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Knotting Matters

Newsletter of the



INTERNATIONAL
GUILD OF KNOT TYERS

The logo is a circular emblem. In the center is a detailed illustration of a reef knot (square knot). The words "INTERNATIONAL" and "GUILD OF KNOT TYERS" are written in a circular path around the central knot. The entire cover is framed by a wide border of a reef knot, with smaller reef knots at the intersections of the border.

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KNOTTING MATTERS

**THE QUARTERLY NEWSLETTER of
THE INTERNATIONAL GUILD OF KNOT TYERS
ISSUE No. 48 MARCH 1995**

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Notes From The Secretarys' Blotter

It seems ages ago since I sat here and wrote the last "Blotter", and sending you my Christmas greetings. That was nearly six months ago, and such a lot has happened, that I simply don't know where to start. Many problems and crises have come and gone, whilst others remain. I have always tended to follow the policy of "if you leave a problem long enough, hopefully, it goes away!!"

I suppose that the first thing to report is that Gordon Perry, KM's editor for the past four years, has decided that it is time to hang up his green eye shield and put away his blue pencil. Whilst he was still with the Navy, he found that his free time was extremely rationed, but now that he has retired, there appears to be none at all!! In fact, like so many others, one tends to look back on ones working days as though they were one long holiday. (Just a moment, there are some men in white coats at my front door).

With Gordon at the helm, Knotting Matter has been transformed into a magazine of high a professional standard, and on behalf of the Council and members of the Guild, I would like to offer him our most sincere thanks or all his hard work.

This naturally leads me on to my next item, and that, of course, is that there is now a vacancy for an editor of Knotting Matters. If you have ever thought, "why don't they print a little more of this, or that", then perhaps you are the person we are looking for!!

This is both a fascinating and stimulating task, as it brings you into direct contact with a great many of the Guilds members, who are either trying to pass on information, or obtain it. As in my case, it is not essential to be a brilliant knot tyer, or even a dab hand at the typewriter or word processor, just able to communicate. I can't offer any formal "training", but I can offer the advice and support of the Council, and of all the previous editors. In addition, Mike and Bob from Gipping Press, the company we use to print

KM, are always willing to help and advise. In fact, the anonymous editorial team, "Pen and Ink", who prepared this edition, send them their thanks, as they could not have done so without their help. If you are interested in this prestigious, yet unsalaried position, please let me know.

As yet, I have not had any enquiries about the Group Membership, but then as that was only first mentioned in the last KM that it perhaps a little too early to expect any response.

The UK members will remember that at the meeting last October the Grand Draw was held, (our thanks to Denis Murphy). This not the roaring success that we had hoped for a number of reasons, not the least of which being the imminence of the National Lottery, which caught the imagination of the country, even I have bought a ticket! That aside, it was sufficiently successful for the Guild to purchase a computer to assist with the administration of the organisation.

For those who are interested, it is a Viglen Professional 4DX266, with a 486 processor, a 348Mb hard disk and 8Mb of RAM. It is loaded with Windows, and Microsoft Office, which has "Access" "Excel" and "Word". This should serve the Guild well for many years into the next century. If you wish to send information to me on disk, then use Word, or ASCII text, and I shall be able to read it. It also follows on from this that our membership records will be held on computer file, and so, the Guild is "registered" in accordance with the Data Protection Act.

The AGM is coming along shortly, and the weekends programme looks to be exciting. I do hope that I will see you there. This is the time that members are elected to the Council for the coming year. This, combined with the change of British telephone numbers, has been chosen as a good time to reprint the Membership Handbook. Now is the time to let me know if my records need updating.

It is hoped that the new editor will be in place for KM49, which will be out on time, in the summer even if "Pen and Ink" have to be conscripted again!!

Until the next "Blotter", regards - Nigel.

'Big Ben'.

1. Start with a bight and twist it to lock (ie so that it continues the over-under sequence) and lock the whole structure by passing the ends as shown.

2. Pass the ends as in the second diagram. All the sections marked with a tick (✓) are now locked - check that this is the case with your own knot.

The rest of the structure is still unstable so take care not to lose any spaces during the next moves.

3. The knot will be completely locked if the ends are passed as shown. When doubling use both ends alternately until they emerge at the top of the knot.

This knot is the largest of the 'Bell' series - hence the title, and is dedicated to Ben Asberg, a good friend and knoter from the Netherlands.

'Big Ben'



MEMBER'S PROFILE - Richard Hopkins

I am now 51 and was born in East Anglia in order to be close to my mother who was there at the time, but was brought up in Wales and consider myself to be Welsh.

My father first showed me knots, and explained their uses, when I was quite young and I retained this information and built on it in later life. One of my father's hobbies was making model sailing ships and this involved rigging which has always interested me.

I have worked on polymer research, banking and commercial security and found many opportunities to tie things up, down and together — usually successfully — and have been somewhat surprised at colleagues lack of ability and absence of interest in knots. During all these jobs and also in a very long period of unemployment I found my 1944 copy of Ashley (£2 at a library sale) to be invaluable. Occasional difficulty in following some of the diagrams led me to buy more books from which I could usually figure out how to achieve my goal.

At this time I knew no one who could help me on a personal

basis — but I became hooked on affordable knot books. Eventually I learned about the Guild from Geoffrey Budworth's *"Book of Knots"* (excellent value) and finally joined the Guild early in 1989. When funds permitted — I was still unemployed — I attended the Guild meetings, where I have enjoyed myself and made some good friends.



My main interest in knotting is practical applications which I tend to rely on when taking people abseiling. I came back to group abseiling through voluntary youth work and recently qualified as an Industrial Rope Access Technician. There is no call for this skill in my present job at Bristol University although I do find uses for ropework and knotting.

My other interests include primitive cord and ropework, ropemaking and netting. I used to make my own camouflage nets for birdwatching in my schooldays following instructions in an Arthur Ransome book.

I like to knot with a definite purpose in mind, but — like most of us — I can happily doodle with a cord for practice although I seldom attempt the intricate ideas we see in *"Knotting Matters"*.

It gives me pleasure to see the correct knot in its proper place in modelling and in real life when things look right.

I do relatively little ornamental work — usually a one-off as a gift as I would not know how to charge for the enjoyment I get from my efforts.

It is always difficult to stop when talking about knots, but I hope this potted biography will give you some idea of my background and interests. ■

Phone ONE day

UK members will already be aware of what has become known as Phone ONE Day. This takes place one Easter Sunday, 16th April 1995, when an additional "1" will be added to all UK telephone numbers. This digit will be inserted between the initial zero, and the start of the present number, IE my own number is 0449 711121, and will become 01449 711121.

Overseas callers usually drop the initial zero, thus in future all UK numbers will start with a "1".

In addition the area codes for some major cities will change -

0532 - becomes - 0113 2 -

0742 - becomes - 0114 2 -

0602 - becomes - 0115 9 -

0533 - becomes - 0116 2 -

0272 - becomes - 0117 9 -

The next edition of the Members Handbook will include all these changes. - meanwhile I look forward to receiving your telephone calls. NH

LETTERS

PO Box 390327
Cambridge Massachusetts 02139-0004
USA

01 May 1994

Dear Nigel,

I suggest you save the enclosed issue of *"Popular Science"* as it is likely to be very valuable as a collector's item in the future. Please note the article on Page 114 by P. J. Skerrett on knots.

I bought my first copy of Graumont & Hensel in 1948 and have been very interested in Turk's Head ever since. I bought a copy of *"Trenzas Gauchas"* by Osornio around 1950, but the paper in the book was of poor quality and the book has now practically disintegrated. Bruce Grant came out with some nice books on leather braiding in the 1950's which interested me in ring knots such as the fan knot of Osornio.

The MIT Science Library got a copy of Reidemeister's *"Knotentheorie"* on 20 December 1948, but I did not see the Knotentabelle until 1963. Also in 1964, Martin Gardner published *"The Ambidextrous Universe"*. Both of these books cover topics mentioned in the May 1994 article by Skerrett.

Einstein and other scientists developed theories that were later supported by experimental scientists. Now that knots have theories, it is appropriate for practical knot tyers to "Prove" the theories by actually tying the theoretical knots.

My natural reaction is to contact some of the people mentioned in the Skerrett article and begin a personal program to tie theoretical knots. However, I think it would be much better if perhaps Dr. Vaughan Jones and IGKT could set up some formal arrangements between the scientists and practical knot tyers.

For example, Graumont & Hensel mention and show a class of Turk's Head up to 25 strands. Perhaps they could be studied and tied.

Perhaps *"Popular Science"* might be induced to champion a practical effort to tie the knots in Skerrett's article.

Please try to find if there is any interest in having IGKT members joining in a formal program to tie knots that have so far been only in computers.

I sincerely believe that it would be far better to have some formal context between knot tyers and scientists, which is why I am writing to you. However, a golden opportunity exists to get IGKT involved in the forefront of modern scientific activity. I have been trying, with no success, since 1983 to raise money for a Knot Museum.

The *"Popular Scientist"* article may open doors to wealthy people who perhaps never thought much about knots in the past. That is why I will not delay my personal efforts, one has to strike while the iron is hot as the adage goes.

Best regards,

Fred Brown

The Ties That Bind



Mathematicians unraveling the secrets of the humble knot find it is a scientific jack-of-all-trades.

Boy Scouts fumbling their way through a big square knot don't imagine it exists. Nor do surgeons tying off a tiny stitch on a blood vessel. Even old salts whipping up a Round Turn Spilled-Hitch Bowline are unlikely to suspect they're also exploring a once-obscure but increasingly important branch of mathematics. Lurking inside the crisscross pattern that forms a knot is a complex theory that has puzzled and challenged mathematicians for more than 100 years.

Thanks to several unexpected connections, knot theory is now emerging as a powerful tool for solving a broad array of practical problems. It explains how tightly coiled DNA manages to replicate inside cells. And it's helping to define the very structure of space. Knot theory is aiding the search for effective antibacterial and anticancer drugs, and it may make computer networks more reliable and efficient. A segment from the videotape "Not Knot", a computed-animated tour of advanced knot theory, even makes a cameo appearance in the Grateful Dead's psychedelic concert light show.

These applications represent just the tip of the "knot-berg". As more scientists struggle to understand this intricate theory and knot theorists turn their attention to real-world problems, practical applications will likely mushroom. That's not a bad turnabout

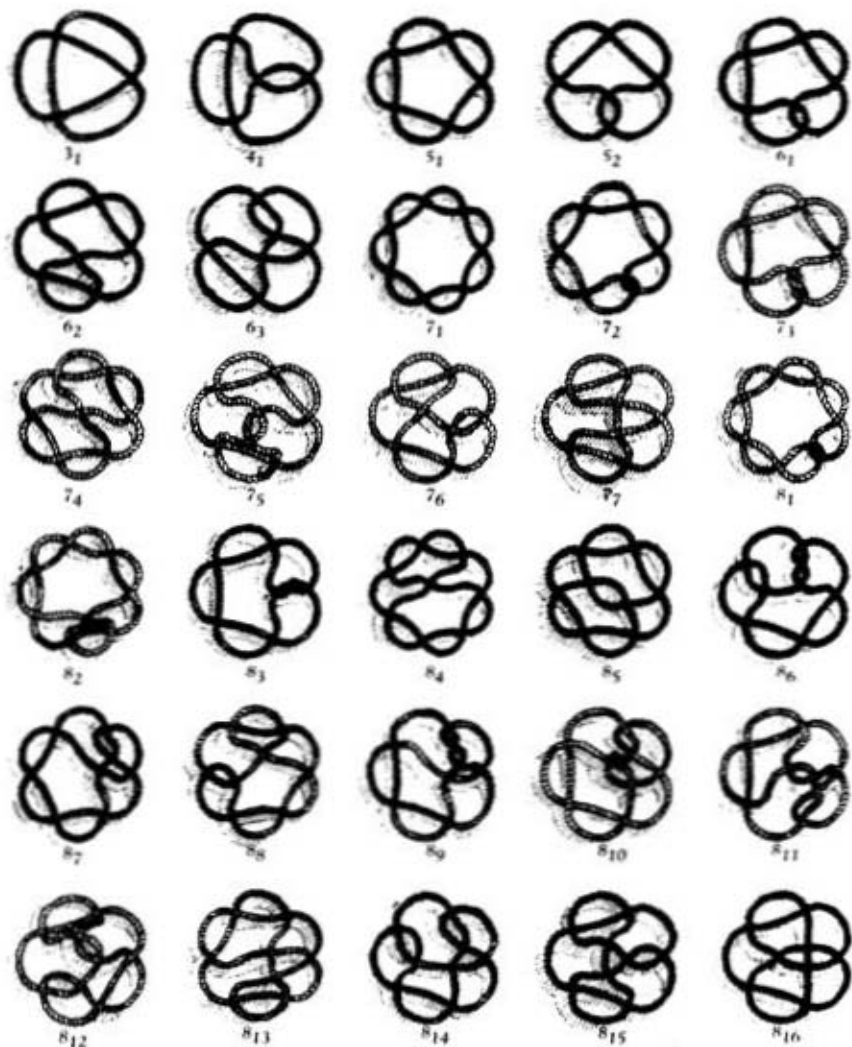
for a branch of mathematics once derided as recreational doodling for terminally bored topologists.

"It is so satisfying to see all this mathematics that we've had sitting on the shelf for 25 or 50 years now being put to use in a stunning variety of disciplines," says mathematician Alvin Thaler at the National Science Foundation in Washington, D.C.

Weavers, fishermen, and sailors have depended on knots for thousands of years; mountain climbers and surgical patient's stake their lives on them. Knots appear in artwork and religious ceremonies around the world. Hundreds of different knots have evolved, from the simple overhand to the showy combinations used by macrame artists. The *theory* of knots, by comparison, is a relative newcomer, originating in the 1860's as a perfectly practical offshoot of chemistry.

Dissatisfied with the then-current theory of atoms as hard spheres held together by mysterious forces, William Thomson (who became Lord Kelvin) guessed that atoms might be "knotted vortices in the ether". He imagined these vortices, or elongated whirlpools, bonding together by forming tiny knots. Scottish chemist Peter Tait started cataloguing knots and ultimately created a crude periodic table, classifying them by the number of times their strands crossed. Tait and assorted collages spent

The Periodic Table of Knots



The number of crossings helps classify knots, much as the atomic number does for elements. In each example above, the larger number represents crossings, while the subscript tells which knot it is in that series. For example, the top right knot, 6_1 , is the first knot of three with six crossings. This table contains all possible knots from three up to seven crossings; it has 16 of 21 knots with eight crossings.

Right & Left Trefoils



Knots are right- or left-handed. In chemistry, handedness makes otherwise-identical compounds behave differently.

years on this project, and the mathematical relationships they discovered gave birth to a new field.

In the real world of neckties and bakery boxes, knots are simple devices for securing a rope to itself or to something else. In the writings of the scientist-futurist Buckminster Fuller, knots physically store information by capturing (or tracing) the trajectory of two rope-holding hands. Mathematicians, as is their habit, see knots more formally; one-dimensional curves sitting in three-dimensional space that begin and end at the same point and never intersect themselves. That means that linked rings (in fact, any rings), such as those in the Olympic insignia, are knots. It also means the bows we tie on our shoes, or the hopelessly snarled ball of fishing line in the bottom of the boat, aren't really knots.

"If a knotted string has loose ends, it's really not a knot, since you can always slide a free end around and eventually, if you have the time and patience, get back to a nice untangled line," explains De Witt Sumners, a mathematician with Florida State University. To make a knot that would satisfy Sumners and other mathematicians, take an electrical cord—or string of pearls if you're feeling extravagant—tie a simple overhand

knot, then plug or clasp the free ends together.

Given the no-free-ends rule, the simplest knot is a circle, sometimes called the "unknot" or trivial knot. A trefoil has three crossings of the rope, pearls, or extension cord. The trefoil comes in two "flavours", right-handed and left-handed (see illustration above left). No amount of twisting or sliding can transform one into the other. Only one knot has four crossings, the familiar square knot and its mirror image, the granny knot. From there, the number of knots in a group grows exponentially—there are seven knots with seven crossings, 21 with eight crossing, 49 with nine crossings. The most complete table to date contains 12,965 knots with thirteen or fewer crossings, not counting mirror images.

Mathematicians, following their natural instincts to ferret out patterns



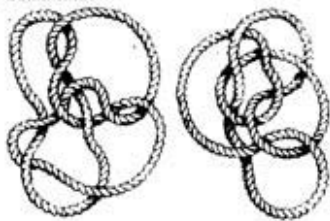
Knots in nature: Enzymes tie strands of DNA together. These knots may help tell proteins when, where, and how to act on genetic information.

that occur in nature, look for some common rules that will let them label a knot, determine whether something is really knotted, or tell whether two dissimilar-looking knots are in reality the same or different. Trivial problems? Think again. It took almost 100 years to prove that two different-looking knots with ten crossings listed in Tait's periodic table were, in fact, the same (see illustration over page). This difficulty

arises because a single knot can be twisted and rearranged into what looks like different shapes, yet by the rules of topology it remains the same as long as it isn't cut. (Topology, sometimes called rubber-sheet geometry, cares little for point-to-point congruence. To a topologist, a doughnut with a hole in the middle and a coffee cup with a handle are equivalent. That's because a clay doughnut can be stretched into a cup shape, with the hole providing the cup's handle.)

For several years, mathematicians searched for a universal number or formula that could uniquely define different knots (see "Unravelling Knot Theory"). A break-through came in 1984. New Zealand-born mathematician Vaughn Jones discovered a powerful method for labelling knots. Much to everyone's surprise, his startling new approach shared equations with quantum physics and statistical mechanics, the study of systems with a massive number of components.

The Same Knot



Categorizing can be tricky; it took nearly a century to prove these two different-looking knots are the same.

"The discovery that Jones made linking statistical mechanics and knot invariants [formulas that describe knots] immediately got people wondering how close this relationship was, and where else it might lead," says mathematician Louis Kauffman at the University of Illinois at Chicago. Kauffman is widely credited with exploring this connection and stimulating others to investigate the

link between knot theory and the physical sciences. By the time Jones was awarded a Fields Medal—mathematics' equivalent of a Nobel Prize—for his work in 1990, knot theory had become a vital tool in biology, and its applications were rippling through physics, chemistry, and engineering.

Perhaps knot theory's most dazzling, or at least its most practical, application to date is in molecular biology. The DNA inside cells, it turns out, naturally kinks up into knots, loops, and links. These pose serious problems for the enzymes that copy DNA or translate its genetic information, because they only work on flat, untwisted sections. On the other hands, knots and kinks may provide crucial topological stop-and-go signals for these enzymes.

"Knot theory is really the next chapter of the DNA story," now that DNA's structure and chemistry are fairly well understood, suggests mathematician Ayner Friedman at the University of Minnesota. DNA, or deoxyribonucleic acid, is an extraordinarily long ladder-shaped molecule that carries the entire genetic code for making and operating a bacterium, a beech tree, or a baby.

Actually, *long* is an understatement. If a muscle cell's nucleus were the size of a basketball, then the DNA packed inside would be as thin as a fisherman's monofilament line and stretch across lake Michigan and halfway back, or about 125 miles. Cramping that much DNA into a tiny space requires some regular method of compression, and living organisms have adopted supercoiling. This is what happens when you repeatedly twist the ends of a rubber band in opposite directions. Cells also wrap sections of DNA around tiny globular proteins. In addition to making DNA more compact, this wrapping also

knots it up, just as wrapping a perfectly untangled garden hose around a circular storage rim causes kinks and twists to form in the hose still lying on the grass.

Biologists have discovered several proteins whose job in life is twisting, knotting, and unknotting DNA. Called topoisomerases, these enzymes act like molecular fingers that tie and untie strands of genetic material. Knot theory has been invaluable in helping unravel the mechanism by which topoisomerases work. It's impossible to watch them in action inside a cell or in a test tube. But when you know the DNA's starting configuration and what it looks like after a topoisomerase does its job (see photo), then basic knot theory "lets you deduce the enzyme's reaction mechanism," says De Witt Sumners of Florida State.

Gyrase, a poetically named topoisomerase, helps twist the DNA double helix into a supercoil. Another class untwists supercoiled DNA, opening the way for yet other enzymes to read or copy the genetic message stored in a particular stretch of the molecule. Still other topoisomerases knot and unknot DNA by snipping open a section of double helix, sliding a nearby section through the break, and resealing the cut. University of California, Berkeley, biologist Nicholas Cozzarelli calls this "incorporealizing the DNA"—making it act for an instant as if it had no body and, like a ghost, could pass through solid DNA strands.

Computer simulations carried out at the Courant Institute of Mathematical Sciences in New York show that small pieces of DNA probably coil up and form simple knots like the two-ringed figure eight even in the absence of any proteins. This writhing, slithering, and twisting—all precisely defined mathematical terms—may create knots or bulges that act as road maps for

proteins. "We used to think DNA was just this boring chain of chemicals that sits there and waits for proteins to come along and act on it," says the Courant Institute's Tamar Schlick. "We're learning that all this coiling may actually determine when, where, and how proteins attach to it and act on it."

This new picture of DNA has led to the discovery of powerful drugs that stop bacteria from multiplying inside our bodies and kill cancer cells before they divide out of control. Basically, these new drugs turn a cell's unknotting enzymes against its own DNA. Ciprofloxacin, one of the most effective and widely prescribed antibacterial drugs, allows one kind of topoisomerase in the invading bacteria to untwist DNA and snip it open. But then it blocks the enzyme from resealing these breaks. When the bacterial cells divide, they split into daughter cells with deadly, nonfunctioning DNA. And since the drug doesn't target human topoisomerases, only the bacterial cells are affected. Several anticancer drugs use essentially the same strategy, acting only on cells that divide rapidly, such as tumor cells.

Biology isn't the only field enriched by knot theory. Physicists are using it to develop a long-sought theory of gravity that works on both the galactic and subatomic scales. Einstein's theory of general relativity explains gravity in the visible world—the attraction between a boulder and Earth, or how stars influence the movement of planets. But his equations don't work at the tiny, unseen distances between atoms and the basic building blocks of matter. Here, the mathematics of quantum mechanics must be used to explain particle interactions.

A team of scientist thinks that knot theory may help tie general relativity

and quantum mechanics into a unified theory of quantum gravity. Their work also gives new meaning to the term "fabric of space". In 1988, physicists Carlo Rovelli and Lee Smolin noticed that a new translation of Einstein's

equations by physicist Abhay Ashtekar bore an uncanny resemblance to equations from knot theory. Rovelli suggested melding Ashtekar's equations with different knot polynomials—equations that describe

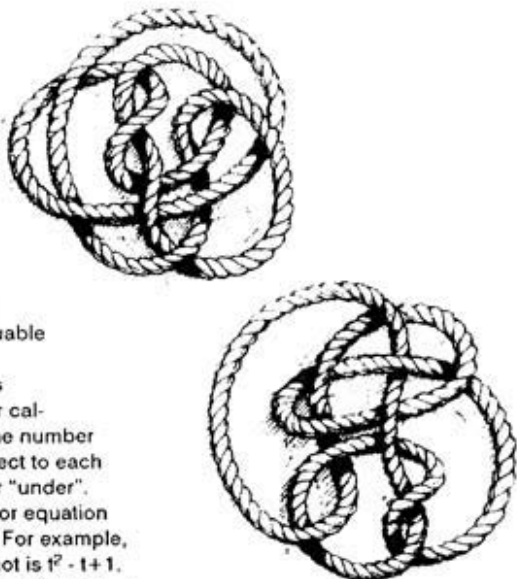
UNRAVELING KNOT THEORY

The quintessential problem for knot theorists is finding a unique number or formula that identifies knots known and unknown. This number, which must stay the same no matter how much the knot is twisted or rearranged, is called an invariant. It acts a little like a knot's Social Security number. An invariant not only identifies a knot, it also carries invaluable information about its core structure.

In 1928, American mathematician James Alexander devised an intricate method for calculating a knot's invariant. It considers the number of crossings, their arrangement with respect to each other, and whether a crossing is "over" or "under". Alexander's method yields a polynomial, or equation with variables raised to different powers. For example, the Alexander polynomial for the trefoil knot is $t^2 - t + 1$. This polynomial distinguishes most knots, but not all. It can't discriminate between mirror images, like right and left-handed trefoils. And there are two knots with 11 crossings that have the same Alexander polynomial as the unknot, or circle (see illustration).

Vaughn Jones at the University of California, Berkeley, has added an extra piece of information to the invariant—the "direction" of two crossing strands. To determine this, begin at an arbitrary point on the knot and paint small arrows all the way around. Using simple rules, knot crossings are labeled as positive or negative, depending on how the arrows point at each crossing. This directionality lets the Jones polynomial tell mirror images apart. For the right-handed trefoil, it's equal to $t^1 + t^3 - t^4$; the left-handed trefoil is $t^{-1} + t^{-3} - t^{-4}$. While more powerful, the Jones polynomial also takes far longer to compute. A fast computer might take an hour to spit out the Jones polynomial for a knot with two dozen crossings. Since 1984, a host of new, faster-to-compute polynomials has appeared.

Polynomials aren't knot theorists' only concern. Last year, three groups of mathematicians determined how to calculate the so-called Gordian number. Named after the mythical knot that Alexander the Great untied with a single slash of his sword, the Gordian number represents the least number of steps required to turn a knot into a circle. These steps involve momentarily cutting one strand, allowing another to move through the opening, and then resealing. "The concept is very intuitive, but it's also a bear to compute," says one of the discoverers, mathematician William Menasco of the University of Buffalo in New York. His new approach uses an interesting number called the braid index. Every knot, no matter how complex, can be rearranged into several braided loops that resemble a coiled lariat. The number of coils equals the braid index. —P.J.S.



various knots. The combination clicked, especially for the class of knots called links, open circles connected to each other.

These hybrid knot equations appear to explain gravity at all distances. They also point to a physical model of space that could resemble The Weave, something Rovelli built using hundreds of key rings, each attached to several neighbouring rings. "I emptied stores of key rings," he says, laughing. If Rovelli and his associates are right, space looks like three-dimensional chain mail. Each link represents a single loop of space, measuring ten to the minus 33 centimeters across. That's so small that if a loop were enlarged to the size of the period at the end of this sentence, a single atom would be ten times larger than the entire Milky Way. The extraordinarily small size of these loops ensures that space appears solid even at the atomic level, just as a woven cotton sheet looks solid to us from a distance.

The loop model even describes gravity graphically. When two bodies approach each other, they may increase the number of links in space, or the loops may link up with a greater number of neighbors, says Rovelli.

Chemistry also has its knot theorists. In 1989, French chemists synthesized the first knotted compound ever made, a 124-atom molecule shaped like a trefoil. More knotted molecules are in the works. Chemist David Walba of the University of Colorado uses a Mobius strip molecule—a circle with one or more half-twists—made from carbon and oxygen as the starting point for pretzel-shaped trefoils, square knots, and more complex chemical arrangements. Why bother? Partly because of the challenge, explains Walba. "Bucky-balls were first made just because of their cool geometry. Now

they're appearing in all sorts of useful applications. By tackling targets that are impossible to make, we develop new synthetic pathways and elements."

Knots also share the property of chirality, or handedness, with many natural and artificial compounds. A square knot and a granny knot can't be superimposed unless you lift them off the plane. (Like your hands—the only way to match opposite thumbs and fingers is to lift them into the air and place them palm to palm.) Handedness plays a crucial role in chemical activity. Right- and left-handed thalidomide, for example, share identical chemical formulas and structures. But left-handed thalidomide acts as a powerful tranquilizer, while its right-handed twin severely disrupts fetal development. This sinister difference wasn't discovered until long after pregnant women who took thalidomide in the 1950's bore children with severe birth defects. Elements of knot theory used to distinguish mirror-image knots may someday help chemists do the same with newly synthesized molecules, says mathematician Kenneth Millett at the University of California, Santa Barbara.

Even computer science is benefiting from a dash of knot theory. Until recently, programmers found it nearly impossible to predict how fast, or even if a computer could solve a particularly complex problem. U.C., Berkeley, mathematician and Fields Medal-winner Steve Smale borrowed a page from braid theory, one of knot theory's close cousins, to devise a solution. Essentially, he found that the more "if-then" statements a program requires, the more tangled its braids, and the longer the computations must run.

Computer-network reliability may be the next target says Lorenzo Traldi, a mathematician at Lafayette College in

Easton, Pa. Like knots, networks contain segments that are directly linked together and others that aren't. Knot theory should be able to analyze the relationships between linked and unlinked segments and help determine which are most prone to failure.

Even as it is applied to an ever-expanding number of problems, knot theory is evolving at a fairly rapid clip. This is partly due to the field's reinvigoration by Vaughn Jones and those he had inspired. It is also due to mathematical tools imported from the very fields where knot theory is now being applied. The new polynomials and elegant solutions for knot, braid, and tangle problems that are emerging may eventually be put to work in as-yet-undreamed applications.

That's not to imply that knot theorists always work with one eye on practical problems. In fact, perhaps the bulk of current knot-theory research is being performed without any application in mind. John Sullivan and his associates at the University of Minnesota's Geometry Centre, for example, want to know what happens when you distribute a negative charge evenly around a computer-drawn knot. "I can't imagine what practical use this might have," he says. "But mathematicians have great faith that if you find something that exhibits really interesting patterns, it will eventually have some application."

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20657 - 2966.

Dear Sir,

My hat is off to Stuart Granger for his wonderful illustration of the DAHLIA KNOT, K.M.44 pg. 25. Garret Smith would applaud his work, were he still with us. Out on Log Island, (Long Island) where Smith and I grew up we often referred to the Spanish Hitching (KM-44, pg. 28) as "Gracklin". A reference to a crow-sized black bird, grackle. Later I've heard gracklin used to identify the type of hitching used when covering the bulked innards of a bow pudding or fender for tugs etc.

I enjoy reading K.M. but I sure get lost when long-winded mathematical explanations by those "perfessers" from Down Under are included. I'd rather see pictures of other members work, tools etc. Now that I'm finished with my sea duty I'll have time to put together some short articles that may be of interest to our members.

So "fair winds" to all,

Respectfully,

Dick Roming.

THE BERGKVARA SPLICE

by Torsten "Pampas" Nilsson, 87 years old

From Halmstad, Sweden. As told to Ronnie Gustavsson.

Drawings by Christine Thery.

In 1927 I was on a 4-masted schooner called the 'Carina' (ex Dana) built of Oak at Nakskov, Denmark in 1919. She was 40 metres wide with a dead weight of 550 tons. Her home port was Raa now part of Helsingborg (Sweden), she sailed around the Baltic Sea to Finland, northern Sweden, France and England and so on.

Well, I signed articles as an ordinary seaman, but they were so short of crew that I worked for 27 days as cook, but with ordinary seaman's wages, which was about 80 Swedish crowns (about £8 or 14 US Dollars) a month. Now, the "Constable" (in other words a Second Mate without a ticket) was Anton Karlsson from Bergkvara, a real old seaport with a big sailing fleet on the Swedish east coast south of Kalmar.

One day he sat outside the Galley sewing a new fore staysail. As he spliced the luff and the lee rope in at the head he used a splice that looked rather strange to me. Anton was a much older man coming near to pension age and he was not very keen to show me anything, so I just went behind him for a bit of a look. Later I asked him if he would show me this splice. He was a little difficult about it, he was a master, with nothing left to learn, he had sailed on the big

ships, he had been a sailmaker, his knowledge was valuable.

"All right," he said, "but I will show you just once."

You begin as the sailmakers splice, you know tucking with the lay of the rope, first strand under two strands, second strand under one and third under one from the left and out to the right. But before you tuck the strand take out two yarns (well it could be more yarns it depends on the size of the rope), these two yarns



are stuck right through the middle of the strand you are going to go round as you make the splice in the usual sailmakers way.

You can do the same for a splice tucked with the lay, but this is the way Anton showed me. When you stick the yarns through the strand you should not go too close to the previous tuck because you will need to go over it with the next tuck to lock it. You usually make three full lots of tucks, but you can do more and just take away 1 or 2 yarns each time. Be sure to open the yarns of the strands flat so that they lay flat and smooth. Pull all the strands tight and then cut off the yarns. Take a look at the last tuck in this splice, I tucked it from right to left. I think that the strain will lock the splice.

You always use 3-strand hemp rope to rope a sail, but of course everybody knows that.

Illustrations by
Christine Thery



Learning the Bergkvara Splice

THE MAT SIDE SPLICE

(For losing the two ends when finishing a mat)

1 Tuck all three strands one above the other



2 All strands tucked through adjacent strands before trimming

THE SAILMAKER'S SPLICE

1 Tuck left to right taking A under two strands, B under one and C under one. Next tuck C round again left to right and repeat on other strands

B

A

2

Completed splice prior to trimming. Be sure to make at least three tucks with each strand



C



THE BERGKVARA SPLICE

The yarns are tuck left from left to right through the middle of the strand before the entire tuck is made with the lay



Diary of Events

1995

May 13th/14th	A G M Weston Super Mare
July 15th/16th	<i>Weymouth Maritime Modelling Festival</i>
July 25th	<i>Le Classic Boat Show</i>
July 15th-18th	<i>Tall Ships Race - Edinburgh</i>
August 10th-14th	<i>Tall Ships Race - Amsterdam</i>
August 17th-19th	<i>Navy Day</i>
September 2nd /3rd	Gilwell Reunion
September	East Anglian Branch Meeting - no details yet
October 6th/7th	October General Meeting - Yorkshire

1996

April	East Anglian Branch Meeting
May 4th	A G M Gilwell Park London (provisional)
May 24th-27th	International Festival of the Seas, Bristol
October 5th	October General Meeting

1997

May 10th	AGM
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Note:- Italics indicate Guild presence not confirmed

This is our first attempt at a diary of events. If you know of anything that you would like to see included, please advise the Secretary.

Murphy's Mat.

1. Arrange the rope as shown (a left handed half knot with the last pass unlocked).

2. Lead the end shown in a regular under-over weave to lock every thing in place.

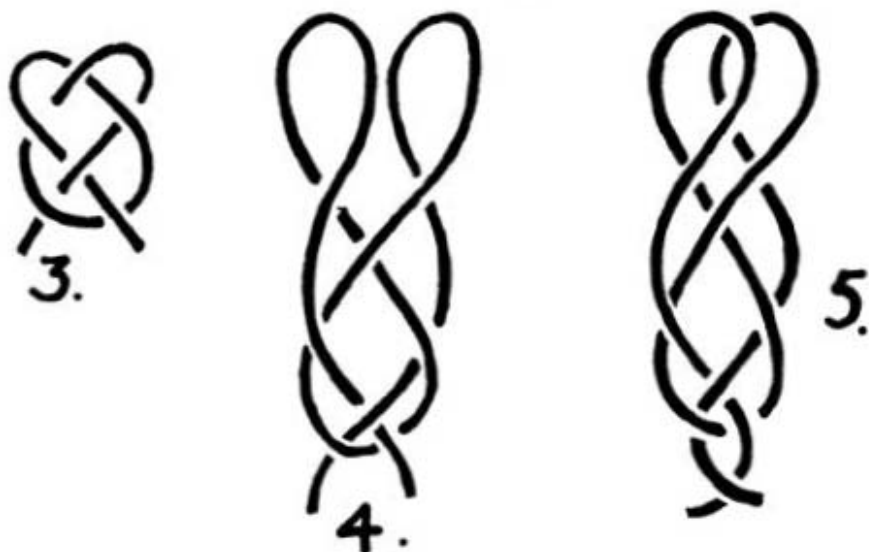
3. Turn the knot through 90° so that the working ends are to the bottom.

4. Work material into the two top bights and twist each to form an unlocked loop.

5. Lay one loop over the other as in the diagram and cross the working ends so as to continue the over-under weave.

6. This diagram has been turned sideways to save space! Rearrange the diagram or your knot and pass the ends as indicated to lock everything in place. The mat is now ready for doubling.

Murphy's Mat



BEND-RELATED KNOTS

John Halifax's The Single Strand "Hunter's Bend", KM Issue 33 1990 p24, reminds me that I once sought similar relations — a long time ago, before *"Knotting Matters"* existed to allow us to tell the world what we had found. Here is a revised and updated summary of seven single-strand knots related to bends. In each case, the bend can be drawn so that its working ends emerge parallel, pointing in opposite directions; these ends are then 'fused' to form the knot.

The numbers in the Table are Ashley serial numbers, but sometimes the knot produced has all its crossings reversed, compared with Ashley's illustration. Asterisked entries are commented on in the Notes.

No.	Bend	Knot
1	1425	525
2	1425A (Rigger/Hunter)	551*
3	1426*	551
4	1453	575
5	Zeppelin*	569 or 582*
6	N*	516 (Blood Knot)
7	"New" Bend*	516 (Blood Knot)

Notes:

2K. As Ashley says, this knot, 'tends to capsize into one of several forms', which explains why Ashley's illustrations look nothing like those of John Halifax.

3B. Has the same Knot as the Hunter, since it differs only in a final 'twist' of the working ends; this difference vanishes when the ends are fused.

5B. Alias Bend P in Desmond Mandeville's 'Alphabend' KM issue 4 1983 pp2-5.

5K. 582 is the obvious knot, but this may be deformed into 569 (the 2nd illustration so numbered; a 3-bight twist braid).

6B. Bend N of 'Alphabend'.

7B. Ettrick Thomson 'A New Bend?' KM Issue 5 1983 p15; it is Ashley 1425 with working and standing ends interchanged and differs from Bend N only in a final 'twist' of the working ends; hence the same knot as Bend N.

Ettrick Thomson
Aldburgh
Suffolk

John Halifax's article is reprinted on next page

THE SINGLE STRAND "HUNTER'S BEND"

A VARIATION ON A THEME By John HALIFAX



FRONT



REVERSE

This can be achieved in two ways:

1...By forming two linked overhand knots as at 3 below and gently tightening them together. Then twist the right side overhand knot up and outwards away from yourself and ease it tight. It will take the symmetrical form of the Hunter's Bend of only two ends, not four.

OR

2...Form a single overhand knot (left over right) and follow it round - tucking the left lead to the right over and under and over and gently tightening. It will form two linked overhand knots as described above and depicted at 2, 3 & 4 below.



1



2



4



3

John HALIFAX
Gorleston, Gt Yarmouth
Norfolk
7th March 1990

13th Annual General Meeting

13-14th May 1995

on board
TS Weston
Weston Super Mare

Come to the sea side for the weekend

Get together with others who share your interest in Knotting.

Meet old friends, or make some new ones.

Members and their guests are all welcome.

Formalities kept to a minimum - *by Order of the Council*

A full day of knotting activities, displays and demonstrations.

Easy access by motorway, or train direct from London and Bristol

Buffet Lunch/Evening Meal available.

Make a note in your diary
The 1995 Half Year Meeting
will be held on
Saturday 6th October

For this meeting we shall be guests of the Yorkshire Branch

Tangles from the Tub

Like Douglas Adams of *"Hitch Hiker's Guide to the Galaxy"* fame I do much of my constructive thinking in the bath. Unfortunately the water is often cold before I resolve my knotty problems and I therefore take this opportunity to air some questions which have floated into my mind from time to time.

Those who came to the May AGM in Nottingham last year may remember I'd been toying with the manufacturer of primitive string and attempted to reproduce the method of production I observed in an African village, where fibrous vegetable material (I use lime bast) is twisted into two strands by rolling it against ones leg and then laid up by rolling in the other direction. Being right handed I used my right hand and right leg. This gives a hard laid two strand right hand laid string very similar to material I have seen in Australian Aboriginal artefacts as well as in Africa. Presumably a left handed person would produce a left hand lay. Question — has the high proportion of right handed people in the population led to the fact that rope is usually right hand lay?

In both African and Australian Aboriginal cultures the making of string is usually women's work. Question — Does this have anything to do with the hairiness of men's legs? One or two who tried my technique at the Nottingham meeting may have some views on this!

Finally a thought about Cat's Cradles and Stone Age cultures. North American Indians have a tradition of story telling with string figures, so do Australian Aborigines and so too do the Inuit (Eskimos). Questions — What is the significance of this and do the stories they tell have anything in common?

Now where did that sponge go?

Penny Bodger



Cartoon by Stephen Whalley

Tremendous Response

Membership interest in North America generated by some well placed notices in "WoodenBoat" and "Western Horseman" magazines...

Thanks to the efforts of Mike Storch, the Marlinspike Cowboy, for getting us honorable mention in "Western Horseman" magazine. Incidentally, Mike is winter-wrangling on a 25,000 acre ranch in Arizona right now. It would be kind of hard even to breath back at Mike's home in the mountains around Silverton, Colorado right now - mainly because the snow is up to one's eyeballs!

Aussi un Grand Merci à l'Homme au Chapeaux Rouge, Des Pawson, the Man in the Red Hat, for collaborating with Peter Spectre and getting us some notice in Peter's column,

"On the Waterfront" in "WoodenBoat" magazine.

Between the efforts of "le Chapeaux Rouge" and Marlinspike Mike, the North American branch of the IGKT was inundated with over one hundred requests for information. It took a couple of months to respond properly to them all!

Even now, however, we are still getting letters and calls so it is hard to say just how effective those two vehicles have been, and will continue to be - suffice it to say: VERY Effective!

Obviously, the readers of both publications savor each issue.

I would like to take this opportunity to thank all the members in North America who have been corresponding with me; and, to apologize for the time it may take for you to hear back from me. I hope you will understand just how busy things have been; but,

PLEASE KEEP WRITING!

IGKT North America Annual Meeting 1995.

Through the kind cooperation of "WoodenBoat" magazine, in the person of Jim Miller, members of the Guild can look forward to accommodation for the 1995 Annual Meeting in North America in conjunction with the Wooden Boat Show being held at Southwest Harbor in mid-July this year. (Actually, as VP Brian Field noted because it is also a special date for him: that is Bastille Day, "le quatorze juillet".)

Brian has also brought up a good point with regard to an IGKT stand at the "Wooden Boat Show". We would like to know if any members would volunteer to man the booth and be responsible for greeting the public, answering questions, providing demonstrations, and generally representing the Guild. It may also be necessary to do some

"light construction" on our booth; however, we will know more about that later and we will keep you informed. If Lansing was any indication, this year's meeting should be a lot of FUN!

PORTABLE DISPLAY

In addition to the the "Welcome Rope" representing the members of the high council in Great Britain, we have received impressive samples for our IGKT portable display from:

Mike Storch
Maggie Machado
Tom Hall
Geoffrey Budworth
Brian Field
Brian Glennon
Chris & Lauren Malhoit
LuAnne Kozma

This initial version is getting full; but, if we get too many pieces, we'll just do another one. This display will certainly make a fabulous exhibit at the Annual Meeting 1995.

A FEW NOTES ON TESTING KNOT STRENGTH AND SECURITY

PART I. TERMINOLOGY

© Robert Chisnall, 1994

PREFACE

There has been some interest in a brief article that appeared in *Knotting Matters* some time ago ("Sheet Bends — Direct versus Oblique", issue #38, 192, page 5). Originally, this was part of a brief note to Geoffrey Budworth regarding knot testing. Its appearance prompted some correspondence from Guild members — mainly queries — so I thought a more extensive article was in order.

INTRODUCTION

How trustworthy are certain knots? the only way to determine a knot's reliability is to test it. Why is it important to know the relative dependability of certain knots, like similar loops or hitches? Considering the plethora of knots currently in use, and the variety of occupational and recreational applications, knots have to be tested and compared. This is essential for knots used in safety systems.

How much testing has been done? What is known? These are difficult questions to answer because the research has been sporadic and the results have been reported in a variety of obscure publications. What follows is a brief tour of the literature covering:

1. Basic terminology,
2. Common testing methods
3. And some research results.

These topics will be presented as a three-part series.

PART I: TERMINOLOGY

Many knots analysis focus on quantitative properties like *knot strength* (Ewing, 1973; Microys, 1977; Wheelock, 1967). But a complete evaluation should also include qualitative factors like *knot security* (Ashley, 1944; Budworth, 1983; Chisnall, 1985).

(a) Quantitative Measures - Strength and Energy Absorption

Strength is the most important concern in any research. As it applies to textiles and knots, strength can be defined in the following ways:

Strong knots should be "...able to sustain high loads for a period of time..." and "...handle repeated subsequent loadings of similar magnitude."
(Chisnall, 1985, Page 140).

"Breaking strength is defined as the maximum tensile force observed during a test in which the specimen is stretched until it breaks."
(Canadian General Standards Board, 1984, 2.1).

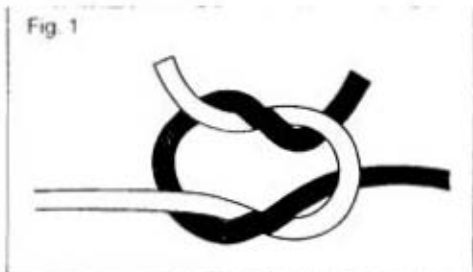
Breaking strength or *tensile breaking strength* can be measured using some sort of gauge while increasing "tension on the rope by means of the moving element of the testing machine until breakage occurs." (Canadian

Government Specifications Board, 40-GP-1M, 1978).

Other terms can be found in the research literature. *Minimum breaking strength* is the lowest failure load of a given knot in a series of tests — its worst performance if you will. *Maximum breaking strength* is the highest failure load of a given knot in a series of tests — its best performance. *Mean or average breaking strength* is the sum of all of the failure loads recorded in a series of tests divided by the number of tests. The amount of variation around the mean can be used to calculate other statistical measures like standard deviation.

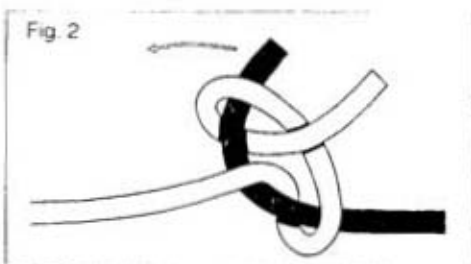
In my opinion, the minimum breaking strength is the best and most reliable piece of information. It gives you an idea of how reliable a particular knot is. Maximum and average strengths, which are higher, can lend undue confidence to a knot's performance.

Often, researchers measure knots according to *relative knot strength* or *knot efficiency*. This can be calculated by dividing a knot's breaking strength by the *absolute breaking strength* of the cord or rope (which can be a problematic determination in itself) and multiplying by one hundred percent. Unfortunately, as you will see in Part III of this series,



varying the materials and test conditions produces wide-ranging values that are difficult to compare.

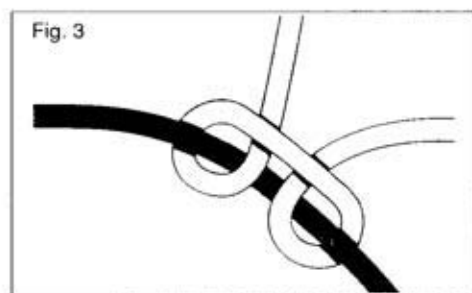
Riggers, rescue personnel and construction workers rely on another standard when selecting rope and cable for a job: *Safe working load*, *maximum safe working load* or *static safety factor* (SSF) (Paul, 1983; Dickie, 1975). Safe working load is the ratio of the minimum, new-rope breaking strength to the maximum load experienced in practice.



For example, according to the Construction Safety Association of Ontario (Canada), ropes and cables designed to sustain industrial loads must have a minimum breaking strength that is five times that of the maximum load the rope or cable will ever have to bear (Dickie, 1975) — the SSF is 5:1. The ratio is 10:1 for human loads. For rescue systems, the national Fire Protection Association (1990) recommends a standard of 15:1.

What does this have to do with knot strength? I believe *safe working load* should be a consideration when selecting and testing knots for particular purposes because knots substantially weaken any piece of rope. Therefore, the safe working load of any system

should take into account the minimum breaking strength of every knot used.



Knot strength deals with static situations. Often, knots are employed in fall-arresting safety systems. When a falling body is stopped, an impact force is produced that is proportional to the mass of the body and its deceleration ($F=ma$). All knots in the system have to handle the impact force. (Ideally, the impact force should not exceed the *safe working load* of the knot, which can be called the *dynamic safety factor* in high impact situations. (See Paul [1983].)

Energy absorption is just as critical as strength. The falling object's *kinetic energy* has to be absorbed or dissipated in some way. The stretch or give in the safety system decreases the deceleration and thereby decreased the impact force. Energy absorption can be calculated by plotting *impact elongation* (give in the rope) against *impact force*, and determining the area under the curve.

Why should energy absorption be of interest when testing knots? Knots absorb energy as they tighten. It has been demonstrated that the energy-absorption capabilities of a knot can substantially decrease impact forces

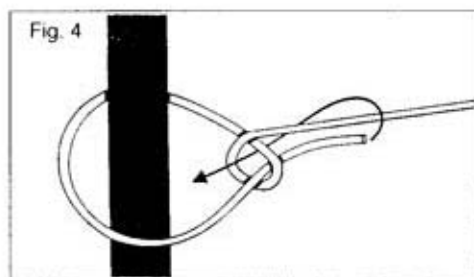
(Cannon, 1988), and this has an overall affect on the shock absorbency and effective holding capacity of any safety system that employ knots.

For a more detailed discussion of these and other concepts relating to force, energy and dynamic rope systems, see Wexler (1950), Fillion (1979) and Paul (1983).

(b) Qualitative Observations - Security, Capsizement, etcetera

Knot security is, if you will pardon the pun, a slippery concept to qualify. Each knot is unique, and every application has unusual circumstances that can influence a knot's overall security.

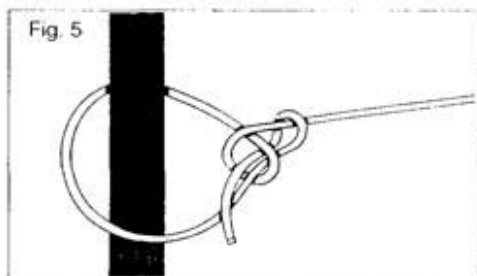
Several knots — like the Thief (Grief), Jinx and Granny Knots — by their very arrangement of nips and bights, can automatically untie when loaded. Other more secure structures, like the Reef or Square Knot, can come undone when the cord is too slippery or too stiff.



Knots can become insecure through deformation or capsizement. Under the right conditions, a Reef Knot might capsize into a Girth or Cow Hitch and slip (Figures 1, 2 and 3). Even the king of knots, the Bowline, can capsize into

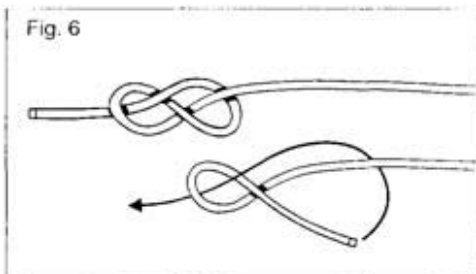
an Overhand Slip Loop. This, in fact, has happened with tragic results while people were climbing (Spence, 1980). Consequently, knots like the Bowline and Reef are not recommended when life and limb are at stake.

There are structural factors than can influence knot security, allowing some knots to capsize more readily than others. For example, consider single, fixed loops. *Post-bight knots*, like the Bowline (Figures 4 and 5), are tied entirely after the loop has been made. *Pre-bight knots*, like the figure Eight End-Loop or Follow-Through (Figures 6, 7 and 8), are tied before and after the loop is made — and are, therefore, much more secure. (However, post-bight knots like the Taut-Line Hitch, Round Turn and Two Half Hitches, and Tarbuck Knot are stronger because there is no bight in the load-bearing side of the knot.) (Chisnall, 1991).



Capsizement is just one aspect of knot security. A more systematic assessment of knot reliability should consider two major qualitative themes:

1. How did the knot fail — breakage, capsizement or slippage?
2. What are the consequences — damage, system failure, injury?



Here is a sample of the qualitative detail some researchers maintain in their testing notes. Larson (1989) provides several terms for describing how rope is damaged when belay hitches fail. The *glass transition point* or melting temperature of synthetic belay rope and accessory cord can be surpassed when slippage occurs. The rope and cord can *glaze, melt, stick, fuse* or *weld*. Each term has a slightly different but distinct meaning. Such details can be very useful in determining the mode of failure and the consequences of failure.

Of course there are other important qualitative considerations when it comes to evaluating knots:

1. Ease of tying.
2. Ease of untying after severe and/or prolonged loads,
3. Ease of teaching/learning,
4. Ease of verification at a distance or while in use,
5. Suitability to the task,
6. Susceptibility to wearing and jamming,
7. And aesthetics.

Fig. 7



Each factor has to be carefully weighed in light of the knot's particular application and the range of circumstances encountered during any task.

SUMMARY

Hence, in any investigation, qualitative and quantitative factors — like knot strength and security — must be assessed according to how a knot will be used.

NEXT ISSUE:

PART II. TESTING METHODS.

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Fig. 8



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Tools!

As in any undertaking, they can make a big difference!

Chris Malhoit IGKT-NA

After watching Des Pawson manufacture a boat fender in a matter of minutes at the 1994 Annual Meeting in Lansing Michigan, (something I can do, too - except that it's a matter of HOURS in my case), I realized that I needed some tools to get the job done a little faster and also to save my aching finger tips!

Indeed, even though I have been an avid reader of Knotting Matters and other knotting and rigging publications, and even though I have taken note of the mention of various tools being used by various authors, I guess I just hadn't made a conscious commitment to acquisition - until I saw them in action - WOW!

Shortly after the Lansing meeting, I wrote to Des and asked him to help me start my collection of rigging tools. He asked me what kind of rigging work I intended to be involved with, and I told him that I liked working with 1/2" to 1" laid manila; but, naturally, I would have to deal occasionally with some modern stuff

- braid-on-braid as well as some 8-plait. Initially, he came up with a modest list of essential items which he said would get me through just about any project, and at a price which was quite reasonable - under \$50.

Only because I am a bit of a tool fanatic, I told Des that I might as well pick up a few extra tools as well. (I still don't have that Brass Serving Tool, but it's only a matter of time...) So, with Des' guidance, we came up with the following list:

Marlinspike

Pricker

Fid

Serving Mallet

6" and 10" Swedish Fids

Gripper Fid

Sailor's Palm

Assorted Needles

Bees Wax

A couple of Awls

A swivel hook for my bench
(still under construction)

I sent Des the money (converted to British Pounds, of course - could've used a credit card, too) and about 3 weeks later, I had the beginnings of a fabulous collection of specialized rigging and knotting tools!

In the package of tools was a note from Des wishing me luck with my new toys (it did feel like Christmas), and also a suggestion that, because I had not yet developed a good, healthy tool bias, I should go about my next several projects using each of the tools with an open mind and develop my own preferences for the "right" tools for specific tasks.

Well I am still developing those biases; but, at this early juncture in my knot-tying career, I must say that I wouldn't want to be without my Swedish Fids, my Marlinspike, or my Serving Mallet. My Gripper Fid also is really handy and the Palm is invaluable!

Only at that point did I realize that I needed a container for all my tools.

At first a regular tool box seemed appropriate. But after some careful consideration, I decided that I would prefer a Rigger's Tool Bag. So I made one out of heavy sail cloth with a double-thick bottom, two levels of pockets (tall and short: perfect for holding each tool in its own place) stitched to the inside wall of the bag, and finally a length of cord for the draw string inserted right into the hem at the top of the bag. It serves the purpose beautifully!

Today, as I survey the snow and ice covered grounds around my house, the temperature is -2°F or something like -19°C. It has become quite apparent that I am going to have to incorporate a leather handle around the thick end of my marlinspike to provide a little insulation from the cold. So I managed to procure a small strip of Elk skin which I greased up with a mixture of mutton fat and soap and proceeded to secure it using two of my new needles, some waxed small stuff, and Brion Toss' favorite "Baseball" stitch. It snuggled right up tight to the handle and not only provides the insulation, but also a bit of a "non-slip" grip as well.

One last improvement was to tie a leather thong at the blunt end using the "Jug Sling Hitch" and, at this point, I am ready for some serious marlinspike.

Do you think Fidspike would mind if I use the pseudonym:

Wallen Crown?

Letters

Dear Nigel,

I received my Knotting Matters Issue 46, yesterday. Was very happy to receive it, and read it from cover to cover. Enjoyed Brian's impression of Lancing 94, and I too was as happy with our Lancing meeting. That was the highlight of my summer, and felt fortunate to be part of an event that promotes our interest in all facets of knotting. I also want to give a very special thanks to all the knotters from England, Brian, Gordon, Liz and Dez. Without their participation it wouldn't have been the event that it was. Lu Anne Kosma did an outstanding job of putting the exhibit together, and I hope that our North American groups will move forward and become a great branch of the IGKT.

I KM46 there is mention of a new booklet on button knots by John Halifax. I would like to order it if I may, my Credit Card no is *(this is the easiest way to pay for supplies, SI - Supplies Sec)*

It seems that I have paid twice for membership in 1994, can the second payment be applied to 1995? *(Certainly, its nice to have subs paid promptly, and if it helps the members, they are welcome to pay for several years at once. NI)*

Also the next question I have is, how often is KM published? To date I have only received two!

("Knotting Matters" is the quarterly newsletter NI)

Can the "Gripfid" offered by Stuart Grainger be ordered through the Guild Supplies Shop? *(Yes - SI)*

I'm enclosing an article that appeared in our paper. Thought you might get a laugh out of it. *(the article was about a hardened criminal, who had braided vast quantities of dental floss to produce a rope which helped in his escape from prison!!)*

It was interesting to see what people will do to achieve freedom. Points out that dental floss can be used for something other than what it was designed for!

I enjoy my affiliation with knotters and look forward to many more years to come.

Gus Erickson Minnesota.

Dear Mr Harding

At your meeting on board Swiftsure, I was telling one of your Council members that I am in the Scout movement, and that last summer I went with them to camps in Denmark, Russia, and Estonia. Whilst in Russia and Estonia, I made what I think to be the first Turks Head (woggle) in the new Russian colours, actually made in Russia, and the same in Estonia. Could this be something of a record?

Harvey Wallace IOW *(Yes, I think this must be, as Scouting is banned in most communist countries, as they are classed as a "paramilitary organisation"!! NI)*

Letters

Dear Sir,

re -The article on the Turks Head on p5 KM45. I have tied a Turks Head out of C.A.Ashley's book #1336B, page 137, followed round four times; it took 50 yards of line, and 42 hours to do.

C A Lewis Humberside

Dear Nigel

This time I am writing to inform you about the success I had in the matter of knot tying. Speaking about my hobby to several friends, one of the TV personalities took note of my activities. I was invited by the Hungarian TV Channel 1 to give a demonstration in the frame of a Sunday morning scientific programme. It was only a short interview and demonstration. (8 mins) but I could make publicity for the activities of the IGKT too. Its effect has been surprising. A lot of people gave me a call or write to me after the broadcast, expressing their interest to know more about knot tying or offering information about their work in this field. So I decided to set up the Hungarian Branch of knot tyers. Unfortunately, -or fortunately? -I have a lot to do in my job (I am a mathematician), and so it will probably last a long time to organise the association.!

Karloy Csebfalvi Budapest

(Great news!! -NH)

Dear Nigel

I have your welcome letter of - advising that you may accept Visa or Master card in payment of our annual IGKT dues. As this appears to be the most expeditious manner of liquidating my yearly obligation on the part of both the IGKT and myself, I would like very much to take advantage of the credit card alternative to payment by check. Accordingly, please accept my Visa card no. in payment of my 1995 dues. If there is a method by which my Visa card can be used until it date of expiration and it is your advantage to do so, please provide your concurrence and make the necessary arrangements. It is certainly to my advantage, and I have no objection to this arrangement. *(Yes, a good idea NH)* Thank for providing the projected dates of the IGKT meetings for the year 1996. I hope to be retired by then. My wife and I have laid the groundwork for an extended tour of our mutual homeland (the former Czechoslovakia). I will plan to combine the date of an IGKT meeting with our planned tour of England. I am looking forward to this event with great anticipation. I hope to make it a highlight of our grand tour, and to exchange knotting experiences with you and other leaders of the IGKT whose names frequently appear in KM.

For a fine knotting season and a tight stout seizing, Wesley E Sullivan - Maryland USA

(we look forward to seeing you NH)

Daft as a Brush!!

For the first twenty years of our married life, Sylvia and I lived in Chelmsford. We enjoyed our time there, and saw the town increase in size from a quaint little market town, to a veritable metropolis

In fact, during the eighties, it was one of the three fastest growing towns in Europe.

When in 1992 we uprooted and moved to Stonham Aspal, we were in for quite a cultural shock. Although only 14 miles from the county town of Ipswich, we are in a relatively unknown part of Suffolk, on the "tourist Route" from Stowmarket to Yoxford. A village of some 450 souls is a far cry from the village of Boreham, on the outskirts of Chelmsford with a

population of around 4000.

The result of all this has been that we don't see our friends as often as we used to, although when they do visit, it is more practical for them to stay for a day or two.

And so it was last summer that we had the pleasure of Europa staying for the weekend, whose company we enjoyed very much. We also entertained Sylvia's mother on quite a number of occasions

As you know, Grandmothers always show great concern for their grandchildren, and my mother-in-law is no different. Adrian, my son, does seem prone to getting colds, and his grandmother has offered lots of advice about not sitting on wet grass, etc. and taking lots of

Congratulations

Congratulations are in order for Frank Harris, who celebrated his eightieth birthday last February.

Happy birthday Frank, best wishes for the future, and keep on tying those multicoloured Turks Heads!!

For the information of new members, Frank is a founder member, who was Secretary of the IGKT until our tenth birthday celebrations in 1992. Not that he is actually retired, for he still keeps a watchful eye on the present secretary. He is always at the General meetings (except for the last one, when he was obliged to attend a family wedding).

A life time of Scouting means that if accommodation is not readily available, near to the IGKT meetings, he is likely to bring his tent, and camp locally!!

vitamin C. Sure enough two or three days after she had gone home. I received a small parcel, which contained a carton of vitamin C tablets. As it was the height of the summer, I mentioned them to Adrian, and put them away in the cupboard.

October brought us to the AGM at Farnham, and that was our next opportunity to see Europa, whom we chauffeured to the meeting. On the journey down, in passing, she asked Sylvia if she liked the earrings she had sent her some time ago.

Sylvia denied all knowledge of them, and so it would seem that her letter had gone astray.

Since living here, and receiving all the Guild correspondence, I have noticed from time to time, that letters appear to have gone astray. When we were first here, I estimate that about one per cent of my post never arrived. This really came to light when chasing overdue subscriptions, and one of our founder members was somewhat dumbfounded to find that he was in arrears.

I must confess that the postal system has improved noticeably, and I cannot now remember when the last item went missing - well done Royal Mail!!

Anyway, the year rolled on, and Adrian came home from Sheffield, where he is at university. By now

the winter is upon us, and sure enough he brought an absolutely appalling cold home with him. So bad, that it laid me up in bed for the whole of the Christmas period, and Sylvia still has not recovered after three months!!

Remembering Granny's vitamin C tablets, I got them out of the cupboard, and opened the packet.

I don't think that I have ever felt so silly - for inside the packet was not the usual strip of pills sealed in plastic, but a letter from Europa, dated last July, and a pair of earrings !!

I was somewhat speechless, which, for me, is a rare affliction. All there was left to say, both to him and Europa, "I really must be daft as a brush!!" NH

Subscriptions

Are **your** subs overdue?

The great news is that once again subscriptions have been held at the level fixed back in April 1991.

It really does help the administration of the Guild if you can get them in on time. It also saves the cost of sending out an individual reminder.

For simplicity, you can ring me and quote your credit card details.
Thanks -Nigel

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