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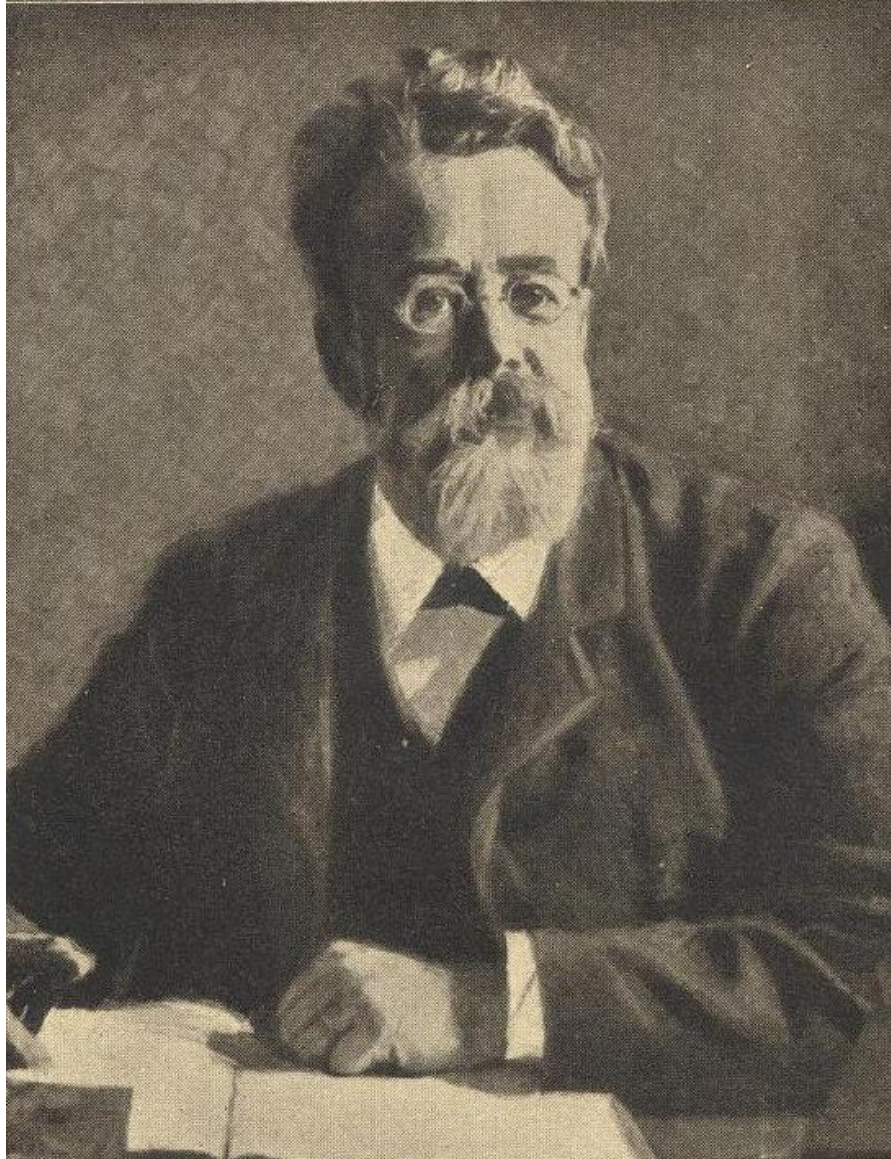
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Hjalmar Öhrvall

On Knots



Abstract

Paper on the life and knotworks of the Swedish physiologist Hjalmar August Öhrvall (1851-1929). We discuss his writings, the introduction of Knot Knowledge Management (KKM) and assess his impact on successors.

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Chapter 1

Life and Works

This exposition, which the author has produced during idle hours, pretends to be neither exhaustive nor complete; for a first attempt in this field one can hardly request such a thing. In any case it will serve as a basis for a more complete treatment of the subject. Additions and corrections are received with gratefulness.

Hjalmar Öhrvall 1908 [77, p3].

Hjalmar August Öhrvall was born on December 15th 1851 in the village of Nora, a municipality in Örebro County in Southern Sweden. He died on January 11th 1929 and his remains were cremated in Stockholm a few days later. The cover of this paper carries the only image of Hjalmar Öhrvall of which I am aware exists in the public domain [86]. It was taken when he was in his 50's. An excellent, but astonishingly hard to procure, biography has been written by Valfrid Spångberg. His work extensively covers Hjalmar Öhrvall as a human being and as a scientist. The book's third part expounds the influence of Darwinian thinking, which appears to have pervaded every facet of Hjalmar Öhrvall's being. Unfortunately Spångberg's work deals with Öhrvall's knotting activities in a well-hidden footnote [66, p15].

During his life Hjalmar Öhrvall published a number of knotworks, which, despite having been written in his native Swedish, managed to influence both Clifford Warren Ashley (1881-1946) and Cyrus Lawrence Day (1900-1967). Beyond those 2 instances Hjalmar Öhrvall's impact in the knotworld is hard to trace. In the first chapter of this paper I am directing the spotlights on the life and works of this impressive knot author from Sweden. In the second chapter we investigate the origins of, what I propose to call, Knot Knowledge Management (**KKM**). In the third and final chapter we delve into Öhrvall's influence on the knotting world in general. This paper is intended to be a timely commemoration of the KKM-centennial.

1.1 Öhrvall's life

Hjalmar's father was Anders August Öhrvall (1810-1882), the village chemist. In 1842 he married Märta Elisabet Westberg (1817-1852). She died soon after Hjalmar was born.

In 1872 Hjalmar Öhrvall passed his highschool exam in Uppsala. What occupied him till 1881, when he obtained his university degree, is not clear. However, 9 years is a long interval for Hjalmar to graduate on a master's diploma. In 1887 he passed his licentiat exam. Two years later, at Lund University, he successfully defended his doctoral thesis in medicine. It was titled *Studier och undersökningar öfver smaksinnet* and concerned the physiology of taste.

Upon enrolling into Uppsala University Öhrvall became an ardent follower of contemporary scientific radicals Charles Darwin and John Stuart Mill. In fact Öhrvall's publishing debut was a translation of Mill's famous work on freedom. Among his prolific writings some were politically charged. It is alleged that Öhrvall published an anonymous guide to contraception (*Försiktighetsmåt i äktenskapet*) with a foreword by his close friend Knut Wicksell. This publication led to his temporary dismissal from Uppsala University. Spring 1893 was spent in Leipzig, Germany, where he worked under Professor Ludwig. During this extended stay abroad travels brought him to Europe's Physiological Institutes in Berlin, Munich, Strassbourg, Innsbrück, Basel and Copenhagen. In 1899 he obtained his professorship in physiology at Uppsala University.

Hjalmar Öhrvall was a man of many talents, he was a scientist, with a drive to investigate, systemize and classify. He was interested in culture and came to play a part in the battle of Darwinian ideas and equal rights in Sweden at the beginning of the 20th century. Hjalmar Öhrvall was frequently spotted at gatherings of, and was a major proponent for, his day's feminist movement. He managed to inspire the suffragette leadership, Ann Margret Holmgren, in particular [73, pp7-8].

Together with his good friend, economist Knut Wicksell (1851-1926), Hjalmar Öhrvall believed himself to be a public educator, which resulted in a copious 41-volume set of collected works at the Uppsala University Library [74]. He took a keen interest in the early developments in the field of photography and championed for the introduction of radiology at the Uppsala University Hospital. Öhrvall published a number of articles on this topic in a popular magazine [84]. In the physiology department he collaborated in scientific experiments with physicist Knut Ångström, whose family achieved immortality by an SI-measure being named in their honour. Öhrvall successfully nominated Professor Allvar Gullstrand (1862-1930) for his work on the dioptrics of the eye for the 1911 Nobel Prize in Medicine [49].

Hjalmar Öhrvall married twice. First time, in 1882, his bride was Tekla Tullia Vilhelmina Andersson. She was the daughter of Alfred Andersson and his aunt Vilhelmina Öhrvall. While serving at the Stockholm *Serafimerlasaret*, in 1882, Hjalmar contracted

open tuberculosis. He recovered on Tenerife, but then his wife fell ill, so he had to look after her, being doctor, nurse and patient all in one. Öhrvall spent the winter of 1883-84 on the Canary Islands. The treatment was successful and he grew so fond of the archipelago that he wrote an article on the meteorological observations he conducted during his cure! Tekla died in the autumn of 1889. In 1891 Hjalmar remarried to Elise Ingeborg Axelson [85, pp784-784]. The couple stayed together for the rest of his life and Elise gave birth to three children, Inga, Elli and Leif [66, p36].

Hjalmar Öhrvall was an optimist by nature [66, pp6-7]. This reflected in his physical and intellectual well-being. It has been said that he had the strength of 10 men and the wisdom of 20. He loved outdoor life in both team spirit and alone. Even in later life he was a powerful swimmer and a good sailor. When surfacing his full beard gave him the appearance of Poseidon himself. He was a singer and enjoyed playing the piano, an instrument which had interested him since his youth. However, after a gardening accident in 1915 he lost control over his left little and ring finger, which made playing hard on 3 fingers [66, pp8-9].

It is not easy to capture Hjalmar Öhrvall's character in a few words. He was a person with a strong drive to systematically investigate the world in which he lived and convey his finds and thoughts in laymen's terms. This caused him to become known as an author and translator rather than a professional researcher in physiology. A grateful spin-off of his observational powers and drive to systemize were his knot researches.

The origin of Öhrvall's knot-interest can be traced to his leisure time. Sailing on the east and west coast of Sweden he noticed the great variety of knots used by sailors [82, p51]. After he became aware of the diversity of sailor knots, he transgressed to the knots employed by the many peoples of the world, delved into the literature and began to collect illustrations from many sources. His visits to the Gothenburg Museum in particular afforded him many knot-observations. At the age of 57 all of this culminated in the 1908 publication of his first knot monograph, which he named *Om Knutar* (On Knots). This was a remarkable book for its days in which scholarship was blended with common sense and the mix applied to the field of knots. Over the next 14 years other works flowed from his hand. Let us first focus on these individual publications before attempting a general synopsis of his collected works. In Chapter 2 we shall sketch an image of how this led Hjalmar Öhrvall to actually launch Knot Knowledge Management (**KKM**).

1.2 *Om Knutar* Book (1908)

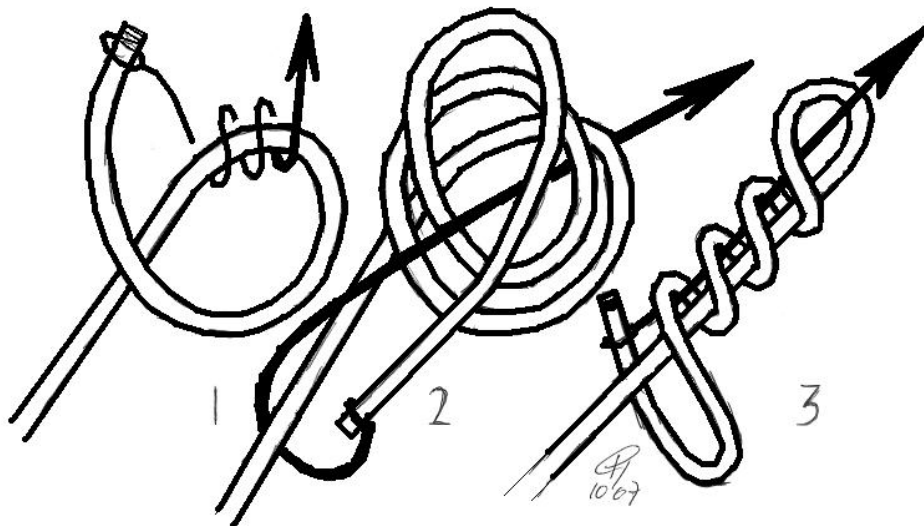
The most neutral description is that it is a book with 116 pages and 133 illustrations, which cost 2.25 Swedish Crowns when it was published by Stockholm-based Albert Bonniers Förlag [78, p157]. Its presentation squarely positioned it as the most comprehensive knot monograph the world had seen until then. It is interesting to read what drove Öhrvall to write it. His motivation, as cited from the preface:

Någon uttömmande eller ens någorlunda utförlig framställning af knutar har jag icke påträffat i vare sig vår egen eller andra länders litteratur [77, p1].

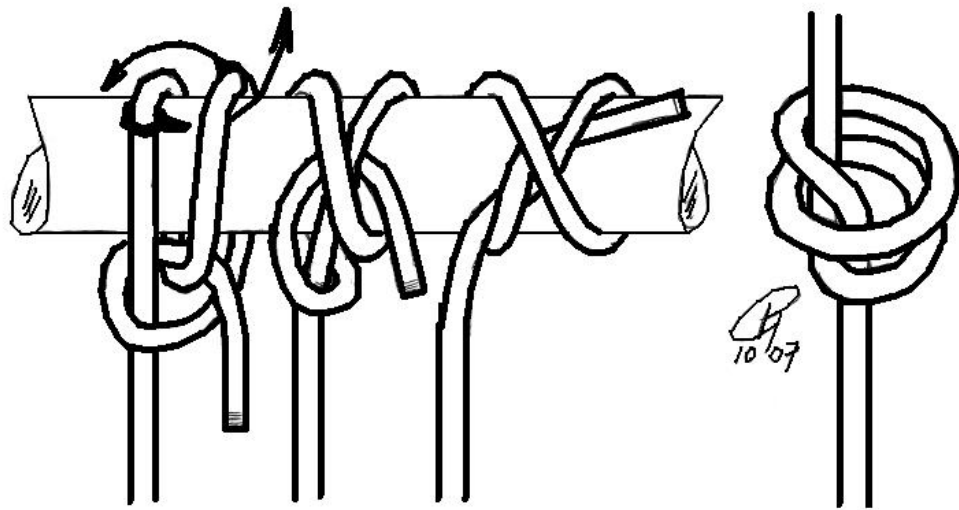
Any in-depth or otherwise extensive discourse of knots I have not found to exist, neither in our language nor in the literature of other countries.

Books dedicated to knots were surely available. In fact, his monograph presents the first bibliography on knotting sources! But, as a rule, they somehow failed to impress Hjalmar. In the quarter century prior to *Om Knutar*, the world had witnessed the Bowling [11], Burgess [12] and Biddle [10] knotshows. So, what is essentially different about this book, given the status quo of the knotbook scene around 1908? Moreover, why should that ever have been a reason for Hjalmar Öhrvall to persevere in producing his book? In Section (2.3) we shall investigate details of the literature context. However, let us first take a rather arbitrary look at the contents of this book.

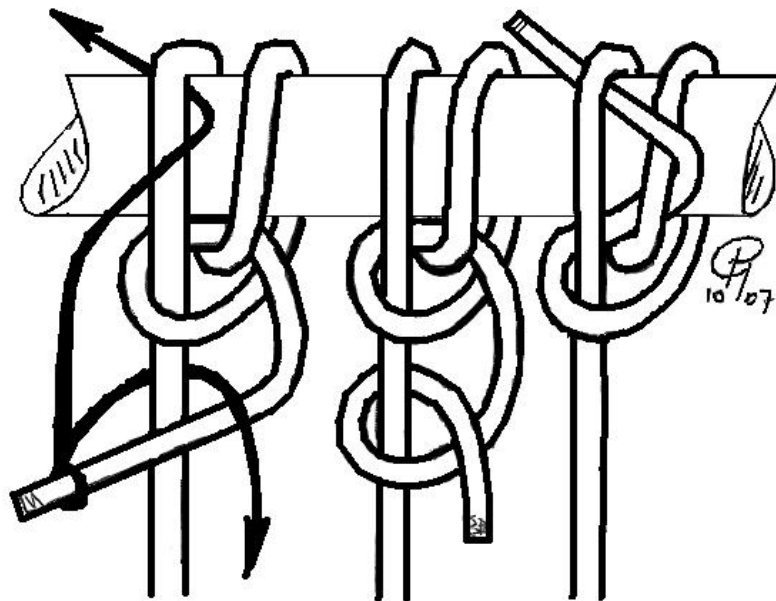
The book's table of content tells us that the traditional classification of the subject has been attempted. Only the number of pages and the depth, to which the subjects are treated, witness of a steep change, away from the contemporary moribund knot-scene.



The first illustration to appear in this book shows the creation of a Single Overhand Knot [77, p19]. It enters stage after a lengthy discussion on the making of whippings, seizings and the coiling of rope. All of it delivered verbally, without the aid of one single illustration!

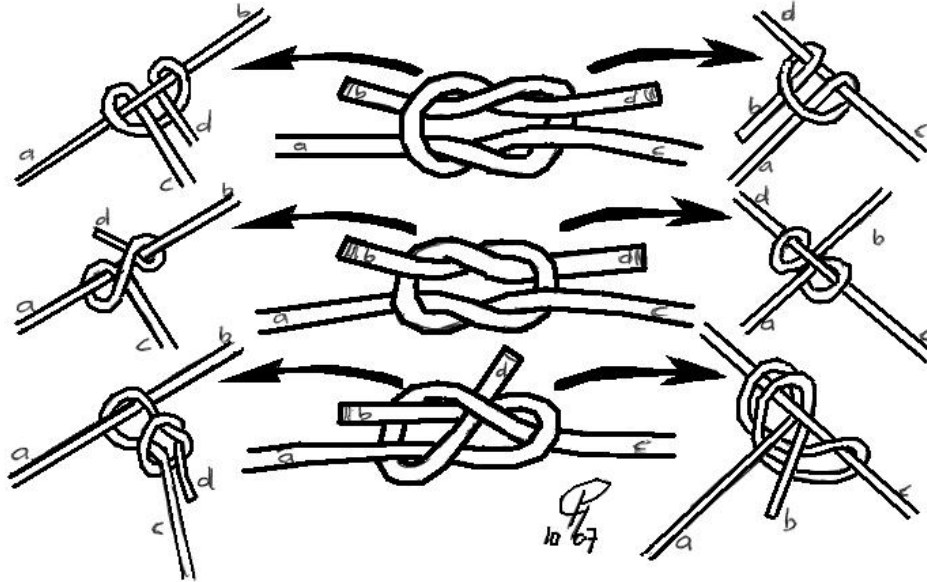


Öhrvall observes that there are at least 3 distinct ways for making a Multiple Overhand Knot [77, p21-23]. The final form in which the Overhand Knot is required, determines the method used. Relationships and structural transformations were generally high on Öhrvall's agenda. He notes the Anchor Bend and Strangle Knot's ability to intertransform and how, by slipping the structure off the spar, the trail leads to the Double Overhand Knot [77, p55, Figs.58,61].



Not stopping at the Anchor Bend structure and its ability for modification, he elaborates the Anchor Bend tying method and links it to the Studding-sail Bend [77, p55, fig.59]. All of this may seem innocent, but will have some consequences as we shall see later. Öhrvall has quite outspoken opinions on how names are abused and shares them with his readership. In Chapter 3 we shall see how this habit annoyed the established authorities (p42).

Other examples of how Öhrvall viewed relationships based on topology are given by the isotopical deformations of the Reef Knot to the Cow Hitch, the Granny Knot to the Clove Hitch and the Sheet Bend to the Slip Knot [77, p45], [78, pp154-155]. For the Reef-Cow transformation he mentioned that this was the way imposters manipulated knots during spiritual séances.



How he extended tying methods, is nicely illustrated with his 4-looped Bowline on the Bight [77, p51, fig.52]. This structure was later shown by Clifford Ashley as an adaptation of the Portuguese Bowline [5, p196, #1083].

Let us not yet become engrossed, as this publication returns in a second edition in 1916. The book was hailed as a pioneering endeavour by the major American knot authors Clifford Ashley and Cyrus Day. It is, however, not clear which edition pulled that feat. The major change this book delivered, as compared to previous and contemporary sources, is that it offers more opinions and departs from the trodden path. It is left to the reader to decide whether that is an act of courage or stupidity in a topic submerged by lore and tacit knowledge.

The 1908 edition of *Om Knutar* was published in facsimile by Rediviva Bokförlaget. Their motivating reasons remain unclear [77].

1.3 *Almanack för Ungdom* Article (1909)

This little article appeared in a small booklet. The more academically interesting aspects he promoted in his earlier book, provided we can call them that, are not treated here. Why this article was produced I have not been able to find out. In any case, Hjalmar did what most writers do - rehash previously published material. Nothing novel was presented here. He showed about 50 knot-structures, all of which had previously appeared in his 1908 publication. In fact he immodestly attempts to market that monograph as a source for further information!

He obviously chose this audience with care, being juvenile and educatable. Öhrvall the educator, who will never pass on any occasion to teach, tries to sell them the Slipped Ligature Knot for their shoelaces [78, p154, fig.34].

There are 49 photographic illustrations of dreadful resolution and the article essentially sticks to knots. The exceptions being the Seizing, Crown Knot, Wall Knot and the Short Splice.

1.4 *Nordisk Familjebok* Entry (1911)

Due to its shortness this article is given in full below [57], [79]. There are no thrilling highlights, except that Öhrvall carries through the explicit distinction between nautical and rural knotnames. Many names are offered, but how correct they are can only be surmised. They are obviously names, which he collected and partially published earlier. For many of the names, which he offers here, I have not encountered any independent Nordic reference.

There are 12 illustrations. Excepting the criterion of Swedish nomenclature (being *knut*), it is otherwise unclear what motivated the selection. Many other Swedish knotnames, which are not presented here, also possess the knut-suffix. Most of the structures in this article are run of the mill. A possible exception being fig.11, the Jug Sling Knot [5, p410, #2554]. Note fig.7, the Surgeon's Knot, we shall return to it more extensively in Section (3.2). It is also interesting to note that the Reef Knot and Surgeon's Knot are given in the so-called "Thief-configuration". This is probably due to an illustrator who did not pay sufficient attention to detail [40], [76]

Nordisk Familjebok is a popular encyclopædia, which contains knotty contributions from other authorities on the subject. Whereas Hjalmar Öhrvall wrote about *knut*, a certain R.Nissen wrote about *stek* [48]. Freely translated the text runs

Knots are used to attach or unite rope, cordage, twine, tape and so forth to each other, or to other objects, but also fulfill decorative purposes. At sea one calls them knopar and stek (see those words). The most used knots on land are: half knot or finger knot (at sea overhandknot fig.1) which is used to connect a thread (for example while sewing), a cord, etc., but also to attach two threads with each other it is called the waterknot (fig.2), and for to make an eye, which does not slip (eye with waterknot). An Eight, or Flemish knot (fig.3), is used in similar manner. The Noose (fig.4) is employed universally, for example when tethering a horse, but it is often hard to untie again. Better suited for that purpose are Two Half Hitches (around own part) (see Knop) which is also used a lot on land, or Bowline, (see Stek). Most used of all knots will be the Reef Knot, illustrated in fig.6. At sea it is called råbandsknop and on land it has many names: hardknut, brakknut, blåknut, vräxelknut, vrängselknut, tvärknut, stenknot, smällknut among many others. Well-tied it is symmetric as differing from the useless so-called Granny Knot (kärningknuten) - see Knop. It also appears in netting (reyssjeknut). Like many other knots it is often slipped, for easy

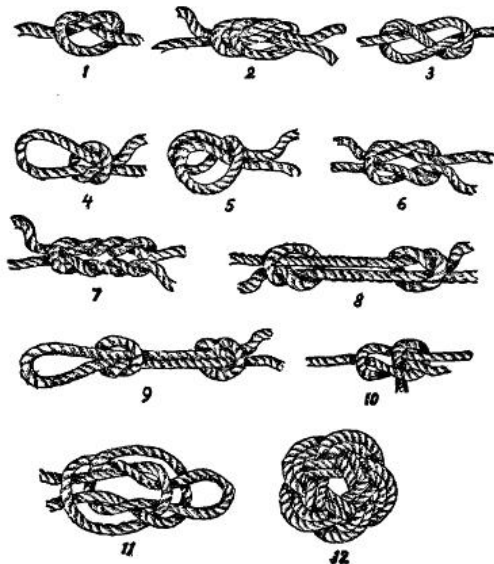
release and, as such, is used in a neck tie. It was known and appreciated already in ancient times. It appears on the Vestal statues, which have been excavated in Rome, namely on their girdles, which holds the robe and is therefore - without doubt - identical to the ancient Hercules Knot, which was believed to possess supernatural properties. Even better, when it comes to attaching two ropes, is the Sheet Bend (vävknut) (fig.10) also called varpknut, tumknut (at sea Sheet Bend). This is the usual netting knot, in short it is said to be used all over the world. Fig.7 is a surgical knot or tvinknut. Fig.8 is a fiskerknut. Fig.9 a kärleksknut. Fig.11 is a säckknut. Valknutar consist of a ringshaped braid and are mostly used for decorative purposes. There exist 3-pleated versions (fig.12), but also 4-, 5-, 6, etc pleats. See Hj.Öhrvall, Öm Knutar (1908).

415

Knut

416

Knut. Knutar användas till att fästa eller förena tåg, rep, snören, trådar, band o. s. v. med hvarandra eller med andra föremål, äfvensom till prydnad. På sjön kallar man dem *knopar* och *stek* (se dessa ord). De i land mest använda torde vara följande: halfknut l. fingerknut (på sjön öfver handsknop; fig. 1), som tjänar till att



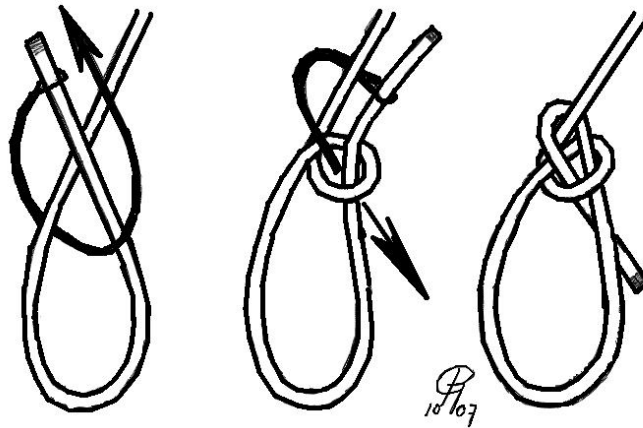
fästa en tråd (t. ex. i tyget, när man syr), ett snöre o. s. v., men äfven till att förena två trådar med hvarandra, då den kallas vattenknut (fig. 2), och för att göra en ögla, som icke glider, ögla med vattenknut. En åtta l. flandrisk knut (fig. 3) användes på samma sätt. Rännknut l. grimskaftsknut (fig. 4) användes allmänt, t. ex. när man binder en häst, men är ofta svår att taga upp igen. Bättre för detta syfte är två halfslag om egen part (se Knop),

som äfven användes mycket i land, eller på stek (se Stek). Mest använd af alla knutar torde vara den i fig. 6 afbildade; den kallas på sjön *råbandsknop* och har i land en mängd namn: hårdknut, brakknut, blåknut, vräxelknut, vrängselknut, tvärknut, stekknut, smällknut m. m. Rätt gjord, är den symmetrisk till skillnad från den odugliga s. k. karingknuten (se Knop). Den förekommer äfven i somliga nät (ryssjeknut). Den göres ofta liksom många andra knutar med öglor, för att lätt kunna lossas, och användes sålunda t. ex. som halsduksrosett. Den var känd och värderad redan i forntiden; den förekommer på vestalernas i senare tid upprädda statyer i Rom, nämligen på den gördel, som sammanhåller manteln, och är därför utan tvifvel identisk med de gamles herkulesknut, som ansågs ega öfvernaturliga egenskaper. Ännu bättre, när det gäller att förena två ändar, är vävknuten (fig. 10), äfven kallad varpknut, tumknut (på sjön skotstek). Detta är äfven den vanliga knuten i nät, använd snart sagdt öfver hela jorden. Fig. 7 är en kirurgisk knut l. tvinknut, fig. 8 en fiskarknut, fig. 9 en kärleksknut, fig. 11 en säckknut. Valknutar bestå af en ringformig fläta och användas mest till prydnad. Det ges 3-flätade (fig. 12), men äfven 4-, 5-, 6-flätade o. s. v. Se Hj. Öhrvall, "Öm knutar" (1908). Hj. Ö.

1.5 *Viktigasta Knutarna* Booklet (1912)

Viktigasta Knutarna appeared as number 185, a slim 32 page booklet, in the series *Verdandis Småskrifter*. Its subtitle purports it to be a manual for sailors, fishermen, scouts (!) and other practical people in general. It is positioned to be a significant expansion of the 1909 article [80, p2].

Here Öhrvall made a U-turn and decided to abandon photographic images for most of his illustrations. Daughter Elli Öhrvall started producing ink drawings. Her work is acknowledged in the booklet's preface. There are many reasons why this decision may have been made. The printing of line-drawn illustrations rather than photographic images gave rise to less confusion. A century ago the printing of any image was a problem. The difficulties encountered are numerous. Mirroring and omissions to name a few examples. All of this makes text a preferable option [76].



An interesting illustration concerns the Fingertip Method for making the Bowline [80, p17, figs.38-40]. Until then it was merely worded by Öhrvall [78, p156], which is less cumbersome than presenting a set of diagrams.

Once again copyright belongs to Albert Bonniers Förlag, which is peculiar for a booklet published by Verdandis. Öhrvall's liaison with student association Verdandis was quite special. He actively supported the association and, in turn, found them willing to publish parts of his writings on knots. Why he initially went to the much larger publishing house of Albert Bonniers for *Om Knutar* and returned to Verdandis 4 years later is an interesting question. Whether Bonniers owned the initial copyright of *Om Knutar 1908*, and later got it extended to 1916, or whether Verdandis was owned by Bonniers, I do not know.

1.6 *Om Knutar* Book (1916)

After a 4 year break he erupted back onto the knotscene. What motivated this massive spurt is not clear. Öhrvall only indicates a sort of addiction to his study of knots, admits nothing, but the result speaks for itself. Anyway, in 1916 he published the second edition of the work he is best known for.

Volume-wise the book expanded from 116 to 262 pages. Öhrvall showed 133 knots in his 1908 edition and expanded that number to 278 in his second edition. In 1916 he pushed out a lot of new knots, although he did not market them as such, and shared more of his observations and opinions. We shall return to most of these aspects in the remaining parts of this paper, together with a batch of structures he did not care to illustrate. Initially photography was important for an experimentalist, like Hjalmar Öhrvall, but by 1916 that point of view had altered. By then most illustrations were black and white line drawings by Elli Öhrvall.

When it was published, the second edition of the *Om Knutar* paperback cost the great sum of 7 Swedish kroner and 50 øre (about 1 Euro). It is curious to read how its publication announcement directs potential buyers and small libraries to his cheaper Verdandis 1912 booklet. Nowadays, in internet sales, copies of the 1916 edition of *Om Knutar* fetch well over 100 USD.

The grapevine has it that Öhrvall's 1916 edition of *Om Knutar* was (to be) translated into English. An often-quoted source for this rumour is *Seagoing Knots* by Frank Rosenow, but he is pretty clear:

In Sweden the book [om knutar 1908] has recently been reissued, so there may someday be an English translation [55, p99].

Öhrvall's monographs state that all rights to translation are reserved (*Översättningsrät till främmande språk förbehålles*). However, it is still to be awaited whether Stockholm-based publisher Bonniers, who owns copyright to most of Öhrvall's works, will actually publish an English edition. Fortunately this edition of *Om Knutar* is freely accessible online, in partial translation, on the website of the Runeberg Organization [57].

There is very much to be said about this important book [81]. Its content will significantly dominate our discussions in Chapters (2) and (3).

1.7 *Eranos* Article (1916)

Whilst working towards a second edition of *Om Knutar*, Öhrvall came across the 1851 edition of Bussemaker-Daremborg's *Œuvres d' Oribase*. Hjalmar was quick to notice that a subset of the morbid illustrations did not match the structures, which the original Greek textual descriptions would give rise to. In order to find the structures, which the ancient Greek doctor Oribasius had intended, he approached the subject, "not as linguist, but as an interested sailor". Although he did secure help from Dr. Ernst Nachmansson, whom he acknowledges. There is contention whether his results are a proper representation of the structures intended by Oribasius (p12). We shall return to them in Section (3.2).

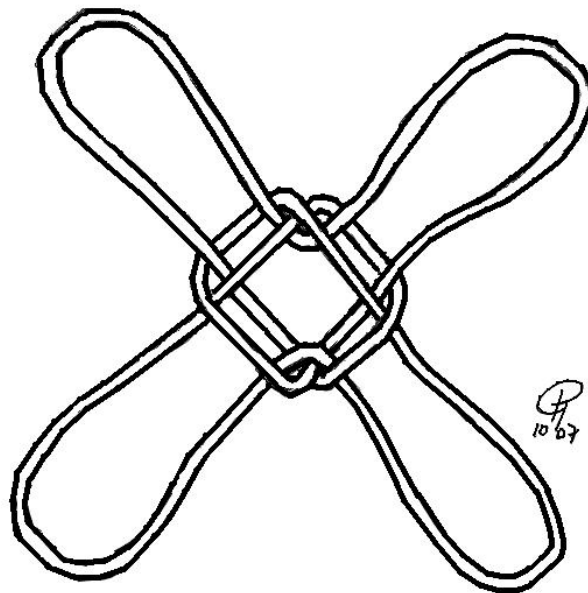
Oribasius' encyclopaedia appears to have covered a wide range of technologies of which the 18 knots and slings were a small part. Öhrvall concludes that not all of Oribasius' structures were surgical, many of them were used both at sea and in a rural context.

He was somewhat surprised to realize that Oribasius arranged his "tension-machines" not according to their structure, but by their application [82, p79]. Interesting to note is the absence of the Ligature Knot [5, p221, #1209], yet the presence of 4 distinct tying methods for the Jug Sling Knot!

It is uncertain what motivated Hjalmar Öhrvall to publish his results in the scientific magazine of *Eranos*. I surmise he realized his paper, "Något om knutar i antiken, särskildt hos Oreibasios", would not fit into his 1916 edition of *Om Knutar*, which, moreover, was written for a different audience.

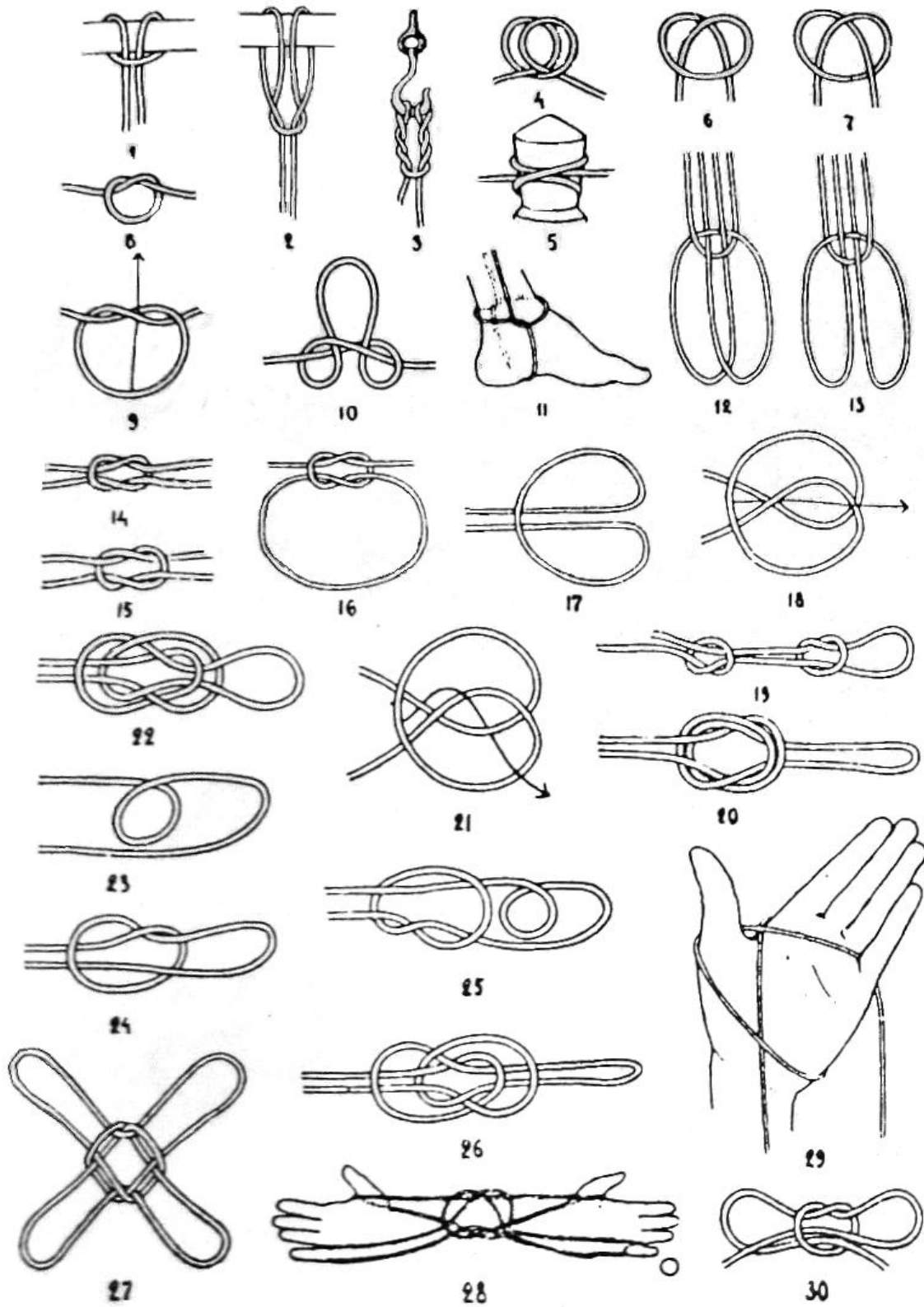
1.8 *Svenska Dagbladet* Article (1922)

After a period of quietness Hjalmar Öhrvall wrote about knots once more. In the Sunday edition of the newspaper *Svenska Dagbladet* of february 5th he shared his views on the ethnographical significance of knots and stringfigures [83]. He had gotten hold of a copy of Walter Rouse Ball's work (*String Figures an amusement for everybody*) and was sympathetic towards its ethnographical approach. He apparently decided to word some of his ideas on the finding, the usage and the spread of knots. He writes about stringfigures from Lapland and identifies them in Rouse Ball's book [6, p13, p52]. He also notes links to Oribasius' *Plinthios*, which is illustrated below.



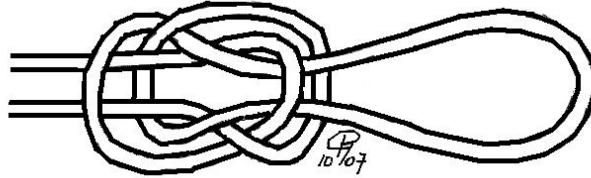
He remarks that, although distinct stringfigures may be known by various names in different locations, it is quite noteworthy that such complex structures have managed to become independent discoveries in time and space. He pulls in cultural interaction and education in an attempt to explain the propagation of knot knowledge.

Pl. II.



Orcib. n:r

Öhrvall makes an interesting move towards the Jug Sling Knot. In *Om Knutar* (1916) he had already mentioned 8 different ways of making this structure [81, p96-104]. He had learnt 3 from sailors, dredged 2 from seamanship manuals and bumped into 3 others during his studies of Oribasius' works [82].



He concludes that this peculiar knot, with its many different, yet pronounced, tying methods, illustrates that identical knots have been independently invented in different places and times. His final call to his public was to undertake an effort to preserve knotting knowledge locally and persuade Swedish scientific expeditions directed to far away lands to collect knots and stringfigures. He realized this would be a tremendous task and suggested to start off with a study of hitches. He believed that the diversity of solutions to this confined, yet practical, ropeproblem would offer sufficient richness for investigations.

1.9 Overview Öhrvall's collected knot works

Hjalmar Öhrvall nurtured many ideas about knots and he addressed a large part of them. They ranged from the form and function of knots to their presentation, covered historical and educational aspects, were tainted by his academic approach and touched sociological aspects. The short-list of his collected knot works is covered by 6 book(let)s and articles. His first knot-publication appeared relatively late in life, followed by a string of smaller publications till the big bang of the very productive year 1916. Here we got an initial taste of what he wrote and when he did so. Let us concoct a crude overview.

Representation. As mentioned above he was taken by photography. This is reflected by the terrible images in his earlier works. He photographed rope-knots on glass plates suspended above sheets of white paper to prevent shadow formation. However, for multistrand knots he resorted to lead wire, as real-rope specimen resulted in even more deplorable imagery. It is fair to conclude that photography in his knot works was no success. As a rule he obtained small images of poor resolution. Gradually he secured help from his daughter Elli Öhrvall to do the line drawings. But in general, as a staunch believer in the power of the written word, he rather resorted to eloquent textual descriptions to convey his thoughts.

Education. Öhrvall believed that knot knowledge was a prerequisite for solving practical, everyday tasks. He saw himself as a public educator and strongly believed the written word was the medium to educate the masses. He suggested to teach knot tying in schools and urged his readership to make knotboards to aid remembering the structures and their names [81, p2, p5].

Sources and fieldwork. The basis for his fieldwork is very diverse. He occasionally mentions trips to museums and holidays. He (and also his children) collected knots during their vacations and small-talking with passers-by. He critically studied knot books in any language, which he could lay his hands on, and compiled one of the first international glossaries. He urged his readership to study knot structures in order to comprehend their workings. His earliest work is by and large about rope-working techniques and practical knots, but is seen to evolve towards facets which no longer touch the form and function of individual knotted structures.

Shying away from his professional career as a socially engaged physiologist at Uppsala University and restricting the view to his work on knots, our conclusion can only be that Hjalmar Öhrvall was an outstanding thinker. In the foregoing we have seen that he was the first knot-author, who was sufficiently courageous to supply non-superficial bibliographies and undertake the compilation of an international glossary. In short he tried to get knot-research on a straight keel. There is little doubt in my mind that Hjalmar Öhrvall's work resulted in a timeless culture-historical document on knots.

It is impossible to write a small article on Hjalmar Öhrvall and his knots. He managed to transmit an undeniable signal, ringing loud and clear, from the Scandinavian knot world. Unfortunately, overall, references in the knotting literature stayed out. In Chapter 3 of this paper we shall see *how* and *why* this presumably came about. In the next Chapter we lay the foundation for our study of the ripples his impact propagated across the Knot Knowledge Management pond.

Chapter 2

Kindling Knot Knowledge Management

Nothing before had ever made me thoroughly realize, though I had read various scientific books, that science consists in grouping facts so that general laws or conclusions may be drawn from them.

Charles Darwin, 1832.

We presented an overview of Hjalmar Öhrvall's knot-works. Here we describe how he launched Knot Knowledge Management (**KKM**). In general knowledge management is concerned with the processes of collecting, storing and making available of information. Often information is enriched with experience to deliver useful knowledge in the problem-solving context.

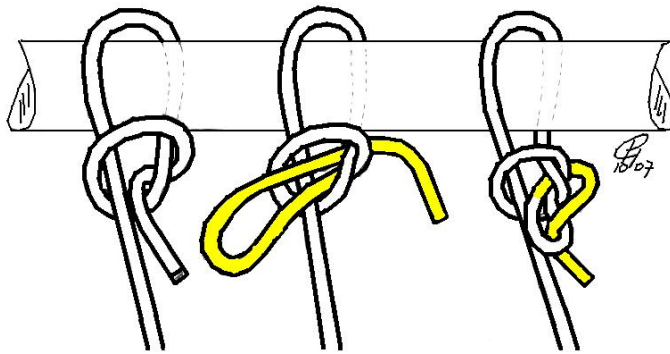
We commence our journey by seeking the roots to Öhrvall's writings, i.e. get grips on his fieldwork and sources. Unless otherwise indicated, we shall work from the second edition of *Om Knutar*, for which we can safely assert that it stands for a representative impression of his netted knot-catch.

2.1 Fieldwork

An interesting question to pose is wherefrom Hjalmar Öhrvall obtained his knots? Gathering structures is how most knotters commence their collections. For Öhrvall the start appears to have been in his sailing interest [82, p51], but it rapidly spread and extended from rope-working techniques to all sorts of knots in use by miscellaneous usergroups. The foundation for his fieldwork came to cover a diverse set of sources. He collected knots during his vacations and during engagements with ad-hoc informants. His works are interspersed with footnotes from his casual talks and experiments.

Examples are easily given. In Swedish there is a *grimskraft knut*, the Halter Hitch. On several occasions Öhrvall notes there may be ethnographical significance with respect to

its usage and tying methods [81, p34], [83]. He also offers an example of the evolutionary nature of this hitch-solution. The left-most image shows how it is usually deployed. A first stumbling block is that the structure may jam. One may prevent jamming by slipping the wend. However, this introduces a new scenario in which the animal may untie itself by tugging the bitter end. The right-most image illustrates how to outwit clever horses. Öhrvall was given this structure by a farmer he chanced to speak. Clearly we have a set of progressive improvements of a solution to a rope-problem.



Another example is given by the encounter his children had with roaming gypsies in 1902. The nomads taught Öhrvall's children how they used Two Half Hitches to tether their cattle. During a later holiday in the Swedish Dalarne the children had to stand corrected when they were confronted with the Halter Hitch as the officially accepted hitch for tethering horses. Opinionated Öhrvall, without proof, states that Two Half Hitches and the Bowline are better than a Halter Hitch as hitch because they are the sailor's preferred hitches [77, p28]. Again without proof he states that the Bowline is occasionally used in coastal regions due to Mariner influences [83]. Around 1900 the Two Half Hitches were generally accredited to the Mariners usergroup. For example G.A. Scholten's bricklayer handbook calls them *zeemansknoop*, i.e. "seaman's knot" in translation [62, p147, fig.51b].

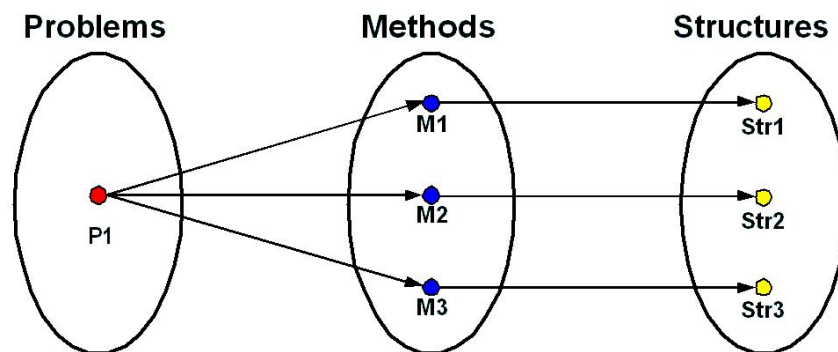
Another of Hjalmar Öhrvalls favorite knot-sources were museums. He frequented Sweden's National Museum's Ethnographical Collection and describes rope samples [81, p10]. In the Gothenburg Museum he noted a "neat kind of belay" on a samisen, which is a Japanese musical instrument [77, p102], [81, p189]. We shall return to this structure more extensively in Section (3.6).

Öhrvall also profited from a network of informants, which supplied him with international knot knowledge. In his *Svenska Dagbladet* article he mentions how Prof. Skottsberg, brought 21 different knots to Sweden from an expedition to the Pacific Ocean for investigation. They were made by a Chilean sailor, whose set only contained one structure, which was unknown to Öhrvall [83]. Tantalizingly, details were omitted. His friend Dr. Thorild Wulff brings in knot-related folklore snippets from his father's days at sea [81, p212] and excursions to Iceland [81, p7]. He also sent Oriental Button Knots from Nagasaki in spring 1914, which tempted Öhrvall to offer his opinions [81, p134]. In short, there are many occasions where he writes about aspects of his fieldwork.

2.2 KKM Processes

Ever wondered why there are knots, which can be observed? Aside from all philosophical connotations, their existence plainly boils down to the fact that there exists a **structure-generation process**. The reason structures are generated is usually due to a problem-solving demand. Given the nature of the problem, and the frequency with which it occurs, there will be incentives to trigger something like a **knowledge-generation process**, as it shows that experience is gained by usage. That in turn forces a **knowledge-preservation process** to commence. So far we have a lot of invisible activities shrouding a simple knot, don't you think so? However, we need all of them to explain how knots get into books.

Problem-solving in a knotting environ can be modeled by three abstract sets: **problems**, **tying methods** and resulting **structures**. We say that a problem is attacked by a rope-user, tangling the medium, in an attempt to solve it. A "satisfactory" solution to the problem results in a structure, which eliminates the problem. The structure is an object which has sufficient stability to become observable. The method, leading up to the structure, lacks that durability and is, therefore, often ignored.

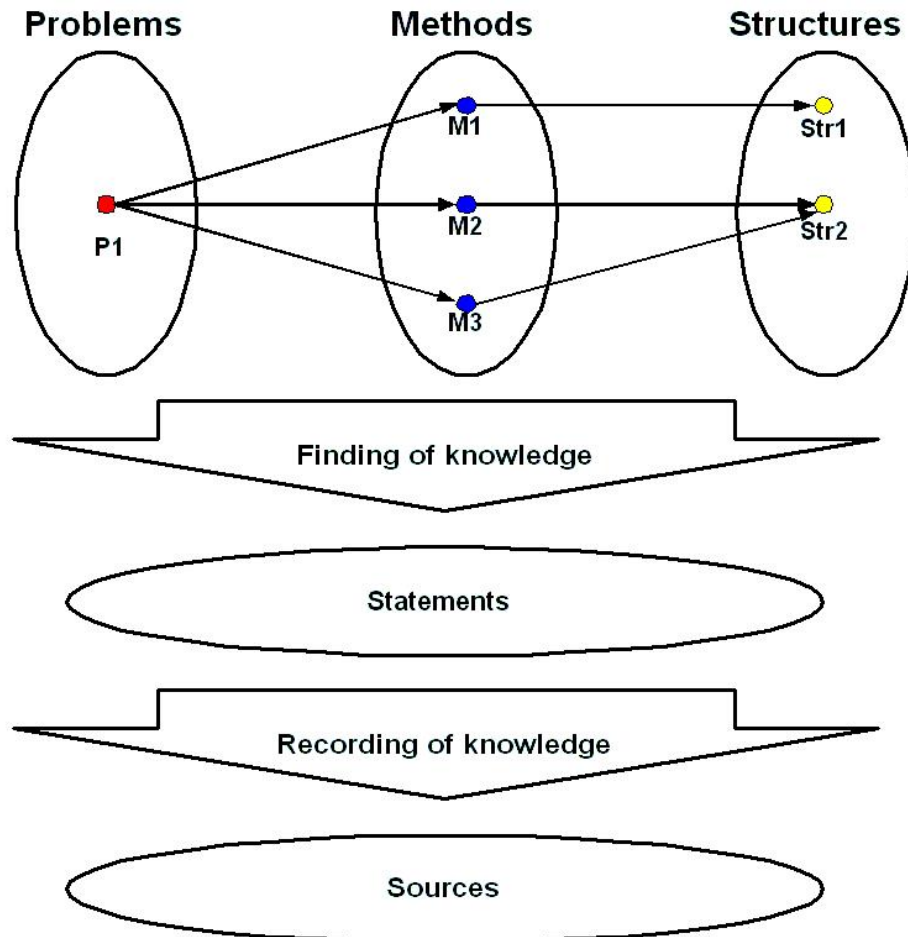


Of course there are many methods which may give rise to any given structure. The structure cannot come forth without some tying method. Therefore one thing is certain: any structure is always the result of some tying method. Note that there is an implication: there will also always exist an untying method for any structure. Any structure can be made to disappear by untying it simply by letting the wend backtrack itself till it reaches the stend.

From now on, let us apply an analytical view from the problem-solving context and consider knotted structures as solutions to rope-problems [26]. This view corresponds closely to one of the chapters in both of Öhrvall's books, where he offers links between the various problems and possible solutions [77, pp104-109], [81, pp225-253].

How do most knot-enthusiasts start their craze? One way is by simply collecting individual instantiations of structures. More realistic and useful results, however, come forth when subjecting the structure to actual usage. This process will result in experience and knowledge on the structure's properties. This will spawn and transmit tacit knowledge among user-groups [46]. In order to propagate such knowledge con-

ainers are required. In the following we shall refer to them as **statements**. Typically statements may cover tying methods, whether or not a structure can be employed as a Hitch, Bend or Loop Knot or how it stands up to loading (strength, stability and security). The knowledge-generation process results in experiences and beliefs, which are shared within the community. Statements are held as tacit knowledge by those who tie knots. The image below illustrates how such knowledge on a specific structure may become recorded in **sources**.

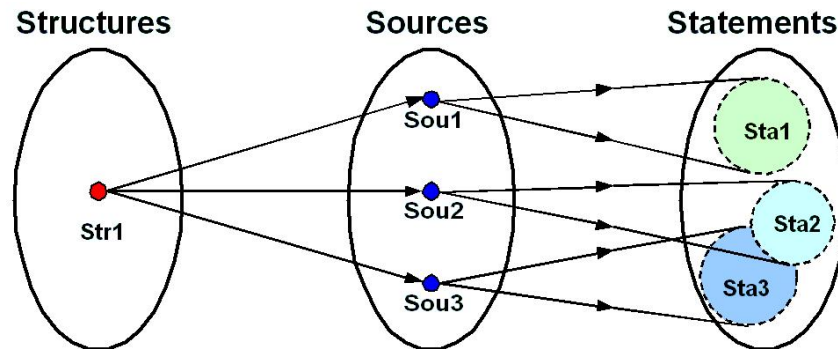


Taking a helicopter-view of the information beast's nature, what can we now say? Components of the set of KKM-processes obviously include structures, sources and statements. I propose to call this approach the **Triple-S Model to KKM**.

Initial fieldwork processes mainly concern the collecting of structures. Later they are accompanied by statements on tying method and application. That is (1) structure S can be obtained by tangling the medium so and so and (2) you can solve problem X by means of structure S . In short, fieldwork is nothing other than collecting tacit knowledge and formalizing it, i.e. writing it down in some format and seeking its publication. This process is easier presented as a show of conviction than rigorous description.

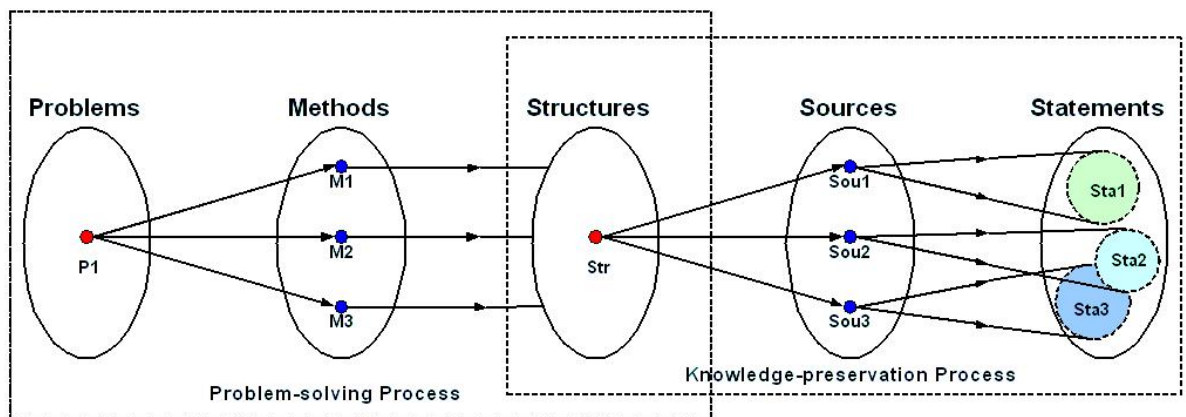
This intuitive model raises many questions. How to ensure that theory stays in touch with reality? Many knot authors artificially expand the set of structures or cosmetically enhance previous statements to produce a new source.

When it comes to studying statements, there typically is a different approach, which is illustrated below. In the early stages of theory generation, retrospective analysis of existing data in sources is a relatively low cost way to refine a theory, rather than having to reinvent the wheel.



In this approach, usually lacking feedback from practical experience, is it legitimate to inquire into the purpose of artificial expansion of knowledge? After all, what controls the quality of statements? They may suddenly range from opinions, lacking any support for their plausibility, to assertions, which are delivered with concrete proof.

Knotters, at least knot-authors, amass structures and statements from sources. An interesting question pops up; why do they uncritically copy their predecessors and contemporaries? The subject in a practical sense is very limited in its scope. Artificial expansion is believed to be justified when the absolute structure count plays a role; the more the merrier. If psychologists are ever seeking untrodden territory, they can encounter some challenging research leads in the knotting business.



How does all of the foregoing apply to Hjalmar Öhrvall's endeavors? Öhrvall conducted his fieldwork, formalized oral knowledge and put it into his published writings. Although the transition from tacit knowledge (in the heads of rope-workers) to getting it in print is a necessary requirement to enable others to gain access to this information, we shall see that Öhrvall's formalization activities were not equally well-received. He was aware that his work stood for a new approach to the subject of knots [77, p3]. In his monograph's first edition he was somewhat apologetic about his activities, but by 1916 the excuses had evaporated.

Hjalmar Öhrvall, a well-trained scientist, knew that no scientific work is ever conducted in isolation, ideally it continues to build on top of that delivered by others. The next logical step in his studies was finding ways into formalized knowledge, i.e. to see which part of the intellectual territory was mapped. That meant retrieving books to satisfy his hunger for information on knots.

2.3 Sources

In his 1908-edition of *Om Knutar* Hjalmar Öhrvall already listed a selection of referenced publications and distinguished between Swedish and foreign language sources [77, p114]. In the 1916 edition he enlarged both lists by appending 4 and 6 items respectively [81, p258]. This increase witnesses of the fact that he progressively learnt more about the written sources of knots. His Swedish language sources were:

1. V. **Linder**, *Lärobok i sjömanskap*, 1896.
2. *Undervisning för manskapet vid flottan, II. Sjömanskap*, 1882, 1904.
3. **Dahlman**, *Utkast til et Sjölexicon*, 1765.
4. **Calwagen**, *Svenskt, Engelskt och Franskt samt Engelskt och Svenskt Sjölexicon*, 1851.
5. **Ekbohrn**, *Nautisk Ordbok*, 1840.
6. A. **Ekelöf**, *Svensk nautisk ordlista*, 1899.
7. C. **Smith**, *Om båtar och båtsegling*, 1873.
8. C. **Smith**, *Båtsegling*, 1889.
9. C. **Smith**, *Båtseglarordbok*, 1899.
10. *Uppfinningarnas bok*.
11. *Nord.Fam.Bok*, artiklarna "Knop", "Påslagning", "Stek".
12. R. **Lundberg**, *Fiske med metspö*, 1889.
13. E. **Smith**, *Nautisk Ordbok*, 1914 - 1916.
14. N. R. **Comét**, *Fullständig framställning av sjömansknopen*, 1908.
15. Hj. **Öhrvall**, *De viktigaste knutarna*, Verdandis Småskrifter nr. 185, 1912.

His foreign literature covered.

1. G. F. **Krogh**, *Lærebog i Sømandskab*, 1884.
2. T.E. **Biddle**, *How to make knots, bends and splices*, London (utan årtal).
3. T. **Bowling**, (I Bonwick), *The book of knots*, Edinburgh 1866, 1904.
4. *Encyclopædia britannica*, 9 ed. 1882, art. "Knots", "Sailor's Knots".

5. G. **Belitz**, *Seglers Taschenbuch*, 1903.
6. *Grand Dictionnaire Larousse*, 1874, art, "Nœud", m. fl.
7. *Nouveau Larousse illustré*, art. "Nœud".
8. *La grande encyclopédie*, utg. av Berthelot m. fl., art. "Nœud".
9. E. **Bobrik**, *Allgemeines nautisches Wörterbuch*, Erste Abth., Leipzig, 1850.
10. **Dabovich**, *Dizionario tecnico e nautico di Marina*, Pola, 1883.
11. J. Kusk **Jensen**, *Haandbog i praktisk sømandsskap*, Anden Udg. Köpenhagen, 1907.
12. J.T. **Burgess**, *Knots, Ties and Splices*, London.
13. **Captain Alston's Seamanship**, Fourth Edition, Portsmouth, 1902.
14. **Captain Jutsum**, Cardiff, *Knots, bends, splices*, Glasgow, 1914.

Hjalmar Öhrvall scattered approximately 50 additional sources throughout his writings, well-hidden in footnotes and the text body. For example he refers to Henry Manwayring's 1670 *The Seaman's Dictionary* and Captain John Smith's 1652 *The Seaman's Grammar* [81, p21]. Why he opted for bibliographical incompleteness is unclear. It appears like he was unable to get all of his sources lined up for presentation. Undoubtedly he had many others, which he did not mention. Moreover, there are sources in the first edition, which were removed from the 1916 edition [41], [77, p2].

Apparently Hjalmar Öhrvall was not aware of Joseph Tom Burgess' work in 1908. A study into factors, which drive availability of and access into sources, would make for an interesting KKM-paper. Note that Öhrvall relied heavily on Mariner sources. Had he lived today, and used the online medical search-engine *Medline*, he might have believed surgeons were the forestay knotters

What can these sources tell us? The listed ones are mainly Mariner-related and the majority of the strewn-out sources are non-Mariner. By combining these contexts and indiscriminately discussing all structures which he could lay his hands on, Hjalmar Öhrvall became an isolated experiment in the aggregation of distributed knowledge.

2.4 Statements

In a sense structures and sources are absolute things. A source either illustrates an individual structure or it does not. When it comes to statements, however, things are less clear-cut. For example, note that a tying method is a statement on how to produce a specific structure. Observational correctness, linguistics and applicational context team up to shape its formulation. Is knowledge the superset of all statements? I do not know, but publishing provably correct knot-related statements is already a formidable challenge.

What, in general, characterizes the nature of Hjalmar Öhrvall's innovations in terms of statements? As a sailor Öhrvall reflected a conservative bias. Mariners tend to have strict protocols, which allow little leeway for variation, for their shipboard activities. Öhrvall picked up a twang of knot-related sailor supremacy. In his *Eranos* article he noted that Oribasius' presentation was application-oriented. This remained the *modus operandi* for a long time in knotting sources. Although Öhrvall followed, in that respect, he was quite name-oriented and we have seen that he collected many. In particular for the Reef Knot he has in excess of 20 names. This shows that identifying the objects of his study had considerable focus.

Hjalmar Öhrvall also critically examined knots' behavior to form an understanding of their workings. During these investigations he discovered numerous surprising and unrecorded interrelationships. Many of them went into his works as statements. In Hjalmar Öhrvall's case we see an academic with an undeniable pragmatic flair and, of course, sailorman. How to match pragmatism and his love for the written word to teach the masses? In the following paragraphs we detail some of the more general aspects Hjalmar Öhrvall covered.

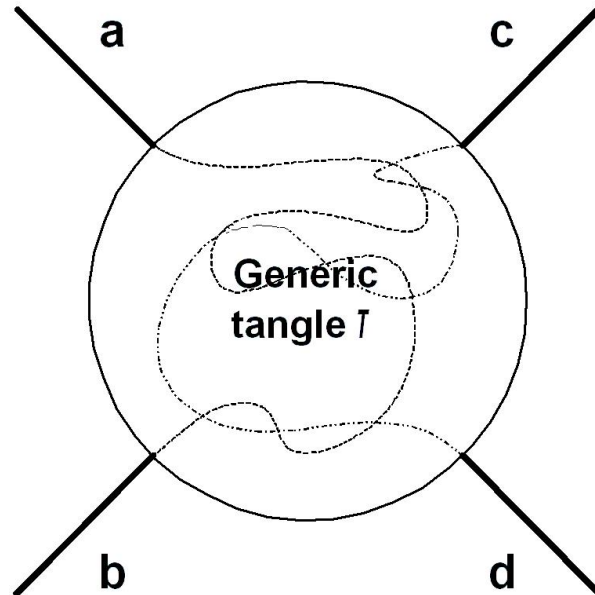
2.4.1 Relationships and Proximities

Obvious questions, to pose about knots, inquire into their intrinsic properties, i.e. their nature. How do they react to shifting application? How to classify them? Most knot books tend to look at application and dismiss relationships due to deformation. In particular those which leave topological properties invariant (the so-called isotopical deformations). Yet those aspects can be observed and thus belong to real-life knot behavior. As both perspectives depend on load configuration, let us undertake an attempt to define that term.

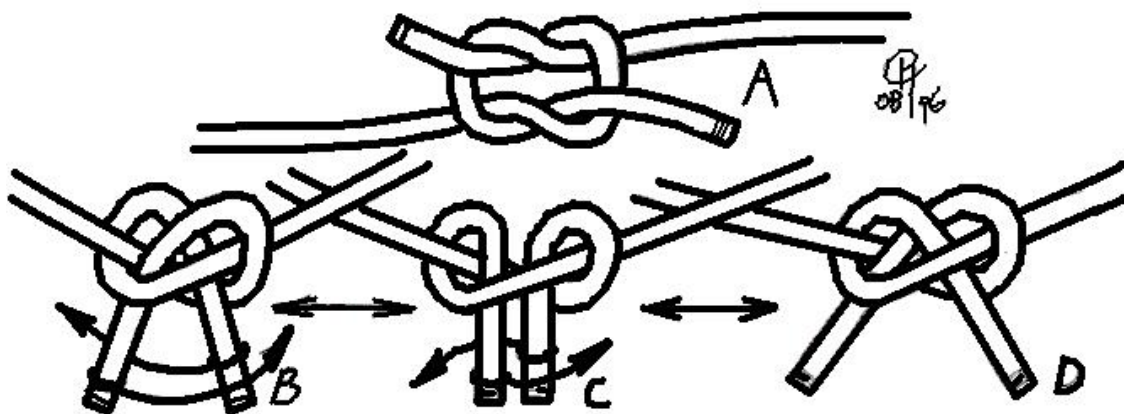
Structure-recognition allows knotters to recognize structures in a pragmatic manner. So, the structures are typically recorded in the way knotters encounter them. The method, which is the actual solution to the originating rope problem, is more important yet seldom recorded. The concept of a "solution" is in fact a package-deal in which learning plays a major role. The distinction appears to lie across know-how and know-what, but would lead us too far astray for our purposes. For further information query Google on the science of knowledge or epistemological research [53], [70].

During the knowledge reproduction phase it is significant that structure, method and application are often (partially) copied erroneously. From a knot-research point of view this is fortunate, as "new knowledge" comes into play. On the other hand most knotters experience the interplay as confusing. It is interesting to note that structure, method and application collaborate. If you allow isotopy, then many hitches lead to bends (and vice versa). Deforming loop knots, by pair-wise pulling parts emanating from the operative center, may lead to useful bends and/or hitches. We require a framework to denote this "active part" of the knotted structure. Henceforth we shall call it a "tangle". For our purposes tangles consist of two interacting parts. Öhrvall frequently indirectly refers to the tangle concept, but generally did not use it.

In the image below the generic tangle notation is given. Note that there are 4 ends, indicated by a , b , c and d . We shall say that ab and cd form a component in any tangle. Bends thus come forth by pulling ac , ad , bc or bd . Hitches may come forth by assuming ab or cd is a non-deformable spar. That is to say, assume ab or cd is unknotted, i.e. either of these components can be stretched. Loop knots come forth by applying tension $2F$ to any part, taking its counterpart and any of the remaining two ends and applying tension F to them.



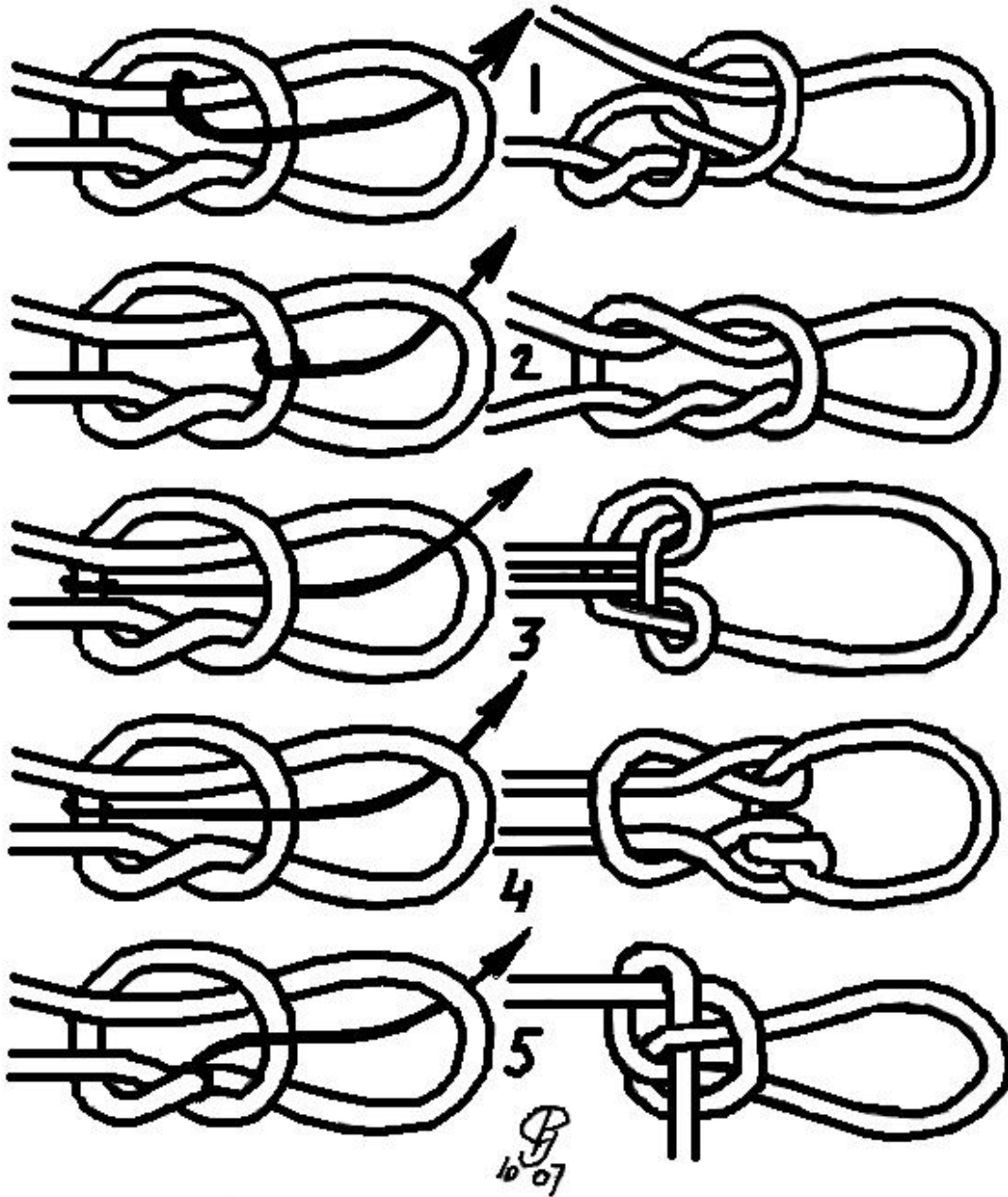
Behavior may also be due to isotopical deformation, in which the structure is deformed, within the laws of physics. Topological equivalence of two distinct spatial configurations does not imply identical behavior. The schizophrenic character of the What Knot clearly indicates the dramatic effects this can take on [5, p258, #1406, #1407]. Under load the What Knot Structure in configuration D is stable and in configuration B quite unreliable.



Relationships between structures always imply that there is a certain "distance" between the relatives. This distance can be in one (or more) of three types of relationship. I prefer to speak in terms proximity rather than distance [27].

Algorithmical proximities

In Section (1.2) we have seen the linkage between the Anchor Bend and the Studding-sail Bend. The image below shows how Hjalmar Öhrvall exploited the Slip Knot to illustrate algorithmic proximities between five otherwise unrelated structures [81, p71].

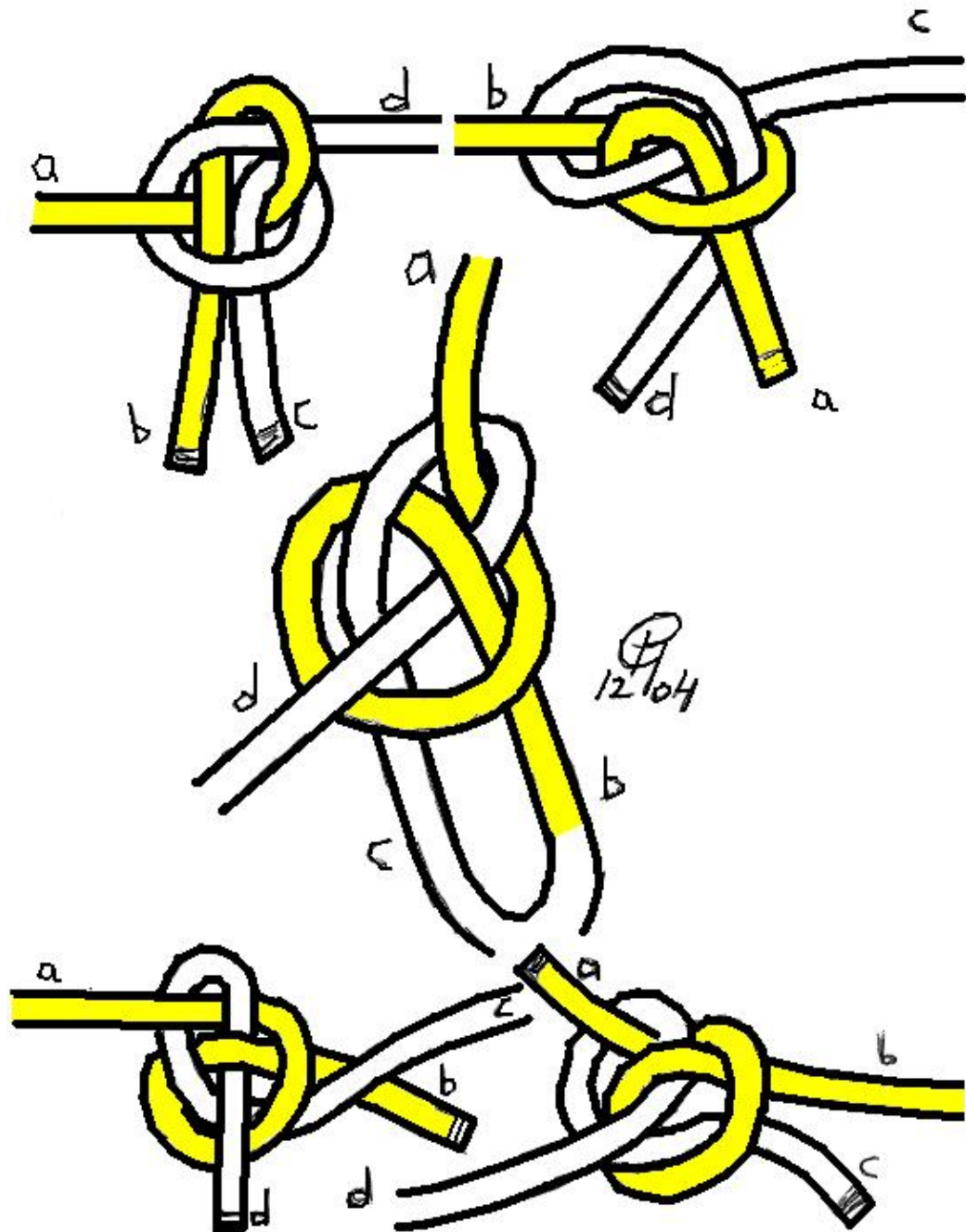


Structural proximities

Unlike Clifford Ashley and George Shaw, Hjalmar Öhrvall does not explicitly mention this type of proximity anywhere [5, p263, #1440, p274, #1549-1552], [63, p32]. Why he ignored it is a good question. The only exception is, perhaps implicit, in his description of the Reef and the Granny [77, p39].

Applicational proximities

Öhrvall has a few examples where he notes that the structure can be assigned different functionality by re-assigning the tangle's load-configuration. Hjalmar Öhrvall mentions the Sheet Bend and Bowline [77, p49], the Reef and the Cow [81, p56] and the Granny and the Clove [81, p56]. He also mentions a less obvious transformation between the Capstan Loop Knot and the four Capstan Bends, but refrained from illustrating them [27, p5], [81, p74]. They are illustrated below.



2.4.2 Nomenclature

Whilst defining the concepts he needed, Hjalmar Öhrvall lists generic knot-properties. Among them he states that a knot can always be found in either of 2 forms, being its mirror images [77, p14]. In 1916 he speaks of "properties", "applications" and "tying methods" of knots, which were previously poorly identified concepts. Öhrvall embraces the classical approach to the word "knot", like Clifford Ashley's describes as the third and narrowest sense [5, p12, #11]. To Öhrvall the Swedish word *knopar*, meant a multi-strand structure worked into laid rope. He notes that splices are not knots (*knopar*) [77, p89], [81, p166]. Hitches, Bends and Loops are covered by the Swedish word *stek*. As noted earlier his classification is traditional, by application. The Table of Content is usually a good indicator for such an observation.

Öhrvall put in considerable effort to record the names of structures he encountered. He clearly assigned importance to identification nomenclature. Already in 1908 he gave an international knot-name overview covering Swedish, Norwegian, Danish, German, English and French and writes

Jag meddelar här en förteckning på några utländska benämningar på knutar, som visserligen är mycket ofullständig, men ändock synes mig äga ett visst intresse, och som i alla händelser kan tjäna som en första början till en utförligare sammanställning. En svårighet, som man vid ett dylikt försök alltid har at räkna med, är den, att termerna ofta äro något vacklande [77, p110].

Here I offer an overview of some foreign names for knots. The list is obviously very incomplete, but nevertheless it appears to me to have a certain interest. And in any case can serve as a start for a more comprehensive list. A difficulty with such an attempt, which one must cater for, is that the concepts are somewhat shaky.

Here I would like to say a few things on his Dutch knotnames. It is not clear wherefrom he extracted the information, but out of his 30 Dutch knotnames, 12 are to varying degree provably incorrect. A surprising result to say the least.

2.4.3 Statistics

Another decidedly innovative and remarkable aspect is Öhrvall's introduction of blunt statistics. In fact he claims a singular observation in that field gave rise to his books [77, p40], [81, p55].

He once observed that out of 26 bends, gathered from a random sample of packages, 18 were Grannies and only 8 were Reefs. He condemned the Grannies as being "erroneous" and wondered why people did not produce the "correct" (Reef) knot. In 1912, the Granny continues to be the most used landknot [80, p11]. It is surprising when he later contradicts himself by stating that the Reef Knot is the most used landknot while at sea that honor falls upon the Two Half Hitches [82, p65].

2.4.4 Knot Mechanics

In the 1800's it was fashionable for seamanship manuals to tabulate breaking strengths of ropes, cables and chains. Also in the mountaineering literature of the late 19th century such statements can be found. For the climbers they were more specific towards knots.

Already in 1908 Hjalmar Öhrvall, possibly inspired by Dr. J. Lehman, started looking into knot strengths [41, p26]. His approach is systematic. Rather than jumping head first into empiric determination of strengths, he offers specific formulæ and a methodical approach.

He gives the friction formula for roundturns around a spar [77, p35]. This is a well-known formula from statics classes in physics, which explains how one roundturn can counteract 8 times the load. For two roundturns up to 64 times the load can be countered. Hjalmar Öhrvall stresses that the knotter should think about how to exploit this feature when making hitches. The return on this investment is obvious, the wend loses much of its stress. As Clifford Ashley puts it: "there is a lot of virtue in a roundturn" [5, p296, #1732].

Hjalmar Öhrvall also has a number of practical experiments. For example his very interesting tests on relative security [81, pp81-82] and his investigations into *elongation* of moistened fibers [81, p13]. He required that experiment in order to explain the mechanics behind laid rope. More specifically he needed it to explain why wet rope *shrinks*. On several locations in his books he stresses that the reader should try to analyze the way knotted structures work.

2.4.5 Usergroup Boundaries

In Öhrvall's days, knots were believed to belong to the sailors. Öhrvall himself is much infected with that view. However, when he published his studies' first results he was very well aware of the fact that knots were used on land too. Many of his samples show that the applicational boundaries of the actual knot structure were moved, away from Mariner context. He gives examples of knots used by farmers [77, p28], laboratories [77, p31, p38], chemists [77, p32], [78, pp151-152], [80, p9], [81, p40], surgeons [77, p43], kites [81, p39] and the military [81, p52], to mention but a few. He even described the agricultural usage of Water Knots as they were produced by the mechanical binders of manufacturers Munktell, McCormick, Appleby and Woods [81, p29].

All of these actions caused Öhrvall to remove the structures from the Mariner context. His next step was to understand how the structures operate (behavior). In other words, the context for the knot was no longer relevant and isolated statements about classes of characteristics were. In short Hjalmar Öhrvall looked at the clinical structure, stripped from its context, and focused on its behavior. He aimed at creating a synthesis between contexts across structures. This kind of formalization is at the basis of KKM.

2.5 Structures (newly-recorded)

In terms of structures Hjalmar Öhrvall offered many additions to the knowledge mass. He noted a delta between what he could find recorded and structures he knew existed, but could not find recorded. This implies that the recordings are "incomplete". His knots were often knot-research results, which had not yet appeared in other knotting sources. Here we give a selection of the knots Hjalmar Öhrvall believed were not previously discussed or identified in the literature.

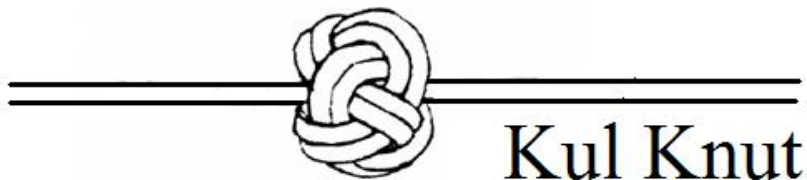
2.5.1 Turks Head Knots

Hjalmar Öhrvall published unprecedented research into Turk's Heads and their possible forms [77, pp68-76], [81, pp110-140]. He started from what he calls *valknutar*, which are Turks Heads in disc representation. They are often presented as mats. He links the disc representation to the grid representation, which he refers to as *partkunta*, a word he traced all the way back to Dahlman's *kunta* [15, p33], [81, p129]. Öhrvall's scope does not extend beyond casa-coded (U1O1) regular grids. Hjalmar Öhrvall was by no means the only researcher into Turk's Head Knots, but he was the first to publish such a substantial set of results.

An interesting question is what drives knotters, in general, to explore this topic? What qualifies Turk's Head Knots for knot authors to incorporate them so excessively in their books? This type of decorative knot poses an easy challenge, as they are commonly found in various degrees of complexity. In Chapter (3) we shall return in more detail to Hjalmar Öhrvall's Turk's Head research and its impact on Clifford Ashley.

2.5.2 Knob Knots

Hjalmar Öhrvall introduced two knots, which can be mentioned here. The first is the so-called *Kulknut* [81, p137, fig.166] and the other is a structure he christened *Ållonknut* [81, p139]. The word "ållon" has become extinct in the Swedish language and is replaced by "ollon", which means "acorn" or "beechnut". In terms of Regular Grids the Kul Knot is $p/b = 3/4$ and the Ållon Knot $p/b = 4/3$. Öhrvall was downright flabbergasted by how neatly the latter could cover a spherical surface [81, p139, p133].



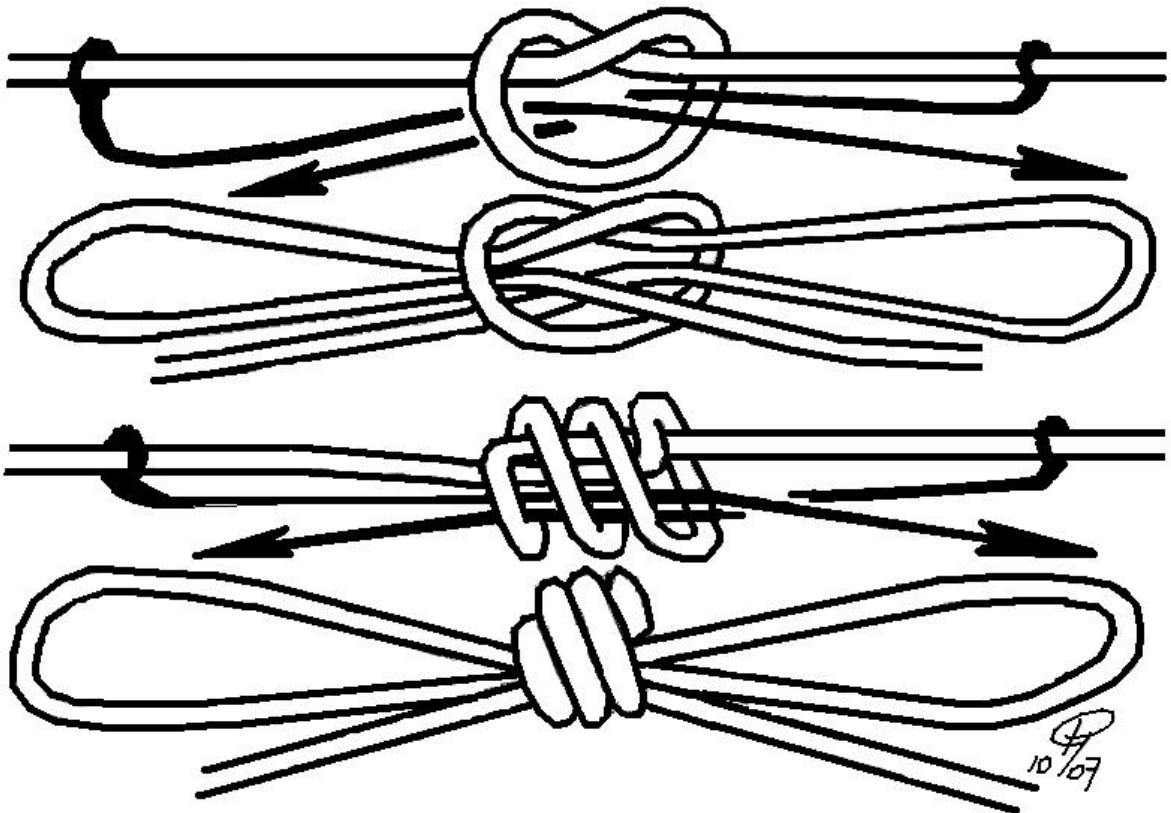
2.5.3 Slipped Multiple Tom Fool Knots

From a Slipped Half Hitch, Öhrvall arrived at a Slipped Multiple Tom Fool Knot, which he named something to the extent of Slipped Multiple Overhand Knot. He modestly formulated his find as:

Flerdubbel Överhandsknut med ögler. Denna knut, som jag ingenstädes sett eller hört beskriven, göres på liknande sätt som ... [81, p41].

Slipped Multiple Overhand Knot. This knot, which I have neither heard nor read about being mentioned, is made in a similar way as ...

The image below illustrates the extended principle. Note that by careful construction, for any degree of multiplicity of the Overhand, the resulting structure can be tied on the bight. This is a sensitive tying method, as one single errant crossing will ruthlessly compromise the structure's on-bightedness! Hjalmar Öhrvall suggests that the structure can be used to handcuff a person or as a makeshift seat, to raise or lower a person, during a calamity [81, p41].



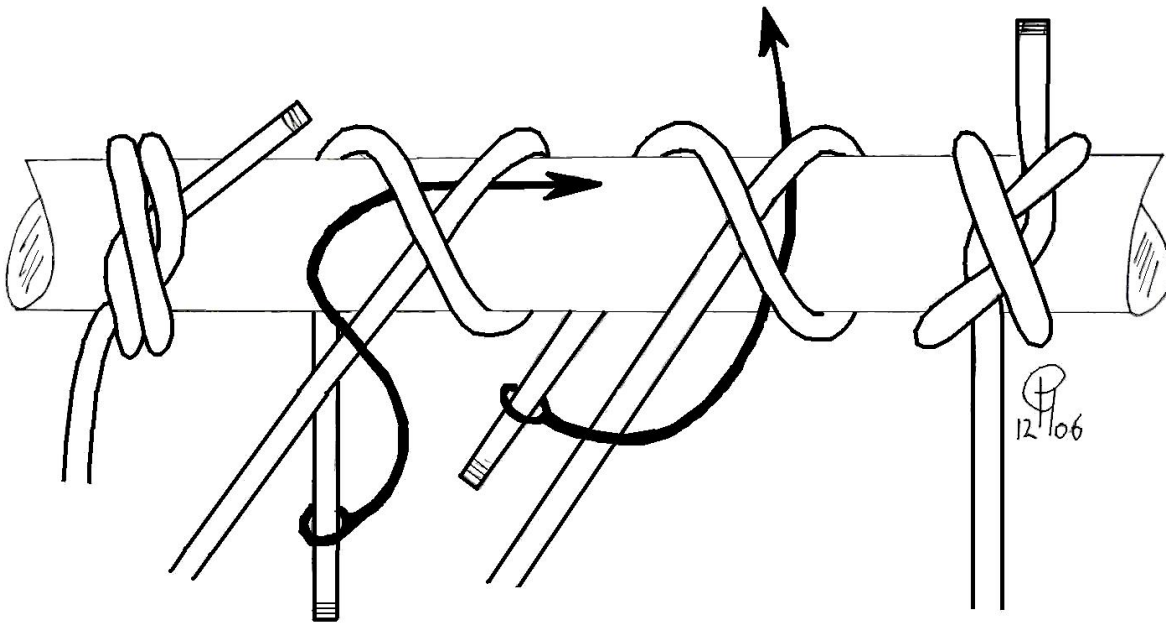
Hjalmar Öhrvall obtained many results from Jens Kusk Jensen's "seaman's bible". He borrowed the Star Knot [32, p26, fig.129], [81, p160] and 2 methods for making the Jug Sling Knot, [32, p22, figs.111-112], [81, p96-104].

2.6 Structures (non-illustrated)

Here we will discuss the not-illustrated structures, as the illustrated structures speak for themselves for anybody paging through the Öhrvall works. The statements may be harder. A preference of text over graphics introduces the risk that your readership will not register your statement. This was Öhrvall's fate on many an occasion. Why did he resort to the written word in the first place? He preferred text, not that he deemed the visual component less important, but drawings and photographs were not his strongest side. Let us see which structures he left unillustrated.

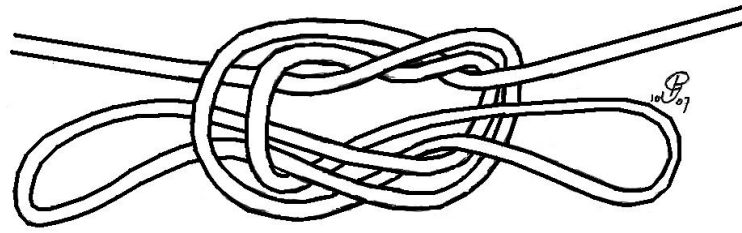
2.6.1 Constrictor Knot

The famous Constrictor Knot, which was mentioned as *Timmerknut* in his 1916 *Om Knutar*, escaped Elli Öhrvall's inkpen and has grown to become a fine piece of knotting lore [19, p116], [21, p111], [81, p78]. Öhrvall decorated the algorithmic proximity between the Strangle and the Constrictor with words, but refrained from illustrating the latter.



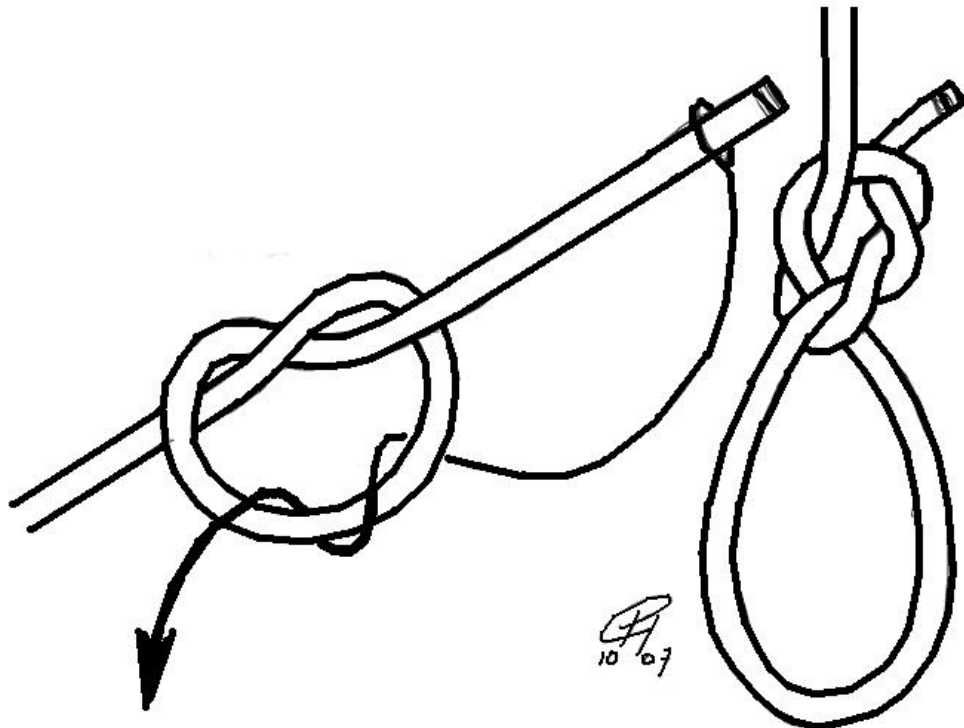
2.6.2 Shorteners

He wrote about the Bowline on the Bight being used to fool horsemen. Raskals would tie one in the reins and enjoy the rider having to unharness in order to undo the structure [81, p67]. Tying under tension poses a special condition while hitching. For that reason he states Two Half Hitches are to be preferred [81, p83]. He offers many solutions to the rope shortening problem, such as the Drummer Boy Plait and a pleat-assortment, but illustrates none of them [81, p90]. The on-bight Reef Knot shortener, which Jens Kusk Jensen describes [32, p16, fig.76], and left without image by Öhrvall, was found to be unreliable by the latter [81, p93].



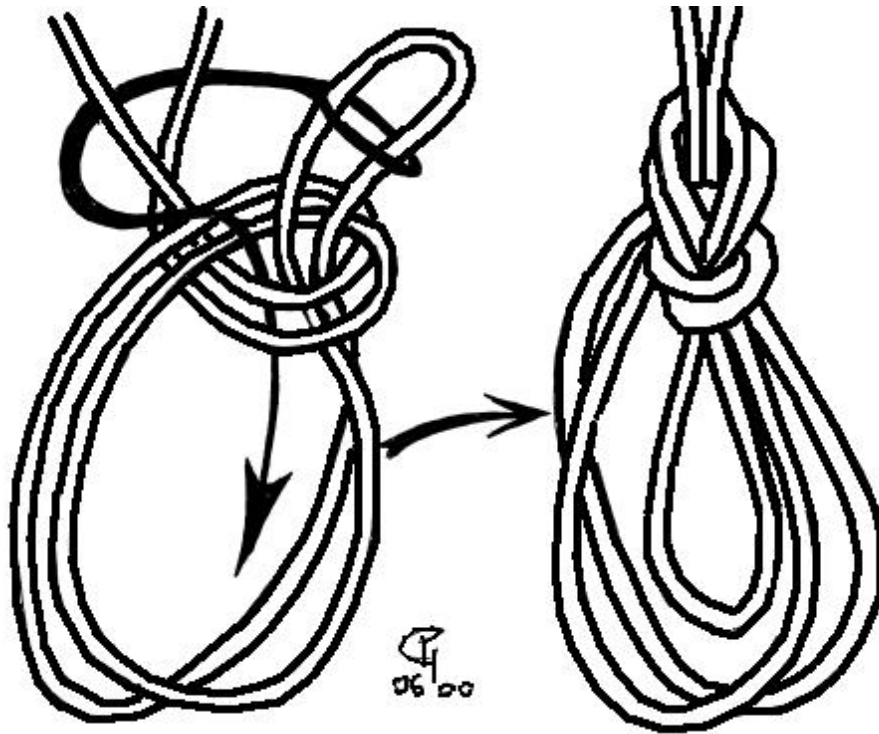
2.6.3 Öglenknoten

The *Öglenknoten* is a simple fisherman method to make a fixed loop knot. Öhrvall classifies it as *lidt klumpet men pålitelig* which means "a bit lumpy, but reliable". Although first illustrated by Lundberg, Öhrvall presented it in words [45, p34, fig.62], [77, p49], [81, p64]. This Loop Knot, which does not appear of much, is a monstrous example of how friction works. The reader should try and understand how it operates without slipping or budging. It would make for an interesting wild knot hunt to find who succeeded in illustrating it after Öhrvall.



2.6.4 Doubled Bowline

In *Strömmingsfiske*, which was written by his friend Dr. Ivar Arwidsson, Öhrvall found mention of a Triple Loop Bowline [1, p40]. He took over the mention, but left the structure unillustrated [81, p69]. This Loop Knot which locally, in the Skärssa area, is called *dubbelt pålstek*, translates into Double Bowline. It does not seem to feature in *The Ashley Book of Knots* [5].



Note that this process, i.e. creating the doubled version of a knot, can be done for any knot, merely take a bight and tie the desired knot.

Hjalmar Öhrvall described many structures without the benefit of a diagram. We shall meet others in Chapter 3. He enjoyed offering textual descriptions, not deterred by verbally making a whipping and coiling rope [77, p12]. Doubtless his most daunting act covers part of his wire splicing instructions, which are delivered under dense prosaic camouflage, without any image to aid [81, pp175-178]. In a sense knotbooks are like certain saucy picture books in which the images tell a story.

Early knot-researchers were taking inventory of the intellectual territory, wrote it down and at times added their own opinions. Apparently the reason for Hjalmar Öhrvall to undertake a study of knots lay in the fact that he encountered a bewildering diversity of structures. His actions were aimed at building a knowledge base on paper.

The directional shift towards KKM in the knotting literature at large, such as induced by Öhrvall's work, is complex to analyze and describe. However, here we have seen how Hjalmar Öhrvall's knotting knowledge was influenced by informants and sources. This caused him to be among the first to generalize the knotting context. He peeked outside of the knotting-box by extending the knowledge base and recording numerous previously unrecorded structures.

In the third and final chapter we move to assess the impact of Hjalmar Öhrvall's knot-writing efforts. We shall do so by listing citations to his knot-works and chart the recorded reactions from his contemporaries and successors.

Chapter 3

Influences and Impact

With Professor Öhrvall's book, our Swedish literature has gotten a lucky streak. Fortunately it is an original work in Swedish, which should soon become translated to other languages, because such a knot encyclopedia does not yet exist anywhere else.

Gösta Langenfelt 1917 [39, p87].

We first presented an overview of Hjalmar Öhrvall's knot works. Next we showed how he laid a foundation under Knot Knowledge Management (KKM). Here we assess the impact of his knot-writing efforts. It is not our intention to grade his activities, but rather pursue an approach by objectively listing citations and charting recorded reactions from his contemporaries and successors. Our central questions will be: "How did Hjalmar Öhrvall influence others?" and "To what extent did he succeed?"

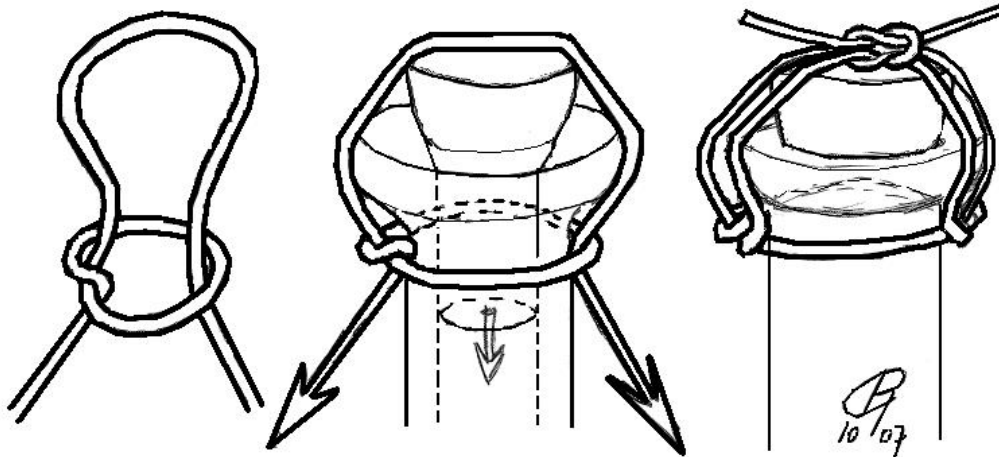
Upfront we admit to having knowledge of merely a few referential traces. All stem from the Nordic and Anglo-Saxon knotting literature. We shall assume they suffice to paint a reliable picture of Hjalmar Öhrvall's followers. Note that when source *A* is not acknowledged by source *B*, it remains uncertain whether or not author *B* was aware of source *A*. Moreover, knot authors have no strong referencing tradition. Whatever determines propagation of source-knowledge makes for an interesting KKM-question with which we shall not be concerned here.

3.1 Martta Ropponen

The earliest references to Hjalmar Öhrvall's work are by his countrymen, whom we shall meet later, and Martta E. Ropponen-Homi from Finland. In the period 1927-1933 she published seven reprints of her *Esperanto-kurso*, a course in Esperanto [22] and, in 1931, a charming little knot book, titled *Solmukirja* [54].

She did not have much to say about Hjalmar Öhrvall, as his name does not occur in the text, but an (undated) *Om Knutar* is cited in her bibliography. As languages,

Swedish and Finnish are miles apart, but large parts of Finland speak Swedish, not so much vice versa. It is reasonable to assume that Martta Ropponen could read and understand Hjalmar Öhrvall's work. The latter is evidenced by the following example.



One peculiar structure which is often mentioned, but went without the aid of an illustration, in all of Hjalmar Öhrvall's publications is the so-called Chemist Knot (*Apotekarknut*). It is used to force a cork down a bottle's neck and constrict it there [77, p32], [78, pp151-152], [80, p9], [81, p40]. Martta Ropponen illustrates Öhrvall's Chemist Knot, thus proving she actually read the text [54, p72, fig.123].

Ropponen was a scout-leader, which in fact represents one of Hjalmar Öhrvall's intended target groups. We further know that she was in touch with Cyrus Lawrence Day and several other knotting enthusiasts, with whom she corresponded in Esperanto [19, p116]. She could have been in contact with Öhrvall too, but we have no evidence. Ropponen's work is not mentioned by other early native Finnish knot authors, such as Hannes Teppo (1944), whom admittedly is more Mariner-related [72].

3.2 Cyrus Lawrence Day

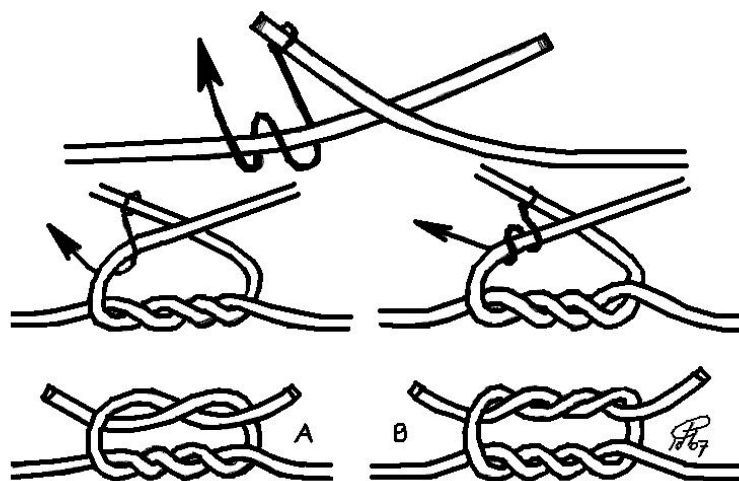
Cyrus Lawrence Day (1900-1967) was a linguist, a professor of English literature, at Delaware University. Like Hjalmar Öhrvall he enjoyed sailing and, at the beginning of the 1930's, conceived the plan to write a Bowline article. Day proceeded prolifically and suddenly found he held sufficient material for a book. His knot-publication debut was in 1935 with a monograph titled *Sailors' Knots* [17]. In 1947 he followed up this work by *The Art of Knotting and Splicing*, for which he obtained the US Naval Institute's assistance in publication [19]. His other major scholarly work is *Quipus and Witches' Knots* (1967) [21], which grew out of some earlier papers [18], [20]. The period spanning 1947 and 1967 saw various editions of *Knots and Splices*, a booklet which was intended for a less discerning knot tying audience.

It is not clear how Cyrus Day came across the writings by Hjalmar Öhrvall. In any case they are listed among the references in *Sailors' Knots*. It thus took 15 years for Öhrvall to get recognition in Scandinavia and 20 years for his works to reach bibli-

ographical listings of US knotbooks. As we shall show, Day may have heard about them from Ashley, but he may have equally well obtained the information from one of his knotty correspondents. For example Bostonian patent attorney Lawrence Miller, who had undertaken a study to identify Oribasius' Knots too (after Öhrvall) [19, p.vi], [21, p106], [47]. That Hjalmar Öhrvall's work represented the largest published knot monograph up till then may have aided, but that is a long way from being a provable fact.

Hjalmar Öhrvall and Cyrus Day shared a lot of common ground in terms of knotting interest, e.g. Oribasius and magical knots. Both were academics, who extended their extra-curricular focus onto the field of knots. There are also differences. Öhrvall is Darwinian in his approach and views knots as solutions to rope problems. Cyrus Day is more taken by the diversity of the standard solutions and did an excellent job of illustrating the most common elements in a photographic quality, which would have dazzled Hjalmar Öhrvall. Whereas Öhrvall published his ideas in a rather condensed time-interval, stretching from 1908 to 1922, Cyrus Day had an almost equally long-lasting tranquil spell between 1935 and 1947, but published across 3 decades. Day was not the only one to suspend publishing activity for some time. As we shall see, Clifford Ashley did something similar. Presumably creating a *magnum opus* takes time. On the other hand, there is no compelling reason as to why knot authors should publish in a steady stream, but it is indicative of how people think about knots.

Miller, Day and Öhrvall had all tried their hand at deciphering Oribasius' knotting texts. Apparently their competition ran high. Camilla Day, the widow to Cyrus Day, wrote to tell me her late husband had translations of Öhrvall's second edition of *Om Knutar* [16]. This was corroborated independently by the librarian at Peabody Maritime Museum in Salem, Massachusetts, short time later. He informed me that about 250 items stemming from the Day Knotting Library had been integrated into their collection. Parts of this heritage are mentioned in the Peabody Manuscript List of their Phillips Library [52].



It is interesting to observe how Öhrvall affected Day after he got translations. To begin with he discovered Öhrvall's Constrictor Knot [19, p116], [21, p111]. A circumstantial example may be given with the Surgeon's Knot also known as the Ligature Knot.

In 1866 Tom Bowling calls structure *B* the Double Twist Knot. It is not used as a bend, but as a tie [11, pl.1, fig.44]. Tucked away in his chapter 3, "Ties and Lashings", Joseph Tom Burgess follows suit. Albeit that he shows the Granny version [12, p62, fig.109]. Initially Hjalmar Öhrvall illustrated the version *B*. However, after 1909, he textually corrected his statement to surgeons using type *A* [78, p154]. In 1935 Cyrus Day still went by (Öhrvall's?) illustrations and shows Type *B* [17, p31]. After he obtained translations, presumably between 1935 and 1947, he started showing type *A* too. He did better and (1) found a much earlier reference in Diderot's Encyclopedia of 1778 and (2) mentions an unsupported forensic story of a Californian surgeon who left a Ligature Knot tell-tale, which is claimed to have led to the culprit's arrest [19, p46].

Note that the Ligature Knot name was not really known in the Anglo-Saxon knotting literature at any early date. Öhrvall did not introduce it, as he speaks of a *kirurgisk knut* (surgical knot) [77, p43]. In the second installment of "The Sailor and his Knots" Clifford Ashley launched a whole set of binding knots, which he collectively named "Ligature Knots". Among them he speaks of the Surgeon's Twist, leading to a Surgeon's Knot, the Type *A* structure above [2, pp114-116, figs.21-22]. Cyrus Day presented Type *B* as the "Surgeon's Knot" in 1935. Later Clifford Ashley compellingly argued that the Type *A* structure should be labeled the Ligature Knot [5, p221, #1209].

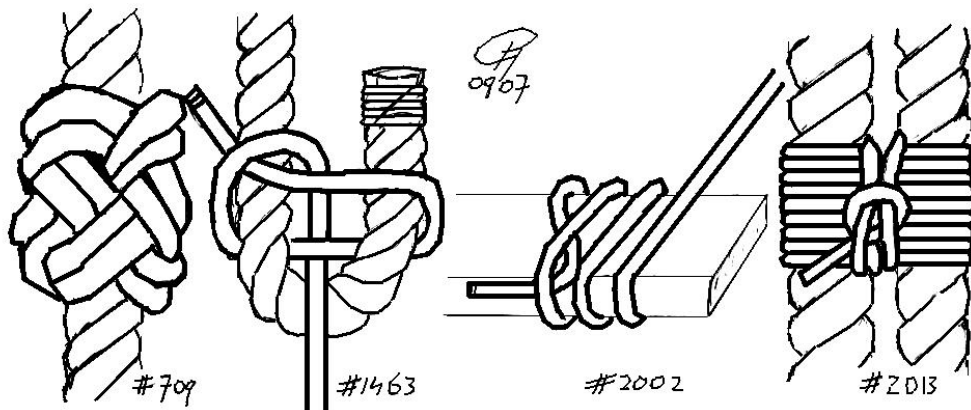
A curious fact is that our gentlemen knotters, Lawrence Miller inclusive, had studied Oribasius' ancient manuscript, yet none of them thought it strange that the Ligature Knot went unmentioned. Hjalmar Öhrvall casually expressed surprise that Ambrose Paré, whom around 1550 revolutionized surgery, did not discuss the Ligature Knot [82, p52]. In the 1918 Arthur Rogers Grant paper on surgical knots Type *A* is called the "True Surgeon's Knot" [25]. Peculiar is that Rosing and Robinson's investigations could not establish any superiority of the Ligature Knot over neither the Granny Knot nor the Reef Knot [56, p269]. Probably therein lies the reason that Ashley shovels surgeons into the Grand Users of Grannies Category [5, p220, #1206].

Overall Day gave high appraisal of Öhrvall's second edition of *Om Knutar*, as his bibliography states: "the best work on knots, but out of print" [17, p154].

3.3 Clifford Warren Ashley

Clifford Warren Ashley (1881-1946) was a marine artist, whose life was permeated by the New Bedford (whaling) scene. In 1904 *Harper's Monthly Magazine* commissioned him to produce an article on whaling with narrative and pictures. He undertook one sperm whaling voyage to the Crozet Island Grounds, which are situated to the South East of Cape Town [4, p1]. In August 1904 Ashley embarked aboard the bark *Sunbeam* to observe whale-killing first hand. This experience sketched the backdrop for "The Blubber Hunters", which ran in two issues of Harper's in 1906. These articles became the first two chapters in his subsequent book *The Yankee Whaler*. The voyage left an ever-lasting impression on young Clifford.

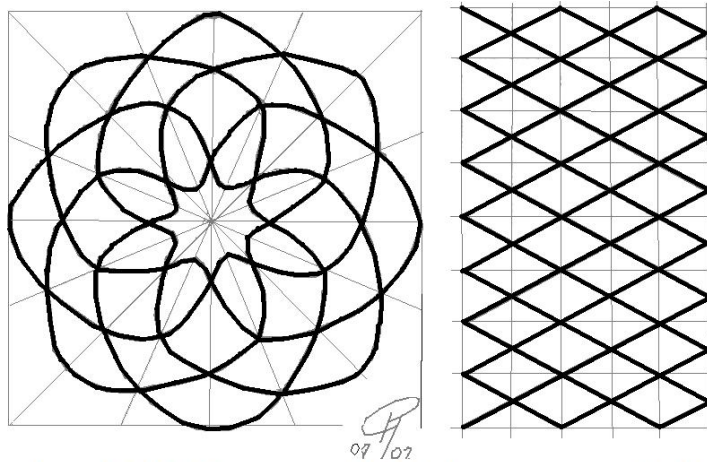
During his whaling stint to the Southern Ocean, Clifford Ashley was already sufficiently interested in knots to engage in daily conversations on the topic with Charles W. Smith, the *Sunbeam* mate [4, p9], [5, p6]. However, his knot publication debut had to wait till 1925. Aged 44, he published his first paper on knots. As we shall show, from his *Sea Stories* articles it can be inferred that Ashley had encountered Öhrvall's work on prior occasion. The question to pop is how Cyrus Day and Clifford Ashley learned about Hjalmar Öhrvall's endeavors? Ashley could not read Swedish and, prior to 1925, apparently did not have access to the Day translations, as they became available later. According to his bibliography Ashley owned copies of Öhrvall's 1908, 1912 and 1916 monographs. So, the keen collector went to considerable extent to obtain copies.



The Ashley Book of Knots harbors a few well-defined references to Öhrvall. The Double Crown and Diamond [5, p125, #709], which, according to Öhrvall, is known as *Rosenknop* (Rose Knot) in Sweden [81, p159]. A Heaving-Line Bend, to which we shall return later in this article [5, p265 #1463]. Ashley shows a hitch, which is not to be found in Öhrvall's work as such and seems to be off here when stating: "Öhrvall shows a similar knot for the same purpose" [5, p326, #2002]. One may check the 1908 and 1912 works in vain. In 1916 Öhrvall illustrates a parcelling technique, which probably inspired Ashley [81, p189, fig.223]. Clifford Ashley discusses a Flat Knot [5, p327 #2013], which is rightfully acknowledged to Öhrvall [81, p186, figs.214-215].

In terms of placement along a time-line and depth of research, succeeding Hjalmar Öhrvall's writings on Turk's Head Knots, Clifford Ashley published the next comprehensive treatment of the subject. Ashley appears to have studied Öhrvall's Turk's Head Knots section diligently indeed. Although some points got lost in translation. The history of the Turk's Head Knot from Clifford Ashley's point of view differs from that of Hjalmar Öhrvall's. Ashley departs from the name given in Darcy Lever's 1808 first edition of his *Sheet Anchor* [5, p232, #1302]. The name for the knot must have been fleeting, as it skedaddled from the second edition a decade later [42]. However, Ashley immediately remarks that the structure itself is much older. Öhrvall reproduced one of Albrecht Dürer's knots (often credited to Leonardo da Vinci), had personally researched Turk's Head Knotted artifacts from Viking archaeological digs and drops references to even earlier Byzanthian structures from the 9th century [81, p133].

Despite some referential glitches Ashley genuinely tried to understand Öhrvall's text. For example he mentions Öhrvall identifying three out of four expansion methods for Square Turk's Head Knots [5, p235, #1321]. Square Turk's Heads are Casa-coded Regular Grids for which the number of parts (p) and the number of bights (b) relate as $p = b \pm 1$. As Ashley stated, without proof, expansions of Square Casa-coded Regular Grids fall into exactly one out of 4 types [5, pp235-236, #1321]. This is not entirely evident from Hjalmar Öhrvall's work. Öhrvall discerns the *Valknut* (disc-represented structure) and the *Partkuntor* (grid-represented structure). He studied most of his Turk's Head Knots as "valknutar", i.e. by means of disc representations. In that context he discussed the expansions of $3/4 \rightarrow 5/6 \rightarrow 7/8 \dots$ etc and $4/5 \rightarrow 6/7 \rightarrow 8/9 \rightarrow \dots$ etc. In other words, Hjalmar Öhrvall showed the $p = b + 1$ cases, but not the $p = b - 1$ cases. In any case it takes close study to spot such details.



$p/b = 5/8$ Disc- and Grid-representation

There are many questions seeking an answer in this corner of the decorative knotting field. What is so powerfully attractive about Turk's Head Knots? Why are knotters driven to promote them to the degree they do? Peculiar is how knotters seldom leave the Casa-coded Regular Grids arena. Here Ashley with Graumont and Hensel were among the first in a Mariner context to explore this *terra incognita*.

3.4 Scattered References

Reading Hjalmar Öhrvall works it is not hard to be impressed. He was a bright thinker and had the gift of exceptionally clear formulation. We have seen how three respected knot-authors acknowledged influence by Öhrvall. Over the past century a variety of authors cited Hjalmar Öhrvall's works. Here is an anthology, representing a scrape across some 30 sources, to assess influence and impact.

The initial welcome of Hjalmar Öhrvall's works in homeland Sweden was hopeful. As early as 1913 his friend Dr. Ivar Arwidsson refers to Öhrvall's excellent 1908 book [1, p9]. He merely uses it to identify the knots he stages throughout his book on fishing-related ethnographical facets from Gavleborg county. A 1917 *Fataburen* article, which reviews the second edition of *Om Knutar*, is very positive about Hjalmar Öhrvall's

work in the magical knot area [39]. With patriotic flair the reviewer, ms. Langenfelt, stressed the importance of Öhrvall's work and noted the lacking equivalent in any other language.

Excluding Finland, Öhrvall's impact on the scouting movement in Scandinavia is surprising. For example in 1983 the Svenska Scoutrörelsen's *Scoutuppslag boken* is silent on Öhrvall, although he reached out for them already in 1908 [67, pp132-134]. In Denmark Hjalmar Öhrvall's words were not heard. Axel Saugman, a well-respected Danish scouting knot-source for over 40 years, has a bibliography without Öhrvall [60, p87]. Kurt Jensen, who took over Saugman's knotmaster role later in the 20th century, avoided Öhrvall. Kurt Jensen's 1960 bibliography still promotes Nordic sources, e.g. Jens Kusk Jensen's seamanship book as a work "making our nation proud" [33, pp105]. However, in later editions he became increasingly Anglo-Saxon oriented [33, pp96]. Norwegian scout-manuals do not mention Öhrvall. We must conclude that one of Hjalmar Öhrvall's targeted groups, the scout movement, failed to appreciate his efforts to reach them. At least in Scandinavia.

Remarkable is that yachtsmen Öhrvall and Day, completely lacking professional sea experience, and artist Clifford Ashley, having limited sea experience, all promote Mariner approaches to knotting. In Mariners circles, however, Hjalmar Öhrvall's work did not appear to fare well either. In his 1923 little sailor's knotting booklet the Swedish sea captain Comét did not waste a word on Öhrvall [13]. Among the Danish merchant naval heavy-weight knotters, neither Kaj Lund nor Tom Jørgensen seemed to have been aware of Öhrvall's work, as their bibliographies do not mention it [44], [38]. Neither did the later editions of Jens Kusk Jensen's "seaman's bible", nor the influential works on seamanship by Knud Hansen or F.W.J. Paulsen reference Öhrvall's work [30], [32], [50]. The Swedish decorative marlinspike boaty boys of the second half of the 20th century ignore Hjalmar Öhrvall. Sune Berkeman, who has some remarks on knot-history and such, is almost silent on Öhrvall [7, p16-20, p112], [8], [9]. That the decorative traditionalist knotting clansmen punished Hjalmar Öhrvall by ignoring his work seems to go without saying. In fact, in their preface, Nils Ström and Anders Eneström pride themselves on keeping a craft alive and rather praise Clifford Ashley as their source of inspiration than mention fellow countryman Öhrvall [71].

In the General Knotters Category Yngve Johansson does not mention Öhrvall [34]. However, it is interesting to note that Albert Bonniers is the publisher once again of this knot work. In Sweden Bonniers dominates the knot-book market. Much like Glasgow-based publisher Brown, Son and Ferguson controlled the UK knot-book market at the turn of 19th century and well into the 1900's. The Bonniers-based opposition a decade later by Ynge Rydholm acknowledges Hjalmar Öhrvall, but holds *The Ashley Book of Knots* and *The Art of Knotting and Splicing* to be the best available knotbooks [58], [59, p37]. In his impressive 1991 account of Sweden's cordage-industry, Olle Wahlbeck has mere fleeting mention of the 1908 *Om Knutar* in his bibliography [75, p210].

How come Öhrvall was so unknown on his home-turf? Indifference or ignorance? Overall it is a sad picture how little Öhrvall's influence spread across his Scandic hitherland. It appears like the Scouting and Mariner knotworld exhibited endemic behavior, or perhaps were genuinely unaware of his work or simply chose to ignore it. However, many knotting enthusiasts, of varying degree of anonymity, were sympathetic towards Öhrvall's work [35], [36], [37], [51], [55].

3.5 Sam Svensson's Critique

No doubt Hjalmar Öhrvall liked being a provocative thinker and anticipated attacks from many directions. Therefore he cloaked his reasons for writing and researching in an apologetic invitation [77, p3]. Apart from the academic disagreement with Lawrence Miller [47], Cyrus Day and J.Joris Hage [28] on their Oribasius knot-identifications, a critical downpour came from a quite unexpected direction. The staunchest attacks, in fact, arrived from his own back yard.

Sam Svensson (1896-1966) was a sea captain, who turned curator of Sweden's Maritime Museum in 1935. He was involved in the preservation of the *Vasa* in Stockholm, among other things, and produced several books on maritime history and seamanship. In the preface of his *Handbok i sjömansarbete* Svensson, on two occasions discusses Öhrvall's and Comét's influence on and contributions to knotting [68]. These thoughts have not managed to make their way into the English translation [69]. Granada, the UK publisher for Svensson, decided to leave out the Öhrvall and Comét references. They probably assumed the paragraphs were intended for a local Nordic market and sadly missed an opportunity for Hjalmar Öhrvall-promotion by not translating them. Let us take a closer look at these omissions.

3.5.1 First Omission

Sam Svensson complains how the seamanship literature holds a long tradition of poorly representing ropeworking techniques. Generally marine experts have the tendency of introducing errors which are propagated. To that extent read Clifford Ashley's supportive account of whaling experts and their beliefs [4, p.xiv]. Actually Svensson moans mostly about the terrible state of books with errors. He finds that Hjalmar Öhrvall contributes to the confusion and writes:

Hjalmar Öhrvalls bok, Om knutar, Stockholm 1916, som är det största arbetet på svenska språket i detta ämne, bör nämnas i dette sammanhang. Öhrvall hade genom intresserad forskning skaffat sig stora teoretiska kunskaper om knopar och stek. Hans praktiska insikter voro emellertid ej helt av samma höga standard, och arbetet är behäftat med flera fel i framställningen. Som exempel kan nämnas långsplitsen på tågvirke, felaktig i både text och bild, och fiskarsteket, som är feltecknat. Många påståenden och antaganden blotta dessutom en obekantskap med knoparnas namn, ändamål och väsen som förvånar. Sålunda sägs, att drejrepsteket slås på en drejare, när en sjöman skall sitta på den uppe i masten,

och att det måste bero på gammal slentrian, att aviga halvslag ej använda mere än de göra, för att nämna blott två exempel. Drejrep har tyvärr intet med drejare att göra, och denna användas aldrig att sitta på. Ej heller har knoparnas användning bestämts slentrianmässigt utan empiriskt med rön ända från vikingatid. Långsplitsen på wire är omöjlig att utföra efter den givna beskrivningen, och det är säkert, att varken professor Öhrvall eller den författare, han ordagrant översatt, någonsin själva gjort det. Allt detta gör, att boken ej har så mycket att ge sjömannen. Den har emellertid andra värden, och den, som önskar en utredning om knoparna i deras historiska, geografiska och etnografiska sammamhang, kan troligen ej finna ett fulständigare arbete på svenska språket [68].

*Hjalmar Öhrvall's book, About Knots, Stockholm 1916, which is the largest work in the Swedish language on this subject, should be mentioned in this context. Öhrvall had acquired, by inquisitive research, a large theoretical knowledge about knots. His practical insights were not of the same high standard, and his work is plagued with many mistakes in its presentation. For example one can mention the **Long Splice in rope**, mistaking in both text and graphics, and the **Anchor Bend**, which is wrongly illustrated. Many assertions and assumptions witness of an unfamiliarity with knot-names and purposes in general. It is stated, that the **Rolling Hitch** is made onto a heaver, when a sailor wants a seat up in the mast, and that it must be based on routine that the **Buntline Hitch** is used less than it actually is, for to mention but two examples. The "drejrep" has nothing to do with a heaver and it is never used to sit on. **Neither has knotting's application become determined in any routine manner but in an empiric way with pure spirit from the Viking days.** The **Long Splice in wire** is impossible to conduct by means of the given instructions and it is certain that neither professor Öhrvall nor the author he copied literally has made one either. All of this results in the book not having much to offer the seaman. It does have other virtues. For those who wish to have an exposition on the history of knots, their geographic and ethnographic relationships, it will hardly be possible to find a more complete work in the Swedish language.*

Sam Svensson raises 4 points on the Long Splice, Anchor Bend, Rolling Hitch and the empiricity of knotting experience. Let us take them in slow-mow.

Long Splice

Hjalmar Öhrvall has a somewhat peculiar way to make the Long Splice. The odds are that his instructions will fail in most interpretations [81, pp167-168, fig.199]. The image below stems from Öhrvall's 1908 book. Count the strands between splicing sites. They must be a multiple of three, unless some obscure rope-working technique is intended.

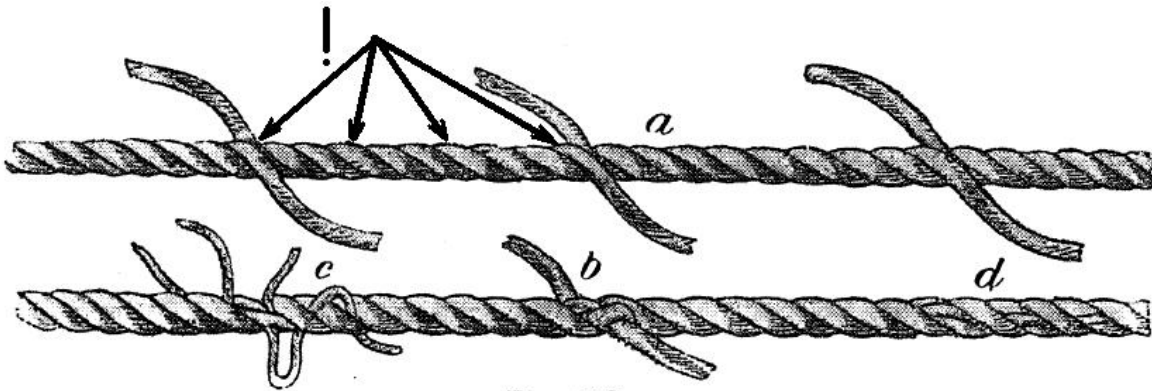
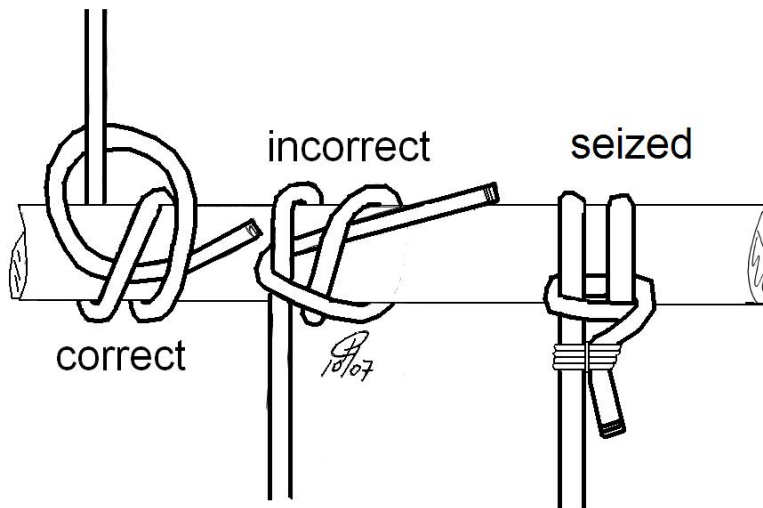


Fig. 122.

Trying to trace the origin of Öhrvall's probable source for this splice, I found that Vilhelm Linder illustrates a faulty 3-strand Long Splice [43, p437, fig.293]. Also Denmark's Royal Shipbuilder, Diderich Funch, has a Long Splice in 4-strands, which appears incorrect [24, p5, pl.3]. The Long Splice by Jens Kusk Jensen is alright [32, p36, figs.162-163]. Of course Sam Svensson's Long Splice is correct [68, p84, fig.190], [69, p130, fig.190]. Surprising, however, is Svensson's illustration for the Short Splice in 2(?)-stranded rope [68, p84, fig.189], [69, p129, fig.189].

Anchor Bend

According to Svensson there is a correct and an incorrect way to make an Anchor Bend [68, p45, fig.67], [69, p64, fig.67]. This wisdom is parroted by Olle Wahlbeck [75, p207].



In 1908 Hjalmar Öhrvall shows a picture of "Svensson's correct" version [77, p55, fig.58], but in 1916 an inkdrawing of the "incorrect" version emerges [81, p77, fig.75]. In Section (1.2) we noted how Hjalmar Öhrvall appears to have irritated his readership when deforming the Anchor Bend to improve its grip as a Strangle Knot (p5). Sam Svensson, however, alters the load direction of this hitch to prove his point. It is well-known that, for that reason, the wend should be seized to the stend. Age-old knowledge which is recorded in most of the ancient seamanship manuals.

Rolling Hitch

The *Dräjärestek* is known as the Rolling Hitch [5, p298, #1734]. Hjalmar Öhrvall had the following discussion:

En eller flere sådana extra rundtörnar tjäna äfven till at hindra halfslagen att slira af en dräjärest (kort käpp, som begagnas dels som häfstång, dels at sitta på, när en skal hissas upp på masten): s.k. dräjärestek (fig.47) [77, p35].

One or more of such additional roundturns also serve to prevent the Half Hitch from sliding off a heaver (short stick, which is used partially as a heaver, partially for a man to sit on when hoisted up the mast) a so-called dräjärestek (fig.47).

Textually Öhrvall seems to have missed out something here. His figure in 1908 refers to the Double Bastard Weaver Knot [5, p79, #491]. By 1916 Öhrvall got this fixed and the text refers to the image of the Rolling Hitch [81, p48, fig.36]. However, what these enigmatic words mean is a puzzle. Carl Smith's work from 1889 and 1899 seems to have been Öhrvall's primary source here. In 1889 Carl Smith had a discussion, which started from the Bowline when used to hoist a man up the mast. Smith added:

Til sistnämnda ändamål kan man äfven begagna det på figur 55 afbildade sättet att fästa en stark käp "drejare": kallad, på hvilken karlen sätter sig med benen på ömse sidor om trossen [64, p68].

For the last mentioned purpose one can also use the structure shown in fig.55 for attaching a strong short stick, called a "heaver", on which a guy sits with a leg on either side of the rope.

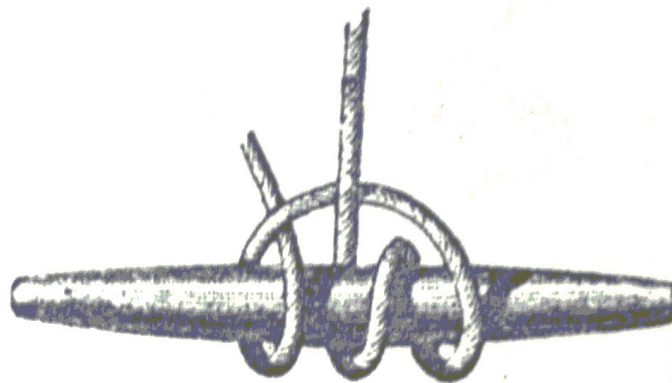


Fig. 55.

In 1899 Carl Smith had the following

Drejare, en kort stark käpp, som begagnas dels såsom häfstång, vid åtskilliga sjömansarbeten dels for att sitta på, när en karl skall hissas upp på masten, i hvilket sistnämnda fall den påstickes såsom figuren visar [65, p31].

Heaver, a short stick, which can be used as a lever during various seamanship activities, partially to sit on when a hand must be raised up the mast, in which case [the heaver] is used as shown in the figure.

So, Hjalmar Öhrvall bluntly copied Carl Smith. The question is wherefrom Smith got this information? A *drejer* also seems to be a spar. Moreover, there is a *Drejrepstik* in other Nordic languages. For example Harboe in 1839 and Funch in 1846 call a seized Lark's Head *Dreiereebstik* [31, p392], [24, p25, pl.11]. Mention of the *Drejrepstek* by naval authority Vilhelm Linder was not found [43, p144], but his book on seamanship does make mention of the heaver seat:

Fig.312 a visar påslagning af drejare med två halfslag och rundtörn sam b med halfslag om egen part, för att ej halfslagen skola slira af drejaren, da en man sidder derå. [43, p449, fig.312]

Figure 312 a shows the belaying of a heaver with a Clove Hitch with round-turn. Illustration b shows a Clove Hitch with a Half Hitch, to ensure that the turn will not slide of the "drejare", when a man is sitting on it.

It is unclear why Carl Smith thought one should sit on a heaver. Unless he witnessed some dare-devil, recorded that experience for posterity and had the Linder-Öhrvall tandem propagate it.

Interestingly Svensson does not have the *dräjrepstek*, but mentions and illustrates *drejare* a so-called heaver [68, p33, fig.21], [69, p45, fig.21b]. In the realms of a ship only having seven ropes, Olle Wahlbeck mentions the

drejrep: Tåg, vari märsrå, stundom bramrå hänger. (se rep) [75, 55, p118].

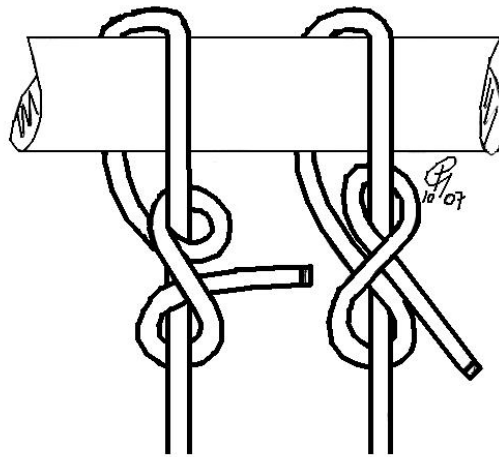
"drejrep": a rope by which certain kind of spars was hung.

Knot repertoires and empiricity

On knot repertoires becoming ground in by means of routine. Let us see how Hjalmar Öhrvall incited our curator. Svensson seems to be referring to Öhrvall's 1908 edition where a discussion on Two Half Hitches and the Buntline Hitch is taking place [77, p37]. The Swedish name *Två Aviga Halfslag (om egen part)*, literally translates into Two Wrong Half Hitches but is named Buntline Hitch in English [5, p14, #55]. Öhrvall had excavated a link between the Buntline Hitch and the Two Half Hitches from Carl Smith's *Båtsegling 1899* [65, p68]. Smith was quite positive about this hitch and contaminated Öhrvall, who jokingly links it all to superstition:

Om således de avviga halfslagen hålla bättre, äro lika lätt att göra, och nättare än de vanliga, borde de nästan alltid vara att föredraga. Att de ej begagnas mera, torde nog dels bero på gammal slentrian, dels måhända därpå, att de fått namnet "avviga": man gör ej något avvigt af samma skäl som man ej gärna afseglar på en fredag eller tar een spinnrock ombord! [77, p37]

As the Buntline Hitch (Two Wrong Half Hitches) holds better, is equally easy to tie and neater than Two Half Hitches, it should make it the most preferred hitch. That it is not used more, will partially be due to [the rope-user's] routine, in part also that "Wrong" makes that one will not want to resort to the wrong thing, for the same reasons that one shall not set sail on a Friday, or carry a spinningwheel onboard!



Hjalmar Öhrvall's discussion on how users grind knot tying methods into their fingers in a subconscious manner clearly had nothing to do with Vikings. Why Sam Svensson thought knowledge should be collected in an "empiric way with pure spirit from the Viking Days" is a good question. Knots were in use long before then. Moreover, why choose a millennium as calibration interval?

3.5.2 Second omission

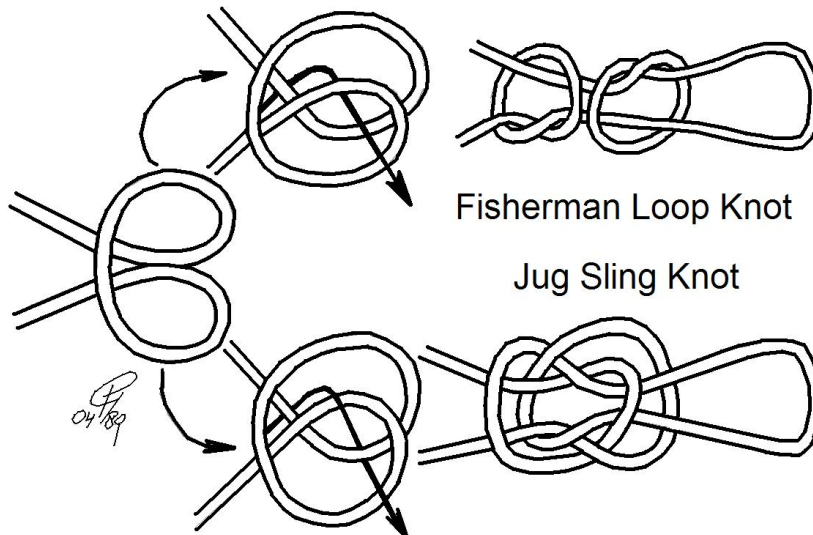
The second part, which dropped from the English translation of Svensson's Swedish handbook on seamanship, concerns the application of knots by the ancient Greeks.

Öhrvall går här längre än andra författare. Han inte endast beskriver de gamla vanliga, han ger även sjömannen kärleksknopen och säckknopen at använda som toppstek. Han anser nämligen, att de gamla grekerna slog en säckknop i sina vant och trädde över masttoppen. I verkligheten torde de ha smugit varje vant med en rännsnara runt toppen, vilken riggningsmetod med eller utan bändslar runt mast och vant strax nedanför godset, har urgamla anor i Medelhavet och Främre Orienten [68, p.iii].

Öhrvall ventures further than other writers in this field. He not only describes the ancients badly, he also gets the Sailor's (?) True Love Knot and Jugsling Knot to be used as a Jury Masthead Knot. He believes the ancient Greeks put a Jugsling Knot in their rigging and led it over the top of the mast. In reality they will have put a Running Loop Knot in each upper around the masthead, which riggingmethod, with or without bindings (as will be demonstrated below) has age-old origins in the Mediterranean and the Middle East.

Svensson's issues here concern the Sailor's True Love Knot, the Jug Sling Knot and the Jury Masthead Knot. Let us take all points in slow-mow.

In his Oribasius knot-discussion Hjalmar Öhrvall discusses the Fisherman's Loop Knot in the context of Sailor's True Love Knot and shows it to be algorithmically proximate to the Jug Sling Knot [81, p96-97], c.f. image below.



Indeed Hjalmar Öhrvall has an opinion on how the ancient Greeks may (have) use(d) the Jug Sling Knot in their rigging [81, p103]. To substantiate his statement Öhrvall offers a 1914 reference. This is an article by a certain A.M. Alexanderson titled *Den grekiska trieren* in which aspects of Greek smallboat rigging are discussed. No doubt there will be various ways to erect primitive rigging. The question is who may claim sufficient authority to dictate which structure is superior in this environ?

Sam Svensson has an interesting statement, which occurs in both the Swedish and the English version of his book:

The unusual, complicated hitches have never had a place at sea, but like the incorrectly drawn items in the books they have long been associated with the seaman and he will never be able to escape them [68], [69, p8].

Although certain knots may be complex and unwieldy appearing solutions to any rope problem, that does not render them rejectable offhand. After all, which factors determine the criteria for rejection? Uncommon usage within an arbitrary user-community is surely no criterion, as there exist arguments and cases which prove the opposite [29].

Svensson discarded Hjalmar Öhrvall's work as useless for the sailor. We have just discussed Svensson's evidence and note he does not offer any foundation as to why his work was tailored to sailor needs. Apparently professor Öhrvall's meddling in knots displeased curator Svenson. Nothing prevented the latter from deriving inspiration from parts of Öhrvall's work. Knots and rope-working techniques turn touchy subjects when it comes to critical investigation.

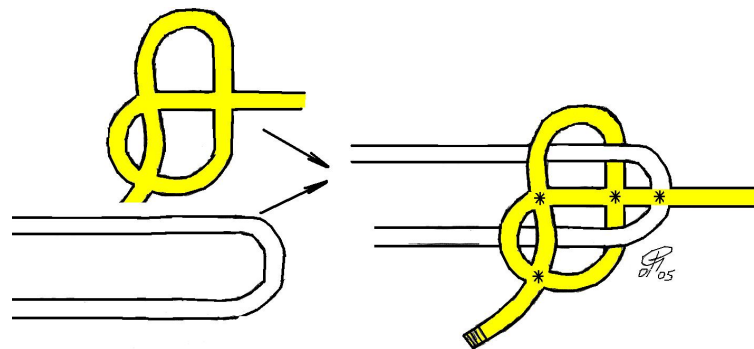
Svensson's foremost message seems to be that authors copied each other indiscriminately. As a result the sailor never knew what to believe and came to regard the sources with a healthy amount of contempt [69, p7]. The validity of such statements deserves doubt for at least two reasons. Firstly sailors could not read, unless we de-victimize their selling-point of illiterate sailors who were driven to knotting. Secondly the people who wrote books, got this information from the sailors to begin with. Obviously Sam Svensson was not overly positive about either Hjalmar Öhrvall's or N.R. Comét's attempts at recording marlinspike seamanship and realised that a window for self-promotion was available. However, much of his comments were already defused by the disclaimer Hjalmar Öhrvall posted in 1908, noting the pathetic state of affairs with respect to knots in Swedish and gratefully accepting any help [77, p3].

Much of this sort of folly boils down to the boaty boys enjoying being worshipped as the traditionalist professionals with a massive, yet unsubstantiated, claim to knots. If Sam Svensson really sought fault in Hjalmar Öhrvall's writings, then the latter's Running Bowline is indeed erroneous [81, p66, fig.57]. On the other hand there is the surprising fact in the Granada version of Svensson's book where we find "the Matthew Walker Knot, described in an English book, *The Seaman's Dictionary*, as early as 1644." [69, p79]. The original Swedish version does not contain this statement [68, p54]. Now who to hold accountable for the propagation of nonsense? It is well-known that practice and theory are prone to violent clashes. They bash and bite each other. Moreover, knots are a difficult subject to theorize about and especially to get everything right. So, before someone finds the faults I overlooked in my writings, let it be known that additions and corrections are accepted with gratefulness.

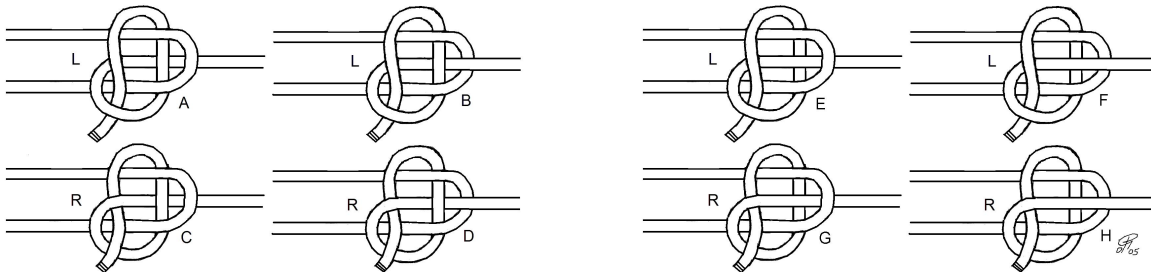
3.6 Samisen Structure

During his fieldwork Hjalmar Öhrvall discovered a knot on an Oriental musical instrument in the Gothenburg Museum [77, p102], [81, p189]. This guitar-like instrument was a three-stringed plucked lute known as *shamisen* in the Tokyo area and as *samisen* in the Kansai district around Kyoto.

There are a number of bends, which have become related to the Samisen. In the following we shall speak of the Samisen Structure, which results from the superposition of a Hook- and Overhand Knot Shadow, leading to a 9-crossings construct.



For our purposes this structure has 5 crossings of fixed parity. Hence there will be 4 variable crossings, which are marked with an asterisk. This leads to 16 structurally proximate bends, of which half are mirror images. The structures, which come forth, are illustrated below. We shall identify the 8 relevant types of Samisen Structures by the letters *A, B, C, D, E, F, G* and *H*.



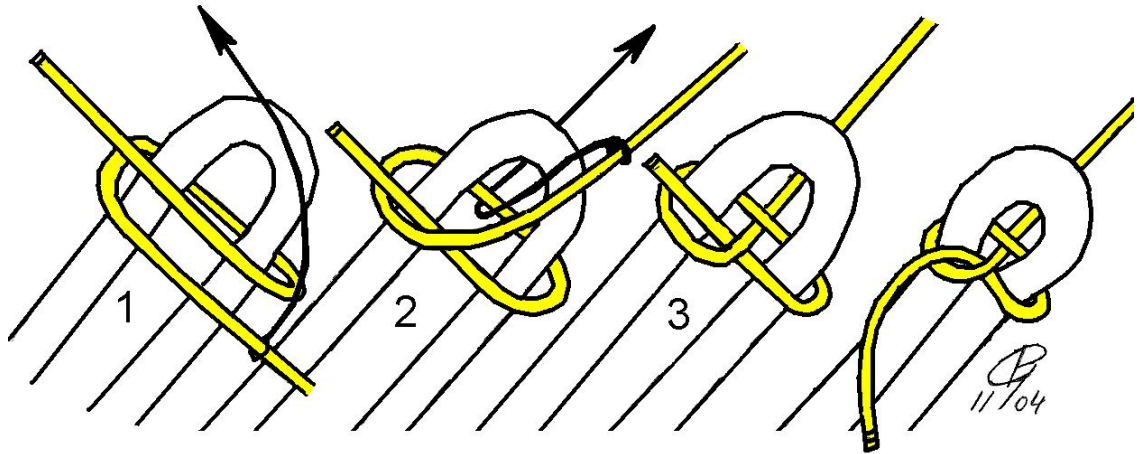
Types *B* and *D* may result in some kind of stable bend. *A* and *C* are treacherous. *E* is the Binder's Turn. *F* and *H* are rubbish and *G* is a Sheet Bend. Half of these structures cannot be used with customary bend load-configurations. Actually Type *A* requires pulling both looplet's legs in order to survive. Which ones managed to sneak their way into the knotting literature?

Let us first see what Öhrvall writes and then proceed to investigate what Japanese knotting sources can tell us about this knot. Next we try to unravel the trail of confusion which followed in the wake of this controversy. Insignificant textual differences between both of Öhrvall's editions exist, but in 1908 he wrote the following:

Vid instrumentets undre del sitter ett antal öglor, en för varje sträng. Man gör med strängen en rundtörn om de två parterna i öglan, och låter den sedan, när den kommer midt för mellanrummet mellan öglans båda parter, korsa sig själf, och gå mellan dessa ut på andra sidan, tvärs under egen part, därpå upp genom öglan och så vidare uppåt instrumentet till skrufven i dess hals. Strängen sitter således icke fast i själfva öglan, som den icke ens berör, då den är spänd, utan frestar lika på båda dess ursprungsparter och det tvärgående lilla stycket af strängen bildar en kant, som strängen gåöfver och som bestämmer dess längd. Man kan lätt öfvertyga sig om, att denna enkla beläggning håller förträffligt [77, p102], [81, p189].

At the instruments lower part there are a number of eyes, one for each string. With the string (1) make a roundturn around the two parts of the eye, such that it comes back between its own part and the eye and let it go, when it returns to the middle of the space between the eye's both parts, (2) crosses itself and (3) go between them out towards the other side, therewith going up through the eye and further up into the instrument to the screw in its "neck". The string is thus not fastened to the eye, which it does not even touch when it is tensioned. The crossing little piece of the string forms a side, which the string crosses and determines its length. It is easy to convince oneself that this simple belay holds remarkably well.

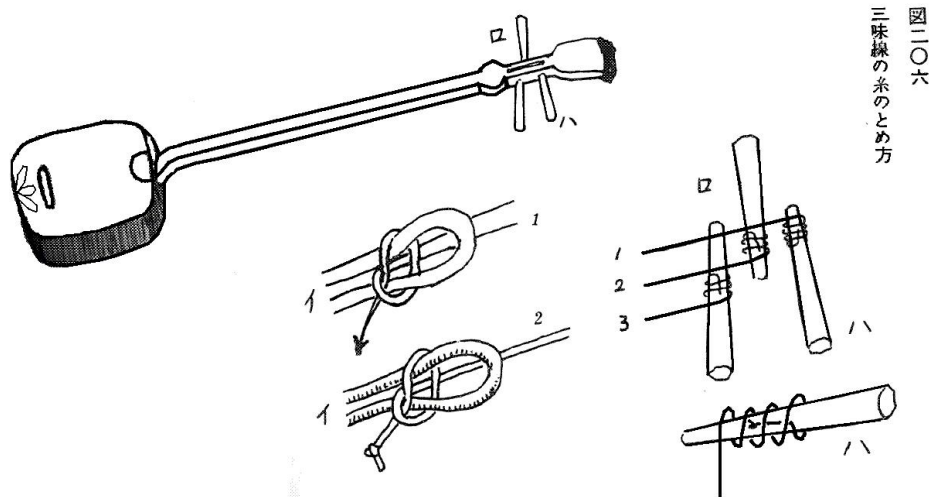
Hjalmar Öhrvall described a stend-tying method whose steps are attempted illustrated stepwise below. It results in a Type *C* Samisen Structure, but may equally well lead to a Type *A* Samisen Structure. The step-numbers in the illustration correspond to the bold numbers in parenthesis in Öhrvall's text's translation.



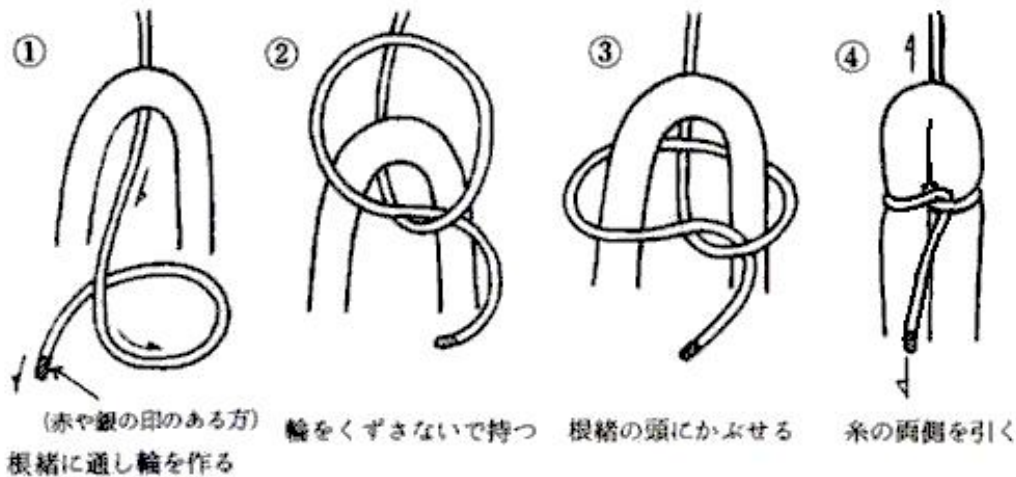
However, was that what Hjalmar Öhrvall intended? In 1908 the photography is so bad that nothing can be gleaned from it. In 1916 there is an unambiguous inked line-drawing representing a Type *B* Samisen Structure.

So Hjalmar Öhrvall describes the Type *A* or *C* Samisen Structure (up to mirror image), but illustrates the Type *B* Samisen Structure in 1916. It is interesting to track this structure through the knotting literature. Let us first go get some Japanese sources.

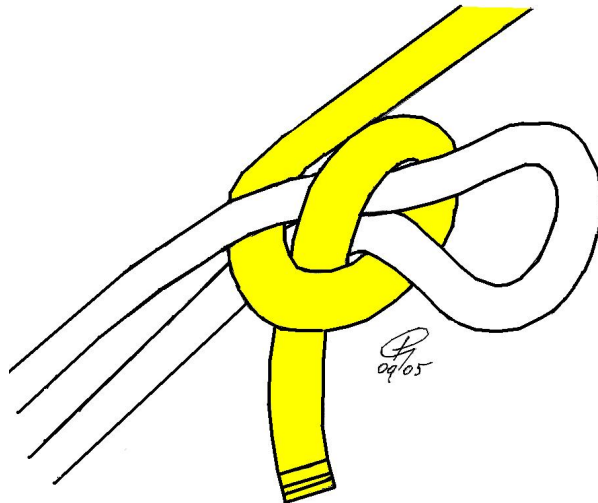
Kakuichi Fujiwara shows the structure below [23, p82]. Noteworthy is that he shows a wend-tying method for Type *A* Samisen Structure.



A different tying method was shown on the internet by a certain Nagauta around 2003 [87]. Since then the website has moved and the samisen illustration removed. However, the former image is reproduced below and shows a tying method, which results in a Type *A* Samisen Structure.



Testing the Type A Samisen Structure's security, it is soon found that unilaterally loading either of the looplet's legs, will cause the structure to disintegrate within nanoseconds. It becomes more stable when loaded on both of the looplet's legs, but all in all it remains a balancing act. Peculiar is how the Japanese Samisen causes a loose looplet to protrude. This shows up in neither Hjalmar Öhrvall's 1908 nor his 1916 version. Actually he shows a loop, which is too long to remain stable when loaded.



The first post-Öhrvall source in the Western knotting literature to mention this kind of bend appears to have been Clifford Ashley's third installment of his 1925 *Sea Stories* article [3, p154, #86]. He shows a Type B Samisen Structure as a Heaving-line Bend: "Large to Small heavingline bend". No references are listed in this famous series of articles, but it is safe to assume that Ashley had encountered Hjalmar Öhrvall's 1916 work prior to his knotting publication debut. If that is not the case, the alternative is to assume that the Type B Samisen Structure was a somewhat well-established Heaving-line Bend. However, the literature does not support that contention. Fun part is that in 1944 Ashley claims he got it from Öhrvall after all [5, p265, #1463].

In 1940 Sam Svensson has a Type B Samisen Structure and later Yngve Johansson followed suit [34, p62], [68, p51, fig.98], [69, p74, fig.98]. Johansson gives no references to Öhrvall, but to Ashley instead. Maria Constantino, at least in the Dutch version

of *The Knot Handbook*, shows a Type *B* Samisen Structure and calls it *Trekljnknoop*. Obviously the author fell victim to a bad translation, as that is a name which makes little sense. In the Dutch knotting literature the Heaving-line Bend is called *Werplijnsteek*, for which there is credible historical backing. The word *trekljnk* does not exist in the Dutch language and certainly not in any Dutch maritime context [14, p190]. Moreover, Constantino erroneously credits Hjalmar Öhrvall *Viktigsta Knutarna* 1912 as a source which does not discuss this knot [37].

Remarkable how everybody, excepting the Oriental sources, has a Type *B* Samisen Structure in the L-version. This may be pure coincidence, of course, but that strikes me as an untenable statement.

3.7 Conclusion

Knots merely played a sideline in Hjalmar Öhrvall's life, yet they must have absorbed him. Imagine what disaster would have paralyzed Sweden's research into physiology had he spent more time on them.

In our trilogy we saw Hjalmar Öhrvall offer a promontory with a view onto the Ocean of Knots. This knotting icon offers a rich mine, veins brimming with gems, for any knot-researcher who is willing to learn some Swedish. The question to ask here is whether Hjalmar Öhrvall fell victim to the power of prose, to his beloved Swedish language? To me the answer appears merely partially affirmative. Additionally his scope extends beyond most knotters' interest. Unfortunately his efforts did not instigate the knotworld at large, despite sympathetic advertisement by Clifford Ashley and Cyrus Day. Much remains to be researched in Hjalmar Öhrvall's knot works.

3.8 Acknowledgements

I extend my thanks to Tove Kjellander, librarian at the Royal Library in Stockholm, Charles Warner (Australia) and Dan Lehman (USA) for their help and discussions during the preparation of this paper.

Thanks is also due to Joe Schmidbauer (USA) who published an initial version of this paper across 3 issues of *Knot News*, which allowed a revised version to be presented here [61].

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