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On Gridtype and Codingform Interplay

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The art in making a knot is not only the laying of the strands, but the pulling them evenly into their places, this ought to be done carefully, working the knot around the hand.

O.T Olsen, *Fisherman Seamanship* 1885.

Prologue

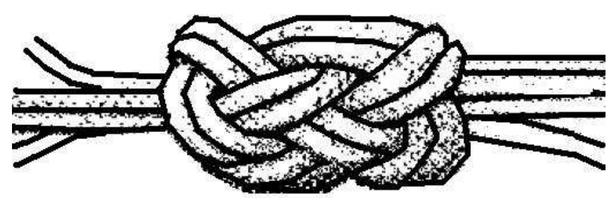
On the internet Dan Callahan moderates a chatroom where Pineapple Knots are a flourishing topic. After a brief, curiosity-driven, visit I learnt that participating chatters lump anything and everything from the decorative knot-scene under the Pineapple Knot header. Historically it seems to have become a knot concept which is blessed with abundant confusion. This article will not change much in that respect, but I have a modest hope that it will shed light on how the chaos ever managed to kick in.

This article is arranged as a small set of braiding exercises, analyzing ideas from the Pineapple Knot playground, which I laced with a dab of theory. In the pages to follow the Pineapple Knot will be the recurring theme, but the main focus is on the interaction between gridtypes and codingforms eventually leading up to the Pineapple Knot Class [19]. However, let us first get a feeling of what a Pineapple Knot once was believed to be.

Pineapple Knot Origin

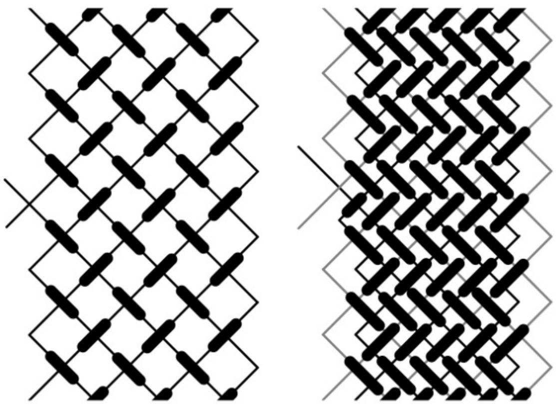
Where does the "Pineapple Knot" come from? Google offers close to a quarter of a million hits when queried, but leaves you none the wiser as to the Pineapple Knot's origin. Pineapple Knots are not the sailor's cup of tea. This can be verified by checking the major knot monographs. Clifford Ashley avoids discussing Pineapple Knots in his book's chapter on Turk's Head (**TH**) [1, pp227-256]. Raoul Graumont and John Hensel utter some words and offer three plates of limited usefulness in the TH-arena, but are deafeningly silent on Pineapple Knots [7, pp214-223].

TH's occasionally feature in early seamanship manuals, but none of them show anything really more convoluted than a Casa-coded 3 part 5-bight Regular Knot. Technically speaking, Cyrus Day classifies TH as lashings, which neither explains their need to be single-stranded nor intricate, but he does not move into any Pineapple Knot-stuff [3, p98]. Chas Spencer and Eric Fry offer a funny 4-stranded structure, which is reproduced below [20, p109], [4, #56]. They call it a Pineapple Knot, but it does not come close to what you find in internet chatrooms, where the knots are usually of the braided type.



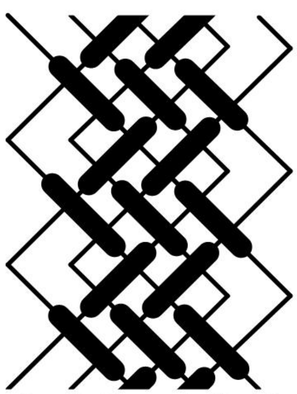
It is well-known that sailors take great pride in tying complex knots, but the earliest Pineapple Knot noises come from the masculine braiding types on horseback. Obviously the boaty boys seem to have been overtaken here by some great cowboy braiding tradition and left utterly steerless out on the Ocean of Knots. That these grand braided knots did not cotton on in nautical circles is perhaps understandable. Harbors are far from ranches and a horse, or a cow, is the last thing you want to embark with on your epic sea voyage. After all *why* should salty dog sailors take to cowboy braiding? Not that Pineapple Knots are forbidden territory for sissies, but some hair on your chest and a horse between yourself and the deck helps create a more impressive profile. In that

setting you start encountering Pineapple Knots and it has nothing to do with rope-problems, of course ☺.
In his books Bruce Grant writes a trifle about Pineapple Knots. His first offering is in *Leather Braiding*, published around 1950. It is shown below and will be referred to as Grant's Pineapple Knot I [5, p140-142]. One starts off with a Casa-coded Regular Grid of 7 parts and 6 bights and continues by interweaving the wend into a 5 part 6 bight Regular Thingey, which is positioned along the centerline. This is done by following the famous technique of laying tracks and splitting pairs – resulting in a 2-pass coding.



Grant's Pineapple Knot I

So, Grant's Pineapple Knot I is a singlestrandish structure, which is obtained by sort of interweaving two Regular Knotties. The diagram above shows the flaw midway on the left rim. The knot is also known as the Gaucho Button Knot. Unsatisfied with this Pineapple Knot, Bruce Grant set out to do better. Finally, in 1972, after years of trial and terror, he found a single-stringer to publish in his encyclopedia. He was so pleased that he called it *The* Perfect Pineapple Knot and immediately crowned it the "King of the Braided Knots" [6, p420-423, p134]. We shall refer to this truly remarkable find as Grant's Pineapple Knot II. Its Nested Grid, replete with 2-pass coding, is shown below



Grant's Pineapple Knot II

Other great names in braiding, such as Robert Woolery and David Morgan, neither show these knots nor elaborate the Pineapple Theme. Anyway. the name is no longer proprietary to Bruce Grant and it became abused instantly. Although mainly in the braiding magazines and the internet rather than the braiding monographs. Having established some context, let us pose the question: *"What made it so difficult for Bruce Grant to find his Perfect Pineapple Knot?"* To formulate what was he looking for and where, we need some theoretical machinery.

Theory versus Practice

Theory and practice are age-old antagonists. Theory-haters are forced to build a collection of worksheets and notes in order to survive. They must rely on memory and recognize which element, among their set of collected solutions, will help them tie the appropriate decorative knot. In previous *Knot News* articles on decorative knotting I supported that restrictive approach by dishing out grids and leaving it to the readership to apply handsome codings. Now let us make a U-turn and refrain from design being driven by availability, but by demand instead. With carefully assorted elements from a theory at hand, life becomes different, not necessarily easier, but certainly different. Now *you* decide what *you* need and, even if you have never seen or tied anything like your actual requirement before, *you* set out to make the new artifact *you* want. Surely this approach alleviates pains due to lacking creativity and gets a different driver in the seat.

For example, assume you want to make a single stranded Turk's Head Knot. Theoretically, 3 things are all you need to know in order to produce the structure of your design dreams. First you need the knot's proposed dimensions in parts, denoted by p, and the number of bights, denoted by b. In the following we shall speak of p/b Regular Grids. Secondly you need to be aware of the so-called Law of the Common Divisor for Regular Grids [1, p233], [6, p440], [21]. This law helps you determine whether or not your grid will be single-stranded. This shall be the case if and only if p and b are coprime, i.e. they have no common divisor other than 1. Suppose they are coprime, then you hold a single stranded Regular Grid. Your next action will be sweating your way through the U1O1-coding across all of the Regular Grid's crossing points. In other words, our third requirement is the so-called Casa-coding, which makes most knotters recognize a TH as a TH. Instead of having to wait for a particular single stranded Turk's Head to cross your course in life, you can now design your own Turk's Head Knotty and produce it.

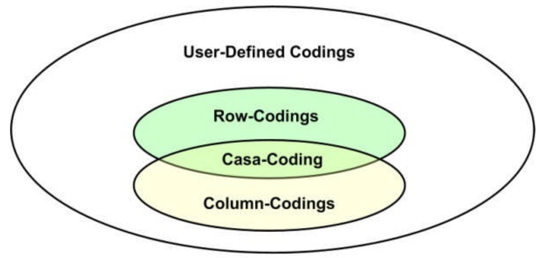
Okay, but how about wanting a specific coding, not knowing the approximate dimensions or even the grid type? After all, that defined the vicious set of problems growling at Bruce Grant. Then how to proceed? In general you must have a working knowledge of grids' attributes and know how grids behave. For Regular Knots this is not much of a challenge. Therefore, in this little article, I want to embroider on the Pineapple Knot theme. They illustrate a non-superficial interaction between the demands which are posed on the grid type *and* by the coding requirements. Therefore they form a good exercise in coming to grips with some useful braiding theory and, as a bonus, result in beautiful knots!

Coding in General

A crossing in a grid-diagram has some well-specified type. I usually say the type has a **parity**, which can be either / or \. Coding a grid is done by assigning parity to each of the grid's crossing points. Every crossing in the grid-diagram gets one of either crossing types. Coding forms influence the appearance of the final result. They determine the weave's texture so to speak. Choosing one of them depends on the requirements posed by the knotter and the available creativity.

An important observation to make is that a *grid* is not a *knot*. Grids represent knots as soon as every crossing has been equipped with a well-defined crossing. Regular Grids with a coding make for Regular Knots.

Given a Regular Grid it seems natural to apply rows, or columns, of identical crossingtypes. Remarkably these options were not recorded in the knotting literature till the beginning of the 1980's. Robert Woolery pointed them out and introduced nomenclature to make the distinction. He called the coding with constant columns *"gaucho"* and the coding with constant rows *"herringbone"* [22, p77, fig.51], [20, p134]. As Robert Woolery's proffered names already occur elsewhere and only expound existing confusion, our way out of trouble will be simple: introduce new and objective terminology! In the following we shall generically speak of **column-coding** and **row-coding**. Observe that there is exactly one coding form which is both row-coded and column-coded. It is our good old friend the Casa-coding, which adorns many a TH. Then there still is a large set of codings which are neither row- nor column-coded. I call them **User-Defined Codings**. In the illustration below there is a set-theoretic representation of the coding forms which can be applied to Regular- and Nested Grids and in fact to most grid-diagrams.



Codingform Classification

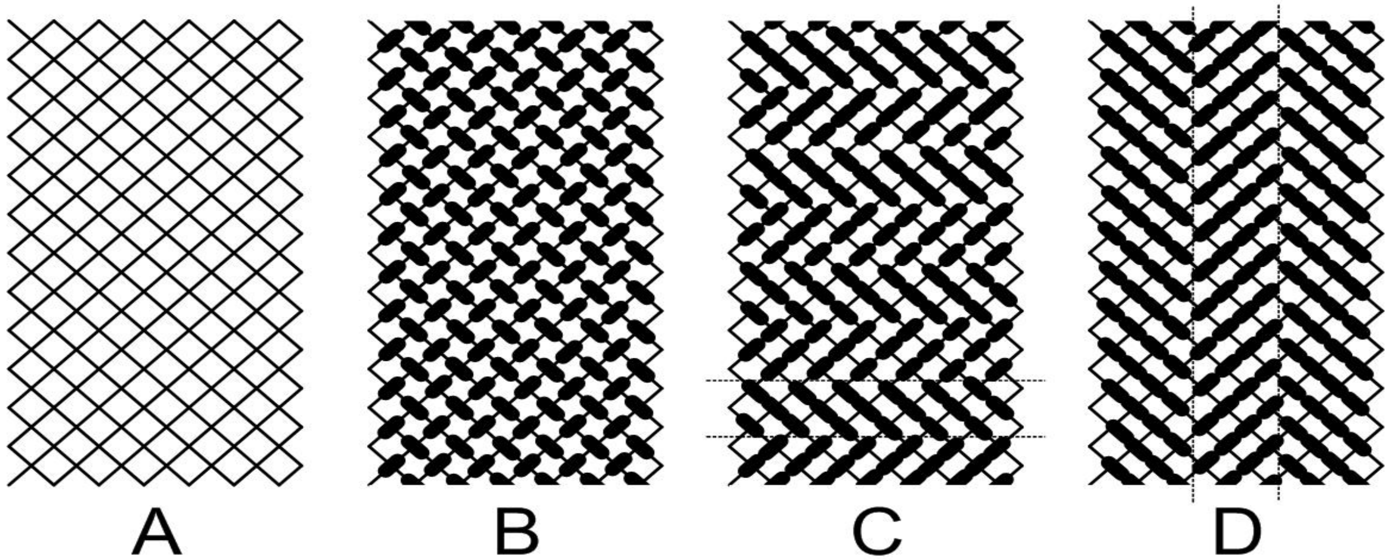
Luckily there are finitely many ways in which a given *p/b* Regular Grid can be coded. Clifford Ashley words a handy formula on the number of crossings in an arbitrary Regular Grid of *p* parts and *b* bights [1, #1401]. In symbols the number of crossings is given by $b(p\text{-}1)$. Assuming you do not rotate your Regular Grid and/or its accommodating cylinder, an arbitrary *p/b* Regular Grid therefore spawns

$$2^{b(p-1)}$$

distinct coding-forms. This figure includes the mirror symmetries. Two of them are Casa-coded and there are 2^{p-1} column-coded possibilities. In the following we shall only be interested in the row-codings, of which there are 2^{2b}.

An intuitive subclass of coding-forms consists of bands of the same crossing parity. They are frequently referred to as the so-called ***n*-pass coding-forms**. Bands can be placed horizontally or vertically and subjected to symmetrical placement.

Consider some examples. The illustration below shows four Regular Grids. They all have p = 13 parts and b = 12 bights. However, they are all *coded* differently. Diagram A has no coding and is a proper grid-diagram. If you apply an O1U1 coding throughout you arrive at diagram B. This is the well-known TH, i.e. a Regular Grid with Casa-coding. In diagram C a 3-pass row-coding has been attempted, i.e. all crossings per row are identical. Note, however, that the 3-pass requirement has not been fulfilled on every horizontal band. Moreover, there are scallops on both of the knot's rims which reach overpasses of 5. We shall return to this problem later. Diagram D shows a 4-pass column-coding, i.e. all crossings per column are identical. For alternative coding-forms, check out the following examples. Raoul Graumont and John Hensel offer 2-pass column-codings, which they call French Sennit TH [7, p220, pl.111, #49]. Clifford Ashley has row-codings [1, #1290, 1386, 1390] and column-codings [1, #1291, 1381]. He is not very discerning in this respect and calls both types "herringbone".



Nested Grid Notation Recapped

Symmetrical Nested Knots can be identified by means of the 4-parameter notation (*B*, *A*, *x*, *y*), which we introduced in issue 57 of *Knot News* [9]. Let us recap its highlights before jumping into deep water.

Symmetrical Nested Grids have identical left- and right-hand side rimsections. They have *B* outer nests with each *A* nestings. The nestingnumber is denoted by *A* and the number of nests by *B*. The Nested Grid's Equatorial Grid is a piece of Regular Grid of width *x* (parts) and length *AB* (bights). We assume that *x* will be greater than 0 here. The total number of parts in any Symmetrical Nested Knot is given by $P = 2(A-1) + x$. The Hemispherical Grids, i.e. the left- and righthand sections of the Nested Grid, have a shift of *y* (parts) relative to each other. To promote understanding of this notation, we shall indicate these parameters in our Nested Grids in this article. All of which will be of the symmetrical type, by the way.

Nested Grids Common Divisor Law

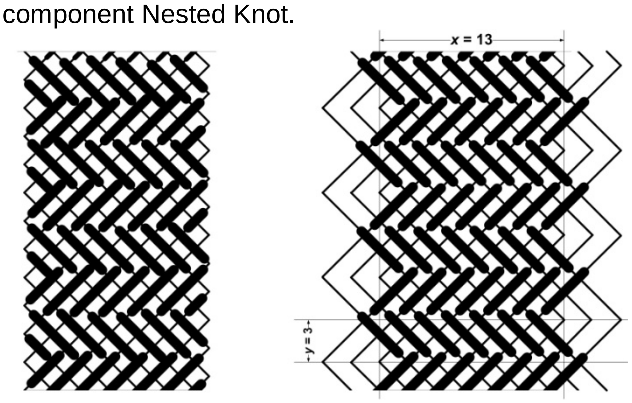
Given *p* and *b*, the number of components in a Regular Grid can be found by means of the Law of the Greatest Common Divisor. It tells you when to expect single-stranded Regular Grids, namely when *p* and *b* are coprime. Is there an equivalent for Nested Grids? Indeed there is. Obtaining a single-stranded Nested Grid requires the fulfillment of two conditions. Namely that the pairs (*P*,*B*) and (*A*,*y*) are *both* coprime [8], [19, p97-104]. We say that:

- (*P*,*B*) coprime is **condition I** and
- (*A*,*y*) coprime is **condition II**.

We almost have sufficient theoretical luggage to help us look for and unearth Perfect Pineapple Knots. There is one thing missing – the coding.

Row-codings and Nested Grids

Nested Grids are like any other grid in that they can be assigned a coding too. The resulting knots, however, exhibit different behavior when tensioned compared to those coming from, say, Regular Grids. One of the most conspicuous and certainly most useful attributes of certain Nested Grids is that they not only accommodate *n*-pass row-codings, but also are a requisite gridtype for hosting this codingform. Why is this the case? Well, this is easiest shown by taking the *p/b* = 13/12 row-coded Regular Knot sample (C) from above. Extend the coding to complete the rows. This exercise has been performed below. Observe which demands this action puts on the underlying grid. Note that the Nested Grid surfaces once again and that our initially single-string Regular Knot has become a 3-component Nested Knot.

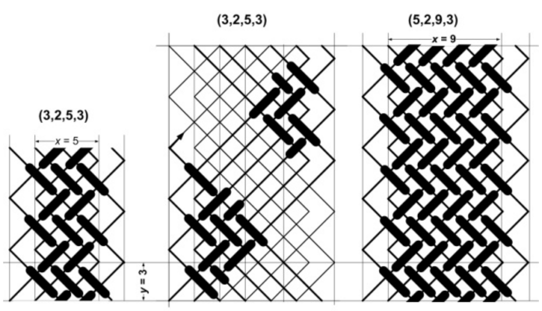


***p/b* =13/12 becomes (*B*,*A*,*x*,*y*) = (4, 3, 13, 3)**

The whole point is that we need Nested Grids if we want to accomplish an *A*-pass row-coded Knot. This fundamental observation will allow us to find the remaining perfect Pineapple Knot parameters. Let us return to the Pineapple Knot, which was launched by Bruce Grant, as it will be leading in the following.

Inspection of its grid shows that Grant's Pineapple Knot I is not a true Nested Knot. It can, however, be approximated by (6,2,10,2), which is an interweave of a 5/6 on a 7/6 Regular Knot, making it 2-component by default [15, p37]. These 2-pass Nested Knots can be obtained by interweaving two Casa-coded Regular Knots. A slight modification in *x* and *y* may lead to single-strandedness. Adapting it into a single-string Nested Knot would result in something like (6,2,9,1) or (6,2,11,1). However, Bruce Grant speaks of achieving the creation of *The* Perfect Pineapple Knot after years of tribulations [6, p420]. What else did he find that made it "perfect"?

In terms of grids Bruce Grant's Perfect Pineapple Knot is (*B*, *A*, *x*, *y*) = (3, 2, 5, 3). If you follow the diagrams in his book you will see that he got there via an *expandable* Nested Grid. In a future article I will return to this interesting phenomenon, but the point is that he found a Nested Knot, which retains its coding upon successive expansion. Consider the illustration below where the expansion is taken one step further.



Expanding (3,2,5,3) into (5,2,9,3) retaining 2-pass row-coding

Bruce Grant is rightfully lyrical about his 2-pass single stringer! In terms of serendipity, isn't it a curious thing that he discovered one of the expandable Nested Grids?

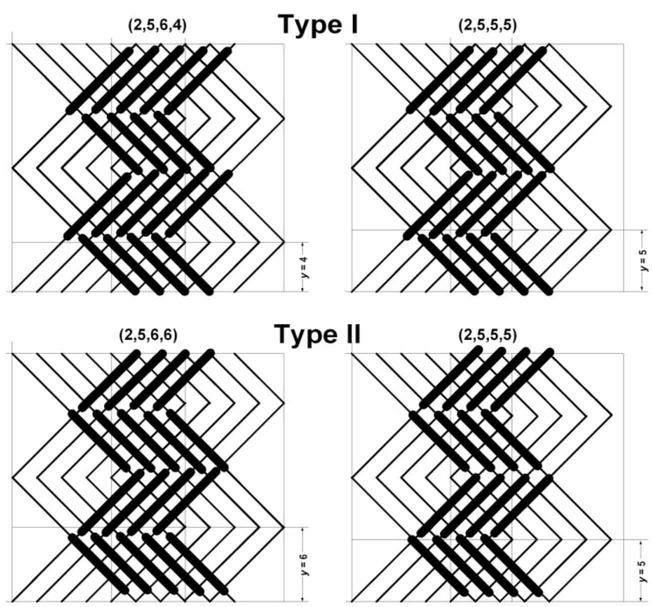
We have just seen that Grant's Pineapple Knot II was reached via a structure consisting of two (interwoven) Regular Knots. The resultant Nested Knot was equipped with a 2-pass row-coding. Can we achieve *n*-pass Perfect Pineapple Knots with our theory so far? Let's take a closer look at the conditions which have to be met before being able to implement an *A*-pass row-coding onto an arbitrary Symmetrical Nested Knot (*B*, *A*, *x*, *y*).

A-pass Row-coded Nested Knots

If you experiment with the placement of *A*-pass row-coding on a Nested Grid, you will find that this can be done in one of two ways. Take two horizontal bands of *A*-pass row-coding and collectively view them as an arrowhead. This arrowhead must to fall onto the area where the intersections are, but you are at liberty to decide whether the lower or the upper band fills the leftmost crossing. This results in two coding-types, which we shall name Type I and Type II. They are illustrated below.

Verify that if you want all bands to have the same number of A-passing strands, you are forced to demand that *y* = *A*. If you let go of that requirement you may choose *y* = *A* + 1 or *y* = *A* - 1.

In the illustration below this has been done for some of the cases where *B* = 2 and *A* = 5. The values for and *x* and *y* are chosen accordingly. An interesting observation can be made here. The *A*-pass row-coding requires a special grid-type, namely the Nested one. Otherwise the *A*-pass arrowhead will simply not fit.

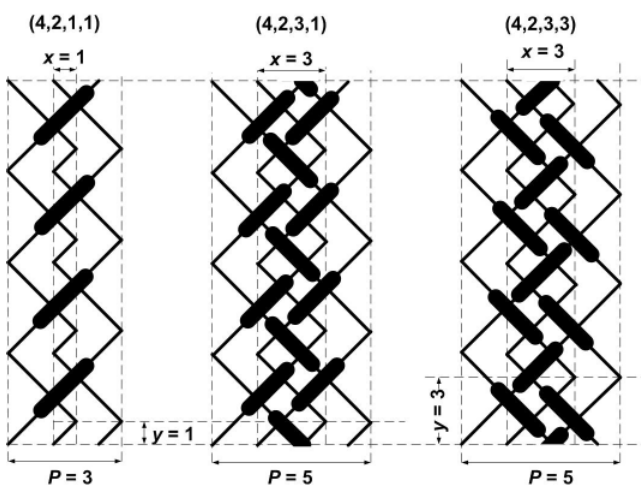


Of course to have an *A*-pass row-coding on a single-component Nested Grid, you would prefer to have *A* to equal *y*, as both bands will then match in their number of overpassers. However, this requirement immediately lands you into trouble, as *A* and *y* will no longer be coprime – violating part II of our Nested Grid law.

Live and Kicking Samples

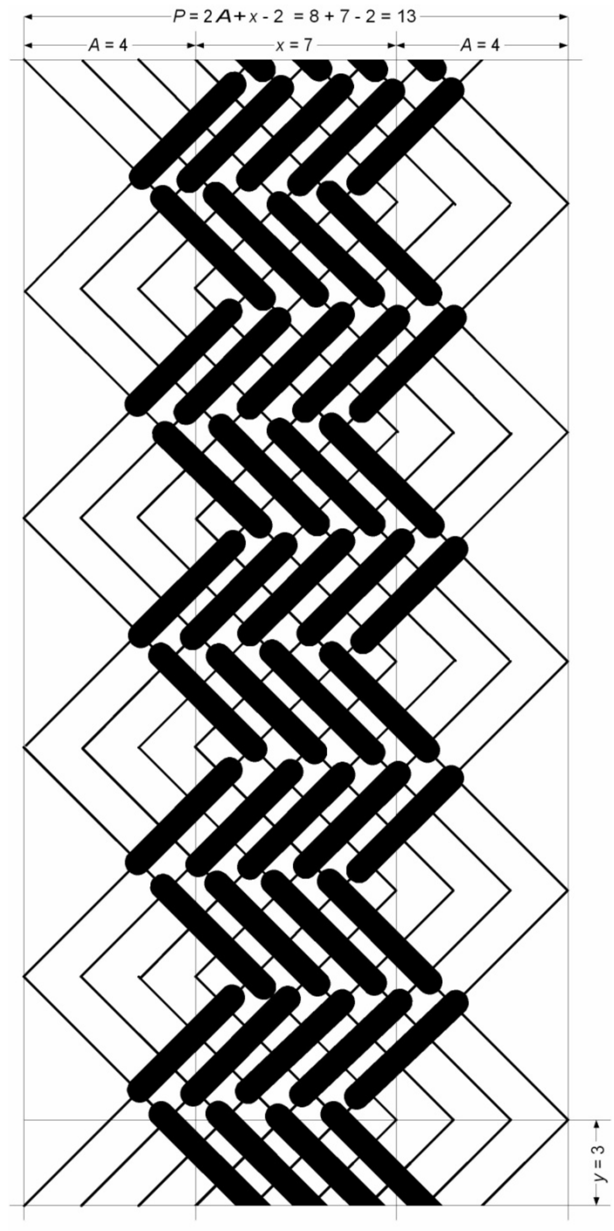
If we want to make Perfect Pineapple Knots, then what we need are single-stranded Nested Grids, which can carry an *A*-pass row-coding. The best way to learn new things is by exercise and looking at illuminating examples. In the following we mainly consider cases where $y = A - 1$.

As a warming-up exercise, let's seek the smallest Pineapple Knot which covers a sphere. The question to answer is: what are its Nested Grid dimensions? The smallest non-trivial *A*-value is 2. To obtain 4-valent Polar Openess, we require $B = 4$. To satisfy the Nested Grid's single-stringer law's Condition I, the values *P* and *B* must be coprime. As $P = 2 + x$ and B=4, they allow *x* to be any odd value. Let $x = 1$. As we are considering the case $y = A - 1$, we get $y = 1$. The single-stringer Nested Grid Law's Condition II is automatically fulfilled. Sweeping our finds into one bucket, we obtain candidate (4,2,1,1). In the leftmost diagram of the image below the 2-pass row-coding has been applied to this grid. When scrutinized, this skinny malinky is nothing other than a 3/4 Regular Knot boasting a 2-pass Coding. Obviously it needs a dab of Equatorial Weave. This has been done in the two rightmost Nested Grids (4,2,3,1) and (4,2,3,3), the latter being coding-type II, by the way.



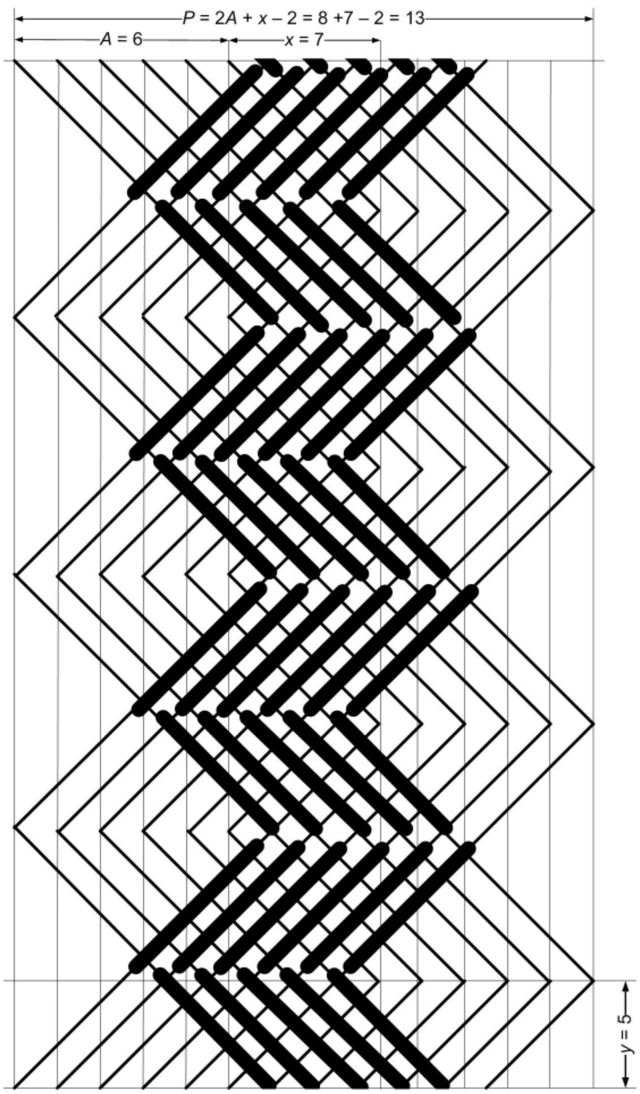
(*B*,*A*,*x*,*y*) = (5, 4, 7, 3)

Here $P = 2(A\text{-}1) + x = 6 + 7 = 13$. As $B = 5$, we have that the pair $(P, B) = (13, 5)$ is coprime. The pair $(A,y) = (4, 3)$ is also coprime. This means that Symmetrical Nested Knot (5, 4, 7, 3) will be single-stranded. It supports a 4-pass row coding, as shown below.



(*B*,*A*,*x*,*y*) = (4,6,7,5)

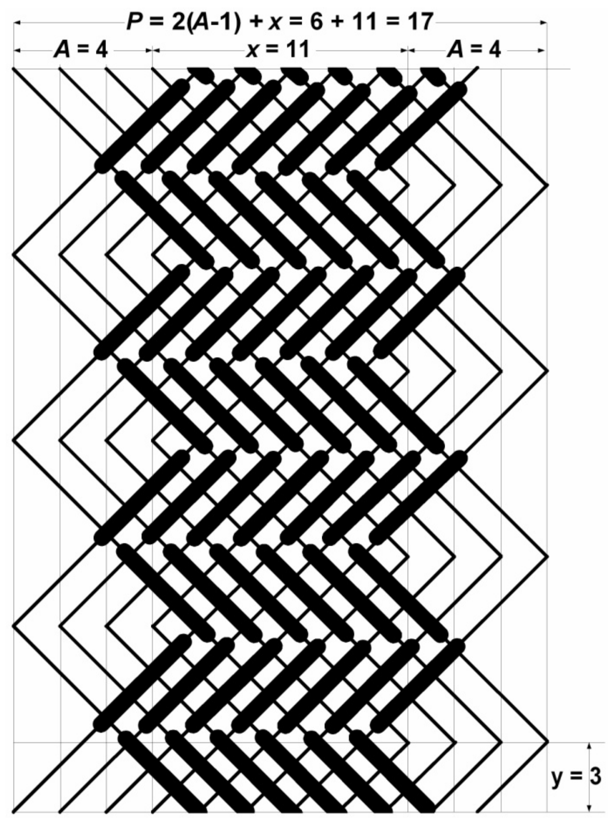
Let us close off by showing two B = 4 samples which can be used as sphere covering. A more impressive sphere covering Pineapple Knot will have a larger A-value than the ones we have encountered so far. Therefore, let A = 6. As agreed we have a Type I sample, where $y = A - 1 = 5$. Note that $P = 10 + 7 = 17$. The pair (P,B) = (17, 4) is coprime. The other pair (A,y) = (6,7) is also coprime. Hence our grid has one solitary component. Its 6-pass row-coded implementation is given below. Copy it, wrap it around a cylinder and try to make your own specimen. Try placing an additional interweave along its centerline or, alternatively extend its diagram to (4,6,13,5).

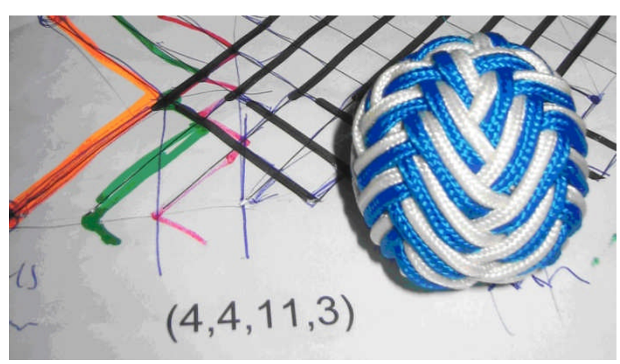


Now try and design a (4,6,7,7). This is a Type II sample with $y = A + 1$. Spot where it differs with respect to its Type I cousin.

(*B*,*A*,*x*,*y*) = (4,4,11,3)

We have picked apart Bruce Grant's struggle to create "The Perfect Pineapple Knot". It went unmentioned so far that (3,2,5,3) is also quite perfect in covering a sphere. Our previous sample (4,6,7,5) was not so good at that task, as it flagrantly violated the Squareness Criterion, which we formulated during the Rockall Ruby project [10, p3]. This criterion informs us that $x = 2A + 2$ when $B = 4$. Let's repair this fault. As A=4, we get that x must lay in the vicinity of 10. However, that value for x will violate the Nested Grid's single-stranded Law's first condition. We therefore increment the width of the Equatorial Weave to obtain x = 11. All in all we get (4,4,11,3). The Nested Knot and a photographic impression of the result are given below.





Sources

I would like to round off by listing notes on available sources for further information. Clearly there is a big clan of decorative knotters in the world. It consists not only of the boaty-boys in the Ashley tradition, whose evolution stopped around 1944. The clan mainly populates the cowboy braiding world. Over the past few decades numerous magazines and associations have sprung up and died out among the cowboys. In the list of references you'll find a number of their periodicals, some now rare and hard to find.

Tom Hall has interesting articles on Pineapple Knots. He clearly illustrated the first of Grant's Pineapple Knots two decades ago [11], [12, p114-115]. He also offers (4,2,6,2) as 2-pass Pineapple Knot and (4,3,7,3) as 3-passer [15, pp14-15], along with many others in his later works [13, pp44-51], [14, pp62-92], [16, pp36-40]. Neil Hood bequeathed us numerous well-illustrated pages on Perfect Pineapple Knots and other obscure things [17]. Cowboy braiders have produced many books with beautiful samples. Casey Beard in particular has brilliant samples [2].

Georg Schaake and John Turner put in considerable effort to explain Pineapple Knots. They coined the term Pineapple Knot *Class* [18], [19].

Epilogue

This article afforded us an impression of the bi-directional interplay between assorted types of grids and permissible coding-forms. We glanced at column-codings but eventually focussed on row-codings. We saw that Regular Grids are well-suited for column-coded designs, but that Symmetrical Nested Grids are a basic requirement for implementing *A*-pass row-codings. However, Nested Grids may also be equipped with a column-coding, which accentuates the Equatorial Weave in perpendicular manner.

We introduced some theory which helped us track Bruce Grant's heroic undertaking of finding his Perfect Pineapple Knot. We extended some of the principles to let them generate a whole class of beautiful knots - the so-called Pineapple Knot Class.

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20 C.L. **Spencer**, *Knots, Splices and Fancy Work*, Brown, Son & Ferguson, Glasgow, isbn 0-85174-157-6, 1978.

21 J.C **Turner** and A.G **Schaake**, "A proof of the law of the common divisor in braids", *Knotting Matters*, issn 0959-2881, no.35, pp 6-11, 1991.

22 R.L. **Woolery**, *Braiding Rawhide Horse Tack*, Cornell Maritime Press, isbn 0-87033-333-X, loc 84-46107, 1985.

TURK'S HEAD KNOT OR NOT?

Subtitle: TURK'S HEAD KNOT = an Uncontrolled Appellation of Origin

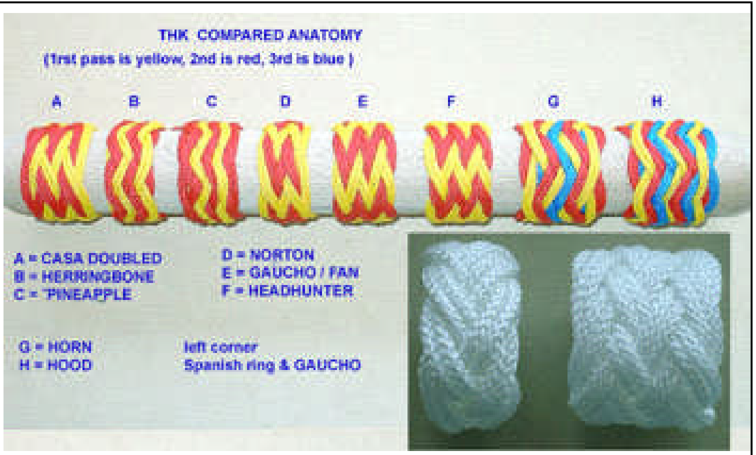
This is a wink to: *vins Français d'**A**ppellation d'**O**rigine **C**ontrôlée*. That is Wines with a Controlled Appellation of Origin.   **A.O.C** wines.

From the 'THK are not braid' article may be you will remember that I hold the view that:

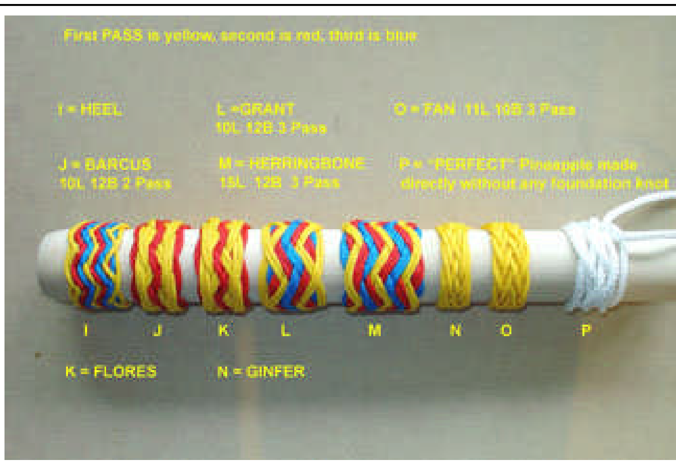
- THK should be a label strictly reserved for what in my perspective is the ORIGINAL BRAND (Part two)

Using Bruce GRANT, Tom HALL's books and, of course, ASHLEY's, I will attempt to clear some notions about THK.

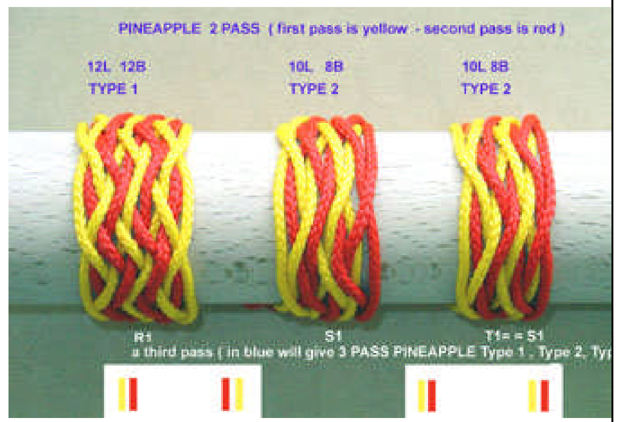
First a bit of compared anatomy:
These photographies can be found on Nautile's Gallery at www.khww.net in a larger size in case you need a better view.
(Part 2 – Photo 1)



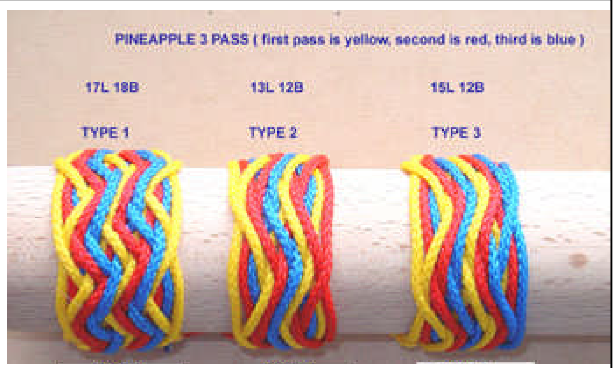
(Part 2 – Photo 2)



(Part 2 – Photo 3)



(Part 2 – Photo 4)



This should be enough to show that a single label is asked to regroup a miscellany of knots, each of them being different from a 'basic THK'.

Chapter 17 of ASHLEY's book always made my (left!) eyebrow raised in query.
It would not have if this Turk's-Head chapter had been titled « Ring Knots » or « Circular Knots » (flat and cylinder forms). Of 124 entries in this chapter less than 60% (71) are about what I consider to be **THE** THK. The word 'braid' appear only 3 times in the whole chapter under the guise of 'braided', twice in p225 and once in p235, in reference with the material of the cordage, not in reference with the knot.

I think that the STANDARD, UNICURSAL or SINGLE STRAND THK, COMPLYING WITH THE COMMON-DIVISOR RULE, WITH STRICTLY ALTERNATING OVER-UNDER CROSSING, IS THE ONLY ONE TYPE THAT SHOULD BE GIVEN THIS LABEL. It is said to be a "CASA" by braiders;

This THK is the native or so to speak, the 'pure element', all the rest are at best alloys.

The name THK seemingly chosen after the head gear « turban » made with *a single length of cloth*; it makes sense that the single line THK alone should get this name.

Turban is of Asian origin. For Turks, in fact, it was common only for the Sultans in the Ottoman Empire period (very end of 13^{th} c to beginning of 20^{th} c). In French it is '*Bonnet Turc'* / Turkish Bonnet, this being *'le turban'*

Playing with a pseudo-spirograph (simulation of the plane on plane motion of a moving circle on an immobile circle: rolling without slippage) is an important step toward understanding the plane geometry of THK :
http://www.wordsmith.org/~anu/java/spirograph.html

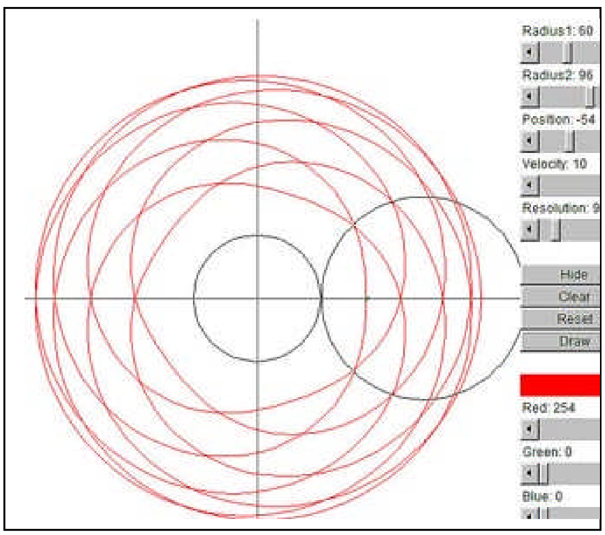
http://thinks.com/java/spiro/spiro.htm

http://www.math.psu.edu/dlittle/java/parametricequations/spirograph/SpiroGraph1.0/index.html

http://alumnus.caltech.edu/~jimmc/spiro/spiro.html

http://www.johngrindall.com/maths/spiro/index.php

This is the template of a 8L 5B THK drawn with a SPIROGRAPH (Part 2 – photo 5)



Let us examine some of the terms I make use of and of some that I did not keep after examination.
Main check sources of my recall about words are my old bi-lingual Harraps dictionary, a relatively recent British Cambridge Dictionary, and of course French Dictionaries and Encyclopedia.

* *First a quick look* at those that I could have used to broadly qualify the categories of so-called THK but that I finally discarded.
I weighted COMBINED against:

--- COMPOUNDED. As in flowers: simple and compounded. I rejected it for the reason that P.P.O HARRISON used it as a label for 3L THK that has been extended in number of bights.

--- COMPOSITE: it could have done the job but what with the confusion with some type of resins.

* *Second point* : the shade of meaning I put between BLENDED and AGGLOMERATED.
A **BLEND** is joining at least 2 different types of a <u>given</u> product. Think whisky blended.
AGGLOMERATED is for joining <u>different categories</u> of items
* *Third point* :
The following words I rejected as not fully suitable for a broad categorization.
Note that some of them pertain to *structure*: *lock, *link ; and others to *process*: *lace, *twine, *weave

Interlink(ed) = cause to join or connect together, with the parts joined having an effect on each other.
This is tempting, the more so with the Celtic Links in the background of the mind.
Interlace = to join (different parts) together to make a whole, especially by crossing one thing over another or fitting one part *into* another.
interlocking = firmly joined together especially by one part fitting into another; connected in such a way that movement or change in one part causes movement or change in another (not gradable).
Tony aka Asemery chose to denote by Interwoven a TH in his gallery; I think that for the Pineapple design, interlocked could be applied. Interlocked rings for me are more plausible than interwoven is.
Intertwine = to twist, or be twisted together, or to be connected so as to be difficult to separate
There is a not really a winding movement entering in the making of a THK of any kind as there is in making 'twine'.
Interweave (woven) to weave (weave=twist) together or combine two or more things so that they cannot be separated easily.
A *weave technically imply weft *and warp*, one being put in place before the other with fixed roles:
a weft cannot play at being a warp (or vice versa) later in the work.
So I do not deem it precise enough, even if it immediately speaks to the mental imagery, to say THK are interwoven, even if I accept that the first THK put in place plays at being a simile weft and the second a simile warp.
I would really prefer to say they are interlocked.

* *Fourth point* : a very 'peculiar' word : **variated**
I was set unto that by Brian's remark: « That is a variated turk's head according to the Harrison Book of Knots. »
I could not then recall seeing it in HARRISON's book and did not find it after a new reading.
GRAUMONT and HENSEL do use , "irregular", "unorthodox" in conjunction with THK and " variated" but that is with other knots than THK (have not seen it used with THK)
I have to raise question marks: is it not varia**ga**ted that is meant instead of "variated"? or **variant**?
Would not "variant" or "variety" be much better?
I knew of 'variegated' and "variate" but had to go to dictionaries for 'variated' and did not find it.

'Variant' is not always adapted as it goes only for *small differences* between the "type" and the "variant" and differences between so-called THK and the true type are not always 'small'.
'Variegated' can be the adequate word in some cases seeing the pattern of some so-called THK.
Anyway using "variated" in the meaning of "variant" will never do the trick.

I will really appreciate standing corrected in case of mistake(s) in the correct ("English" English) use of words. Now for some quick considerations about qualities a criterion or a set of criteria should ideally possess.
I tried to respect these:

- be "**valid**": adapted to the factual reality one want to explore and not doing something else than what is intended at first.
- be "**fair**": that is perfectly defining what is and what is not (should exclude all 'the what is not' and none of the 'what is' **plus** should include all the 'what is' and none of the 'what is not')
- be "**precise**": not too much random fluctuation depending in the surrounding conditions.
- be "**faithful**" or "constant" : result attained should identical in the hands of several honest intelligent, diligent and informed end-users.

All the qualities of a reliable weighting scale.
The exception should be the 'unavoidable exception' indeed and should not detract from the 4 characteristics above stated.
I set on the way of the strictest definition of things I could find either in my mind or in documents and shunned (well, err, tried too) all the every day blindly accepted usage, trying to go back to the root of meaning instead.
Knotting is technical matter so I think it is best to use technically accepted definitions.

SINGLE strand rule	O1-U1 / U1 O1 ALTERNATING	Comply to COMMON DIVISOR rule	
+	+	+	**ORIGINAL THK REGULAR**
+	+	NO	**IRREGULAR** **or NOT** THK
+	NO	+	**IRREGULAR**
+	NO	NO	**NOT** THK
NO	+	+	**ORIGINAL** wantonly made with several strands
NO	+	NO	Possible COMBINED or NOT THK
NO	NO	+	**IRREGULAR multi-strands THK**
NO	NO	NO	**Possible COMBINED Or NOT** THK

With 3 characters there are 8 possibilities of summarizing the situation.

Categorization of THK (Part 2 – Table 1)
Diagnosis flow chart (Part 2 – Table 2)

For lay out reason these tables had to be put at the end of the text part.
Please study them now.

CONCLUSION:

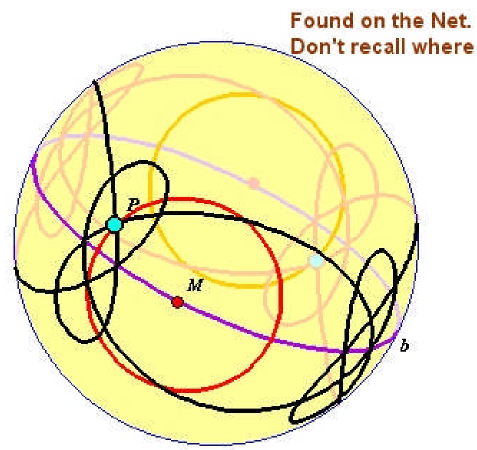
I hope I have build a convincing logical case against the present way of speaking, thinking and writing about THK and that it may have put in a seed now germinating in your brain, to become a strong sapling.

Much about the way THK concept is spoken about by tyers is theology rather than rationality. So I must add the remark that my hope is quite a bit tongue in cheek:
I am under no great delusion or illusion. Creed cannot be altered by logic.
Only the already dissatisfied with what is said around THK may have the opportunity to accept to think anew.

THK ALTERNATIVE is but a euphemism for "not a THK at all".
I use it to humour THK worshippers and give a bow of respect to Stuart GRAINGER work.

PS
A LAST MINUTE FIND that shows that this is just a beginning and that tackling the 3D representation of trochoids has to be made by a professional mathematician.
Quoted (after modification) from
http://antique.cinderella.de/en/demo/gallery/EllipticCycloid.html
Java animation.

Is this a THK?



<table>
<tr><td colspan="4">

TURK'S HEAD KNOTS

[Based on what GRANT and HALL put in their books, so not necessarily valid for others publications as far as COMPOSED THK or aping-THK knots are concerned as Authors at large are mostly clinging to their own personal conception. Nothing 'unified and agreed upon' by peer-review seems to exist as yet.]

</td></tr>
<tr><td rowspan="2">

SIMPLE THK
(the knot is both the element **and** the unique sub-element & vice-versa)
TO ME THE ONLY « THK » by NATURE are of the general formulation
(x) L (y) B
with x <> y
x and Y being integer
(without any decimal part)

| | mean absolute ('sign' +/- is not taken in account)

</td><td colspan="3">

COMBINED subelements: assemblies can be either of CASA only, or CASA plus « something else ».

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<tr><td>

CASA OF EQUAL
« DIMENSION »
in L & B

They are relatives of « true » THK.

DUPLICATION
Think : TILING or TESSELATION

</td><td>

CASA OF UNEQUAL
« DIMENSION »
in L & B

They are still relatives

HYBRIDATION
Think : MOSAIC

</td><td>

CASA AND
« something else »

They are more 'allied' than relatives.

CHIMERA
Think : GRYPHON

</td></tr>
<tr><td rowspan="2">

|x-y| = 1 or |x-y| > 1

I CALL THOSE
« SIMPLE REGULAR »

(Regular as in « following the rule, just like clergy orders!)

BUT THERE ARE ALSO :
--1-- « SIMPLE » THK **NOT** OBEYING TO THE RULE O1-U1 or U1-O1 **WHILE STILL** MADE WITH A SINGLE STRAND AND FOLLOWING THE NO COMMON DIVISOR RULE.
I CALL THEM
« SIMPLE IRREGULAR »
(as in not following the full rule : **MUTANTS**)
--2-- THOSE **NOT** FOLLOWING THE COMMON DIVISOR RULE (they may still be O1-U1 / U1-O1 <u>or not</u>)

THOSE ARE NOT THK

They may be euphemistically said to be THK ALTERNATIVES to humor THK worshippers holding fast to theology

</td><td>

FAN
(the CHECKERED form is tied from a CHECKERED HERRINGBONE followed by a 3^{rd} PASS in GAUCHO style)

</td><td>

GRANT
(said by T.HALL to be the « reverse » of a HORN)

Outer and Inner rims of bights at the border.
Aping a PINEAPPLE

</td><td>

BARCUS
End result mimicking the visual appearance of a FLORES made with two 5L 6B CASA tied as a HERRINGBONE followed by a 5L 6B 2 PASS GAUCHO (GAUCHO having a « something else » in its composition it follows that when a GAUCHO serve as sub-component it give the « something else » to the structure made with its participation.

</td></tr>
<tr><td>

HANSEN
From a CASA that is doubled (follow the leader) then splitting the pairs with a 3^{rd} CASA which give a 3P GAUCHO <u>PATTERN</u>
It can be made with ONE Strand but does not alternate O1-U1 in the finished state.

</td><td>

HOOD
(if compared to HERRINGBONE in 3 colors the result is more equilibrated in this one)
HOOD <u>can be made with CASA of equal dimension</u> so it does have the property of being a TRANSITIONAL form between the column on the left and this one). If tied with unequal CASA the first two are put as HERRINGBONE and the third as PINEAPPLE

</td><td>

GAUCHO
(Spanish RING)
CASA as template **AND** a NON-CASA 'threading' of Over-Under .

A GAUCHO of ONE PASS is 'only' a 9L 8B CASA so why call it GAUCHO 1P?

</td></tr>
</table>

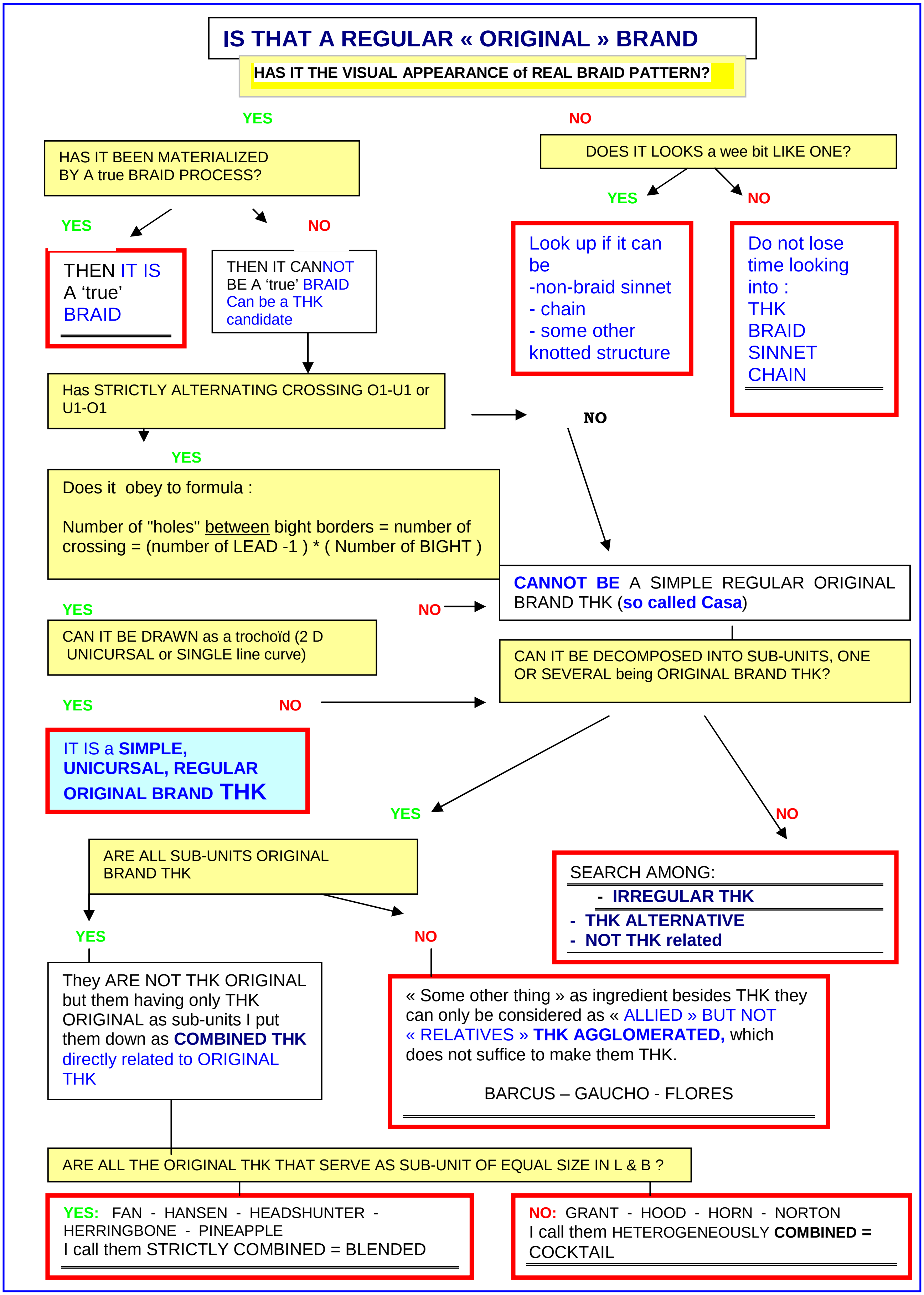
	HEADSHUNTER (the CHECKERED form is from CASA template BUT end with GAUCHO bights) the 'normal' HEADHUNTER cannot be accepted in the CASA related family as at no one time in its construction it follow the 01-UI but jump soon to 02-U2 or 03-U3 (or vice-versa) in the 2 PASS and 3 PASS. So I put them as NON THK. If they are NON-THK it follow that any structure they are part of are NOT THK .	HORN (so called 'nested' bight) Somewhat aping the PINEAPPLE 2 successive CASA put in a HERRINGBONE then a 3rd CASA interlocked ('nested' bights) in PINEAPPLE fashion	FLORES An astute way to ape a PINEAPPLE A 2 PASS type 1 PINEAPPLE **cannot** be tied from a 5L 6B CASA base – it would need an impossible 4L 6B CASA- Here a first 5L 6B CASA is followed by 5L 6B 2 PASS GAUCHO in such a way that ONLY the centre of the GAUCHO can be seen
	HERRINGBONE 2 or 3 interlocked or interwoven CASA all of equal dimension in L & B for a 2 or 3 PASS	NORTON GAUCHO characters in this knot (bights and 'weave') 2 interlocked or interwoven CASA. A CASA knot DOUBLED is said by HALL to be a CHECKERED NORTON 2 PASS TYPE 2. You see how all this is entangled and is much in need of some weeding out	
	PINEAPPLE 2 or 3 interlocked or interwoven CASA all of equal dimension in L & B for a 2 or 3 PASS Identical formulation as for HERRINGBONE but in both end results the rims of bights are not identical. May be the SO-CALLED PERFECT ONE STRAND PINEAPPLE (by GRANT) which stricly alternate O-U in the finished state should be put as a 'true' THK just as much as the GAUCHO 1 PASSA which is 'only' a CASA		

There is a special type of so-called 'THK' for which the formulation is not (x)L (y)B as in the CASA BUT (z)L (z)B the number of LEAD / PART / STRAND / TURN is equal to the number of BIGHT / SCALLOP / CROSS or share a common divisor though only ONE strand is used.
They are not COMBINED, they would be IRREGULAR AND SIMPLE but as they are not following the common divisor rule in my mind they are **not** THK in any way but rather they are aping THK :

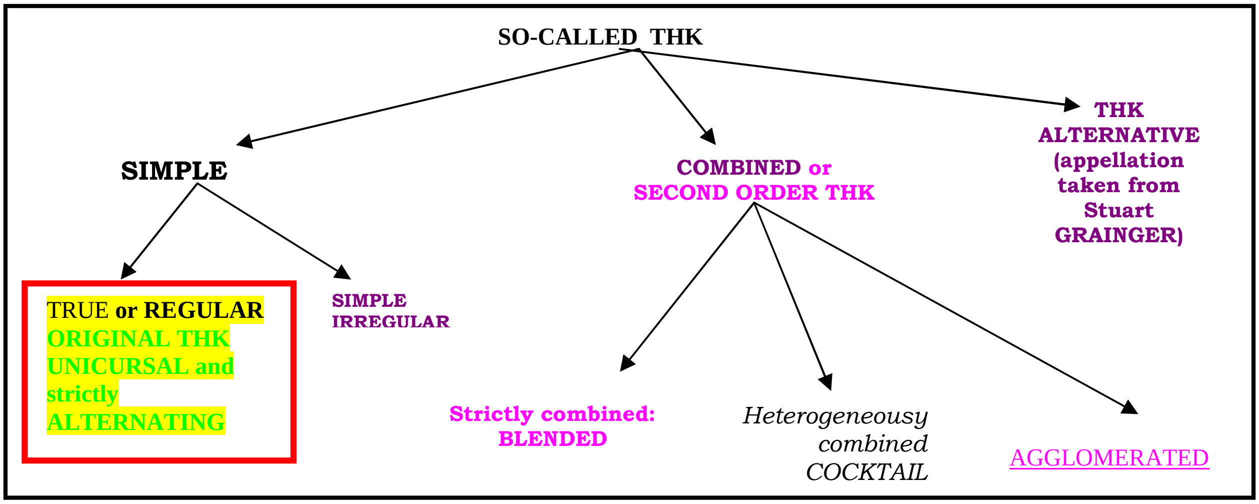
THK ALTERNATIVES.

I will put the so called MÖBIUS/MOEBIUS THK in the same NOT-THK bag and call it a MOEBIUS strip knot.
Add GINFER into that bag too!

This only reflect my personal state of mind after some pondering and study and should not be given a visa to enter your own frame of mind without a personal intellectually honest critical examination .
I was professionally trained to consider that there is two great intellectual faults :
rejection without critical examination honestly conducted AND acceptation without critical examination honestly conducted.


IS THAT A REGULAR « ORIGINAL » BRAND
HAS IT THE VISUAL APPEARANCE of REAL BRAID PATTERN?
YES
NO
HAS IT BEEN MATERIALIZED BY A true BRAID PROCESS?
DOES IT LOOKS a wee bit LIKE ONE?
YES
NO
YES
NO
THEN IT IS A 'true' BRAID
THEN IT CANNOT BE A 'true' BRAID Can be a THK candidate
Look up if it can be -non-braid sinnet - chain - some other knotted structure
Do not lose time looking into : THK BRAID SINNET CHAIN
Has STRICTLY ALTERNATING CROSSING O1-U1 or U1-O1
NO
YES
Does it obey to formula :
Number of "holes" between bight borders = number of crossing = (number of LEAD -1) * (Number of BIGHT)
YES
NO
CANNOT BE A SIMPLE REGULAR ORIGINAL BRAND THK (so called Casa)
CAN IT BE DRAWN as a trochoïd (2 D UNICURSAL or SINGLE line curve)
CAN IT BE DECOMPOSED INTO SUB-UNITS, ONE OR SEVERAL being ORIGINAL BRAND THK?
YES
NO
IT IS a SIMPLE, UNICURSAL, REGULAR ORIGINAL BRAND THK
YES
NO
ARE ALL SUB-UNITS ORIGINAL BRAND THK
SEARCH AMONG:
- IRREGULAR THK
- THK ALTERNATIVE
- NOT THK related
YES
NO
They ARE NOT THK ORIGINAL but them having only THK ORIGINAL as sub-units I put them down as COMBINED THK directly related to ORIGINAL THK
« Some other thing » as ingredient besides THK they can only be considered as « ALLIED » BUT NOT « RELATIVES » THK AGGLOMERATED, which does not suffice to make them THK.
BARCUS – GAUCHO - FLORES
ARE ALL THE ORIGINAL THK THAT SERVE AS SUB-UNIT OF EQUAL SIZE IN L & B ?
YES: FAN - HANSEN - HEADSHUNTER - HERRINGBONE - PINEAPPLE
I call them STRICTLY COMBINED = BLENDED
NO: GRANT - HOOD - HORN - NORTON
I call them HETEROGENEOUSLY COMBINED = COCKTAIL

LIGHTHING FAST SUMMARY: In green ink THE ONLY A.O.C THK



There is plenty of place to make much better tables. So please go to work…

Charles HAMEL; Vitry-sur –Seine, France Oct 2007

From the Mail Bag

Bob Solon of , Ohio: "The July 2007 issue has an article on page 8 called "Sphere Covering of 45 Faces" by Luc Prouveur. After a quick glance at the drawings I thought that I was revisiting our old friend the Knobbley Knot. And then I saw drawing #6 and realized that I really do need new bifocals.

Until now, I thought that 18 faces was quite sufficient. The biggest 18 that I tried is about 8 inches in diameter using ½ inch manila, tripled. It makes a handsome piece, especially if you make a loop out of one of the center passes.

I love the idea of tying it in hand. That mess of spaghetti can't possibly be anything but a tangle, until it isn't. For now I'll Let someone else experiment with the 45."

Louis Bartos of Alaska: "Received the copy of Knot News… it really looks great, you did a great job on it. I wish I had such good editorial and publication know-how. The knot discussion by Pieter van de Griend was way over my head and skill, so far, though I was intrigued with and understood the section on "Engineering Issues"."

Frank Brown of , Australia: "Had a quick look at the latest KN and got to say most impressed by appearance. Content and style of the four articles appears to be markedly different, which makes the issue particularly valuable to my way of thinking. Years ago Charles Warner called for a reorganization of KM, or extra publications to cover different aspects of knotting, e.g. technical, historical, craft, in a letter published in KM. I have been in favor of an occasional technical bulletin for some time. It seems to me that KN is going quite a long way of fulfilling the wishes of the Aussies – and probably a lot of other knot cases. Maybe the various editors could consider forwarding some specific types of articles to these publications more suited to the theme of those articles. Just an idea.

Keep up the good work and *nil bastardus carborundum*."

Darrell Ausherman of , California: "Charles Hamel should read Pieter van de Griend's article in the May 2005, Issue #49 of *Knot News*, "Tacking Turk's head Knots". Pieter defines a Turk's Head as, and I quote: "…they (Turk's Head Knots) are flat braids, which are bent into tubular form by fusing the ends". THKs can be tied with a single or multiple strands. I am not sure that all braids can form a THK, but all THKs, both single- and multiple-strand, can be turned into finite braids simply by cutting them.

I don't understand why you cannot use both descriptions as they are only depictions of physical inanimate objects. Of course, the process of tying a braid (do you *tie* a braid?) or tying a Turk's Head Knot are different.

Drawings or even photographs of braids and Turk's Heads are only two-dimensional representations of the actual objects. Mr. Hamel is apparently not aware that in the mathematical theory of knots *all* can be converted into braids!"

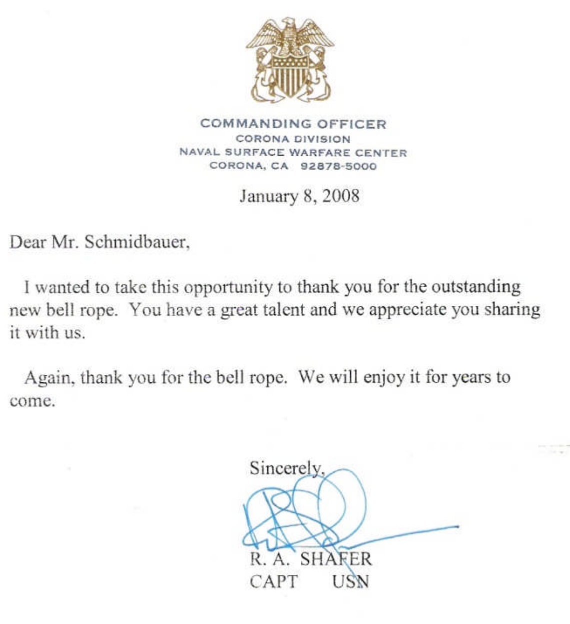
A Knotting Adventure

by Joe Schmidbauer

The Naval Surface Warfare Center in Norco, California, like all Navy bases, has a base "ship's bell". Somehow the bellrope that was attached to it got "legs" and walked away. The base commander directed a Lieutenant Hollie Brown to try and find someone who could provide them with a new one. A search of the Internet eventually brought her attention to the IGKT and Guild member Marty Combs (www.knotstuff.com) in Virginia. Marty sent her some information on how to make a bellrope but also told the Lieutenant that there was a knot tyer right in her backyard in nearby Corona (the name "Norco" is a shortening of "North Corona"). Anyway, as things developed, I ended up making them two bellropes: one large one for the "ship's" bell and a smaller one for the offices of the Naval Sea Cadets.

I was also invited to teach knotting to these same Sea Cadets. The first visit I just did a display/demonstration of the PAB knot collection to catch their attention. I was then asked back twice more, once to try some "fancy knotting" (a Monkey Fist / Whistle Lanyard Knot key fob) and then again for some help learning their six basic knots (they have an annual speed-tying contest against other Cadet groups with ropes hanging from a metal frame).

It was all a lot of fun (for me at least) and maybe they even picked up something along the way.


COMMANDING OFFICER
CORONA DIVISION
NAVAL SURFACE WARFARE CENTER
CORONA, CA 92878-5000

January 8, 2008

Dear Mr. Schmidbauer,

I wanted to take this opportunity to thank you for the outstanding new bell rope. You have a great talent and we appreciate you sharing it with us.

Again, thank you for the bell rope. We will enjoy it for years to come.

Sincerely,

R. A. SHAFER
CAPT USN

Anchors Aweigh!

Humidity has been a particular focus of meteorologists, just as it has to folklore – not only because it can make for uncomfortable weather, but because it is a measure of the amount of moisture in the air. That in turn offers a good indication of an approaching weather system, such as a thunderstorm. Sailors, who like farmers were preoccupied by weather, relied on ropes to give them an idea of what to expect in waters that they planned to navigate.

"When rope twists, forget your haying"

The rope referred to in the saying – hemp – was traditionally employed by farmers as a hygrometer, a weather instrument used to measure humidity in the air. The hemp was exposed to circulating air and would get kinks in it with increasing humidity.

"Curls that kink and cords that bind"

Sailors relied on rope and seaweed to measure the humidity in the air. Rope served the same purpose as a hygrometer. The more humidity in the air, the more the rope would kink. The larger amount of water in the air, the greater the likelihood that a storm system was approaching, which would bring precipitation and heavy wind.