Quipus and Witches' Knots

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Quipus and Witches' Knots: The Role of the Knot in Primitive and Ancient Culture, with a Translation and Analysis of "Oribasius de Laqueis".

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1. The Age of String

Most of the tools of modern civilization, observes J. E. Lips, have their roots in ancient inventions that have been handed down from generation to generation in an unbroken chain ever since the dawn of time. The Age of Iron, he points out, was made possible by the Age of Bronze, and the Age of Bronze by the Age of Stone. But still earlier, and spanning a far longer period of time—reaching back, indeed, to the very beginnings of man’s evolution as man—came the Age of Wood.

Wood was one of the most abundant and usable materials available to primitive man in his attempts to win dominion over the forces of nature. Even animals use wood as a tool. Beavers build houses of it; elephants rip branches from trees in order to strike pursuing dogs; chimpanzees prod with sticks from which they have stripped the leaves; and birds make nests by weaving twigs into geometrical shapes and patterns. Primitive man, by inference, must have begun to use wood for comparable purposes some hundreds of thousands of years ago.

Wood, however, is subject to decay. Hence the tools and implements assembled in archaeological museums give a misleading impression of the probable extent of its use in prehistoric times. During the Stone Age, according to Lips, more things were made of wood than of stone: e.g., the digging stick, the club, the spear, the bow, the arrow, the boomerang, the shield, the sled, the hut, the food bowl, the animal trap, the dugout, the bark canoe, and many other devices utilized by our primitive ancestors. In a sense, the Age of Stone was merely the final phase of the Age of Wood.

Vines, reeds, grass, and bark; the skins and sinews of animals; hair, both human and animal—all of them as perishable as wood—also played an important part in the advancement of primitive man’s material
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culture. By Neolithic times in Europe (e.g., the Lake Dwellers of Switzerland), and more recently among people living at equivalent cultural levels (e.g., the Indians of North America and the Islanders of the South Pacific), these materials were used to make nets, snares, fishing lines, bowstrings, baskets, mats, moccasins, belts, and necklaces; to hold the timbers of huts and the poles of tepees together; and (among other methods) to bind the points of arrows, harpoons, and spears to their shafts, and the heads of axes, adzes, and tomahawks to their handles. The Age of Wood, in fact, could almost as fittingly be called the Age of String.

2. The Oldest Knots

String implies knots, and knots must therefore be one of man's oldest tools. Just how old, it is impossible to say, for string is perishable, and archaeological evidence, as a consequence, is lacking. It is safe to assume, however, that Paleolithic man used lashings in order to attach handles and shafts to implements of stone and other material; hitches in order to tuck the ends of lashings under the final turns; and overhand knots—the most elementary of all knots—in order to contain things and hold things together. Neolithic man, as he invented new implements and developed new skills, may be presumed to have used the granny knot, the square knot, the lark's head, the overhand loop knot, the overhand slip knot, and the weaver's knot (or sheet bend).

These are the familiar, general-purpose knots that people everywhere have always tied—and still tie—instinctively, without being conscious of ever having learned to tie them (though most of us nowadays, if we have been properly brought up, conscientiously tie the square knot rather than the more natural granny). They are the knots, as far as I have been able to find out, that modern Stone-Age people tie (e.g., Indians, Polynesians, and Eskimos), or did tie until the end of the nineteenth century. And by inference they are the knots that our prehistoric ancestors tied and depended on for survival a good many unchronicled thousands of years ago.

Ethnologists, unfortunately, seldom have anything very much to say about knots in their accounts of the material culture of modern primitive people. I gather, however, from their descriptions of primitive
tools and implements, most of which involve the use of cordage, that people who lead Stone-Age lives are on the one hand enormously dependent on knots, yet, on the other, need only half a dozen elementary varieties of the sort I have listed in the two foregoing paragraphs.

Gilbert Wilson, for example, in his monograph on the use of the horse and the dog by the Hidatsa Indians,\textsuperscript{12} describes a great many halters, bridles, snares, lariats, hobbles, saddle-pack lashings, travois-pole ties, and other devices made of thongs and vegetable-fiber cords. Wilson does not discuss knots in the text of his monograph, but if one may judge by his illustrations, the lashing, the half hitch, the overhand knot, the square knot, and the lark’s head sufficed for the needs of the Hidatsas at the time he studied them.

Even when ethnologists discuss knots, they are apt to leave essential questions about them unanswered. Clark Wissler, in his monograph on the Blackfoot Indians,\textsuperscript{31} describes a number of tepee lashings which he calls by picturesque names like Blackfoot tie, Teton tie, Assiniboine tie, and Cheyenne and Arapaho tie. Referring to the Blackfoot tie, he says that “one end of a thong about 15 feet long is passed round the crossing of the tepee poles and tied with a \textit{simple knot}” (italics mine). He does not identify this simple knot, and his illustrative sketch depicts an ambiguous configuration that is evidently intended to represent either a square knot or a granny. The ambiguity is regrettable, since it would be interesting, ethnologically, to know which of the two knots the Blackfoot Indians actually tied; whether they were aware of the distinction between them; and (if so) whether they made a conscious effort to tie the square knot in preference to the granny.

The Polynesians, like other primitive people, were dependent on knots, and used them for mnemonic as well as for utilitarian purposes. Owing, however, to prolonged contact with the crews of whaling ships (as Ralph Linton points out in his 1923 monograph on the Marquesas Islands\textsuperscript{14}), they had begun to use European knots before ethnologists thought of collecting information about them.

This is doubly unfortunate, because the Argonauts of the Pacific, as Malinowski calls them, were among the first and most adventurous of blue-water sailors, and it would be instructive if we could find out what knots they used, originally, and how they used them. Were they acquainted with the indispensable bowline knot (the European sailor’s
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FAMILIAR KNOTS

1. OVERHAND KNOT
2. OVERHAND SLIP KNOT
3. SQUARE KNOT
4. GRANNY KNOT
5. WEAVER'S KNOT
6. TWO HALF HITCHES
7. COW HITCH
8. CLOVE HITCH
9. BOWLINE KNOT
10. WALL KNOT
11. FISHERMAN'S KNOT
12. DOUBLE FISHERMAN'S KNOT
13. SHEEPSHANK
14. TURK'S HEAD
way of tying a fixed loop in a rope)? Did they prefer the square knot to the granny (as European sailors do)? By which of several possible techniques did they tie the weaver’s knot (or sheet bend)? I have been unable to find answers to such questions as these in the published works of Linton, Buck, Handy, Malinowski, and other students of Polynesian culture. I get the impression, however—though I cannot document it—that the Polynesian repertory of indigenous knots was a limited one.

The Polynesians made excellent mats, baskets, plaitings, and nets. Their string figures (or cat’s cradles), in which, like other primitive people, they were fond of indulging, were numerous and intricate. If, as seems likely, they did not develop any highly specialized knots of their own, analogous to the sailors’ knots of Europe and America, it must have been because they did not need them, and not because they lacked skill in the making and manipulation of cordage.

Franz Boas in 1907 published sketches of several remarkable Eskimo knots which had been collected for him in Baffin Land, and which (since he himself was not versed in knot lore) Otis Mason identified for him. Included were a number of rawhide “splices,” a fisherman’s knot, a double fisherman’s knot, a square knot, and some highly unorthodox bowlines and running bowlines. I have not come upon any other references to the double fisherman’s knot, the bowline, or the running bowline in any other study of the material culture of modern primitive people. These knots, therefore, possess—potentially, at least—unusual ethnological significance.
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Now the Eskimo bowline and running bowline, as depicted by Boas, though identical with the European bowline and running bowline in structure, are quite different in the arrangement of their parts. That is, they are lying on their sides, as it were, in the manner shown by the diagrams on the facing page.

Unfortunately Boas does not provide the information we need in order to appraise the significance of these peculiar knots. Were they used by a single individual, or by all the members of the cultural group? Are they genuine Eskimo knots, or were they adopted as a result of imperfect imitation of the bowlines and running bowlines used by European sailors? Are they superior in any way, from the Eskimo point of view, to the European bowline and running bowline? What technique did the Eskimos use in tying them? It is too late now to find the answers to such questions as these, and the same is true, I am afraid, of the questions we would like to ask concerning the knots used by other modern primitive people.

3. A PHYSICIAN NAMED HERAKLAS

The ancient Egyptians, Greeks, and Romans were as dependent on cordage as their Stone-Age ancestors, and a good deal more adept in the use they made of it. The Egyptians, of course, were unexcelled as weavers and rope-makers. The hulls of the earliest Egyptian river boats were held together solely by means of ropes and lashings. It was not until the Fifth Dynasty that Egyptian boat-builders began to use dowels; and boat hulls on the Red Sea were fastened by a combination of ropes and dowels as recently as five hundred years ago. The great blocks of stone that went into the construction of tombs and temples, not only in Egypt but elsewhere (Stonehenge, Asia Minor, Greece, Rome, Peru), were dragged into place and erected by means of ropes.

When Xerxes invaded Greece in 492 B.C., he employed Phoenicians and Egyptians to build the pontoon bridge on which his army crossed the Hellespont. “Beginning from Abydos,” writes Herodotus, “they whose business it was made bridges across to that headland, the Phoenicians one of flaxen cables, and the Egyptians the second, which was of papyrus. From Abydos to the opposite shore it is a distance of seven furlongs.” When a storm broke the cables and scattered the boats,
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Xerxes ordered the waters of the Hellespont to be lashed with three hundred lashes, and he had the overseers beheaded.

Under new overseers, two new bridges were built, one of 360 boats and the other of 314. This time "they stretched cables from the land, twisting them taut with wooden windlasses, and they did not as before keep the two kinds apart, but assigned for each two cables of flax and four of papyrus. All these were of the same thickness and fair appearance, but the flaxen were heavier in their proportion, a cubit thereof weighing a talent." Each rope is estimated to have been a mile long and seven inches in diameter, and to have weighed as much as fifty pounds a linear foot.\textsuperscript{21} Herodotus, unfortunately, provides no information concerning the knots used in this prodigious undertaking.

An obscure Greek physician named Heraklas, who lived during the first century A.D.,\textsuperscript{22} is the only ancient author who has anything at all informative to say about utilitarian knots. His one extant work is a brief essay on surgeon's slings, which owes its preservation to the fact that Oribasius of Pergamum included it toward the end of the fourth century in his so-called Medical Collections.\textsuperscript{23} Heraklas explains how to tie eighteen slings which Greek physicians made use of to apply traction when reducing dislocations and setting broken bones, and to hold the bodies of patients in position when performing surgical operations.

Heraklas's step-by-step instructions are reasonably lucid, and yet far from easy, without the aid of explanatory diagrams, to interpret. Two eminent men of the sixteenth century, Vidus Vidius and Francesco Primaticcio, tried to interpret them in 1540, or thereabouts, and got all but one of them wrong.

Vidius, a Florentine, was the personal physician of Francis I. He translated Oribasius into Latin, gave his name to the Vidian nerve, and became the first professor of medicine in the Collège de France. Primaticcio was the leading artist and architect resident in France during the middle years of the sixteenth century. His brilliant drawings illustrative of Oribasius de Laqueis ("Oribasius on Knots"), as Vidius misleadingly entitled Heraklas's essay in his translation of Oribasius, are preserved in the Bibliothèque Nationale in Paris.\textsuperscript{24} I have reproduced them in Appendix D, below, because they possess a measure of artistic and medical significance, and because they are not available elsewhere to the general reader.
Hjalmar Öhrvall, a well-known Swedish physiologist and yachtsman, labored over Heraklas's knots in 1916, and succeeded in identifying about half of them, and Lawrence Miller, a Boston patent lawyer who specialized in the patented knot-tying machines used in the textile industry, identified the remainder in 1944. Miller published only one of his identifications, but he permitted me to list them in my book The Art of Knotting and Splicing in 1947. In Appendix D, below, I provide a detailed analysis, together with explanatory diagrams, of each identification and each knot. In the following paragraphs I shall discuss some of the more striking implications of Heraklas's essay.

From the anthropological point of view, Heraklas's most interesting knot is probably his No. 13, which he calls a "four-loop plinthios," and which turns out upon analysis to be a cat's cradle, or string figure—the oldest string figure, almost certainly, on record. It is identical, moreover, with a string figure from aboriginal Australia called "The Sun Clouded Over," a name that is descriptive of the way the central circle, representing the Sun in the completed figure (see my diagram in Appendix B, p. 126), gets smaller and smaller and finally disappears when the four loops at the corners are pulled apart. Heraklas, of course, was interested in the four-loop plinthios because he found it useful as a surgeon's sling, and not because the children of his time played, as they evidently did, the universal game of cat's cradle.

Heraklas's No. 9, the single karkhesios, is the traditional true-lover's knot, and he explains how to tie it by the "fancy" technique, which really isn't very fancy, known by all modern sailors. (See Appendix B, p. 118, below.) Structurally the single karkhesios is identical with the Eskimo fisherman's knot depicted by Boas (see p. 84), above). The two knots differ, however, in function: the former is a loop knot, the latter a knot that joins the ends of two cords. Both knots are familiar to modern anglers and fishermen.

Nos. 10-12, the double karkhesios, is a more esoteric knot than the single karkhesios. It is identical with the knot that is called (in books) the hackamore, and that is alleged to be used as a temporary rope bridle in the Western United States. It is more usually called, simply, the jug, jar, or bottle sling. Its traditional function has been to lift jugs, jars, and bottles; and that is probably what it was used for, as a rule, in ancient times, for a karchesion (Greek καρχέσιον; Latin carchesium) was
a kind of vase with two long handles like the loops of a piece of string or rope. Heraklas recommends it, of course, as a way of applying traction to an arm or leg, and not as a jug sling.

The double *karkhesios* is a specialized knot, unlikely to be improvised on the spur of the moment—the kind of knot that has to be deliberately learned through imitation or instruction. Heraklas speaks of it in terms that reveal his easy familiarity with it, and with knots in general. The implication is that other specialized knots were also in use at the time, and already, perhaps, had an ancient lineage. On the basis of the probabilities, we would presume that such was the case. Heraklas's double *karkhesios* provides us with explicit evidence—almost our only explicit evidence—that it was.

I say "almost" because other evidence—rather more general than specific—supports the view that the ancients were interested in esoteric knots. The Greeks, for example, played a game called *himanteligmos* in which one player tied an intricate knot and the other player tried to guess how to untie it. If he stuck a peg into the knot at the point where the secret of untying it was hidden, he was declared the winner. The Gordian knot, presumably, was an intricate knot of the sort devised by the players of *himanteligmos*.

The double *karkhesios*, Heraklas says, can be tied by three different techniques: alone, from a single *karkhesios*, or round the limb itself. (See the diagrams in Appendix B, pages 119-124, below.) Professor K. G. T. Webster of Harvard showed me the first of these techniques in the early 1930's. He had learned it as a boy, he said, from an unlettered fisherman in Nova Scotia. Harry Craigin, in 1884, described how to tie it by what is essentially Heraklas's second technique. Craigin's description of the knot is the first to have been published, I surmise, since Heraklas's time. The third technique does not seem to have lingered on in the folk memory. Miller's interpretation of it, as published in *The Art of Knotting and Splicing*, is unsatisfactory. A better interpretation, which I worked out only recently, is illustrated by my diagrams in Appendix B, pages 122-123, below.

Heraklas's No. 14 is the parlor magician's Tom Fool knot, and Heraklas's technique of tying it is the parlor magician's sleight-of-hand technique. Nos. 1, 2, 3, 6, and 8 are the immemorial lark's head (or cow hitch), clove hitch, overhand slip knot, overhand knot, and square
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knot respectively. A point of special interest is the distinction which Heraklas carefully draws between the square knot (No. 8) and the very similar nameless construction (No. 7) which consists of two interlooped bights. (See Appendix B, pages 117 and 116, for diagrams.) Modern knot-books do not always recognize this nice distinction. The ancients, however, as their faith in the magic efficacy of the square knot demonstrates, were extremely square-knot conscious.

No. 4 (the sandal sling) and No. 5 (the serpent sling) are of particular medical interest. The former is almost exactly like the bandage called Barton’s cravat of the heel, and the latter is similar to the knot that is known in medical textbooks as Gerdy’s extension knot. (See Appendix B, pages 113-115 below, for diagrams and additional comment.)

4. PROPRIETARY EXCLUSIVENESS

While Heraklas and Oribasius wanted to share their specialized knowledge with others, primitive and unsophisticated people are inclined to protect their specialized knowledge and to prevent outsiders from learning its secrets. The ancient Asclepiadae, or traveling physicians, were bound by oath to teach their art to Asclepiadae alone. The Chinese, for many centuries, kept the secret of making silk. The Koreans discovered or stole it about 200 B.C., and the art then passed to Japan, Tibet, Persia, and Europe. A method of making palm-fiber bridges in Liberia was handed down from father to son until very recently. When a bridge was being built, the people who lived near by were required to move so that they would not be able to learn how the work was done. Skill in metallurgy in northern Africa was formerly the carefully guarded monopoly of specific families and clans.

Proprietary exclusiveness of this sort is characteristic of sailors and others who have a specialized knowledge of knots. Ulysses, for example, tied up the gifts of Alcinous with a secret knot that Circe had taught him. The Gordian knot, too, was a secret knot, for the ends of the thong were cleverly concealed and no one knew how to untie it. Steinen, in his account of the Marquesas Islands, reports that a certain tuhuka, or “priest,” considered his mnemonic knot-records superior to European writing because he alone could interpret them.

A descendant of “an ancient tribe of head hunters” showed Grau-
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mont and Hensel an unusual kind of Turk's head, but agreed to explain its construction "only after our promise never to show anyone else how the weave is formed."38 "By golly," Graumont said later to an interviewer, "those old-timers sure were jealous of anybody who wanted to learn their special knots. I'd have to show a guy a hundred different knots before he'd break down and show me one."39

Clifford Ashley, perhaps the last intellectual to ship out of New Bedford on an old-fashioned whaling vessel, confirms the fact that this sort of jealousy used to prevail among sailors. "Complicated knots were explained under pledge of secrecy," he says. "Often a knowledge of one knot was bartered for another. I have heard of a sailor who carried an unfinished blackjack in his ditty bag for several voyages until at last he found a shipmate who could teach him the knot he wished to finish off with."40

Cowboys, like sailors, are dependent on knots as a tool, and take pride in their knot-knowledge. J. M. Drew was acquainted with a cowboy who could tie the complicated Theodore knot, "and who did tie it for his brother cowboys for a good price per knot, but who would never teach anyone else how to tie it."41

The barrel knot, sometimes called the blood knot in England—a knot that is well known to anglers and fly fishermen—is almost the only knot that does not slip when the ends of nylon monofil leaders are tied together. Yet prior to 1910 its construction seems to have been kept a trade secret by one or two "country tackle makers" in England. "The method of construction was eventually worked out by Jock Purvis, an engineer on a White Star Liner, who cut out serial sections of the knot in paraffin wax and, after microscoping, re-built the knot in three dimensions. Purvis was an enthusiastic angler, and he told the secret of the knot to A. H. Chaytor, who published a description of the knot and how to make it, in his Letters to a Salmon Fisher's Son, 1910."42

Proprietary exclusiveness, paradoxically, tends to keep traditional skills alive and vital. Heraklas had a sophisticated modern point of view when he published, for the benefit of other physicians, what he knew about the double karkhesios, and other surgeon's knots. The jug sling is familiar to sailors and cowboys today, however, not because Heraklas explained it in his treatise, but because a number of unlettered individuals in every generation have known it—since long be-
fore Heraklas's time, presumably—and have passed their knowledge on to their descendants.

5. THE END OF AN ERA

Knots play a minor role in the daily lives of modern men and women. They are no longer used as computers and mechanical aids to the memory; the superstitions that were once associated with them have been largely forgotten; and a thousand gadgets ranging in impressiveness from waterproof glue and zippers to welding irons and pneumatic riveters have displaced them as tools for holding things together. Even sailors, nowadays, need to know only a dozen or so of the most essential knots.

Knots reached the final stage of their development during the era of the clipper ships in the second quarter of the nineteenth century. The knot-lore that was preserved in men's memories at that time has not, however, been entirely lost. Most of it is recorded in the 3,854 entries of The Ashley Book of Knots, which does for the modern world what we could wish Heraklas, or some other cultivated Greek, had done for the ancient world. For Heraklas tells us just enough to prove that the ancients—maritime people like ourselves—were exceedingly adept in the use of man's age-old tool the practical, utilitarian knot.