illustration of McCarthy method 46 (fig. 220), see appendix.

191. (FIG. 63)

Extension of *Ibis* (50A). Several string crossings and wraps in the drawing do not match those in McCarthy's photo.

192. (FIG. 198)

Extension of *Two Yams* (164A).

193. (FIG. 31)

Extension of *Mangrove Crab* (20).

194. (FIG. 212).

The ubiquitous "W" figure — an intermediate stage of figures 1, 24, 74, 75, 76, and 86.

195. (FIG. 15, 108)

Same as *Spear Thrower* (92). There are two photographs of this figure in McCarthy's collection.

196. (FIG. 12, 29)

Extension of *Pig* (19).

## 197. (FIG. 36)

McCarthy method 32 gives 197. McCarthy method 32 is the same as steps 1 through 6 of *Dolphin* (26).

## 198.

1. Loop on 5.
2. L1, from below, picks up R5n; extend partially; R1, over L1 loop picks up L5n from below; extend fully. You now have single loops on each 1 and 5; the R1 loop is twisted half a turn towards you, the L1 loop half a turn away from you.
3. 1 picks up 5n.
4. 3 picks up 1f.
5. Release 5 loop.
6. 5 removes 3 loop from below.
7. 3 picks up 1f, close to 1.
8. Navaho 1 loops, lifting transverse 1n string off of 1.
9. Release 5 loop; extend, fingers pointing downward, palms facing you (fig. 213).

Notes: McCarthy method 93 belongs here. One of the string crossings in McCarthy's drawing does not match his photograph (the central transverse string does not pass through the central triangle).

## 199. (FIG. 13)

Steps 1 through 9 of *Native Cat* (8) if extended, palms away from you.

## 200.

1. Position 1.
2. L2 picks up R palmar string.
3. R1 picks up R5n.
4. L1, from below, removes L2 loop.
5. 3 picks up 1f.
6. Release 5 loop.
7. 5, from below, removes 3 loop.

8. 3 picks up 1f.
9. Navaho 1 loops, lifting straight 1n string off of 1.
10. 1, from above, removes 3 loop.
11. 3 picks up 1f; Pindiki extension (fig. 214).

Notes: McCarthy method 5 belongs here.

201. (FIG. 55)

Steps 1 through 7 of *Hungry Women* (44A).

202.

Variation of *Knife* (124). Method unknown.

203.

Simple variation of *Menstral Blood of Three Women* (57):

1. Opening A (pick up R palmar string first).
2. Exchange 2 loops, passing L2 loop through R2 loop.
3. 1, 2, and 5 loop >> (full twist away from you on each loop).
4. Extend, fingers pointing away from you (fig. 215).

204. (FIG. 73)

McCarthy method 60 gives 204. The number of twists seen in the drawing do not match those seen in McCarthy's photograph.

205. (FIG. 113)

Illustration of step 10 in making *One Aboriginal* (96)/*Evil Spirit* (97).

206. (FIG. 45)

Illustration of step 13 in making *Two Stingrays and Two Young Ones* (34B) or possibly *Two Women with Carrying-Bags* (75).

207.

1. Navaho opening.
2. 1, under 2n, picks up 2f; release 2 loop.
3. 5 picks up upper 1f.
2. L2 picks up R palmar string.
3. R1 picks up R5n.
5. L2, under L2n, picks up L2f; release L2 loop.
6. Release 5 loop.
7. R5, through upper R1 loop from above, picks up middle R1f (i.e., string that becomes upper L1f).
8. R3 picks up double R1f; L3 picks up triple L1f; Pindiki extension (no loop on L5).
9. Display the figure vertically as follows: Rotate R hand 180 degrees away from you (fingers pointing downward, palms away from you), then bring R hand upward so that chin rests on right palm, fingers pointing to the left. Swing left hand downward so that left palm faces stomach, fingers pointing to the right (fig. 216)

Notes: Method reconstructed by the authors based on *Spear Thrower* (92).

208.

1. Navaho opening.
2. 5, under 2 loop, removes 1 loop from below.
3. 1, from below, removes 2 loop.
4. All loops >> (i.e. one full turn away from you) (fig. 217).

Notes: Reconstructed by the authors. A simple variation of *Two Shovel Spears* (99).

209. (FIG. 143)

Step 6 of *Stone Axe* (119), in progress.

210.

Apparently an intermediate stage in the formation of a figure related to *Spindle* (122), but set up like *Stone Axe* (119).



211. (FIG. 42)

Extension of *Emu's Eggs* (31).

212. (FIG. 75)

Steps 1 through 6 of Human Faeces (63).

213. (FIG. 218)

An arranged figure resembling *Tree* (73). Probably made from the Murray Opening or a doubled loop.

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## APPENDIX

### McCarthy method 46:

1. Opening A (pick up R palmar string first).
2. Release 1 loop.
3. 1, under 2 loop, enters 5 loop from below; return with 5n and 2f.
4. Release 2 loop.
5. 2 picks up 1f.
6. Release upper 1 loop only.
7. 1, under 2n, picks up 2f; release 2 loop.
8. Release 5 loop.
9. 5 picks up upper 1f.
10. 3 picks up remaining 1f.
11. Navaho 1 loops, lifting transverse 1n string off of 1.
12. 1, from above, removes 3 loop.
13. 3 picks up 1f.
14. Navaho 1 loops.
15. Release 5 loop; extend (fig. 219).
16. R1 and R2 grasp the left "knot" where the strings meet between L1 and L3; release L hand gently, allowing the left side of the figure to fold in half; insert L5 away from you into the near hanging loop (distally into former L1 loop) and L1 away from you into both hanging loops (i.e., distally into former L1 loop and proximally into former L3 loop). Repeat on right hand.
17. 3 picks up 1f; Pindiki extension (fig. 220).

Notes: Fig. 219 (step 15) resembles 187; fig. 220 (step 17) resembles 190.

### McCarthy method 95

1. Navaho opening.
2. Toe picks up strings where they cross, thus creating a double toe loop.
3. 1 loop  $\gg$ .
4. 1, over 2n, picks up 2f.
5. 5 picks up 2n (segment between 2f and toe strings).
6. 3 picks up 1f (segment close to 1, outside toe strings); Pindiki extension to give a three-dimensional figure (fig. 221).

Notes: Releasing toe loops gives a two diamond figure (fig. 222) resembling 180, but lacking the extra twists on 2 loop.

Reconstructed Methods for the Jayne and Garsia Figures

Appendix III  
for H.C. Maude's  
'The String Figures of Nauru Island'  
(second edition)

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Four halftones (Garsia photos from Maude's book)  
Illustrations 1 - 10 (original line art)

Files: cowl\_61.wpd (Wordperfect for Windows, 6.1)  
cowl\_51.doc (Wordperfect 5.1)  
cowl.rtf (Rich text format)  
jyne827.tif through jyne841.tif  
garsia1.tif through garsia4.tif  
ill1.tif through ill10.tif

Date: April 17, 1998

Reconstructed methods for the Jayne and Garsia figures

As stated in the introduction, Honor Maude's 1937 visit to Nauru was inspired by illustrations of fifteen complicated Nauruan patterns in Caroline Furness Jayne's book String Figures, first published in 1906. The illustrations appeared on pages 367-370 under the heading "Figures Known Only from the Finished Patterns." During her visit, Mrs. Maude was able to gather methods for making nine of the 'Jayne' figures, but her informants were unable to remember how to make the remaining six.

During her second visit in 1938, which lasted only a day, Mrs. Maude encountered yet another set of finished patterns, these having been pinned to boards by Captain Garsia, the Australian administrator of Nauru. Garsia's notes stated that sixteen of the twenty-three figures he collected were recently invented, Maude's visit having inspired the creation of new designs. Of the twenty-three 'Garsia' figures, Mrs. Maude was able to record methods for making six of them. Photographs of figures 4 through 20 can be found in Appendix II.

In 1978, seven years after the publication of Mrs. Maude's book, the International String Figure Association (ISFA) was founded, Mrs. Maude being a charter member. Since then, members have spent long hours puzzling over the twenty remaining 'unsolved' Jayne and Garsia figures, wondering how they were made. It's clear from reading Mrs. Maude's book that new figures were often invented by shuffling and/or modifying the methods used in making older figures. This was therefore the approach adopted by members for reconstructing the unsolved figures. Over the years their reconstructions have appeared in numerous issues of the association's annual Bulletin. In 1996 a method for making the last unsolved figure (Seasnake) was published, thus ending a 90-year odyssey instigated by Mrs. Jayne in 1906. In Appendix III these methods are gathered together for the first time, rewritten in the style used by Mrs. Maude in her book.

Like the Nauruan classics gathered by Mrs. Maude, a long string is required for making the figures in Appendix III, and in most cases the final pattern needs to be arranged by a second person. In reconstructing the unsolved figures, careful attention has been paid to the polarity of the string crossings (over versus under) in the original illustrations, when visible. In addition, every effort has been made to employ authentic Nauruan techniques (i.e., techniques recorded by Mrs. Maude in her book).

To underscore the authenticity of the methods presented in Appendix III, a reference has been given at the end of nearly every step indicating where identical instructions can be found in Maude's book. In cases where modifications were deemed necessary the altered text has been italicized, thus emphasizing the 'minimal change' process that frequently underlies the invention of new string figures. Readers interested in learning more about the 'modular' nature of Nauruan string figures are encouraged to read Joseph D'Antoni's 1994 article, in which instructions for making one-hundred-thirty-five intricate new designs are given.

One final note: For some of the unsolved figures more than one reconstructed method has been published. For these figures, the most 'Nauruan' method has been selected for inclusion in Appendix III. Note, however, that this criterion does not guarantee that the chosen method is indeed the one used by the original inventor of the figure. In fact, we will never know exactly how the unsolved figures were originally made -- we can only speculate and marvel at their splendor.

Mark A. Sherman  
Editor, Bulletin of the International String Figure Association  
9 April 1998

For more information about the ISFA and its publications, visit our web site ([www.isfa.org/~webweavers](http://www.isfa.org/~webweavers)), or write us at P.O. Box 5134, Pasadena, California, 91117, USA.

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Jayne 827. Deimano

(The hull of a ship)

Reconstructed by Joseph D'Antoni and Mark Sherman

1. Nauru Opening II.
2. With right thumb and index make an upright loop on left near index string, by giving string a half twist anti-clockwise; insert left thumb away from you into loop, pass right thumb and index, from above, through upper left thumb loop, pull lower loop through upper loop, release thumb and replace original loop. Push loop to centre of figure. (Maude 80, step 3)
3. With thumbs hold down both strings of the *index and middle finger loops*; *pass indices under the near ring finger strings* and insert indices, from above, into little finger loops, hook up near little finger strings *and far ring finger strings* and bring them toward you, indices still pointing down, over all remaining strings, hook up near thumb strings away from you and straighten indices, release thumbs from all but upper far index strings *and lower near index strings*, pass them under all strings and return with far little finger strings; release little fingers. (variation of Maude 81, step 2)
4. Insert little fingers, from above, into upper index loops and transfer these loops to little fingers. (Maude 81, step 3)
5. Release indices, middle and ring fingers.
6. Insert indices, from above, into thumb loops and transfer thumb loops to indices; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings and insert, also from below, into index loops and release indices. (Maude 81, step 5)
7. Caroline Extension.

<Fig. 827 here>



Jayne 828. Itubwer

(Representation of a mat)

Reconstructed by Felix Paturi

This is Maude 101 (Itubwer III) made with Nauru Opening II rather than Nauru Opening I.

1. Nauru Opening II.
2. Pass thumbs, from above, through index loops, insert into middle finger loops, also from above, *insert into ring finger loops, also from above*, and return with far ring, middle, and index strings. (variation of Maude 101, step 2)
3. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 101, step 3)
4. Pass thumbs, from above, through lower index loops, under all other strings and return with far little finger strings; release little fingers. (Maude 101, step 4)
5. Transfer upper index loops to thumbs; pass little fingers over *ring*, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (variation of Maude 101, step 5)
6. Repeat 2, 3, 4, and 5 twice. (Maude 101, step 5)
7. Release indices, and middle fingers, *and ring fingers*. (variation of Maude 101, step 7)
8. Insert indices, from above, into thumb loops and release thumbs. (Maude 101, step 8)
9. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below and release indices. (Maude 101, step 9)
10. Caroline Extension. (Maude 101, step 10)

To match Jayne's illustration the figure needs to be turned over:

11. Release thumbs then pass them under index and little finger

loops, return with far little finger strings and release little fingers; transfer index loops to little fingers; insert indices, from above, into thumb loops and release thumbs; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 92, step 13)

## 12. Caroline Extension.

The resulting pattern barely resembles Jayne's illustration. A second person is needed to arrange the figure. To begin, follow the upper near thumb strings into the design and arrange as illustrated. Next, follow the lower near thumb strings and the strings labeled with arrows into the design and arrange as illustrated. If intertwined strings are encountered while arranging the interior, tease them to either side and position them just behind the upper near thumb strings, as illustrated.

<Fig. 828 here>

Note that several string crossings in Jayne's illustration are incorrectly drawn: (1) The parallel strings at \* (center) and \* (left of center) need to cross as they do at \* (far right); (2) The right segment of the string wrap at + needs to pass under the top frame line to prevent this region from collapsing.

Jayne 829. Egon (1) and Egameang (2), sitting on a stone (3)

(Two famous Nauruans sitting on a stone)

Identical to Maude 103 (Eigemeang) if, in step 6, the index loops are twisted away from you and the thumb loops twisted *towards* you. One string crossing (\*) in Jayne's original illustration is incorrectly drawn.

<Fig. 829 here>

Jayne 830. Itubwer

(Representation of a mat)

Identical to Maude 99 (Itubwer I) if, in step 2, the thumb loops are twisted *towards* you and all other loops are twisted away from you. Note that Jayne's illustration is upside-down. Also note that two different arrangements of the design are possible. If the internal string crossings do not match those in Jayne's illustration, rearrange the two strings marked \*, reversing their order along the far index string, to correct the problem.

<Fig. 830 here>

Jayne 831. Ijewaioi

(A Butterfly)

Reconstructed by Yukio Shishido

1. Nauru Opening I.
2. Pass thumbs over index loops, insert into middle finger loops from *above* and return with *far* middle finger strings. (variation of Maude 104, step 2)
3. Insert indices, from below, into thumb loops, return with *far* thumb strings and release thumbs. (Maude 104, step 3)
4. Pass thumbs, from below, through lower index loops, under all other strings and return with *far* little finger strings; release little fingers. (Maude 104, step 4)
5. Transfer upper index loops to thumbs; pass little fingers over middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 104, step 5)
6. Twist thumb loops by rotating thumbs towards you; twist *middle* and little finger loops by rotating first *middle* and then little fingers away from you. (variation of Maude 5, step 2).
7. Eongatubabo, thumbs holding down both strings of index loops, and near middle finger strings. (Maude 45, step 4)
8. Throw the two hanging loops (former index loops) away from you over the *far* index string, then grasp them with your teeth and draw them towards you. Arrange.

Note: A detailed mathematical analysis has shown that the string crossings (\*) at either end of the figure in Jayne's illustration are incorrectly drawn (Shishido 1996). Also note that if Nauru Opening I is used, the string crossing at the bottom of the hanging loops does not match Jayne's illustration. If Jayne's illustration is indeed correct, a modified version of Nauru Opening I (page xxviii) must be used:

1. Opening A.

2. Transfer *little finger* loops to middle fingers; bringing hands together insert left *little finger* from above into right *middle finger* loop, pick up right *far middle finger* string, draw hands slightly apart then insert right *little finger* from below into left *little finger* loop and extend. (variation of Nauru Opening I, step 2, page xxviii).

<Fig. 831 here>

Jayne 832. Egattamma

(A woman)

Identical to Maude 104 (Egattamma).

<Fig. 832 here>

Jayne 833. Itubwer

(Representation of a mat)

Reconstructed by Yukio Shishido and Mark Sherman

1. Opening A.
2. Pass thumbs *through index loops from above*, insert into little finger loops from below and return with near little finger strings. (variation of Maude 64, step 2)
3. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 64, step 3)
4. Pass thumbs, from above, through lower index loops, under little finger loops and return with far little finger strings; release little fingers. (Maude 64, step 4)
5. Pass little fingers, from above, through upper index loops, under lower index loops and thumb loops and return with near thumb strings; release thumbs. (Maude 64, step 5)
6. Pass thumbs, *from above*, through lower index loops, pass to the far side of upper far index strings and insert into upper index loops from above, release upper loops from indices, and thumbs return through lower loops. (variation of Maude 64, step 6).
7. Pass thumbs *through index loops from above*, insert into little finger loops from below, and return with near little finger strings. (variation of Maude 64, step 7)
8. Caroline Extension. (Maude 64, step 8)
9. Release thumbs. Insert thumbs, from above, into upper index loops and transfer these loops to thumbs; transfer thumb loop to indices (inverts upper index loops).
10. Repeat 4, 5, and 6.
11. Release indices.
12. Transfer thumb loops to indices.
13. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings



then insert into index loops, also from below, and release indices. (Maude 57, step 4)

14. Caroline Extension.

Note: Jayne's illustration is upside-down.

<Fig. 833 here>

Jayne 834. Etima (1) and Etowa (2)

(Nauru women of rank)

Identical to Maude 105 (Edema me Edouwa).

<Fig. 834 here>

Jayne 835. Echeog (1) and Edawaroi (2)

(Two women)

According to Mrs. Maude, Jayne 835 is identical to Eidiow Dogobea Eideuoaro (Maude 106) if the figure is finished with Amwangiyo rather than Small Amwangiyo after step 9. However, to obtain the exact figure illustrated by Jayne a few minor modifications and rearrangements are required. Here is the complete method:

1. Nauru Opening I.
2. Pass thumbs over *index loops*, insert into middle finger loops from below and return with near middle finger strings. (variation of Maude 106, step 2)
3. Insert indices, from below, into thumb loops, pick up far thumb strings and release thumbs. (Maude 106, step 3)
4. Pass thumbs, from above, through lower index loops, under middle and little finger loops and return with far little finger strings; release little fingers. (Maude 106, step 4).
5. Transfer upper index loops to thumbs; pass little fingers over middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 106, step 5)
6. Twist thumb loops *towards* you; twist index and middle finger loops away from you. (variation of Maude 106, step 8).
7. Insert little fingers, from below, into middle finger loops and return with far middle finger strings. (Maude 106, step 6)
8. *Pass indices, from above, through middle finger loops, then insert indices, from below, into little finger loops, pick up near little finger strings and release little fingers; transfer upper index loops to little fingers* (variation of Maude 106, step 7)
9. Release middle fingers. (variation of Maude 106, step 8)
10. Amwangiyo. (rather than Small Amwangiyo, Maude 106, step 9)
11. Nauru Ending.

12. Invert the figure: Release thumbs then pass them under index and little finger loops, return with far little finger strings and release little fingers; transfer index loops to little fingers; insert indices, from above, into thumb loops and release thumbs; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 92, step 13)
13. Caroline Extension.

<Fig. 835 here>

Jayne 836. Itubwer

(Representation of a mat)

Reconstructed by Honor Maude

Identical to Maude 100 (Itubwer II). Note that Jayne's illustration is upside-down.

<Fig. 836 here>

Jayne 837. Iiyanibongo

(A seasnake)

Reconstructed by Yukio Shishido

Steps 1-4 are Nauru Opening II formed on the right hand only:

1. Position 1.
2. Insert right index, from below, behind the left palmar string and extend.
3. Insert right ring finger, from below, into right index loop and return with right far index string.
4. Insert left index, from below, behind string at base of right middle finger and extend.

Right hand:

5. Release thumb.
6. Twist index loop towards you.
7. Twist ring finger loop towards you.
8. Transfer index loop to thumb.
9. Transfer ring finger loop to thumb. Thumb loops merge to form a double loop.
10. Insert thumb, from below, into little finger loop and return with near little finger string.
11. Pass index over upper thumb loop and insert it, from above, into double lower thumb loop, pick up on its tip the double lower near thumb string and release thumb from double lower loop, thus transferring double lower thumb loop to index finger. This move is similar to Amwangiyo, step 4 (page xxix).
12. Release little finger.
13. Pass little finger under double index loop, insert into thumb loop from below and return with far thumb string.

Left hand:

14. Release left index. Extend gently to absorb the slack, then grasp all strings in the middle of the figure with the left hand.

Right hand:

15. Twist double index loop towards you.
16. Transfer double index loop to thumb.
17. Pass index over upper double thumb loop and insert it, from above, into single lower thumb loop, pick up on its tip the single lower near thumb string and release thumb from single lower loop, thus transferring single lower thumb loop to index finger.
18. Pass thumb under far index string and return with it; release index.
19. Repeat 11-13.
20. Repeat 16-19.
21. Repeat 15, then 16-19.
22. Repeat 16-19.
23. Repeat 15, then 16-19.
24. Repeat 16-18, then 11.

Finish the pattern:

25. Release double right index loop; without releasing the left hand's grasp of the middle strings, lengthen the right thumb and right little finger loops by drawing the right hand to the right in zig-zag fashion (repeatedly pivot the right forearm); release the middle strings held by the left hand, then with left thumb and index grasp the segment of the right near thumb string that lies to the left of four strings that cross it (see arrow in illustration).

<illustration 1 here>

26. Twist right thumb loop away from you.

27. Transfer right thumb loop to right index.
28. Pass right thumb under right index loop, insert into right little finger loop from below, and return with right near little finger string.
29. Insert right thumb, from above, into right index loop and return with right far index finger string.
30. Pass right index, from the far side, under the string held by left thumb and index, return with it, releasing left thumb and index. To prepare for the final extension, reposition the lower right index loop so that it is also near the tip of the finger.
31. Insert left index, from above, into left thumb loop and transfer left thumb loop the left index.
32. Pass left thumb under left index loop, insert into left little finger loop from below, return with left near little finger string and insert, also from below, into left index loop and release left index.
33. Caroline extension. Arrange.

<Fig. 837 here>



Jayne 838. Etaroking

(A priestess of Nauru in olden times)

Reconstructed by Mark Sherman

Maude 107 (Etaroking) is almost identical to Jayne 838. However, the string crossings at the left and right of the central diamond differ significantly. The reconstructed figure given below, when viewed from the back, matches Jayne's illustration (i.e., Jayne's illustration shows the figure as seen by an observer facing the maker). The reconstructed method begins with a variation of Nauru Opening II, borrowed from Maude 92 (Apegogora).

1. Opening A. (Maude 92, step 1)
2. Transfer index loops to ring fingers. (Maude 92, step 2)
3. Insert middle fingers, from below, into thumb loops and return with far thumb strings. (Maude 92, step 3)
4. Insert indices under opposite palmar strings as in Opening A, *retrieving the left palmar string first*. (Maude 92, step 4, amended).

Henceforth, steps 1 through 4 will be referred to as *Nauru Opening III*. It differs from Nauru Opening II with respect to the polarity of the string crossings (over versus under). An alternative method for making Nauru Opening III is to interchange right and left in step 3 of Maude's original description of Nauru Opening II (page xxviii).

5. Transfer middle finger loops to indices. (Maude 93, step 5)
6. Pass thumbs, *from above*, through lower index loops, pass to the far side of upper far index strings and insert into upper index loops from above, release upper loops from indices, and thumbs return through lower loops. (variation of Maude 64, step 6).
7. Insert *middle* fingers, from above, into *upper* thumb loops and transfer *upper* thumb loops to middle fingers. (variation of Maude 71, step 11)
8. *Insert thumbs, from above, into index loops, and insert into middle* finger loops from below; return to position with near *middle* finger strings and far index strings. (variation of

Maude 107, step 2)

9. Insert indices, from below, into thumb loops; return with far thumb strings and release thumbs. (Maude 107, step 3)
10. Pass thumbs, from above, through lower index loops, under all remaining strings and return with far little finger strings; release little fingers. (Maude 107, step 4)
11. Transfer upper index loops to thumbs; pass little fingers over ring, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 107, step 5)
12. Pass thumbs over index loops, insert into *middle* finger loops from above and return with *far middle* finger strings. (variation of Maude 107, step 6)
13. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 107, step 7)
14. Transfer upper index loops to thumbs. (Maude 107, step 8)
15. Release indices, middle and ring fingers. (Maude 107, step 9)
16. Insert indices, from above, into thumb loops and release thumbs. (Maude 107, step 10)
17. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, insert into index loops, also from below, and release indices. (Maude 107, step 11)
18. Caroline Extension. A second person arranges figure. (Maude 107, step 12)

<Fig. 838 here>

Jayne 839. Tinamitto

(A Nauru dandy)

Reconstructed by Yukio Shishido

Maude 108 (Tinamitto) is not identical to Jayne 839, despite the shared title. Shishido's reconstruction is based on Maude 92 and Maude 111:

1. Nauru Opening II (page xxviii), but in step 1 use Opening B rather than Opening A, and in step 3 interchange right and left.
2. Pass indices under middle and ring finger loops and insert into little finger loops from below, straighten indices, bring towards you, insert into thumb loops from above (*pick up near thumb strings*) and return to position; release thumbs. (variation of Maude 111, step 2)
3. Pass thumbs, from below, through lower index loops, hold upper far index strings against tips of indices and twist indices down, towards you and up, through lower index loops, which fall off, and return to position; release thumbs. (Maude 111, step 3).
4. Transfer index loops to thumbs. (Maude 111, step 4)
5. With opposite hand bring little finger loops up through ring finger loops, remove from little fingers and replace. (variation of Maude 111, step 5)
6. Release ring fingers.
7. Transfer thumb loops to indices; pass thumbs under index and middle finger loops, insert into little finger loops from below, return with near little finger strings and both middle finger strings, then insert into index loops, also from below, and release indices. (Maude 111, step 7)
8. Caroline Extension. (Maude 111, step 8)

<Fig. 839 here>

Jayne 840. Egarawinago

(A lady of quality)

Identical to Maude 109 (Eidiowinago), steps 1-7, if, in step 3 of Nauru Opening II (page xxviii), right and left and interchanged.

<Fig. 840 here>

Jayne 841. Ibunemun

(A man)

Reconstructed by Honor Maude

Maude 111 (Imwinuman), when modified as described by the author, is identical to Jayne 841 if, in step 2 of Nauru Opening I (page xxviii), right and left are interchanged.

<Fig. 841 here>

Garsia 4. Deban Atia

(Grandchild of Chief Gaunubwe)

Invented by Simon Quanijo in 1938. See Maude 88.

Garsia 5. Itsiyo me Araiman

(The first Nauruans)

Invented by Simon Quanijo and Ijauwe in 1938. See Maude 87. Note that the photograph shown on page 99 of Maude's book is not Garsia 5. However, Maude's instructions do indeed give Garsia 5.

Garsia 6. Ibiaro

(Twin children)

Reconstructed by Joseph D'Antoni

Invented by Simon Quanijo and Ijauwe in 1938. D'Antoni's reconstruction is based on Maude 98 and Maude 108.

1. Opening A.
2. Transfer little finger loops to indices, then insert little fingers, from above, into upper index loops and transfer these loops to little fingers. (Maude 98, step 3)
3. With right thumb and index draw left near little finger string up through index loop, make an upright loop on this string, by giving it a clockwise twist, insert little fingers towards you into loop, draw hands apart and Navaho little fingers. This produces a small 'sun' formed by near little finger strings and far index strings. (Maude 98, step 4)

<illustration 2 here>

4. With fingers pointing up lay figure flat and release *little fingers only*; make a loop lying away from you on the top string, to right of 'sun', by giving string a half twist *clockwise* and then give the loop thus formed another twist; insert right thumb away from you into this loop, pass left thumb from left to right under strings of 'sun' which lie over top string, then insert into made loop beside right thumb and return through 'sun' with right near thumb string.

<illustration 3 here>

Extend hands slightly. *Insert little fingers, from above, into upper thumb loops, transfer upper thumb loops to little fingers.* (variation of Maude 108, step 4)

5. Lay figure flat again (*fingers pointing upward*); find the loop which now makes a tail to the 'sun', enlarge it, pull it down, *and lay it within the index loops.* (variation of Maude 108, step 5, first half)

<illustration 4 here>



6. Give the tail a half-twist clockwise and allow it to rest within the index loops.
7. *Without lifting the figure*, transfer thumb loops to indices, then insert thumbs, from above, into upper index loops and transfer these loops to thumbs. (Maude 98, step 2, amended)
8. With right thumb and index draw left far thumb string up through (left) index loop, then bring up through center of 'tail', make a loop on it *by giving it a half-twist clockwise*, insert thumbs away from you into loop and Navaho thumbs. (variation of Maude 98, step 5).
9. Twist index loops away from you.
10. Small Amwangiyo.

Garsia 7. Eoen Kadama

(Hook for catching flying fish in the daytime)

Reconstructed by Joseph D'Antoni and Mark Sherman

This figure, given by Ijauwe, is said to be an old one.

1. Nauru Opening III. (see Jayne 838)
2. Pass thumbs *over index loops*, through *middle finger loops* from above, insert into *ring finger loops*, also from above, and return with far *ring* and far *middle finger* strings. (variation of Maude 101, step 2)
3. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 101, step 3)
4. Pass thumbs *under index loops*, through *middle finger loops* from above, under all other strings and return with far little finger strings; release little fingers. (variation of Maude 101, step 4)
5. Transfer upper index loops to thumbs; pass little fingers over *ring*, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (variation of Maude 101, step 5)
6. Insert thumbs, from below, into *index loops* and return with near *index* strings. (variation of Maude 107, step 6)
7. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 107, step 7)
8. Transfer upper index loops to thumbs. (Maude 107, step 8)
9. Release indices, middle and ring fingers. (Maude 107, step 9)
10. Insert thumbs, from below, into little finger loops and return with near little finger strings; insert indices, from below, into thumb loops, pick up far thumb strings and release thumbs. Transfer index loops to thumbs. (Maude 71, step 9)
11. Insert little fingers, from below, into thumb loops and

return with far thumb strings; insert indices, from below, into little finger loops, pick up near little finger strings and release little fingers; transfer index loops to little fingers. (Maude 71, step 10)

12. Repeat 11, then 10.
13. Insert indices, from above, into thumb loops and transfer thumb loops to indices. (Maude 71, step 11)
14. Pass thumbs under index loops and insert into little finger loops from below, return and insert into index loops also from below; release indices. (Maude 71, step 12)
15. Caroline Extension. (Maude 71, step 13)

Garsia 8. Eidobu

(The name of a woman)

Learnt from Ijauwe. See Maude 94.

Note regarding photograph of Garsia 9 through 13: Spurious doubled strings can be seen in all of the figures in this photograph. Also note that the photograph is overexposed. While it's possible that a doubled loop was used for these figures it seems unlikely given their large size. A more likely explanation is that the doubling is a photographic artifact. Overexposure suggests that the shutter was left open longer than necessary, and under windy conditions, it's possible that some of the loosely attached strings moved while the image was being captured on film.

## Garsia 9. Enaginuere

(A cave in Ewa)

Reconstructed by Joseph D'Antoni

An old figure, given by Ijauwe. It appears to be Maude 86 made with Nauru Opening I rather than II:

1. Nauru Opening I.
2. Pass thumbs over near index strings and under far index strings; over near middle finger strings and under far middle finger strings; ... return to position with the two far strings. (variation of Maude 86, step 2)
3. Insert indices, from below, into thumb loops, pick up far thumb strings and release thumbs. (Maude 86, step 3)
4. Pass thumbs over lower near index strings and under lower far index strings; over near middle finger strings and under far middle finger strings ... and both little finger strings; return to position with far little finger strings and release little fingers. (variation of Maude 86, step 4)
5. Transfer upper index loops to thumbs; pass little fingers over ... middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (variation of Maude 86, step 5)
6. Release indices and middle fingers. (variation of Maude 86, step 6)
7. Insert indices, from above, into thumb loops, pick up near thumb strings and release thumbs. (Maude 86, step 7)
8. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings and insert into index loops, also from below; release index fingers. (Maude 86, step 8)
9. Caroline Extension and arrange figure. (Maude 86, step 9)

Garsia 10. Uea

(A king)

Reconstructed by Joseph D'Antoni and Mark Sherman

Invented by Simon Quanijo and Ijauwe in 1938.

1. Nauru Opening I.
2. Transfer *middle finger* loops to *little fingers*, then insert *middle fingers*, from above, into upper *little finger* loops and transfer these loops to *middle fingers*. (variation of Maude 98, step 2)
3. Transfer *little finger* loops to indices, then insert *little fingers*, from above, into upper index loops and transfer these loops to *little fingers*. (Maude 98, step 3)
4. Transfer *middle finger* loops to *little fingers*.
5. With right thumb and index draw *lower left* near *little finger* string up through index loop, make an upright loop on this string, by giving it a clockwise twist, insert *little fingers* towards you into loop, draw hands apart and Navaho *little fingers* (*lower double loop over upper single loop*). This produces a *double 'sun'* formed by near *little finger* strings and far index strings. (variation of Maude 98, step 4)
6. With fingers pointing up lay figure flat and release *little fingers only*; make a loop lying away from you on the top string, to right of 'sun', by giving string a half twist *clockwise* and then give the loop thus formed another twist; insert right thumb away from you into this loop, pass left thumb from left to right under strings of 'sun' which lie over top string, then insert into made loop beside right thumb and return through 'sun' with right near thumb string. Extend hands slightly. Insert *little fingers*, from above, into upper thumb loops, transfer upper thumb loops to *little fingers*. (variation of Maude 108, step 4)
7. Lay figure flat again (*fingers pointing upward*); find the loop which now makes a tail to the 'sun', enlarge it, pull it down, and lay over the thumb loops. (variation of Maude 108, step 5, first half)

8. Pass right thumb and index, from above, through *tail* loop, remove left thumb loop, bring up through *tail* loop and replace on left thumb. Repeat on opposite hand. (variation of Maude 41, step 3)
9. With right thumb and index make an upright loop on left near index string, by giving string a half twist anti-clockwise; insert left thumb away from you into loop, pass right thumb and index, from above, through upper left thumb loop, pull lower loop through upper loop, release thumb and replace original loop. Push loop toward centre of figure. (Maude 80, step 3)
10. With left thumb and index make an upright loop on right near index string, by giving string a half twist clockwise; insert right thumb away from you into loop, pass left thumb and index, from above, through upper right thumb loop, pull lower loop through upper loop, release thumb and replace original loop. Push loop toward centre of figure. (Maude 80, step 3, performed on right hand)
11. Twist index loops away from you.
12. Small Amwangiyo.
13. Invert the figure: Release thumbs then pass them under index and little finger loops, return with far little finger strings and release little fingers; transfer index loops to little fingers; insert indices, from above, into thumb loops and release thumbs; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 92, step 13)
14. Caroline Extension.
15. Locate the four strings that wrap around the center of the far index string. Two of the four strings feed into the pattern to become horizontal loops that bisect the large diamonds on either end of the figure. With teeth draw out this pair to create the king's 'crown'.



Garsia 11. Daragine

(A Nauruan fairy story)

Reconstructed by Mark Sherman

An old figure, given by Ijauwe. It appears to be an incomplete version of Garsia 7.

1. Nauru Opening III (see Jayne 838).
2. Pass thumbs *over index loops*, through *middle finger loops* from above, insert into *ring finger loops*, also from above, and return with *far ring* and *far middle finger* strings. (variation of Maude 101, step 2)
3. Insert indices, from below, into thumb loops, return with *far thumb* strings and release thumbs. (Maude 101, step 3)
4. Pass thumbs *under index loops*, through *middle finger loops* from above, under all other strings and return with *far little finger* strings; release little fingers. (variation of Maude 101, step 4)
5. Transfer upper index loops to thumbs; pass little fingers *over ring*, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (variation of Maude 101, step 5)
6. Release indices, middle *and ring* fingers. (variation of Maude 101, step 7)
7. Insert indices, from above, into thumb loops and release thumbs. (Maude 101, step 8)
8. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, insert into index loops, also from below, and release indices. (Maude 101, step 9)
9. Caroline Extension. (Maude 101, step 10)
10. Invert the figure: Release thumbs then pass them under index and little finger loops, return with *far little finger* strings and release little fingers; transfer index loops to little fingers; insert indices, from above, into thumb loops

and release thumbs; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 92, step 13)

11. Caroline Extension.

Garsia 12. Aiju Edetan.

(Three Stars)

Reconstructed by Mark Sherman

Invented by Ijauwe in 1938. It appears to be a simple variation of Maude 86.

1. Nauru Opening II. (Maude 86, step 1)
2. Pass thumbs over near index strings and under far index strings; over near middle finger strings and under far middle finger strings; over near ring finger strings and under far ring finger strings; return to position with the three far strings. (Maude 86, step 2)
3. Insert indices, from below, into thumb loops, pick up far thumb strings and release thumbs. (Maude 86, step 3)
4. Pass thumbs over lower near index strings and under lower far index strings; over near middle finger strings and under far middle finger strings; over near ring finger strings and under far ring finger strings and both little finger strings; return to position with far little finger strings and release little fingers. (Maude 86, step 4)
5. Transfer upper index loops to thumbs; pass little fingers over ring, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 86, step 5)
6. Release indices, middle and ring fingers. (Maude 86, step 6)
7. Extend figure by picking up near thumb strings on tips of indices. Lay figure flat by pointing fingers down; carefully release thumbs and index loops. Make a loop on the top string to the right of central figure by giving right hand end an anti-clockwise twist. Insert right thumb, away from you, into this loop; insert left thumb from left to right under six strings which lie across top string, insert into right hand thumb loop, from below, and return. (variation of Maude 87, step 8)
8. Insert indices, from above, into thumb loops, pick up near thumb strings and release thumbs. (Maude 86, step 7)

9. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings and insert into index loops, also from below; release index fingers. (Maude 86, step 8)
10. Caroline Extension and arrange figure (Maude 86, step 9)
11. Invert the figure: Release thumbs then pass them under index and little finger loops, return with far little finger strings and release little fingers; transfer index loops to little fingers; insert indices, from above, into thumb loops and release thumbs; pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 92, step 13)
12. Caroline Extension and arrange figure (Maude 86, step 9)

Garsia 13. Itubwer

(A mat)

Reconstructed by Joseph D'Antoni

An old figure given by Ijauwe. This reconstruction, based on Maude 68, is surely correct since Maude states at the bottom of page 77 that "an alternative ending is to perform Eongatubabo after 6."

1. Opening A. (Maude 68, step 1)
2. Insert thumbs, from above, into index loops, return with far index strings. (Maude 68, step 2)
3. Insert indices, from below, into thumb loops, return with far thumb strings and release thumbs. (Maude 68, step 3)
4. Pass thumbs, from above, through lower index loops, under little finger loops and return with far little finger strings; release little fingers. (Maude 68, step 4)
5. Transfer upper index loops to thumbs; insert little fingers, from above, into upper thumb loops and transfer these loops to little fingers. (Maude 68, step 5)
6. Repeat 2, 3, 4 and 5 *three more times*; each repetition produces another diamond. (variation of Maude 68, step 6)
7. Twist all loops away from you. (Maude 66, step 7, amended)
8. Eongatubabo.

Garsia 14. Domaneab

(A meeting house)

Reconstructed by Mark Sherman

Invented by Mweiija in 1938. It appears to be a variation of Jayne 838.

1. Nauru Opening III (see Jayne 838).
2. Transfer middle finger loops to indices. (Maude 93, step 5)
3. Pass thumbs, *from above*, through lower index loops, pass to the far side of upper far index strings and insert into upper index loops from above, release upper loops from indices, and thumbs return through lower loops. (variation of Maude 64, step 6).
4. Insert *middle* fingers, from above, into *upper* thumb loops and transfer *upper* thumb loops to middle fingers. (variation of Maude 71, step 11)
5. *Insert thumbs, from above, into index loops*, and insert into *middle* finger loops from below; return to position with near *middle* finger strings and far *index* strings. (variation of Maude 107, step 2)
6. Insert indices, from below, into thumb loops; return with far thumb strings and release thumbs. (Maude 107, step 3)
7. Pass thumbs, from above, through lower index loops, under all remaining strings and return with far little finger strings; release little fingers. (Maude 107, step 4)
8. Transfer upper index loops to thumbs; pass little fingers over ring, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 107, step 5)
9. Pass thumbs, from above, through index loops, under middle finger loops, insert into ring finger loops from below and return with near ring finger strings. Release ring fingers. Pass ring fingers over middle and index loops, insert into upper thumb loops from below, and transfer these loops to ring fingers.

10. Release indices.
11. Extend figure by picking up *far little finger* strings on tips of indices. Lay figure flat by pointing fingers up; carefully release *little fingers* and index loops. Make a loop on the top string to the right of central figure by giving right hand end a *clockwise* twist. Insert right thumb, away from you, into this loop; insert left thumb from left to right under four strings which lie across top string, insert into right hand thumb loop, from below, and return. (variation of Maude 87, step 8)
12. Pass little fingers over ring and middle finger loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 87, step 5, second half)
13. Lay figure flat with fingers pointing up; carefully release thumbs. Make a loop on the *bottom* string to the right of central figure by giving right hand end a *clockwise* twist. Insert right thumb, away from you, into this loop; insert left thumb from left to right under *two* strings which lie across *bottom* string, insert into right hand thumb loop, from below, and return. (variation of Maude 87, step 8)
14. Note that the far thumb strings now interlock before becoming far ring finger strings. Insert indices into the ringlets that encircle thumb loops, pass them toward the center of the figure, pick up interlocking strings and return through ringlets, thus creating index loops from the interlocking strings.

<illustration 5 here>

15. Transfer thumb loops to indices.
16. Pass thumbs, from above, through lower index loops, under all remaining strings and return with far little finger strings; release little fingers. (Maude 107, step 4)
17. Transfer upper index loops to thumbs; pass little fingers over ring, middle and index loops, insert into upper thumb loops from above, with backs of little fingers pick up upper near thumb strings and return to position releasing thumbs from upper loops. (Maude 107, step 5).
18. Release indices and middle fingers.

19. Caroline extension with near thumb strings. (Maude 109, step 7)



## Garsia 15. The Cantilever Jetty

Reconstructed by Mark Sherman

Invented by Mweiija in 1938. This figure is a continuation of Garsia 14.

Complete Garsia 14, undo the Caroline Extension (release the near thumb string from the index tips), then:

20. Release ring fingers.
21. Insert indices, from above, into thumb loops and release thumbs. (Maude 107, step 10)
22. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, insert into index loops, also from below, and release indices. (Maude 107, step 11)
23. Caroline Extension. A second person arranges the figure. (Maude 107, step 12)

Garsia 16. Einogog me Euamwe  
(Grandchildren of Chief Gaunubwe)

Invented by Ijauwe in 1937. See Maude 91.

Garsia 17. Eidagage

(A woman relation of the Chief Eoai)

Reconstructed by Joseph D'Antoni

An old figure, given by Ijauwe. The beginning is the same as Garsia 6.

1. Opening A.
2. Transfer little finger loops to indices, then insert little fingers, from above, into upper index loops and transfer these loops to little fingers. (Maude 98, step 3)
3. With right thumb and index draw left near little finger string up through index loop, make an upright loop on this string, by giving it a clockwise twist, insert little fingers towards you into loop, draw hands apart and Navaho little fingers. This produces a small 'sun' formed by near little finger strings and far index strings. (Maude 98, step 4)

<repeat illustration 2 here>

4. With fingers pointing up lay figure flat and release *little fingers only*; make a loop lying away from you on the top string, to right of 'sun', by giving string a half twist *clockwise* and then give the loop thus formed another twist; insert right thumb away from you into this loop, pass left thumb from left to right under strings of 'sun' which lie over top string, then insert into made loop beside right thumb and return through 'sun' with right near thumb string.

<repeat illustration 3 here>

Extend hands slightly. *Insert little fingers, from above, into upper thumb loops, transfer upper thumb loops to little fingers.* (variation of Maude 108, step 4)

5. Lay figure flat again (*fingers pointing upward*); find the loop which now makes a tail to the 'sun', enlarge it, pull it down to base of the figure, *behind crossing of near index and far thumb strings*, put under bottom string,

<illustration 6 here>

then bring it over and up to top of figure; insert tail loop to right and left at 'a,a' and out at 'b,b'.

<illustration 7 here>

*Gently release little fingers, insert from above into tail loops at 'c,c', pick up top string by passing under it and up at 'd,d' and return through tail loops. Extend hands but do not pull tight. (variation of Maude 108, step 5)*

6. Twist index loops away from you.
7. Amwangiyo.
8. Nauru Ending.

Garsia 18. Aom

(A hermit crab)

Reconstructed by Yukio Shishido

Invented by Ijauwe in 1938. Shishido's highly innovative reconstruction is not entirely Nauruan, but does give the correct figure.

1. Opening A.
2. With opposite hand lift off *index* loop, grasping near string, and put over *middle* finger turning the loop over away from you so that the near string becomes the far *middle* string. (variation of Maude 87, step 7)
3. Insert indices, from above, into thumb loops and transfer thumb loops to indices. (Maude 89, step 10)
4. Pass right thumb under index, middle, and little finger loops, return with both right little finger strings and both right middle finger strings, then insert into right index loop from below; hook down right far index string and return with it by twisting right thumb down, towards you, and up.
5. Insert left thumb, from below, into right thumb loop and return.
6. Pass thumbs under index and middle finger loops, insert into little finger loops from below, and return with near little finger strings, both middle finger strings, and near index strings.
7. Pass middle fingers over far index strings, insert into thumb loops from below, and return with far thumb strings; release thumbs.
8. Pass thumbs under index loops, through lower middle finger loops from above, and insert, from below, into little finger loops; return with near little finger strings.
9. Pass thumbs, from above, through index loops, pick up lower far middle finger strings near center of figure, and return.
10. Transfer upper middle finger loops to thumbs.

11. Navaho double lower thumb loops over single upper thumb loops.
12. Release indices and middle fingers.
13. Insert indices, from above, into thumb loops and transfer thumb loops to indices. (Maude 89, step 10)
14. Pass thumbs under index loops, insert into little finger loops from below, return with near little finger strings, then insert into index loops, also from below, and release indices. (Maude 89, step 11)
15. Caroline extension. (Maude 89, step 12)
16. Two pairs of strings loop around the far index string. With teeth draw out the upper pair to complete the figure.

Garsia 19. Apegogoro

(A coral pinnacle in Anibare)

An old figure given by Ijauwe. See Maude 92.

Garsia 20. Einogog

(Chief Gaunubwe's grandchild)

Reconstructed by Joseph D'Antoni

Invented by Ijauwe in 1938. This reconstruction borrows steps from Garsia 6 and Garsia 17.

1. Opening A.
2. Transfer little finger loops to indices, then insert little fingers, from above, into upper index loops and transfer these loops to little fingers. (Maude 98, step 3)
3. With right thumb and index draw left near little finger string *under left index loop* and up through *thumb* loop, make an upright loop on this string, by giving it a clockwise twist, insert little fingers towards you into loop, draw hands apart and Navaho little fingers. This produces a small 'sun' formed by near little finger strings and far index strings. (variation of Maude 98, step 4)

<illustration 8 here>

4. With fingers pointing up lay figure flat and release *little fingers only*; make a loop lying away from you on the top string, to right of 'sun', by giving string a half twist *clockwise* and then give the loop thus formed another twist; insert right thumb away from you into this loop, pass left thumb from left to right under strings of 'sun' which lie over top string, then insert into made loop beside right thumb and return through 'sun' with right near thumb string. Extend hands slightly. *Insert little fingers, from above, into upper thumb loops, transfer upper thumb loops to little fingers.* (variation of Maude 108, step 4)
5. Lay figure flat again (*fingers pointing upward*); find the loop which now makes a tail to the 'sun', enlarge it, pull it down to base of the figure, put under bottom string,

<illustration 9 here>

then bring it over and up to top of figure; insert tail loop to right and left at 'a,a' and out at 'b,b'.



<illustration 10 here>

*Gently release little fingers, insert from above into tail loops at 'c,c', pick up top string by passing under it and up at 'd,d' and return through tail loops. Extend hands but do not pull tight. (variation of Maude 108, step 5)*

6. With right thumb and index make an upright loop on left near index string, by giving string a half twist anti-clockwise; insert left thumb away from you into loop, pass right thumb and index, from above, through upper left thumb loop, pull lower loop through upper loop, release thumb and replace original loop. Push loop toward centre of figure. (Maude 80, step 3)
7. With left thumb and index make an upright loop on right near index string, by giving string a half twist clockwise; insert right thumb away from you into loop, pass left thumb and index, from above, through upper right thumb loop, pull lower loop through upper loop, release thumb and replace original loop. Push loop toward centre of figure. (Maude 80, step 3, performed on right hand)
8. Twist index loops away from you.
9. Amwangiyo.
10. Nauru Ending.

Garsia 21. Administration Staffs

(Commander Garsia flanked by members of his staff)

Invented by Simon Quanijo and Ijauwe in 1937. See Maude 114.

Garsia 22. Eigugu

(The girl in the moon)

Reconstructed by Joseph D'Antoni

Invented by Simon Quanijo and Ijauwe in 1938. It appears to be a simple variation of Garsia 17.

1. Opening A.
2. Transfer little finger loops to indices, then insert little fingers, from above, into upper index loops and transfer these loops to little fingers. (Maude 98, step 3)
3. With right thumb and index draw left near little finger string up through index loop, make an upright loop on this string, by giving it a clockwise twist, insert little fingers towards you into loop, draw hands apart and Navaho little fingers. This produces a small 'sun' formed by near little finger strings and far index strings. (Maude 98, step 4)

<repeat illustration 2 here>

4. With fingers pointing up lay figure flat and release *little fingers only*; make a loop lying away from you on the top string, to right of 'sun', by giving string a half twist *clockwise* and then give the loop thus formed another twist; insert right thumb away from you into this loop, pass left thumb from left to right under strings of 'sun' which lie over top string, then insert into made loop beside right thumb and return through 'sun' with right near thumb string.

<repeat illustration 3 here>

Extend hands slightly. *Insert little fingers, from above, into upper thumb loops, transfer upper thumb loops to little fingers.* (variation of Maude 108, step 4)

5. Lay figure flat again (*fingers pointing upward*); find the loop which now makes a tail to the 'sun', enlarge it, pull it down to base of the figure, *behind crossing of near index and far thumb strings*, put under bottom string,

<repeat illustration 6 here>

then bring it over and up to top of figure; insert tail loop to right and left at 'a,a' and out at 'b,b'.

<repeat illustration 7 here>

*Gently release little fingers, insert from above into tail loops at 'c,c', pick up top string by passing under it and up at 'd,d' and return through tail loops. Extend hands but do not pull tight. (variation of Maude 108, step 5)*

6. Twist thumb loops towards you; twist index loops away from you.
7. Amwangiyo.
8. Nauru Ending.

Garsia 23. Eidereauwa

(A Gilbertese woman from Nonouti Island)

Reconstructed by Joseph D'Antoni

An old figure, given by Ijauwe. It appears to be a simple variation of Maude 93.

1. Nauru Opening I. (Maude 93, step 1)
2. With thumbs hold down both strings of index and middle finger loops; pass indices under little finger loops, return with both little finger strings, then insert indices, from above, into thumb loops, pick up near thumb strings and release thumbs. (Maude 93, step 2)
3. Insert thumbs, from below, into lower index loops, hold upper far index strings against index fingers and bend indices down through lower loops taking with them upper loops and giving them a twist; release thumbs. (Maude 93, step 3)
4. Insert thumbs, from above, into index loops and release indices. (Maude 93, step 4)
5. Transfer middle finger loops to indices. (Maude 93, step 5)
6. Transfer thumb loops to indices. Insert thumbs, from below, into lower index loops, transfer upper index loops to thumbs, and return through lower index loops.
7. Twist index loops away from you.
8. Amwangiyo. (Maude 93, step 7)
9. Nauru Ending. (Maude 93, step 8)

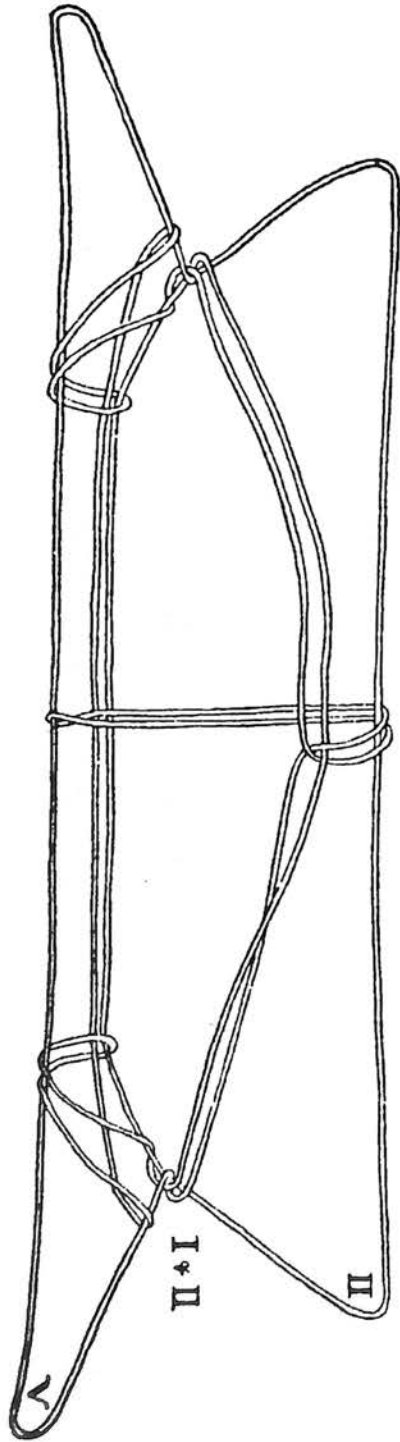


FIG. 827.

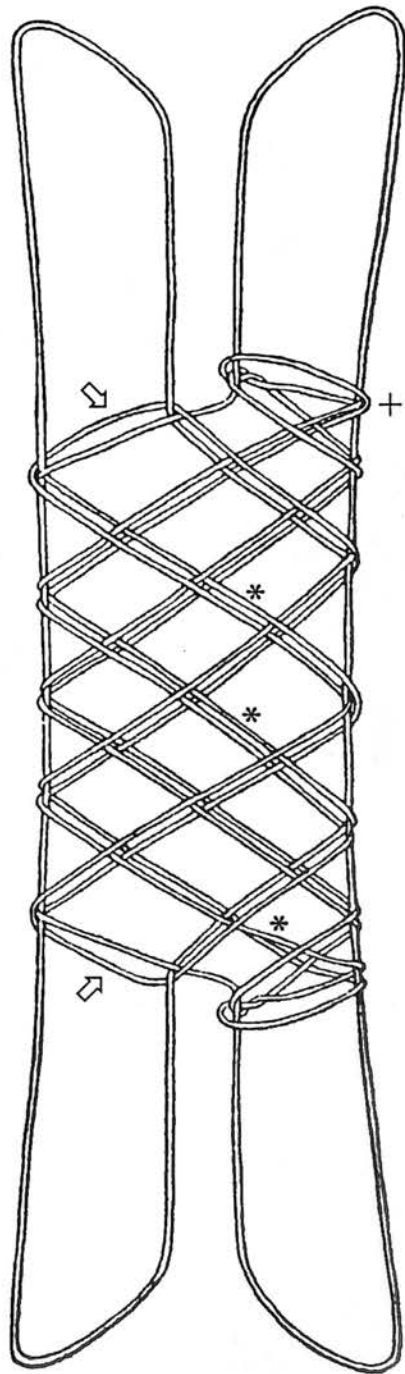


FIG. 828.

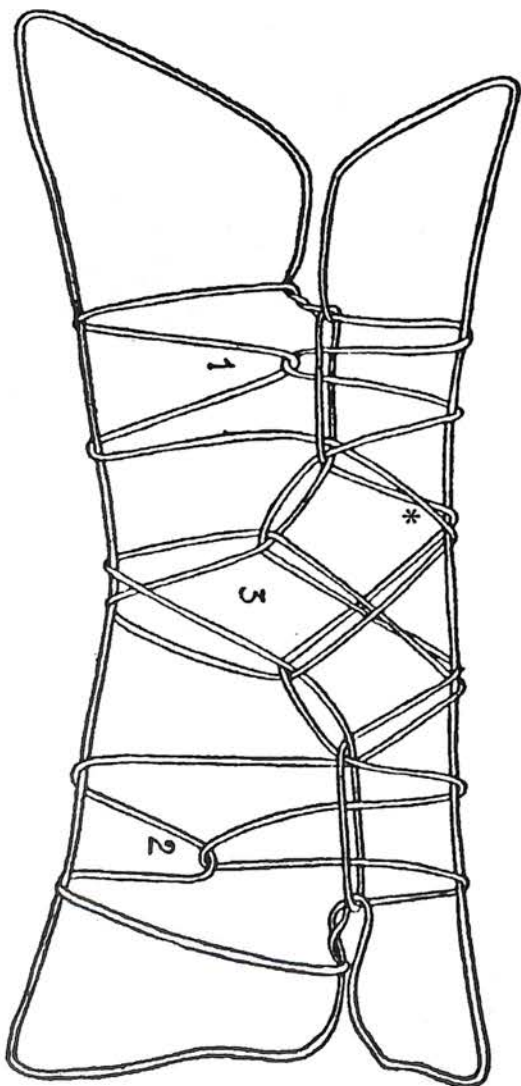


FIG. 829.



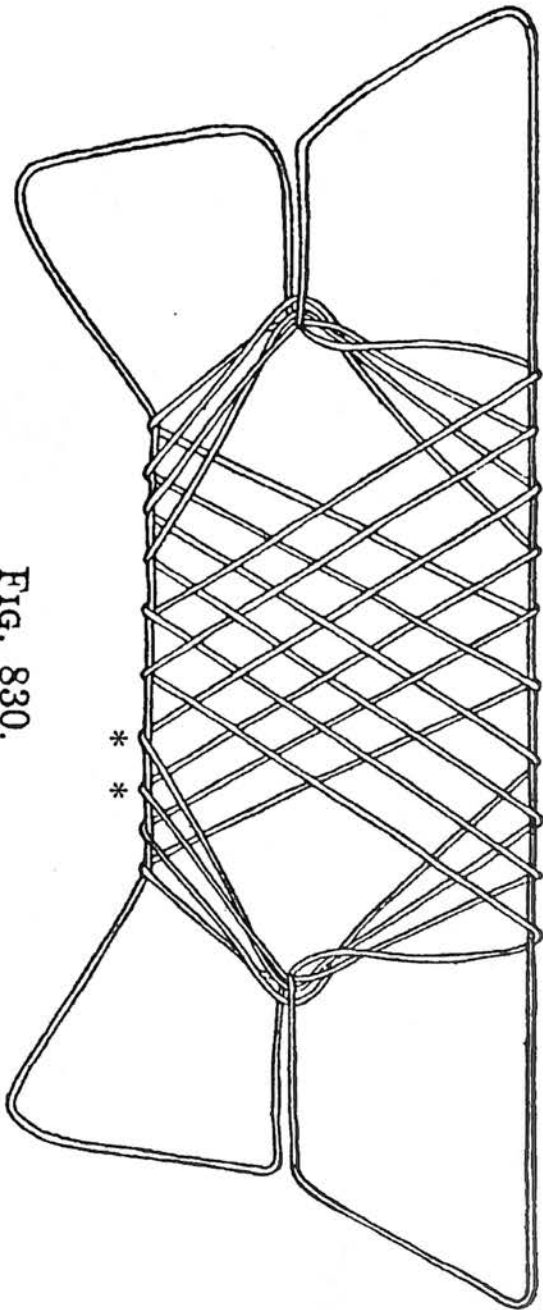


FIG. 830.

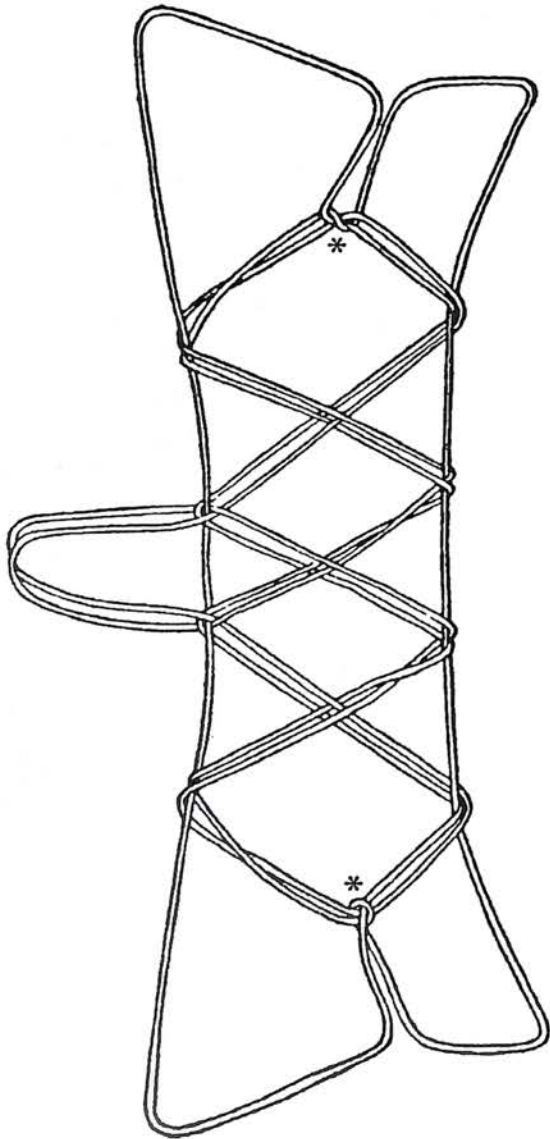


FIG. 831.

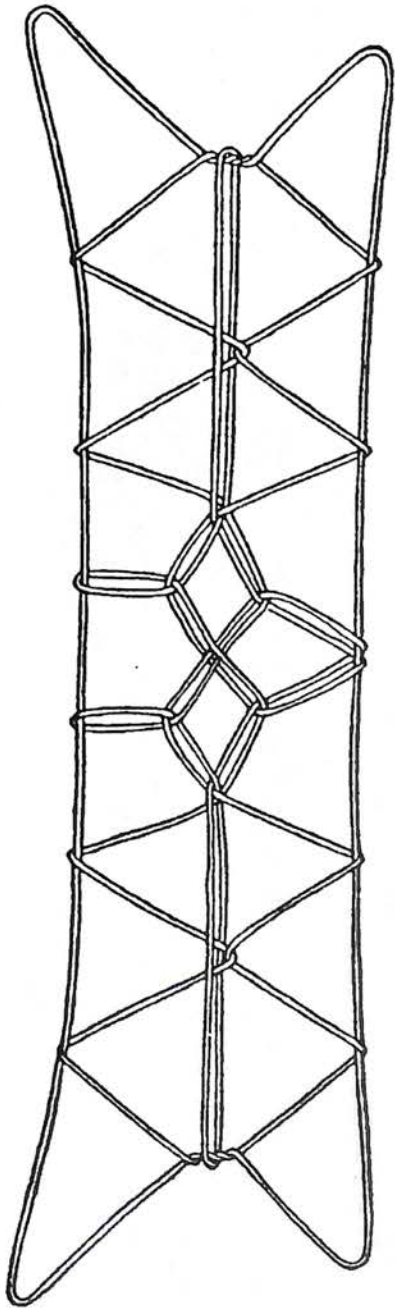


FIG. 832.

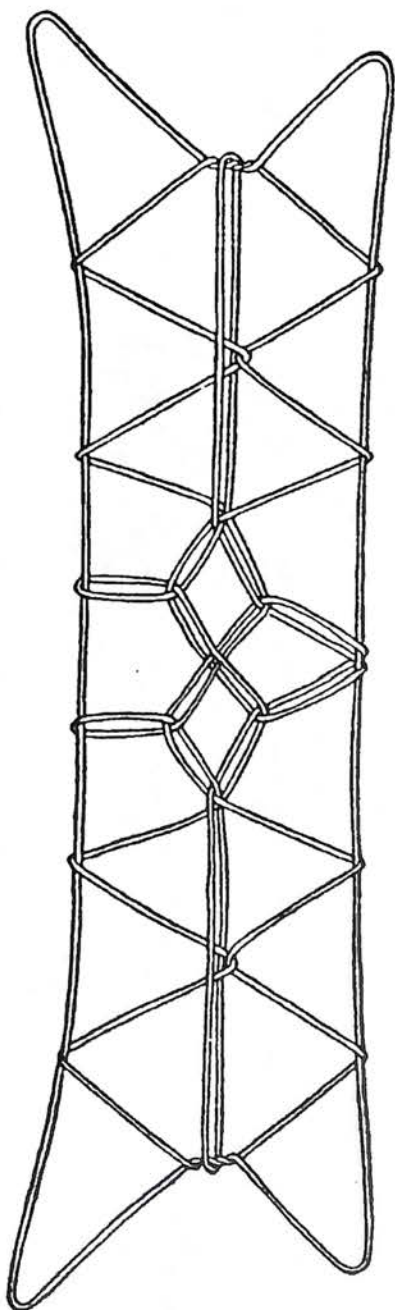


Fig. 832.

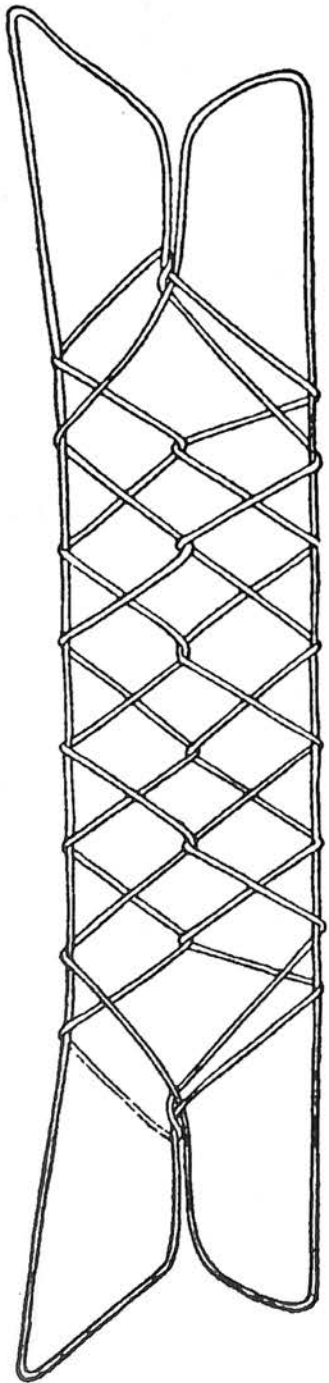


FIG. 833.

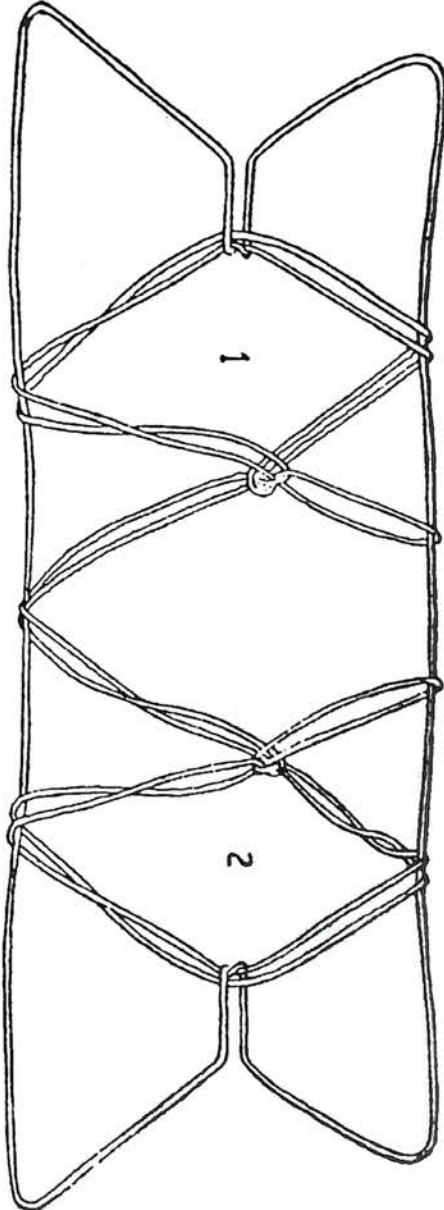


FIG. 834.

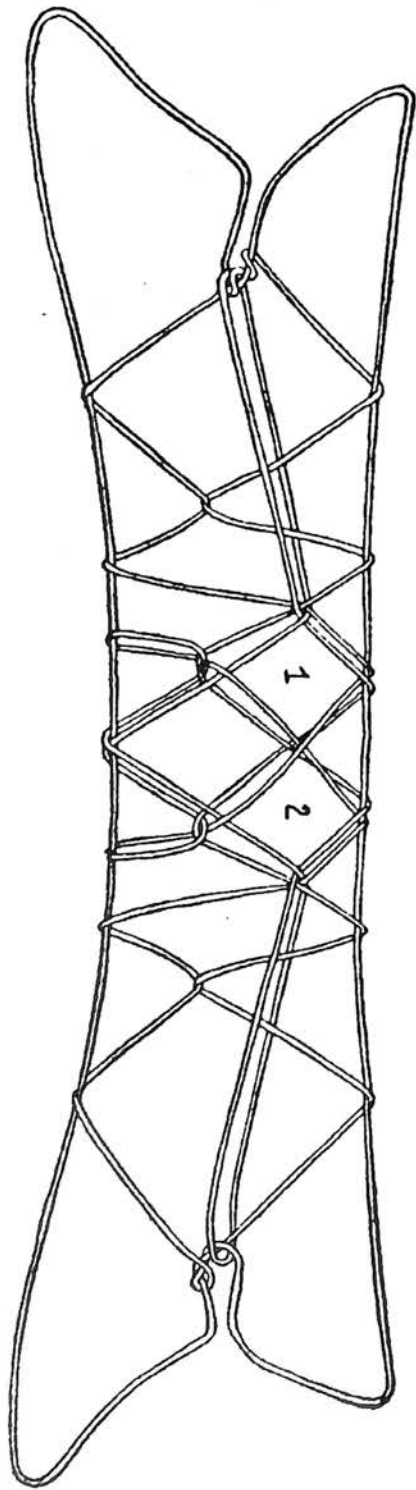


FIG. 835.

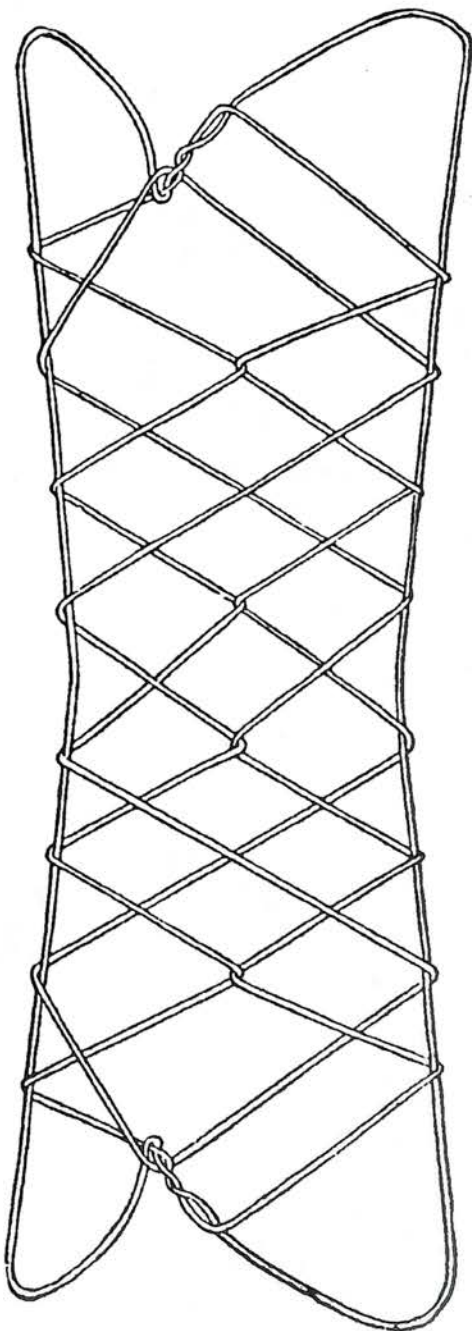


Fig. 836.



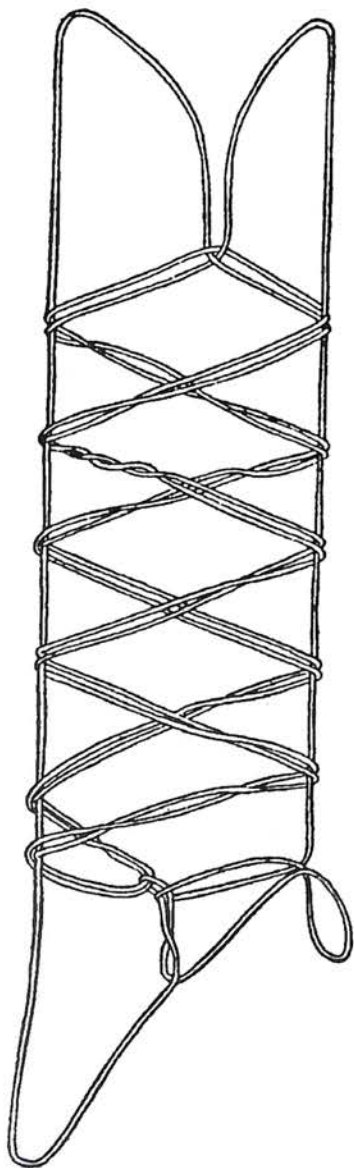


FIG. 837.

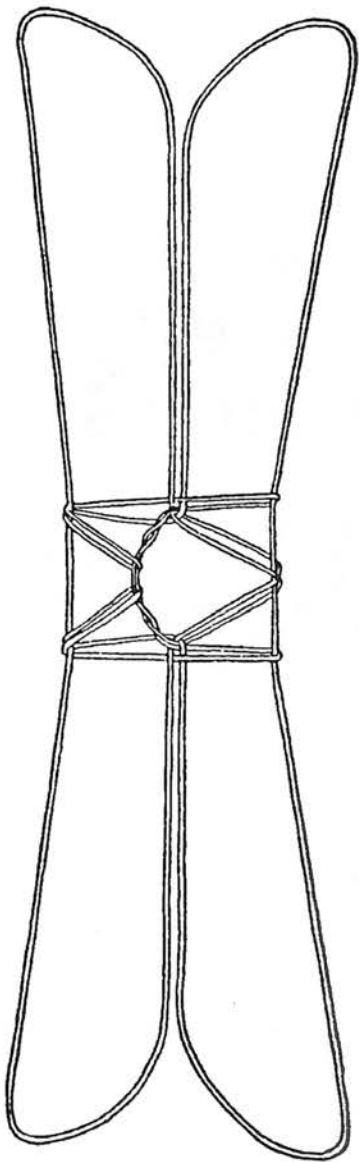


FIG. 838.

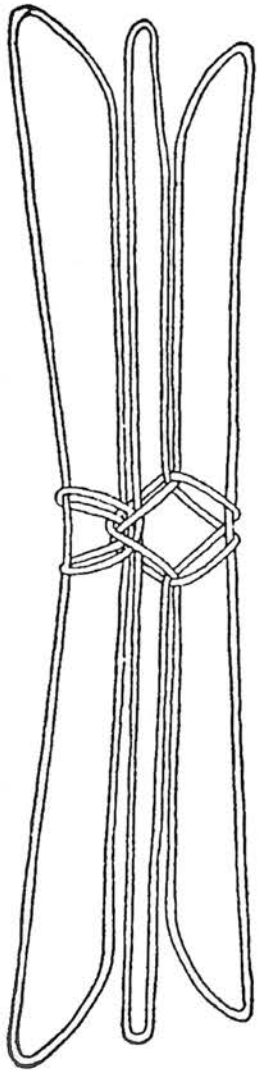


FIG. 839.

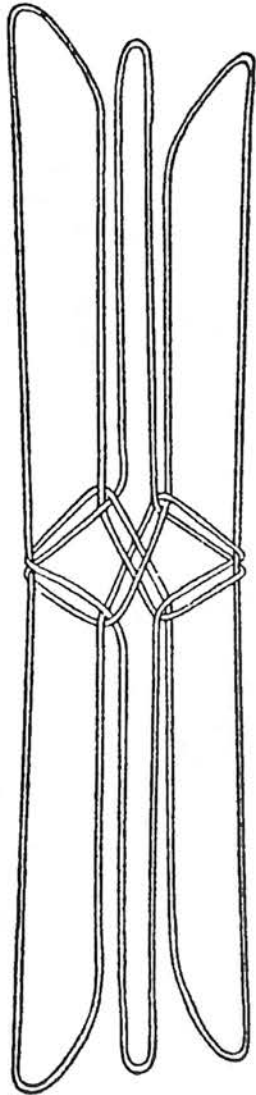


FIG. 840.

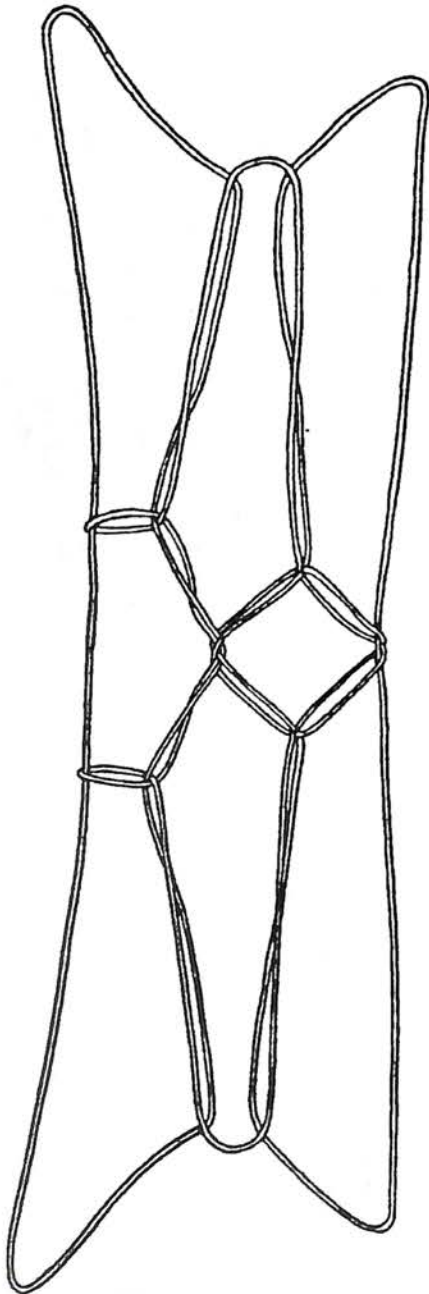
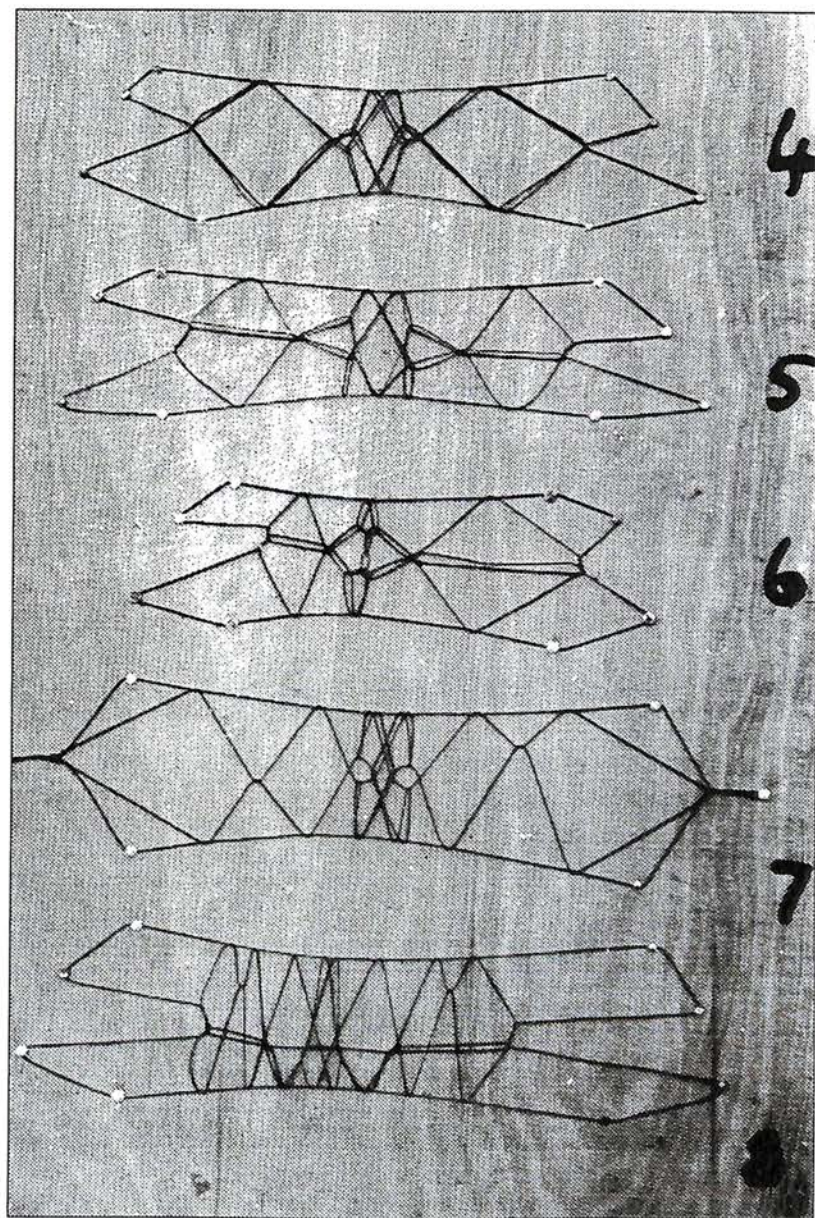
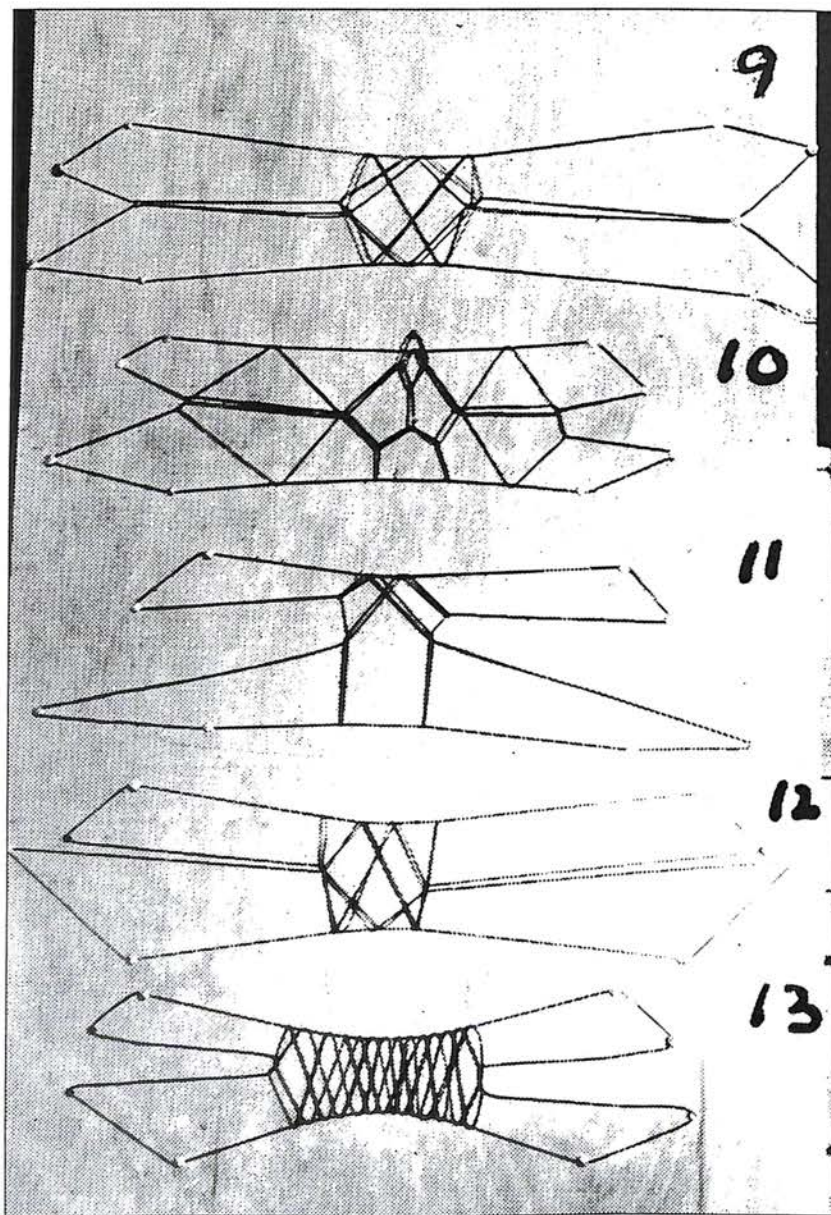


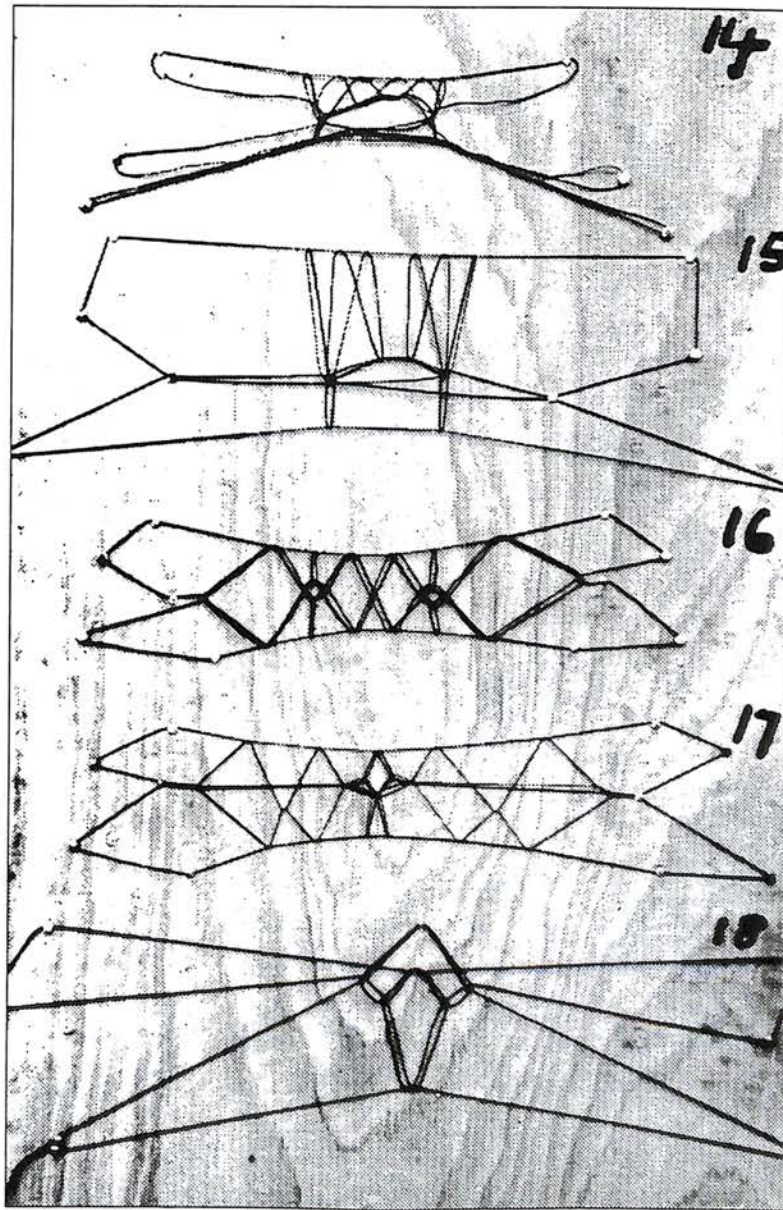
Fig. 841.



Garsia plate 1

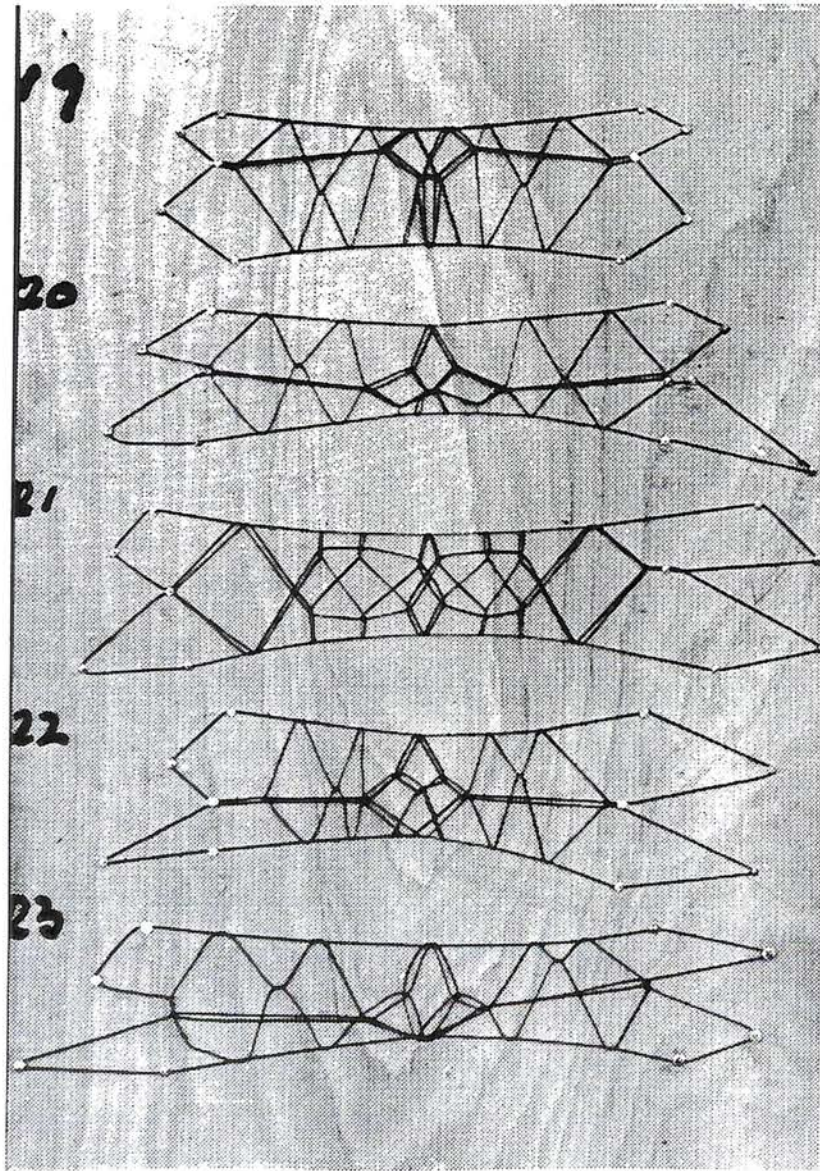


Garsia plate 2



Garsia plate 3





Garsia plate 4

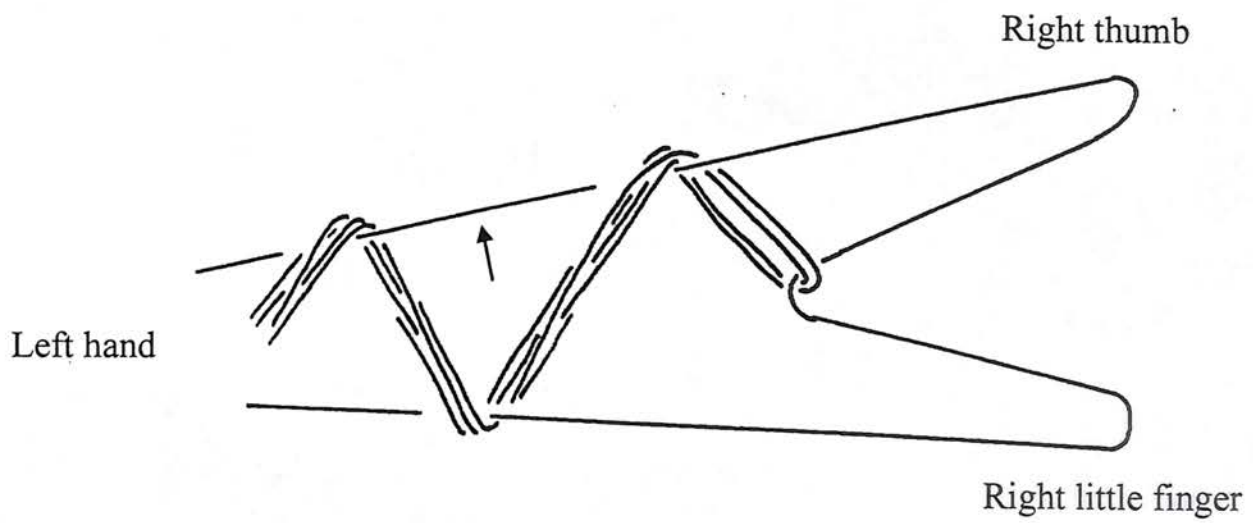


illustration 1

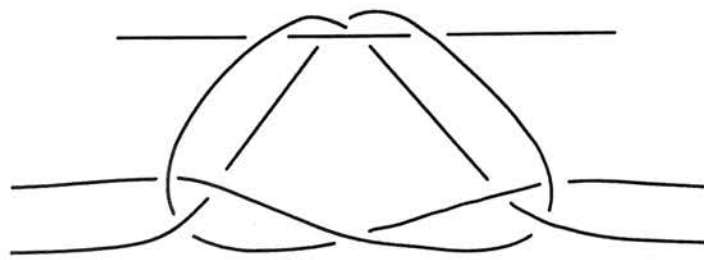


illustration 2

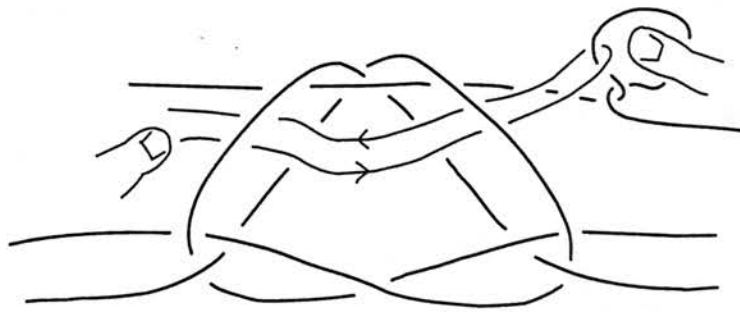


illustration 3

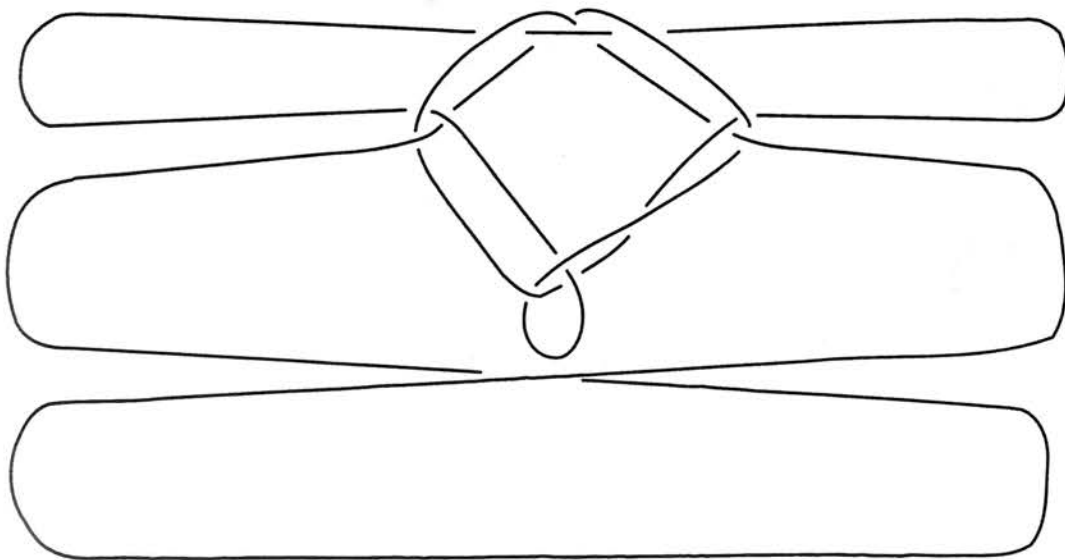


illustration 4

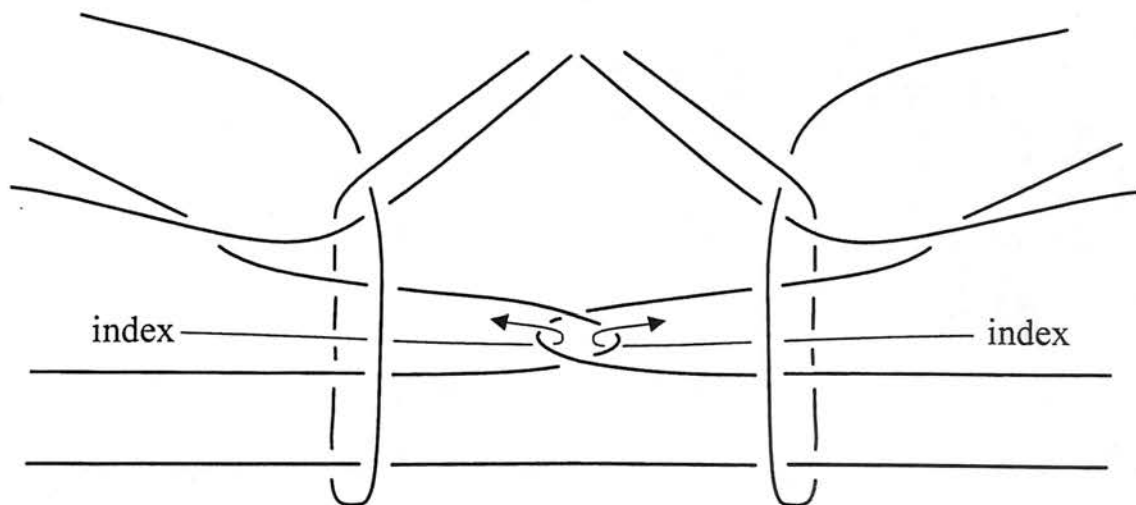


illustration 5

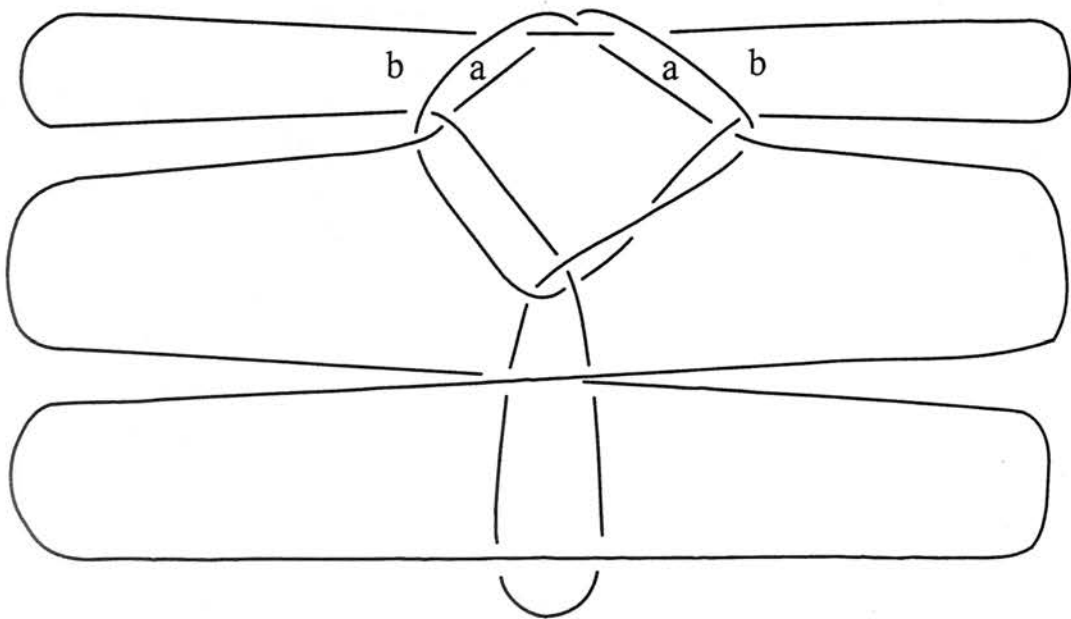


illustration 6

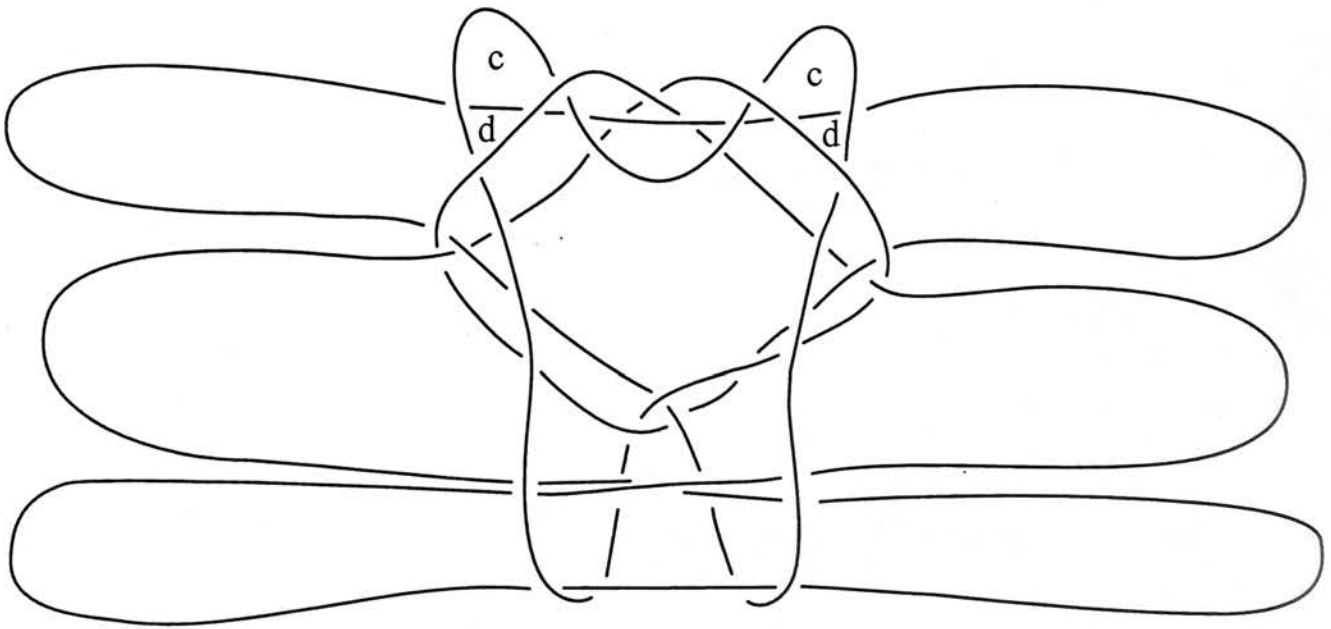


illustration 7



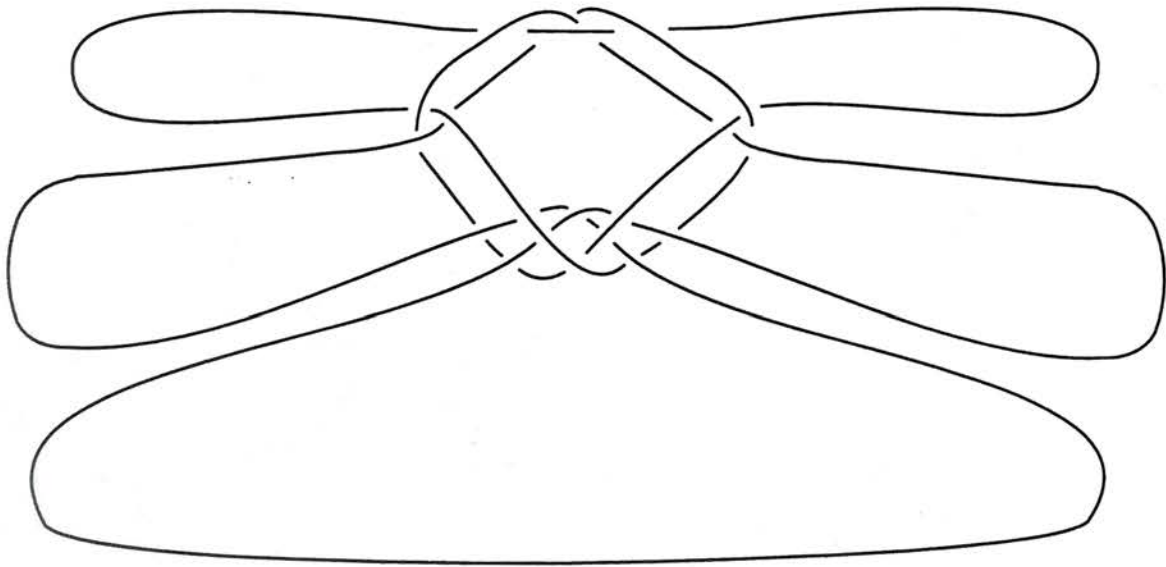


illustration 8

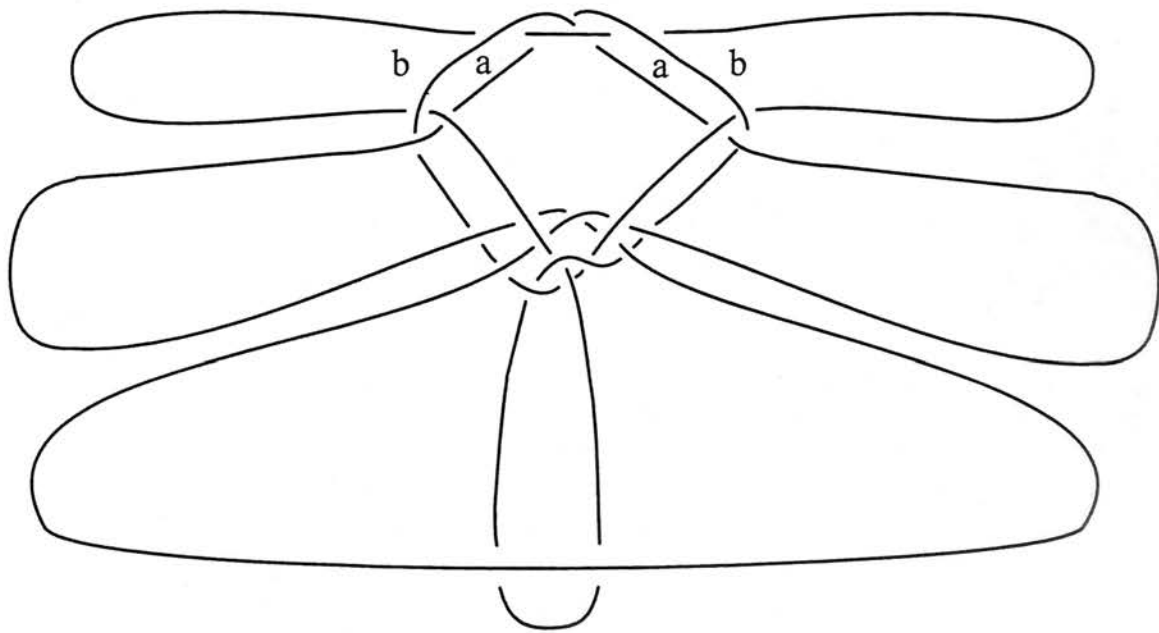


illustration 9

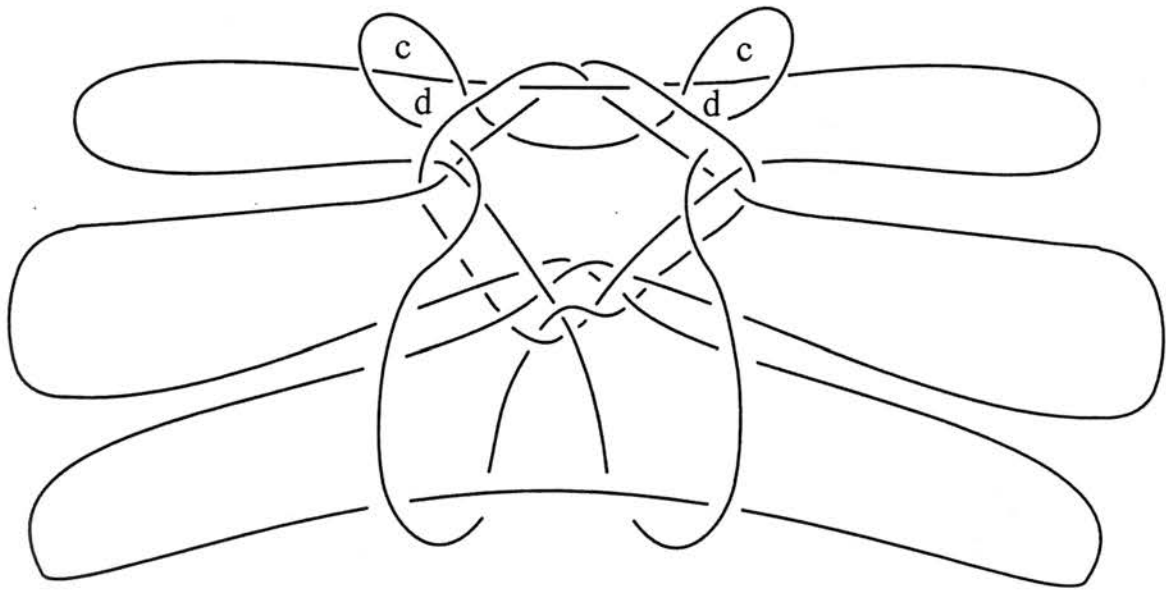


illustration 10